



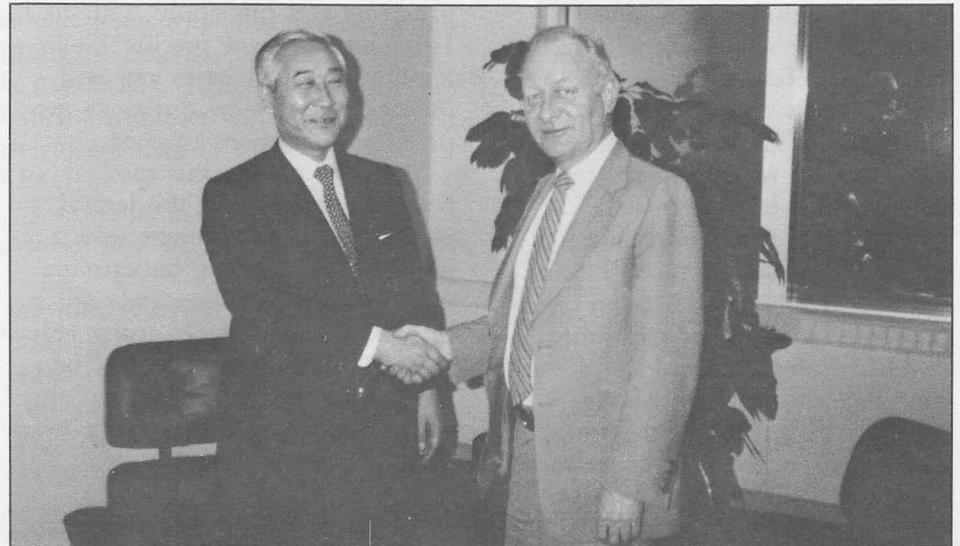
I.P. Sharp Associates

NEWSLETTER

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I.P. Sharp Expands to Japan



I.P.シャープ社で、当社金岡社長と同社 I.シャープ社長
Koji Kanaoka, president of INTEC, and Ian Sharp

I.P. Sharp Associates is now represented in Japan by INTEC, Inc., headquartered in Toyama, Japan. The agreement with INTEC is a natural progression of I.P. Sharp's expansion into the Far East which began last year.

Many of I.P. Sharp's multinational clients are expected to take advantage of INTEC's services to communicate with their subsidiaries or head offices in Japan, and to collect and distribute their corporate data worldwide.

INTEC, established in 1964, employs 1 150 people and had revenues of \$50 million for the year 1981. The company provides timesharing, software development, consulting, and educational services to the Japanese market. It is also involved in the development, production, and sale of information processing equipment and automatic controllers.

According to INTEC president Koji Kanaoka, "We are restructuring our organization so that we may become a total information service company."

Access to I.P. Sharp's more than 70 online public data bases will help them reach that goal. INTEC sees a large market for data bases and states that "I.P. Sharp deals in an area of data base services in which there is very little competition in Japan."

Local access in Japan is currently available using the International Computer Access Service (ICAS) of the Japan International Telegraph and Telephone Company (Kokusai Denshi Denwa). A leased line connected directly to the I.P. Sharp Data Centre is planned to be in place by yearend.

1982 APL Users Meeting Pre-Conference Tutorials

3 October 1982, The
Westin Hotel, Toronto

At the Users Meeting the accent is on users: technical and non-technical users, managers and business professionals, programmers and systems designers. While many of the sessions deal with technical topics of particular interest to data processing professionals, an equal number concentrate on APL applied to solving day-to-day problems in business and industry.

APL conferences and users' meetings are the best way for someone to get an overview of APL, and we feel this experience should be available not only to people currently using the language, but also to those new to APL or considering its use.

What will you learn?

The aim of the pre-conference tutorials is not to turn you instantly into an APL programmer, but rather to take familiar situations and provide a method and vocabulary in which to express them in the context of APL. There are four tutorials scheduled:

- An Introduction to APL for Actuaries
- An Introduction to APL in Finance
- An Introduction to APL for Managers
- An Introduction to APL for Statisticians and Economists

Each will start with a brief introduction to the language and then take examples from your own

profession to illustrate the kinds of problems you can apply APL to. Using examples of specific applications as a base, you will then be shown how questions are posed and solutions reached.

We have chosen this method because we feel it is the logical way to teach a language: take a person with a strong background in a specific discipline and introduce him to APL, using only those APL symbols that will be meaningful to him.

Who should register?

In planning the courses we kept in mind a recent *Computerworld* interview with Ken Iverson, the founder of APL, where he said:

We've found that those who use APL successfully are people who already have a discipline of their own. The user might be an engineer, a financial analyst, a budgeting specialist, an accountant, an operations research person ... people who already know what they want to do. They have the vision to see that the computer could be a very effective tool for them.

Among the people who would benefit from the tutorials are:

- Those who now use applications written in APL, but who know little or nothing about the underlying language.

- Those who are considering writing their applications in APL and first want to investigate the language's capabilities.
- Those who may be considering installing APL on their in-house computer, but first wish to learn more of its potential.
- Those who know that APL is available to them on their in-house computer and wish to learn what it can do for them.
- Experienced programmers and analysts in other languages who wish to evaluate the productivity potential of APL.
- Experienced APL users who may be looking for ideas on how to present APL to colleagues.

Are the tutorials limited to a specific APL system?

Definitely not. The various APL systems (such as IBM VSAPL, SHARP APL, DEC's APLSF, STSC's APL*PLUS, Data General's APL, Burroughs' APL, etc.) share a substantial common core. You will find the tutorials worthwhile regardless of the flavour of APL you are using or considering.

How do you register?

The tutorials are open only to those registering for the Users Meeting itself. To register for both, fill out the registration card

New Release of SHARP APL

Paul Berry, Palo Alto

included in the Users Meeting brochure. If you have not received a copy of the brochure, please contact us at the following address. Again, if you have already registered for the conference and wish to add the tutorial to your registration, just write or phone us:

1982 APL Users Meeting
I.P. Sharp Associates Limited
2 First Canadian Place
Suite 1900
Toronto, Ontario
Canada M5X 1E3
Telephone: 416 364-5361

Tutorial details

- Date: Sunday 3 October 1982
- Location: The Westin Hotel
- Times: 9:30—noon, 1:30—3:00 p.m.
- Cost: The combined registration fee for the Users Meeting and a Sunday tutorial is \$300 U.S. or \$355 Canadian. Only Users Meeting registrants may attend a pre-conference tutorial.
- Lunch: Lunch is included as part of your registration fee.
- Course materials: Printed course materials are included in the registration fee and will be distributed in the tutorials.

Twice a year I.P. Sharp Associates releases an updated version of SHARP APL. A new release was installed on the I.P. Sharp timesharing service in Toronto in March of this year. Before that, the new release had been in regular use for several months on the system that I.P. Sharp uses internally. During May the release was distributed to customers who run their own timesharing service (i.e. in-house users).

A new release may contain extensions to the SHARP APL language, time and space performance improvements for existing functions, or fixes of outstanding bugs. It may also provide changes or additions to batch programs that each installation runs to assist its work, or to *auxiliary processors* which work alongside the SHARP APL system to provide various special services. The most recent release contains each of these enhancements. This article lists the additions and briefly describes a few of them.

Retrieving undefined names automatically

It is possible to construct a large application so that only a central core of its programs remains in the workspace, while the rest are brought in when needed and then erased. One way to manage such an application is to simply start working, even though many of the needed programs are not present. When the main program runs into a statement that refers to something that is not there, an

error condition is noted. But the error does not halt work. `□TRAP` has been set up to detect it, and take remedial action—in this case, to get the missing item.

Mid-line recovery

When an undefined name is spotted by `□TRAP`, the remedy is the new action *I*. *I* stands for *immediate*. The action described to the right of the *I* in `□TRAP` is executed in the immediate environment of the line on which the error occurred, *without* abandoning the line on which the computer was working. When the action has been taken, work resumes where it was interrupted. Action *I* is the only action which permits a line to be resumed in the middle.

Diagnosing an “undefined name”

Deciding whether a problem really was an undefined name used to be imprecise. An undefined name was reported as a *VALUE ERROR*, or as a *SYNTAX ERROR*, depending on the context. Moreover, *VALUE ERROR* was reported when a function (although perfectly well named) failed to provide a result when the rest of the expression seemed to expect one. All that has been cleared up by realigning the boundaries between *VALUE ERROR* and *SYNTAX ERROR*, and adding a new event, number 8, named *RESULT ERROR*. The following diagram shows how this change makes it easier to spot an undefined name:

Old error message and event number	Underlying cause	New error message and event number
<i>SYNTAX ERROR</i> 2	Function requires an argument, but used without one. Function requires no argument, but used with one.	<i>SYNTAX ERROR</i> 2
<i>VALUE ERROR</i> 6	Object named is not present in workspace.	<i>VALUE ERROR</i> 6
	No result returned when needed as argument of next function.	<i>RESULT ERROR</i> 8

When an undefined name is successfully trapped with action *I*, action *I* tacks on a fourth row to $\square ER$ containing the name that was not defined. But if your recovery expression fails to supply the missing name, you get a new *VALUE ERROR*. This error cannot be trapped, and there is no fourth row in $\square ER$.

Formatted display of enclosed arrays

In an enclosed array, each element can itself be an array, and the arrays can vary in size. When you display an enclosed array, you see it arranged in rectangular fashion, rather like a plaid rug. Each vertical band has enough space to accommodate its widest member; each horizontal band has enough space to accommodate its tallest member. That provides a handy way of aligning vertical or horizontal headings.

In the new release, the system variable $\square PS$ (**P**ositioning and **S**pacing) affects the way an enclosed array is displayed by the format primitive ∇ or by the system default display $\square \leftarrow$. $\square PS$ is a four-element vector. The first two elements describe what you want done with a cell which is allotted more space than it needs for its own data (because of a larger member of the same row or column). When there is extra space, you can have the display pushed to the top, the centre, or the bottom of the cell, and horizontally to the left, right, or centre. The remaining two elements of $\square PS$ describe how you want cells to be separated vertically and horizontally, and whether you want a box drawn around each cell. (see figure 1)

A box is formed from the characters | for vertical edges, - for the top, and _ for the bottom. For boxes, the separation must be at least two positions, so -1 is never valid for separation.

Alignment within a cell is often an issue when you display hierarchical data. Suppose you have each level of a hierarchy represented by a two-column matrix. An entry in column one might be the name of a department, and beside it, in column two, a description of that department. The description might itself be formed by enclosing a two-column matrix: the name of the department manager, and beside that, a matrix of employees. The description of an employee might, in turn, be a two-column matrix: beside each name, a matrix of dependents. And so on and on, so that each level of description is enclosed within the preceding one. Here is some fictitious hierarchical data, displayed with two different settings of $\square PS$: (see figure 2)

When you use boxes, the edges of the display do not require separating blanks, but the edges do receive as many extra rows or columns as needed to accommodate their enclosing boxes.

The four elements of $\square PS$

Alignment within cells		Separation between cells	
Vertical	Horizontal	Vertical	Horizontal
-1 ↑	-1 0 1	Number of separating rows or columns equals absolute value	Draw enclosing line when value is negative
0 -	← →		
1 ↓			

Figure 1

Top left alignment, no boxes

Centre left alignment, boxes

```

 $\square PS \leftarrow -1 \ -1 \ 1 \ 1$ 
 $\nabla DATA[13;]$ 
EUROPE OPERATIONS YVES
                JAN
                DICK

        SALES      HARRY
                MARIE
                THEO

AMERICA OPERATIONS HUGH
                JEAN
                CARL

        SALES      EUGENE
                HERBERT
                ANNE

ASIA  OPERATIONS LEE
                MAY

        SALES      JAMES
                HUGH
                JAMES
    
```

```

 $\square PS \leftarrow 0 \ -1 \ -3 \ -2$ 
 $\nabla DATA[12;]$ 
-----
|           | YVES |
| OPERATIONS | JAN  |
|           | DICK |
| EUROPE    |     |
|           |     |
| SALES     | HARRY|
|           | MARIE|
|           | THEO |
|           |     |
| OPERATIONS | HUGH |
|           | JEAN |
|           | CARL |
| AMERICA   |     |
|           |     |
| SALES     | EUGENE|
|           | HERBERT|
|           | ANNE |
|           |     |
    
```

Figure 2

Quad-out can now record input

For years it has been possible to set $\square OUT$ so that all output sent to a terminal is recorded in a file. That permits you to record what appeared, and perhaps play it back or analyze it later. Formerly if you used that method to record an interactive application, your file was able to show the output, but not the input you supplied. Now $\square OUT$ records the input too. Input is identified by one of four new control messages. The *HSPRINT* facility recognizes the new control messages, and thus can print a record that reproduces both sides of the dialogue, as they appeared at the terminal.

$\square OUT$ now records error messages in the file, preceded by a control message indicating what they are. Formerly the errors appeared at the terminal but were not filed.

Consistent rules for functions that define functions

Both $\square FX$ and 3 $\square FD$ create a function from a character array. Formerly, $\square FD$ insisted that no function of that name exist, but $\square FX$ was more tolerant. Now they are both tolerant. They will redefine an existing function provided it is not on the execution stack.

Retard own petard

If you are the author of a workspace which uses `□LX` to start work as soon as it is loaded, you will appreciate the new command `)XLOAD`. When you `)XLOAD` a workspace the latent expression is not executed, but `)XLOAD` is permitted only for workspaces that you have saved.

Indelible system variables

In theory, a system variable is one that you share with the system. So what happens if you erase a system variable? It could cause errors later. For example, when you erased `□IO`, it caused `ι` to fail. Since there is no practical value in having a system variable which has no value, the system no longer permits you to erase one explicitly. The new release prohibits `□EX`, `)ERASE`, and `6 □FD` of system variables.

FILESORT to a shared file

The `FILESORT` program puts its results in a file that you specify. Formerly, the program insisted that you own the file where the results were written. Now you can send output to a file which you do not own, provided that both you and the program (user 1000) can append records to it, and the file processor can read its access matrix.

Primitives for “determinant” and “permanent”

The inner-product operator (whose symbol is a dot, as in `+ .×`) can now be used to generate monadic as well as dyadic functions. Thus, while `A+ .×`*B* gives you the inner product of matrices *A* and *B*, `+ .×`*B* gives you the permanent of *B*, and `- .×`*B* gives you the determinant of *B*.

An easily understood use of the function `- .×` is seen in its application to a 3-by-2 matrix, representing the coordinates of the three vertices of a triangle. In this case it yields twice the *signed* area of the triangle, the sign being determined by the ordering of the vertices, i.e. clockwise or counterclockwise. Similarly, it yields six times the *signed* volume of a tetrahedron represented by a 4-by-3 matrix.

Two better than one—multiprocessor support

IBM's MVS operating system includes provision for *multiple processors*. Several CPUs work together on a common job stream. (This is a more sophisticated and more powerful way of linking two computers than the master-slave option previously supported, since that required one processor to make all the decisions). The new release contains support for multiple CPUs so that in-house customers with such machines can take advantage of the

improvements in performance. The I.P. Sharp Data Centre in Toronto has been using its IBM 3081 in multiprocessing mode since May.

TSIO and JCP auxiliary processors

An auxiliary processor is a program that runs on the same computer as APL, and communicates with APL by variables that it shares with the workspaces of APL users. Both processors, JCP and TSIO, permit a user to communicate with the MVS operating system. They are available to in-house users of SHARP APL. JCP (which stands for “job control processor”) permits a user to request MVS to run a batch job.

TSIO is a major auxiliary processor, permitting users to read and write standard OS datasets, as well as to communicate directly with the operating system. In some IBM installations that offer APL, TSIO is the principal means of access to files, and hence is used in a variety of application programs. For the ordinary APL user, TSIO makes it possible to read or write datasets in the forms that programs written in FORTRAN, COBOL, etc. expect them. For system programmers, TSIO offers a handy way to carry out their work from the convenience of an APL terminal.

SHARPAPL Network Connects with PSS

The version of TSIO available from I.P. Sharp Associates is a completely new program whose behaviour is compatible with IBM's TSIO for the MVS operating system, and also contains some additional features not present in the IBM version. I.P. Sharp's TSIO is described in the *TSIO User's Guide*.

Improved support for the IBM 3270 Information Display System

This family of terminals uses VDTs (some, such as the 3279, have seven colours) as input/output devices to the SHARP APL system. These terminals work best when directly connected to the CPU and cannot be used at all over ordinary phone lines, so they are of interest mainly to in-house customers. The new release contains a number of improvements and corrections to SAPV, the auxiliary processor which controls terminals of this type.

Installations that use the IBM 3270 family of terminals may also have *hardcopy output* devices. These permit the terminal user to reproduce a screen image on paper. SHARP APL provides a processor called *HCPRI* which transmits text from the screen or filed text to such a printer in a fashion analogous to *HSPRI* (which prints files at a central highspeed printer). The new release includes a number of enhancements and improvements to the *HCPRI* facility.

I.P. Sharp's worldwide communications network now interfaces directly with the U.K. packet-switched network, PSS. This connection currently provides local dial access to the SHARP APL timesharing service in ten U.K. cities. Of these ten cities, the following are not served by a local I.P. Sharp node: Cambridge, Edinburgh, Glasgow, Reading, and Slough.

The PSS connection with other public networks benefits users of these networks. They can access SHARP APL through the PSS host in the U.K., as well as through Datapac, Telenet and Tymnet. The recently inaugurated Datex-P network in Germany is one such European public network interconnected with PSS. Through Datex-P, fifteen West German cities have local dial access to the SHARP APL Network.

The fifteen cities with local dial access are: Augsburg, Berlin, Bielefeld, Bremen, Dortmund, Essen, Frankfurt, Hamburg, Hannover, Karlsruhe, Köln, Mannheim, München, Nürnberg and Saarbrücken.

For a complete description of dial-up numbers and sign-on procedures,)LOAD 1 NETWORK, type PHONES, and enter the prompt GERMANY. In the U.K., enter either the prompt ENGLAND or SCOTLAND. In Spain, where access has been arranged through Compania Telefonica, enter the prompt SPAIN for the dial-up numbers for Barcelona and Madrid.

New Dial Access Numbers

Halifax

The I.P. Sharp Communications Network now extends to Atlantic Canada. SHARP APL users in the Halifax/Dartmouth region can dial directly to the I.P. Sharp Network rather than having to use Datapac. The new phone numbers are:

30 cps 902 429-9734
120 cps 902 477-8305

For other access numbers in the Atlantic provinces, refer to the workspace 1 NETWORK or call the I.P. Sharp Halifax office.

Waterloo

With the installation of an Alpha concentrator in the Waterloo office of I.P. Sharp, users in the Kitchener/Waterloo region should use the new phone number when accessing the I.P. Sharp Network at 30 cps. The Alpha will offer greater line reliability to network users as well as the potential for increased services. The new phone number is:

30 cps 519 886-5480

The dial-up number at 120 cps through Datapac remains the same:

120 cps 519 579-0310

Canadian Lease Evaluation System

Vivian Zion, Toronto

Leasing is an extremely flexible method of financing the acquisition of assets which allows the lessee to finance all of the cost of the asset. Under more conventional financing schemes, such as buying, borrowing, or renting, this is not always possible. The series of payments required under the lease allows the lessor to recover the initial investment and earn an acceptable return—not to mention the tax shelter it can provide in some jurisdictions.

The term of the lease is established by the useful life of the asset, not by loan restrictions which may result in terms that are too short or too long. Working capital is preserved for more profitable uses, producing a favourable effect on cash flow and net income. Thus leasing can act as a hedge against inflation: tomorrow's costs are paid with tomorrow's dollars.

I.P. Sharp's Lease Evaluation System is a comprehensive computer system for Canadian lessors. The package handles several stages of leasing—from pricing prospective transactions to amortizing placed leases. You can use the system, without knowing computer programming, for both simple and complex leasing transactions.

With I.P. Sharp's Lease Evaluation System, you can quickly analyze a lease, and save the details if further calculations are required. Reports such as cash flows and amortization schedules are easily requested. The reports can be processed immediately or

on a deferred basis, and they can be printed either on a terminal or on the nearest I.P. Sharp highspeed printer.

There are many different ways to evaluate a lease. The system can accommodate:

- Up to five different assets per lease
- Assets in any capital cost allowance (CCA) class
- Various methods of handling CCA
- Investment tax credit
- Multiple disbursements
- Regular or irregular rental payments, including interim payments
- Prepaid rents and deposits on rents
- Purchase and renewal options during the lease term
- Lease "stretching"
- Floating yield rates and money cost rates

In the case of the cashflow and amortization reports, you can select, from all the information available, those items of particular interest.

New release

Since its release two years ago, I.P. Sharp's LESSOR package has been used by many clients in Canada. Recently I.P. Sharp released an enhanced version of the Lease Evaluation System. The following major changes from the previous release reflect enhancements to the system:

- The cost of money can float over the lease term.
- The yield rate can now float over the lease term.
- An option is now available to determine the way any remaining undepreciated capital cost (UCC) is handled at lease termination. The remaining UCC can be amortized (as in the previous version of the system), claimed in total, or ignored.
- An option amount can now be calculated if both the dollar rental amounts and the yield or apparent rate on the transaction (ART) are provided.
- A deposit amount equal to some lease rental amount can now be calculated.
- The cost of processing the *ANALYZE* and *REPORT* commands is reduced. As well, the option of deferred processing of reports is now available.
- You can now determine whether you want negative investment balances to be zeroed out or to be used in the calculations. (In the previous version of the system, they were automatically zeroed out.)
- The MSP calculation has been changed somewhat, in part to account for the new options for handling any UCC remaining at lease termination.

For a full description of how to use the Canadian Lease Evaluation System, please ask for the *Lease Evaluation System User's Guide* from your local I.P. Sharp representative.

Workspace of the Month

532 CURVEFIT

Caroline Haythornthwaite,
Toronto

Often you have in hand a set of data that you don't want to spend a lot of time analyzing, but you *do* want a quick idea of the trends in the data. You are looking for something that lies between simple descriptive statistics and model building. *CURVEFIT* fills that gap.

Given a set of four or more points, *CURVEFIT* fits curves for *linear*, *xlog*, *ylog*, *log-log*, *inverse*, *polynomial*, and *Gompertz* models.

CURVEFIT begins with data entry, which can be achieved either by entering the numbers directly, or by specifying names of existing variables. The program is conversational, prompting you for answers along the way.

A table of the solutions for the models gives the coefficients and R-squared (a measure of how well the data fits the curve) for each curve. In the following table, it can be seen that, according to the value of R-squared, the *polynomial* model is the best fit for the sample data. (see figure 1)

From here you can go on to examine the models further. You can plot the data, obtain a table of statistics, an analysis of variance, and a table of residuals.

CURVEFIT has facilities for predicting and plotting predicted values. In the following *SUPERPLOT*, predictions according to the polynomial model are

shown. You can produce this plot just by requesting *SUPERPLOT* in *CURVEFIT* (no extra commands are necessary). (see figure 2)

CURVEFIT resides in the workspace 532 *CURVEFIT*. Details on using *CURVEFIT* are contained in the variables *DESCRIBE* and *CURVEFITHOW* residing in the workspace.

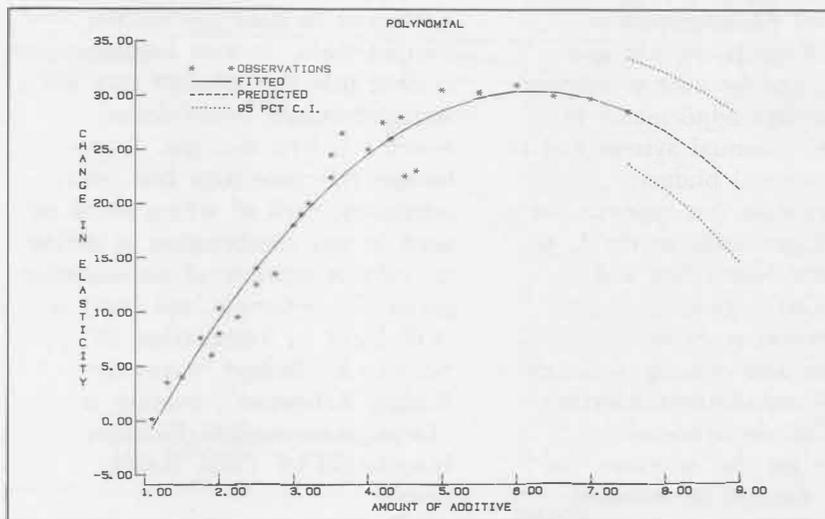


Figure 2

PRELIMINARY ANALYSIS

TYPE	MODEL	K	A	B	R*2
1 LINEAR	Y=A+B(X)		0.836	5.017	0.80664
2 XLOG	Y=A+B(LOG X)		-2.345	18.247	0.92427
3 YLOG	LOG Y=A+B(X)		1.142	0.422	0.49432
4 LOG-LOG	LOG Y=A+B(LOG X)		0.669	1.710	0.70308
5 INVERSE	Y=A+B/X		35.573	-46.950	0.88519
6 POLYNOMIAL	Y=K+A(X)+B(X*2)	-15.410	14.705	-1.179	0.96135
7 GOMPERTZ	Y=K(A*B*X)	758.518	0.014	0.944	0.69333

Figure 1

Venture Capital Reporting System

*David Morgan, London, Senior Capital Accountant
Shell (U.K.) Exploration and Production*

John M. Craig, Aberdeen, I.P. Sharp Associates

Shell Expro is the division of Shell U.K. responsible for exploration and production for several joint ventures in the U.K., both offshore and onshore. Financial and accounting operations are carried out in three locations—London, Aberdeen and Lowestoft.

Shell's problem was fairly typical: We had to produce Consolidated Management Financial Reports quickly and accurately; and be able to respond to frequent late adjustments to figures. Our manual system had to cope with capital budget expenditure data for approximately 25 oil and gas fields in the U.K. sector of the North Sea and Southern Gas regions.

With several types of construction and drilling activities in over 40 installations, together with over 20 departments responsible for the activities, the volume of data to be collected, consolidated, and reported was enormous. This large volume of data made it difficult to manually undertake the required consolidations and accounting, which formed part of our twice-yearly management presentations. Yet another factor we had to take into account was the distance between the accountants in our three locations.

As operator of these installations, most of which involve

other venture partners, Shell has to prepare two sets of reports. One set of reports shows total costs for management control; the other set, in venture share, indicates equity interest of partners.

The solution

We approached I.P. Sharp Associates to have the system computerized. It soon became evident that the solution was not a straightforward consolidation system, as first thought. Every budget reference item had many attributes, each of which could be used in any combination to define an infinite number of consolidation paths. For example, one path is "Oil Field by Installation by Activity by Budget Status by Budget Reference"; another is "Department by Oil Field by Installation by Total Budget Status".

I.P. Sharp consultants determined that MABRA, a record administration program, together with an additional consolidation and reporting system (later christened VCRS), was the solution. Two "sets" of MABRA fields were used: **key fields** and **data fields**.

Key fields are: **base, field, installation, activity, status, reference, department, and section** (a further division of **department**). Each key field is allocated an integer code, which is then converted back to its original name during the reporting. For

example, a key field allocated the code **30** reverts to its original form **BRENT FIELD** in the report.

Data fields contain annual budget data for several years hence, as well as past data on a cumulative basis, and the estimates made for the current year and previous year of the total costs of any item. The total costs include past, present, and future estimates. The Shell venture share and some approval values make up the remaining data fields.

Reports are defined in terms of the relevant key fields. Key fields are used to define the hierarchical path for consolidation: where totals are to be calculated, where page breaks are to occur, and the order in which the data is to be sorted and printed. Each report is specified in about 15 commands, which are then stored as an APL program in our Report Library, ready to be shared amongst users.

Refinements

In the two years that the system has been operational, all three locations have written and stored approximately 100 different report specifications. The data fields have been extended to include quarterly data and future data, in both base and escalated terms. Some recent refinements to the system include N-tasks which reduce costs, and a bisynchronous link between the I.P. Sharp Data Centre in Toronto and our laser printer in London. This link allows us to



I.P. Sharp Associates

NEWSLETTER

technical supplement 39

Searching, Part III

Robert Melzger, Rochester

In the first two parts of this series, we looked at algorithms for searching vectors and tables. In this article, we will explore the problem of searching texts in APL. In APL, a text is just an ordinary character vector. The difference is not in the data itself, but in the way it is handled. In text or "string" searching, the elements of the argument are treated as a unit which frequently comprises a word. Sometimes texts are written in a natural language, other times in a programming language.

3) Searching texts

We will present six algorithms for text searching. Three are modifications of algorithms which originally appeared in an *I.P. Sharp Newsletter* article written by Bob Bernecky ("String Searching in APL", December 1974/January 1975). The last two algorithms are limited to word searching. The second of these was only made possible by the introduction of enclosed arrays.

The first algorithm is one that many people who are new to APL "invent" when they first encounter the string searching problem.

```

∇ POSITIONS←TEXT STRSEARCH1 STRING
[1] STRING←,STRING
[2] POSITIONS←ι0
[3] →((0∈(ρTEXT),ρSTRING)∇
    (ρTEXT)←ρSTRING)ρEND
[4] POSITIONS←(ρTEXT)↑(1-ρSTRING)↓
    ∧/(-1+ιρSTRING)ϕSTRING∘.=TEXT
[5] END: ∇
    
```

```

TEXT←'THE QUICK BROWN FOX JUMPED
OVER THE LAZY DOG'
1 0∇TEXT STRSEARCH1 'THE'
    10000000000000000000000000000000
    00000010000000000000
    
```

Unfortunately, this algorithm is useless for all but trivial problems. The outer product, which compares every element of one argument to every element of the other, causes the error *WS FULL* by creating very large results. It also expends a lot of CPU time making unnecessary comparisons. On many APL systems, the *AND* reduction will process every element in every row even though most rows can be disqualified by looking at the first element.

The second algorithm is a rarity among APL programs—a looping solution that is cost-effective. This function is a modification of the one submitted by Bob Bernecky in the original newsletter article.

```

∇ POSITIONS←TEXT STRSEARCH2 STRING
;∅IO;SHAPE;CTR;LMT
[1] ∅IO←0
[2] STRING←,STRING
[3] SHAPE←ρTEXT
[4] POSITIONS←1⌈1×ρSTRING
[5] CTR←-1
[6] LMT←ρSTRING
[7] LOOP:→((LMT≤CTR+CTR+1)∨
~∨/POSITIONS)ρEND
[8] POSITIONS←POSITIONS^SHAPE↑
(CTR↑TEXT)∈STRING[CTR]
[9] →LOOP
[10] END: ∇

```

Since the texts searched for (right argument) are usually short in most string searching applications, the number of iterations is accordingly small. There are several interesting aspects to this program. The loop in line [7] terminates if either of two conditions is true:

- 1) all characters of the right argument have been searched for
- 2) it can determine that no match will be found.

It doesn't compare as many characters as the first version. The first function does $(\rho\text{TEXT}) \times \rho\text{STRING}$ comparisons. The second does $((\rho\text{TEXT}) \times \rho\text{STRING}) - + / 1^{-1} + \rho\text{STRING}$ comparisons. With SHARP APL, membership uses a special algorithm for searching character data. This makes the \in used in line [8] work more quickly than the $\circ.=$ found in the other function. It even works faster than $=$ in these circumstances.

The third algorithm is based upon a simple but profound observation: every text has a beginning and an end. The original function was written by Paul Waltz.

```

∇ POSITIONS←TEXT STRSEARCH3 STRING
;∅IO;POSITIONS;DIFFERENCE;POSSIBLES
[1] ∅IO←1
[2] STRING←,STRING
[3] POSITIONS←10
[4] →((0∈(ρTEXT),ρSTRING)∨
(ρTEXT)<ρSTRING)ρEND
[5] DIFFERENCE←1+(ρTEXT)-ρSTRING
[6] POSSIBLES←((DIFFERENCEρTEXT)∈
1↑STRING)^((-DIFFERENCE)↑TEXT)∈
-1↑STRING
[7] POSITIONS←(ρTEXT)↑POSSIBLES\
TEXT[(POSSIBLES/1DIFFERENCE)◦.+
10⌈-2+ρSTRING]∧.=1+-1↑STRING
[8] END: ∇

```

This function minimizes the work it does by identifying those segments of the string which have the same characters in the first and last positions as those in the substring. This is done in line [7]. Then in line [8], only those segments are compared to the substring. Even here unnecessary comparisons are avoided. The first and last characters, which we know at this point match, are not compared again. This function works best when the probability of the first and last characters occurring $(\rho\text{STRING}) - 1$ positions away from each other is small. For example, the initial group of candidate strings when $\text{STRING} \leftarrow ' \text{THE} '$ will all be three-letter words.

The fourth algorithm takes advantage of the fact that the characters in a text are rarely distributed uniformly. It searches for the least frequently occurring character first. Thus with each iteration it reduces the number of segments which could possibly match the substring. The original version was written by Roger Moore.

SEARCHING

```

∇ POSITIONS←TEXT STRSEARCH4 STRING
;INDEX;LOCATIONS;LENGTH;∅IO
[1] ∅IO←0
[2] STRING←,STRING
[3] →((0∈(ρTEXT),ρSTRING)∇
(ρTEXT)←ρSTRING)ρEND
[4] INDEX←∇ALPHABET∖STRING
[5] LENGTH←1+(ρTEXT)-ρSTRING
[6] LOCATIONS←(-1ρINDEX)+((LENGTHρ
TEXT)∈STRING[1ρINDEX])/∖LENGTH
[7] LOOP:INDEX←1+INDEX
[8] →((0∈(ρINDEX),ρLOCATIONS)∇
∅WA>6×(ρINDEX)×ρLOCATIONS)ρEND
[9] LOCATIONS←(TEXT[LOCATIONS+1ρ
INDEX]∈STRING[1ρINDEX])/LOCATIONS
[10] →LOOP
[11] END:LOCATIONS←(TEXT[LOCATIONS∅.+
INDEX]∧.=STRING[INDEX])/LOCATIONS
[12] POSITIONS←(ρTEXT)ρ0≠0
[13] POSITIONS[LOCATIONS]←1 ∇

```

You can see that this function is really a combination of versions two and three. It loops like version two, except that it chooses the characters to compare based upon a frequency distribution. This loop is also an improvement over the second in another way. Version two looks at all characters following the position being tested. Version four looks only at selected positions. When it has refined the possibilities, and determines that there is enough space to do so, it compares the remaining candidate segments with an inner product like version two.

Often when you are searching texts, you will be searching for words rather than collections of letters. In the past, we had to use the encrypting techniques described in the previous article to convert words into a single number. The following functions take this approach:

```

∇ INDEX←TEXT WORDSEARCH1 WORDS;∆CT
[1] ∆CT←∅CT
[2] TEXT←(MATFROMVEC TEXT)
ENCRYPTCHAR SET
[3] WORDS←(MATFROMVEC WORDS)
ENCRYPTCHAR SET
[4] ∅CT←0
[5] INDEX←(TEXT∈WORDS)/∖ρTEXT
[6] ∅CT←∆CT ∇

∇ MATRIX←DELIMITER MATFROMVEC VECTOR
;EXPAND
[1] ∅(0=∅NC 'DELIMITER')/
'DELIMITER←1+0ρVECTOR'
[2] VECTOR←VECTOR,(DELIMITER≠
~1+VECTOR)ρDELIMITER
[3] EXPAND←(VECTOR=' ')/∖ρVECTOR
[4] EXPAND←~1+EXPAND-0,~1+EXPAND
[5] EXPAND←(EXPAND∅.≥∅1[EXPAND]),1
[6] MATRIX←(ρEXPAND)ρ(,EXPAND)\VECTOR ∇

```

```

TEXT←'THE QUICK BROWN FOX JUMPED
OVER THE LAZY DOG'
TEXT WORDSEARCH1 'THE'

```

1 7

If we restrict ourselves to a character set of 34 or fewer elements, we can handle words up to 11 characters long by encrypting them into 8-byte numbers. This restriction, however, may not be satisfactory.

With the introduction of enclosed arrays we have an alternative. We can enclose every word in a text, and search using ι or ϵ directly.

SEARCHING

```
▽ INDEX←TEXT WORDSEARCH2 WORDS
[1] WORDS←ENCLWORDS((' '≠1↑WORDS)ρ
    ' '),WORDS
[2] TEXT←ENCLWORDS((' '≠1↑TEXT)ρ
    ' '),TEXT
[3] INDEX←(TEXT∈WORDS)/ιρTEXT ▽

▽ WORDS←ENCLWORDS TEXT;PARTN;SELECT
[1] PARTN←TEXT=' '
[2] SELECT←~PARTN
[3] WORDS←((~1↑1,SELECT)/PARTN)
    PARTNENCL SELECT/TEXT ▽

▽ ENCL←PARTN PARTNENCL VECTOR
    ;LENGTH;SEGMENT
[1] ENCL←ι0
[2] LOOP:→(0=ρVECTOR)ρEND
[3] SEGMENT←(1000⊔ρPARTN)ρPARTN
[4] LENGTH←(ρSEGMENT)-(ϕSEGMENT)ι1
[5] LENGTH←LENGTH+(LENGTH≤0)×ρPARTN
[6] SEGMENT←LENGTHρPARTN
[7] LENGTH←-1-SEGMENT/ιρSEGMENT
[8] ENCL←ENCL,LENGTH+“(1+LENGTH,
    ρSEGMENT)↑”>(ρSEGMENT)ρVECTOR
[9] VECTOR←(ρSEGMENT)↑VECTOR
[10] PARTN←(ρSEGMENT)↑PARTN
[11] →LOOP
[12]END: ▽
```

In a future release of SHARP APL, a more general primitive will be announced to do the work that *PARTNENCL* does. Meanwhile, it acts as an efficient and *WS FULL*-resistant substitute. It does a “partitioned enclose”. The left argument is a Boolean vector in which a 1 indicates where a new enclosed object should begin. The right argument is data to be enclosed. Thus:

```
1 0 0 1 0 0 0 0 1 0 0 0 PARTNENCL
'CATTIGERLION'
```

is equivalent to:

```
(<'CAT'),(<'TIGER'),(<'LION')
```

The program works by looping through the text, and taking chunks of 1 000 (or fewer) characters. This is done in lines [2] through [6]. Then it encloses each word separately, which is done in lines [7] AND [8]. So, you can see that *ENCLWORDS* just identifies the words, removes the blanks, and lets *PARTNENCL* do all the work.

There are several important lessons to be learned from these programs.

- 1) The impressive-looking “one-liner” solution (algorithm 1) is often not the most efficient way to solve a problem.
- 2) There are usually several good ways to solve a problem in APL.
- 3) Boolean operations frequently provide an elegant and efficient means of handling problems that are treated with loops in other languages.

String searching is a common data processing problem that can be handled efficiently with APL programs of just a few lines. If you need to use these programs in your own applications, you can find them in workspace 777 *SEARCHING*.

Acknowledgements: My thanks to J. Henri Schueler for his assistance in preparing this article.

Contest 12 Results

John Bogar, Winnipeg

Congratulations to all who participated in Contest 12 (see *Technical Supplement 36* for contest details). The contest attracted over 70 entries and once again demonstrated the richness and versatility of APL as a problem-solving tool.

Several contestants submitted one-line entries which were extremely efficient for small arguments, but unfortunately failed with *WS FULL* errors for larger arguments. Typical among those was this gem:

```
R←X C12ΔRDC2 Y
R←((ρX,ρY)ρR-0, -1+R←[ \, (+\X)ο. L+∖Y
```

The judging criteria rested on the usefulness of the particular functions in a working environment. Hence performance in a "tight" workspace was considered very important. Aside from the *WS FULL* errors which eliminated some entries, others failed to work with zero vector arguments, while still others returned the transpose of the result.

The top 12 entries (only the best taken per contestant if multiple entries placed) after repeated timings were:

RANK	REL. TIME	CONTESTANT
1	1.000	Roger Moore, I.P. Sharp, Toronto, Ontario (entry G)
2	1.191	Keith Morris, B.C. Systems Corp., Victoria, B.C. (entry NW)
3	1.632	Peter Anderson, I.P. Sharp, Melbourne, Australia
4	2.542	Ethan Seidel, I.P. Sharp, Washington, D.C.
5	2.596	David Dixon, I.P. Sharp, Newport Beach, CA
6	2.806	Zeke Hoskin, I.P. Sharp, Vancouver, B.C.
7	2.878	Paul Krauss, Xerox, Playa Del Ray, CA

8	4.443	Taw P. Lim, I.P. Sharp, Toronto, Ontario
9	6.566	R.E. Siddall, Consumers' Gas System, Toronto, Ontario
10	9.205	Gary Powell, I.P. Sharp, Seattle, Washington
11	12.835	Stephen Durnford, C.A.C.I. Lincoln House, London, U.K.
12	14.983	Allen J. Friedman, Sybron Corp., Rochester, N.Y.

So Roger Moore is entitled to receive a copy of Paul Berry's *SHARP APL Reference Manual* (or some other fine book of his own choice), while Keith Morris will receive the \$50 prize for the best non-I.P. Sharp entry.

The two winning entries may be viewed in workspace 999 *CONTEST*. Thanks to all who participated.

Making the Picture Complex: The Plot Quickens

Clement Kent, Toronto

How do you make a picture more complex but less complicated? Why, by using imaginary numbers, of course.

A good graphics package should have simple, modular functions to do the basic spatial transformations of objects—**translation**, **scaling**, and **rotation**. While none of these is very hard to implement, there is usually a bit of extra code to cope with the matrix format that graphics data is usually in. In this note, I'd like to show how a number of basic graphics transformations can be written in very simple forms since the introduction of complex numbers and enclosed arrays on SHARP APL.

Every complex number is made up of two real numbers—the real and imaginary parts. If we let these stand for the x and y coordinates of a point in two-dimensional space, we have a way of manipulating points as APL scalars. The great advantage of this is that translation, rotation, and scaling become simple arithmetic operations on vectors, rather than more complicated matrix operations. To see how, let α be a vector of complex numbers (points in an object). Then we have the following functions:

Translation by A, B units: define ω as $A+B \times 0J1$
`TRANSLATE` $\alpha + \omega$

Rotation by $THETA$ radians: define ω as
 $*THETA \times 0J1$
`ROTATE` $\alpha \times \omega$

Scaling—multiply both axes by ω :
`SCALEALL` $\alpha \times \omega$

Scale X axis by A , Y axis by B : define ω as
 $.5 \times A, B$
`SCALEXY` $(\alpha \times +/\omega) ++ \alpha \times -/\omega$

To generate epicycles with radii R , rotation rates $THETA$, at times T :

`COORD` $\leftarrow R + .x * 0J1 \times THETA \circ . \times T$

Some graphics systems use occurrences of an “object delimiter” in the control column of the data matrix to break up the matrix into “graphics objects”. Functions must then be written to do the “itemwise applied transform” of graphics objects. That is, if there are n objects in the picture, and n different transformations for the n objects, the function applies the transforms piecemeal to the delimited objects. Sounds complicated?

Now that we have enclosed arrays and complex numbers, we can instead represent n different two-dimensional graphics objects (minus control information) as a vector α of n enclosed complex vectors. Then if $THETA$ and R are length n real vectors of rotation angles and scales:

Define ω as $*R + THETA \times 0J1$
`ROTSCALE` $\omega \times \alpha$ Scales and rotates each object.

Real simple, eh? No, it's complex and enclosed!

CUSTOMER APPLICATION

obtain high quality, multiple copies of reports which are distributed to our venture partners.

Following are portions of some typical reports with, we hasten to add, sample data.

If you would like more information on the Venture Capital Reporting System, contact David Oxnam at Shell, through the MAILBOX code UEF, or John Craig, through the MAILBOX code JMC, at I.P. Sharp in Aberdeen.

Editor's note: At the time that this article was written, David Morgan's title as it appears in the author's by-line was correct. He is now Finance Director of Shell in Saudi Arabia. Our hearty congratulations, David.

8 JUN 1982 23:51:48

VARIANCE REPORT LAST PRESENTATION VS THIS PRESENTATION

BAKER BAKER - NORTH CONSTRUCTION	LAST PRESN	THIS PRESN	COMPARISON	
			CHANGE	% CHANGE
COMPLETED ITEMS	71514	29463	(42051)	(59)
APPROVED ITEMS	69846	71812	1966	3
FIRM SUPPLEMENTARY	70290	81757	11467	16
FIRM PROPOSAL	57851	69967	12116	21
PROPOSAL PENDING	-	57501	57501	-
LONG TERM FORECAST	-	36129	36129	-
CONSTRUCTION	269501	346629	77128	-

8 JUN 1982 23:50:47

DETAIL EXPENSE REPORT (ALL EXPENSES IN 000S)

BAKER BAKER - NORTH CONSTRUCTION DRILLING	LAST PRESN	THIS PRESN	PRIOR YEARS	PHASING						
				1982	1983	1984	1985	1986	1987	1988-92
BAKER - NORTH	672497	823052	80026	90774	91702	91019	100497	96862	90027	91371
BAKER - CENTRAL	571362	746731	69658	86214	84142	78751	84036	89337	86391	81988
BAKER - SOUTH	248644	355002	24539	39159	37765	39390	43504	40045	46275	45166
BAKER - SOUTH	1817189	2314803	211745	262006	254505	253080	271117	271033	266417	262894

BI/DATA FORECAST

Mona Albano, Toronto

Economic forecasts in textual form are now available in the Business International Data Base (BI/DATA). BIFORECAST produces short-term (two-year) reports for 35 countries and medium-term (five-year) reports for 15. The reports are updated monthly, with individual reports changing once, twice or four times a year.

Each report is two pages long and discusses the country's probable interest rates, political stability, industrial production, unemployment, balance of trade, and so on. Gross domestic product (GDP) and other key economic indicators are numerically projected. The reports are prepared using judgmental means (rather than national or regional models) by Business International's analysts, who usually live in the country under study. The reports are then reviewed by BI's senior economists in New York, who provide a world view and ensure that the underlying assumptions are consistent for forecasts appearing at the same time.

Textual and numeric forecasts

The text portion of the forecasts usually begins with a comment on the overall state of the economy. Succeeding paragraphs deal with the current political situation, the economic policies of the present government, then labour, credit, investment, and corporate profitability. The last paragraph comments on the strength of currency, but does not usually make a specific forecast of exchange rates.

The numeric part of a short-term report forecasts national income, and all of the main expenditure components of the GDP, in both current and constant prices. It also contains forecasts of trade, the commercial bank prime rate, and the indices of industrial production and consumer prices. Short-term forecasts cover the current and following year.

Medium-term forecasts follow a similar, consistent structure; but their timeframe is the current year and the following four years. The numeric portion forecasts gross domestic product in current and constant prices, and indices for industrial production and consumer prices.

Users of BIFORECAST pay a surcharge for each report accessed. However, there is a set of reports available for demonstration purposes, free of charge. To access BIFORECAST, first load the workspace 39 *MAGIC*, enter *BISSET*, and then enter *BIFORECAST*.

For further information, contact your local I.P. Sharp representative or:

Peter Mikelson
Business International
Corporation
One Dag Hammarskjold Plaza
New York, New York 10017
Telephone: 212 750-6373

S.J. Rundt World Risk Analysis Package

George Bihus, Toronto

I.P. Sharp now offers the new S.J. Rundt World Risk Analysis Package (WRAP) country reports. S.J. Rundt and Associates has been providing country risk assessment for multinational corporations, banks, and government agencies since 1952. Used by most of the Fortune 500 companies, Rundt reports deliver relevant business judgements by doing more than assembling vast amounts of data. WRAP looks behind the figures: interpreting, measuring, comparing, weighing, commenting and projecting. Reviewed weekly, WRAP reports reflect the latest global trends and developments accurately and concisely.

Available for up to 70 countries, the textual reports give S.J. Rundt's assessment of a country's prospects which includes the following:

Socio-political prognosis

- Prospects for stability
- Official attitude toward foreign investment
- Labour market trends
- Role of the government in the economy

Domestic market forecast

- Economic growth prospects
- Market potential
- Outlook for inflation and credit conditions
- Monetary and fiscal policies

External accounts projections

- Current account balance of payments
- Exchange reserves and foreign debt
- Trade restrictions and collection reliability

API Distillate Data Base

Ethan Seidel,
Washington, D.C.

- Exchange controls and currency outlook

The textual reports are produced from S.J. Rundt's research based on numerous published sources as well as confidential, intramural reports prepared by banks and industries, government and business leaders, and trusted and tested friends "on the spot".

Statistical tables

Statistical tables accompany the text and present current and historical data culled from local government releases, private surveys, and international organizations such as the IMF and the World Bank. Corrected for inaccuracies and inconsistencies, the data is supplemented with estimates until detailed official statistics are released.

As a final component of WRAP, the numerical risk rating reflects S.J. Rundt's judgement of a country in capsule form. It shows significant changes at a glance and indicates the areas in which a country is improving or deteriorating.

WRAP country reports are available with I.P. Sharp's MAGIC system. To print the reports, you must pay a surcharge to obtain access. This can be arranged by your local I.P. Sharp representative, or by contacting:

Juliana Wilfinger
S.J. Rundt and Associates
130 East 63rd St.
New York, New York 10021
Telephone: 212 838-0141

Among the new data bases available through the workspace 121 *PETROSERIES* is *APIDIST*, a monthly report of middle distillate sales in the United States. **Middle distillates** include kerosine, diesel fuels, and home heating oil. *APIDIST* contains data for each of the 50 states and the District of Columbia, as well as the U.S. total. For each state, there are four commodities:

Description	Code
Kerosine Range oil No. 1 oil	<i>KDIST1</i>
No. 2 heating oil	<i>DIST2</i>
Diesel No. 1, 2, 4	<i>OTH</i>
Total middle distillates	<i>MIDDIST</i>

The data is monthly, starting in January 1980. The American Petroleum Institute provides the data one to two months after the reporting month, and it is available on the I.P. Sharp system immediately after the API update. All data is in thousands of gallons. The general access format is:

```
APIDIST 'PRODUCT CODE(S),STATE CODE(S)'
```

For example, one might compare kerosine sales and production as follows: (see figure 1)

You can illustrate the same data with *SUPERPLOT*. (see figure 2)

Notes:

- The command *DISTSET* must be entered after loading 121 *PETROSERIES* and before the first *APIDIST* access.
- A list of valid state codes can be obtained by the following commands:

```
)LOAD 121 PETROSERIES  
DISTSET  
DIRECTORY
```

- There is a possibility that the U.S. Government will assume responsibility for this report from the API, in which case prices would be added to the *APIDIST* data base.
- The data is collected from figures submitted voluntarily by over 50 companies and is not adjusted by the API to reflect total industry sales for the U.S.

```

DISTSET ◊ PSSET
RESETOPTIONS ◊ NOYEAREND
MONTHLY,DATED 1 81 TO 12 81
PUT SPLICE 42 TIMES (DOE2 PROD,KERO) AND SUM PS2 'PRODF,PRODR,KERO,US'
PUT APIDIST 'KDIST1,US'
LABEL 'PRODUCTION,SALES,PROD AS PCT OF SALES' ◊ LABELWIDTH 20
TITLE 'U.S. Kerosine PRODUCTION AND SALES' ◊ TITLE 'IN THOUSANDS OF GALLONS'
WIDTH 78
3 PUT 100 TIMES (ITEM 1) DIVIDED BY ITEM 2
DISPLAY ABOVE
    
```

U.S. Kerosine PRODUCTION AND SALES
IN THOUSANDS OF GALLONS

	JAN/81	FEB/81	MAR/81	APR/81	MAY/81	JUN/81
PRODUCTION	238,434	187,530	161,238	151,788	147,168	129,570
SALES	269,285	188,777	91,688	40,853	33,845	29,763
PROD AS PCT OF SALES	88.54	99.34	175.85	371.55	434.82	435.35

	JUL/81	AUG/81	SEP/81	OCT/81	NOV/81	DEC/81
PRODUCTION	116,340	126,756	112,980	112,518	155,694	189,252
SALES	27,061	36,601	64,470	110,377	129,707	215,672
PROD AS PCT OF SALES	429.92	346.32	175.24	101.94	120.04	87.75

Figure 1

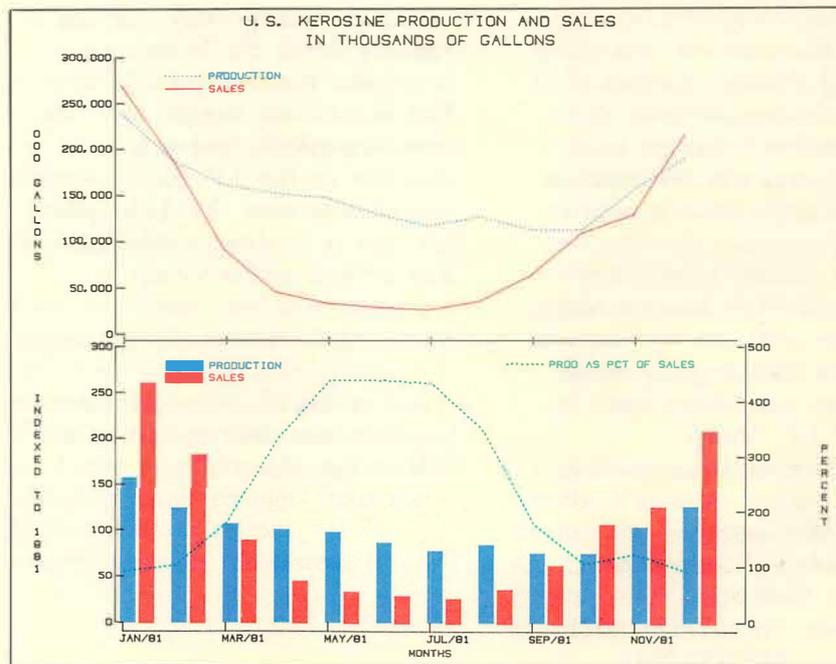
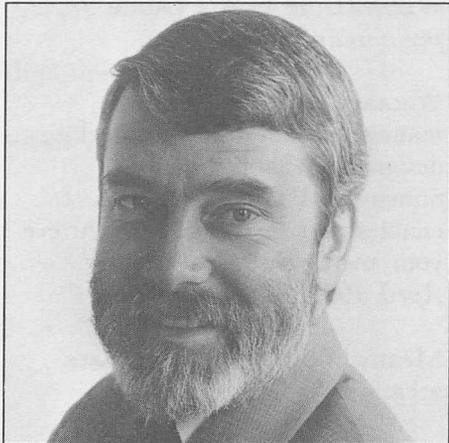
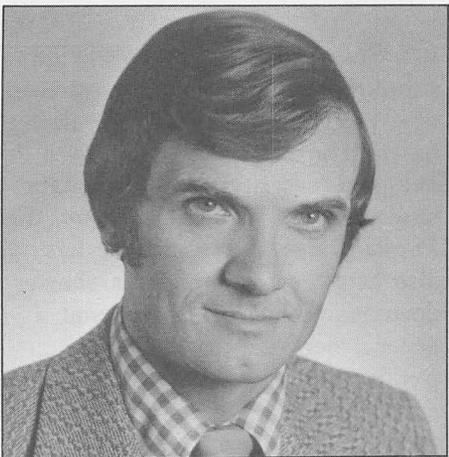


Figure 2



John Bassingthwaight



Gottfried Bach



Josef Sachs

Vancouver

John Bassingthwaight is the new regional manager for the Northwestern United States. He joined I.P. Sharp as a summer student in 1967, after studies at the Universities of Toronto and Western Ontario.

His early projects included data gathering and process control systems, and a data management system. As a pioneer member of the APL group within I.P. Sharp, John organized the installation of the IBM 360/50. He then managed the computer operation until he became Toronto branch manager in 1971. Two years later, his interest in Western Canada took him to Vancouver where he has been branch manager until his recent appointment. In 1977, John spent a year abroad as managing director of the U.K. operations.

Vienna

Gottfried Bach has recently been appointed regional manager, responsible for I.P. Sharp's services in Germany, Switzerland and Austria. He holds degrees in mathematics from the University of Vienna and the University of Nebraska, and has taught mathematics and computer programming at the American International School of Vienna.

Gottfried began his career with I.P. Sharp in 1978 as manager of the Vienna office, a responsibility he still holds. He is particularly interested in econometric modelling, data bases, and using

APL in education. Presently he is involved in setting up a computer science program at the newly founded Webster College in Vienna and in a joint seminar with the Faculty of the Vienna University of Economics on "Time Series Analysis with SHARP APL".

The establishment of this new region will offer the German-speaking business community more relevant, timely data in addition to the thirty-million time series already available on the I.P. Sharp timesharing service. As well, it will provide specific software for new and current users in Germany, Switzerland and Austria.

Philadelphia

Josef Sachs is the new branch manager in Philadelphia. He studied psycholinguistics and artificial intelligence at the Massachusetts Institute of Technology. He then worked as a freelance systems consultant specializing in public health and social sciences research. Later he was manager of Schedule Planning Systems with Pan American World Airways.

Since joining I.P. Sharp, Josef has worked extensively on the conversion to SHARP APL by Morgan Stanley and Co. He is particularly interested in decision support systems and forecasting methods, and hopes to encourage the use of public data by the Philadelphia business community.

Book Ends

Grant Clarke, Toronto

For copies of these publications, please contact your nearest I.P. Sharp office, or write to the Publications Department in Toronto.

In the **Applications Software** area, the following publications have recently seen the light of day:

SHARP APL Public Workspaces Catalogue (*new*)

SHARP APL public workspaces give access to the utility and application software provided by I.P. Sharp. A public workspace is primarily a bundle of programs and data that you can load into your own active workspace. Workspaces are organized into libraries; in the *Public Workspace Catalogue* you will find a well-organized and convenient bibliography of what all the public libraries are, and what they contain.

March 1982, 72 pp., no charge

SNAP Factsheet (*new*) and the **SNAP Reference Card** (*new*)

SNAP—Sharp Network Analysis for Projects is a project management package based on critical path techniques. It is already documented in the *SNAP User's Manual* (April 1981). Now there are two more publications to complement this manual. The *Factsheet* is intended for new and prospective users of SNAP—

although experienced users will also find it of benefit. And the *Reference Card* is intended as a handy pocket guide for the SNAP user.

March 1982, no charge

SUPERPLOT Reference Card (*revised*)

SUPERPLOT has five new types of plots; you can now draw web charts, plus four types of pie charts. There are also several new functions: *VELOCITY*, *SEPARATION*, *LANGUAGE*, *MESSAGE* and *NEWS*, and other functions have been enhanced. So we have issued a new reference card to reflect these changes.

June 1982, no charge

EASY User's Guide (*new*)

The **Econometric Analysis System** provides economists and social scientists with a powerful, interactive system for the quantitative analysis of time series data.

June 1982, 180 pp., \$15.00

GRAPHREQ User's Guide (*new*)

If you use the I.P. Sharp system, but do not have ready access to a graphics plotter, then you may be interested in GRAPHREQ—the SHARP APL Graph Request Facility. GRAPHREQ is a simple-to-use package which can provide same-day plotting service at more than 30 I.P. Sharp offices throughout the world.

May 1982, 40 pp., \$4.00

WIZARD II User's Guide (*new, preliminary version*)

WIZARD II is a data base management system specifically designed to handle multi-dimensional time series data. It enables you to create and retrieve your own private data bases.

April 1982, 164 pp., \$10.00

Meanwhile in the **Data Bases** area:

Public Data Bases Catalogue (*revised*)

I.P. Sharp is a major worldwide supplier of numeric data, and we now offer close to 80 public data bases. The *Catalogue* contains a one-page description of each data base. (Alongside the *Catalogue*, the *Public Data Bases* brochure has also been revised; this is a shorter document intended to give you a general overview of the many public data bases now available—at no surcharge—from I.P. Sharp.)

June 1982, 80 pp., no charge

CITIBASE Manual (*new*)

Citibank's economic data base (CITIBASE) comprises U.S. economic statistics gathered from over 100 government and private sources. It monitors the most important U.S. economic statistics, in time series form, and goes back as far as 1947 to provide a very complete view of the U.S. economy.

Changes to the Actuarial Data Base

Chris Burke, Toronto

CITIBASE is very easy to use.

Don't be put off by the number of pages in the manual; most of this manual is merely a directory of all the 4 500 or more statistical codes available through CITIBASE.

June 1982, 200 pp. (approx.), \$15.00

CANSIM Data Base Manual (new)

CANSIM* is a time series data base containing socio-economic data on Canada. I.P. Sharp provides CANSIM data by means of the CANSIM Mini Base and the CANSIM Mini Base Supplement. (*CANSIM is a registered trademark of Statistics Canada.)
July 1982, 54 pp., \$6.00

North American Stock Market Data Base Manual (new)

The North American Stock Market (NASTOCK) data base contains current and historical price and volume statistics for the major U.S. and Canadian security exchanges, plus indices for the New York, Toronto, and American Exchanges, along with Dow Jones and Standard and Poor's indices. NASTOCK is a fully current data base, and is updated each trading day.
May 1982, 40 pp., \$4.00

OPTIONS Data Base Manual (new)

Option data is of interest to any financial institution trading in option contracts. I.P. Sharp's Canadian and U.S. OPTION data bases contain trading data, volume, open interest, and bid and ask statistics for all currently listed put and call options traded on the major North American exchanges.
July 1982, 80 pp., \$6.00

FUNDMONITOR Manual (new)

The Fund Monitor Unit Trusts and Insurance Bonds (FUNDMONITOR) data base contains current and historical asking prices for all U.K. authorized unit trusts open to the public, and most U.K. life insurance funds that are traded as units. This data can be used by any financial institution in the areas of portfolio management, investing and forecasting, and general economic research.
June 1982, 40 pp., \$4.00

A new version of the actuarial data base is now available. Two new files have replaced the existing file 123 MORTABS. The first, 123 MORTABLES, contains mortality tables only, all stored as rates of mortality (qx's). The second, 123 MISCTABLES, contains all other actuarial tables (e.g. disability rates, salary scales etc.). These tables are stored in various formats.

For your convenience, the old data base will coexist with the new one for about six months, after which it will be renamed 623 MORTABS and retained indefinitely.

ACTPAK accesses the new files by reference to table mnemonic. If your software uses table mnemonics, you may copy in the new version of ACTPAK with no further change required. However, if your software accesses the data by reference to file component number, you should either continue to use the old data base, or else convert the software to access by table mnemonic. Library references to the old data base will have to be changed when it is renamed.

If you prefer to use your own actuarial calculation routines and only want to access the new data base, a set of access routines may be found in the workspace 123 ACTCESS.

Aviation Conference Highlights

Another new file, 123 *SOURCES*, contains a detailed listing of the source documents from which the tables in the data base were obtained.

Some minor changes have been made to functions in 123 *ACT*.

For full details of all these changes, load 123 *ACT* and type *NEWS*.

One of the many speakers at the sixth annual Aviation Conference hosted by I.P. Sharp Associates was **Tad Trantum**, Senior Vice President of L.F. Rothschild, Unterberg, Towbin. Pictured below, Tad addressed the 120 aviation professionals in attendance at the conference, "Perspectives in

Planning", which was held in May in New York. The keynote luncheon speaker was Judith Connor, Assistant Secretary for Policy and International Affairs, U.S. Department of Transportation, who spoke on the topic of how deregulation will affect aviation data.



APL Press Revives *APL News*

APL NEWS (Number 8) is currently available from APL PRESS. It features announcements and summaries of APL PRESS publications, information about APL meetings, and brief articles of interest to the APL community.

Some highlights of this latest issue include a new installment of Jeff Shallit's "APL Play", exploring *Slowly Shrinking Squares*, and the "Guest Column", revealing the wit and wisdom of J.C.L. Guest. "APL Characters" gives members of the APL

community an opportunity to submit photographs of "Great Moments in APL" while "What's in a Name?" challenges readers to contribute interesting or amusing alternative uses of the acronym APL.

To receive a complimentary copy of *APL NEWS*, contact:

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