



I.P. Sharp

# newsletter

## *Joint Venture with McGraw-Hill:* Electronic Markets and Information Systems

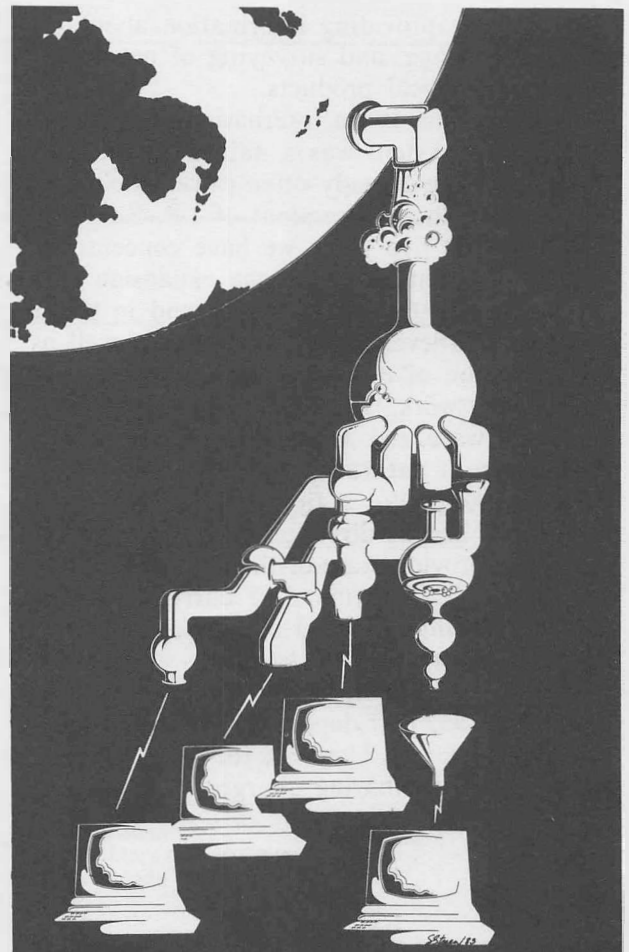
I.P. Sharp has introduced a new computerized information and trading system which permits producers, traders, and consumers of petroleum and petrochemical products around the world to buy and sell electronically on a spot basis. The service, known as Electronic Markets and Information Systems (EMIS) Inc., is operated by McGraw-Hill in a joint venture with I.P. Sharp.

EMIS subscribers have access to the service through computer terminals linked to the I.P. Sharp Network, which provides local access in

over 500 cities worldwide. More than 20 companies are currently using EMIS from some 35 locations around the world. The system allows them to make bids and offers to buy and sell; respond anonymously to bids and offers made by others; and then, if they wish, identify themselves; and continue negotiations to the point where a deal is concluded.

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... Electronic Markets

At present, more than 190 petroleum and petrochemical products are available for trading. The product list includes crude oils, fuels, naphtha, petrochemicals, fertilizers, polymers, and solvents.

EMIS also provides various kinds of information related to the trading including:

- Continuous average price/volume information of the commodities traded in the system, while maintaining full confidentiality of individual transactions
- Complete product price information obtained from McGraw-Hill sources, notably *Platt's*, and others
- Real-time industry and world news supplied by McGraw-Hill sources
- Various kinds of financial information including currency exchange rates, entered five times per day

Plans include providing information about the shipping, storage, and surveying of petroleum and petrochemical products.

"Participation in an international computerized trading system was a natural extension of the services we already offer worldwide", commented Ian Sharp, president of I.P. Sharp. "For the past five years we have concentrated our development efforts in the expansion of our numeric data base offerings and in the associated high-level access software, as well as the expansion of our own private packet-switched network. These three products—data bases, software and a communications network—were a natural base for a worldwide trading system. We anticipate our business to head more in this direction over the next five years—to provide state-of-the-art computerized systems, such as chemical or currency trading, that require international access to a central store of information."

An annual subscription to EMIS costs from \$20 000 to \$32 000 depending on the range of services requested. Users of the service also pay normal timesharing charges. ■

## News for IBM Personal Computer Users

IBM Personal Computer (PC) users can now transfer data easily between IBM PC files and the SHARP APL Service with MICROMAGIC, a new facility from I.P. Sharp. Using a MICROMAGIC command, you can download data in VisiCalc format from the I.P. Sharp public data bases for subsequent manipulation and integration with your own data on the IBM PC.

MICROMAGIC uses a communications program on diskette, called MICROCOMM, and an enhanced MAGIC program. MAGIC is I.P. Sharp's time series retrieval and manipulation language most frequently used to access and analyse the public data on the SHARP APL Service. With the MICROCOMM diskette, you can sign on to SHARP APL using the IBM PC as an intelligent terminal on the I.P. Sharp Network. Once you are in the MICROCOMM program, you can choose from a menu of options to transfer data in the standard Data Interchange Format (DIF), a trademark of Software Arts Inc.

With MICROPUT, a new command in MAGIC, you can copy the numeric and textual data to diskette in VisiCalc format. After the data has been downloaded, you can transfer the data onto the VisiCalc worksheet and manipulate it with standard VisiCalc commands. ■

## United Nations Commodity Trade Statistics

I.P. Sharp Associates now offers vital market research information to importers, exporters and market analysts, with the addition of the United Nations Commodity Trade Statistics (SITC) data base.

The United Nations Commodity Trade Statistics data base is an invaluable aid to exporters evaluating current markets and targeting new markets, and to importers investigating new sources of supply. It is also an important tool for management companies in formulating market plans for their clients, and for government agencies involved in the promotion of export activities.

SITC provides quarterly history on international trade for the United Kingdom, Canada, and the United States, in 3 075 commodities

such as manufactured goods, raw materials, and foodstuffs. Annual data is available for 28 developed countries, covering transactions with some 265 trading partners. Facts for selected reporting countries include the commodity, trading partners, type of trade (import, export, or re-export), value of trade (in U.S. dollars), and quantity traded. Commodities are classified according to the UN's Standard International Trade Classification, Revision 2. In all, there are over 27 million trade statistics available.

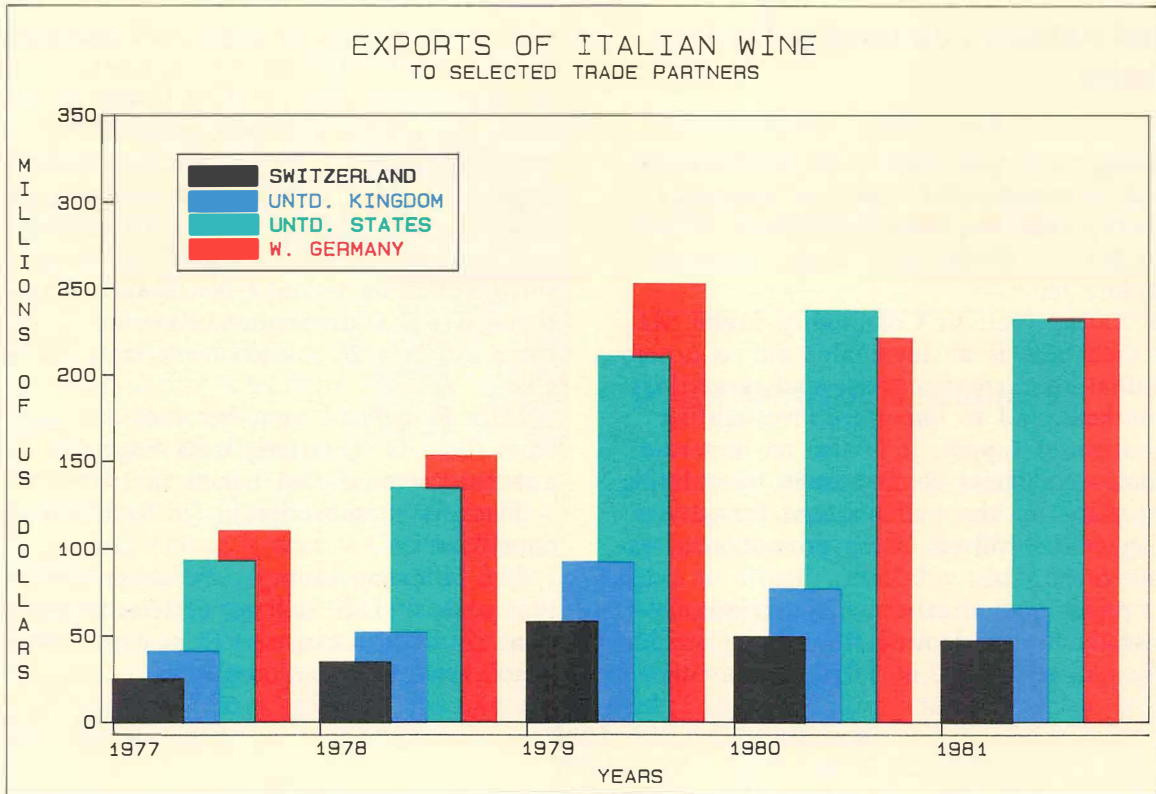
Data is updated as it becomes available from the UN. Quarterly data begins in 1980, and most annual data begins in 1976.

There is no subscription fee to access this data base.

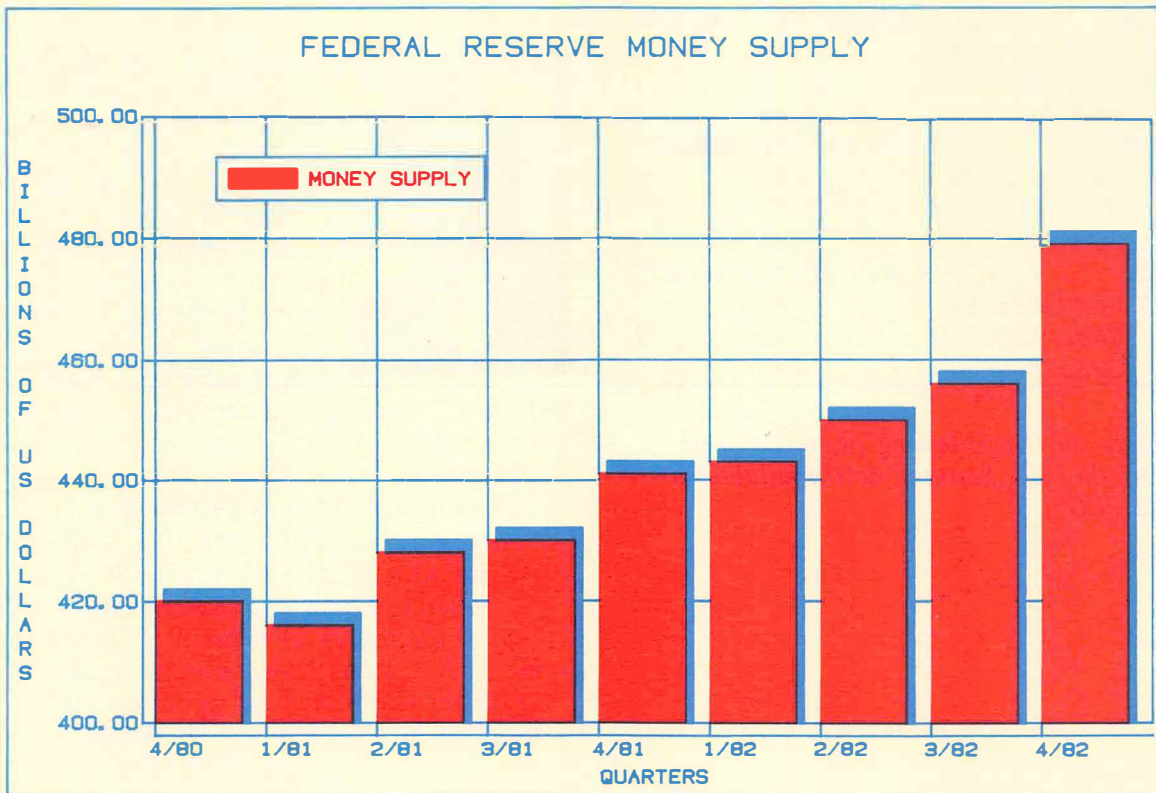
The following example shows the value, in thousands of U.S. dollars, of telecommunications equipment exported from Japan to selected European countries. ■

	1977	1978	1979	1980	1981
<i>JAPAN</i> <i>EXP TELECOMM; SOUND EQUIPMENT</i>					
<i>\$US GERMANY; FR</i>	552,880	857,653	864,715	1,241,703	1,453,073
<i>UNTD KINGDOM</i>	308,098	394,702	526,918	667,088	1,157,922
<i>SWEDEN</i>	97,446	97,067	98,502	138,565	185,982
<i>JAPAN</i> <i>EXP TELECOM EQPT; PTS; ACC NES</i>					
<i>\$US GERMANY; FR</i>	122,535	197,351	200,737	263,946	303,539
<i>UNTD KINGDOM</i>	42,084	66,701	91,008	141,007	235,262
<i>SWEDEN</i>	19,754	22,011	21,465	32,115	37,797
<i>JAPAN</i> <i>EXP TELECOMM EQUIPMENT NES</i>					
<i>\$US GERMANY; FR</i>	4,232	8,871	19,787	49,171	90,019
<i>UNTD KINGDOM</i>	4,124	6,645	15,754	25,329	54,077
<i>SWEDEN</i>	1,894	2,108	6,078	7,122	12,228
<i>JAPAN</i> <i>EXP RADAR APPARATUS ETC</i>					
<i>\$US GERMANY; FR</i>	636	1,570	2,386	6,762	18,945
<i>UNTD KINGDOM</i>	324	644	1,996	3,987	10,029
<i>SWEDEN</i>	181	370	387	832	2,650

The plots on the following page illustrate some of the new features now available in SUPERPLOT.



SOURCE: U.N. COMMODITY TRADE STATISTICS (SITC) DATA BASE



SOURCE: FEDERAL RESERVE BOARD (FRBW)

## Two New Federal Reserve Board Data Bases

Bankers, economists, and financial analysts involved in predicting interest rates and modeling the U.S. economy will welcome the addition of two new Federal Reserve Board data bases to the SHARP APL Service.

There is no subscription fee for either data base.

### Federal Reserve Board Weekly

The Federal Reserve Board Weekly (FRBW) data base contains weekly banking and monetary statistics released by the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York. The data base is updated weekly, one business day after the data is released. The information includes:

- Money stock measures and liquid assets,
- Factors affecting reserves of depository institutions,
- Assets and liabilities of large commercial banks,
- Commercial and industrial loans by Federal Reserve district,
- Commercial paper outstanding in the New York Federal Reserve district.

### U.S. Flow of Funds, Quarterly

U.S. Flow of Funds, Quarterly (USFLOW), is a data base of over 3 600 time series on the sources and uses of funds in the U.S. economy for over 50 major sectors. USFLOW provides a closed model of the entire U.S. economy by bringing the financial aspects of the economy into direct relation to data on the non-financial aspects. As such, it is extremely useful for modelling and forecasting, whether on its own or in combination with information from other I.P. Sharp data bases, such as CITIBASE, DISCLOSURE II, and USSTOCK.

### Statistical software

After retrieving data from these data bases, you can apply well known time series analysis and forecasting tools available on the SHARP

APL Service. For example, I.P. Sharp's statistical software includes the Box-Jenkins technique, the U.S. Bureau of the Census X-11 seasonal adjustment method, and classical regression methods with such extensions as the Hildreth-Lu method, the Cochrane-Orcutt procedure, generalized least squares, and distributed lag schemes. ■

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## Lundberg Survey Data

Lundberg Survey Inc.'s Dealer Buying Price (DBP, or Wholesale Diary) is now available online through the SHARP APL Service. DBP contains historical and current wholesale prices for gasoline and diesel fuel in nearly every market in the United States. Having this data on line will be a considerable advantage to all those involved in oil pricing and marketing.

Founded in 1946 by Dan Lundberg, Lundberg Survey Inc. is the petroleum industry's largest supplier of retail price data. They are well known for both their data bases and their newsletters—the *Lundberg Letter* and *Energy Détente*—which provide statistics and analysis relevant to oil marketing.

Drawing on information from both independent petroleum marketers and representatives of the major oil companies, DBP tracks wholesale prices of gasoline and diesel fuel in 187 cities. It includes data from any company with at least a two-per cent share of the market.

You can access the DBP data base through 121 *PETROSERIES*. The data is organized along five dimensions (or categories):

- Fact (price or effective date)
- Brand
- Location
- Grade (regular, premium, diesel, etc.)
- Class of trade (dealer tank wagon, jobber, etc.)

You may obtain a directory listing the codes for each dimension by entering (in 121 *PETROSERIES*):

DBP 'DIRECTORY'

**... Lundberg Survey Data**

Users of DBP have the option of generating custom reports through MAGIC, or using interactive programs producing standard reports similar to those provided by Lundberg Survey Inc. *DBPREPORT* produces a report showing the prices, price changes, and effective dates for those brands, classes of trade, and locations chosen by the user. *DBPMOVES* displays all price moves during a specified period for those locations requested. The file used by *DBPMOVES* is constantly updated as moves are announced, and contains all moves reported during the most recent two-week period. Both of these reports are available in 121 *PETROSERIES* through the conversational program, *MAGIC*.

Historical data for DBP is recorded weekly. The DBP data base contains the prices and the dates the prices took effect for each Friday since 2 January 1981. Current data for DBP is updated continuously. As soon as Lundberg Survey receives a price announcement, the new price and effective date is entered into the data base, replacing whatever data was previously recorded for the current week.

More specific information on the DBP time series and these two reports are available, by entering:

*DBP 'DESCRIBE'*

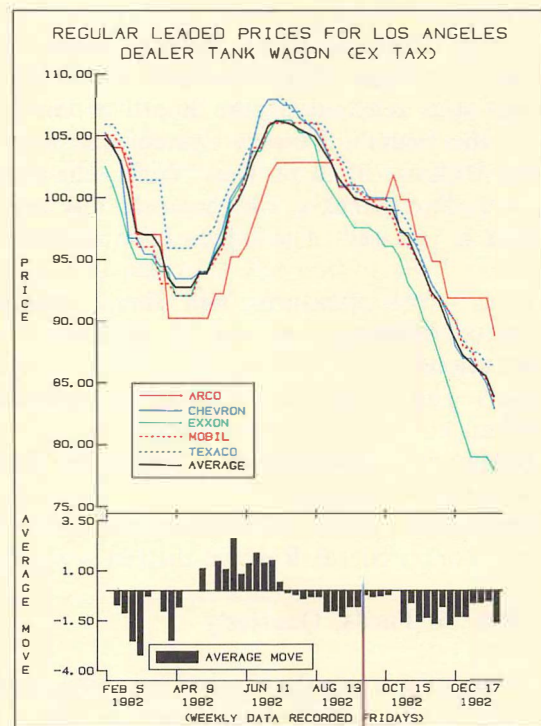
In addition to DBP, I.P. Sharp will be adding several other Lundberg data bases including Retail Price Survey, and Share of Market (gasoline and diesel sales volumes and percentages by brand, state, region, and nation).

You must subscribe in order to have access to DBP data, *DBPMOVES*, and *DBPREPORT*. For subscription information or queries regarding DBP, contact either:

Philip Hutchins  
Lundberg Survey Inc.  
12041 Strathern  
North Hollywood, Ca. 91605

or the I.P. Sharp MAILBOX group *LUNDQ*. ■

*Deborah Bodinger, Newport Beach*



MAGIC  
DATABASE: LUNDBERG  
REPORT NUMBER: 2  
ENTER DATE (DD MM YY) OR CH FOR LATEST:  
ENTER CLASS(ES) OF TRADE (R/T/DW/J/C/L/CTR): DW  
EXCLUDE WHAT BRANDS? (CR FOR NONE):  
LOCATION, STATE OR FADD CODE(S): LAX  
  
LOCATION: LOS ANGELES CA

BRAND	CLASS OF TRADE	REGULAR LEADED		REGULAR UNLEADED		PREMIUM LEADED		PREMIUM UNLEADED		DATE OF CHANGE	DIESEL	
		PRICE	CHANGE	PRICE	CHANGE	PRICE	CHANGE	PRICE	CHANGE		PRICE	CHANGE
ARCO	DW	88.80	-3.00	91.80	-3.00			97.80	-3.00	1/17/83		
CHEVRON	DW	94.00	-1.00	87.00	-1.00			93.00	-1.00	1/15/83		
EXXON	DW	78.00	-1.00	81.00	-1.00			88.00		1/15/83		
MOBIL	DW	85.20		88.20				94.20		1/14/83		
SHELL	DW	88.00		91.00				97.00		1/13/83	92.90	1/11/83
TEXACO	DW	86.50		90.00				96.00		1/11/83	87.00	1/11/83
UNION	DW			91.00		97.00				1/07/83	92.30	1/12/83
AVERAGE	DW	85.08	-0.83	88.57	-0.71	97.00		94.33	-0.67		90.73	

RUN MORE REPORTS? (Y/N): N  
REPORT NUMBER: STOP  
DATABASE: STOP

## Singapore Currency Exchange Rates

The Currency Exchange Rates (CURRENCY) data base has been expanded to include the Singapore market. Mid-point interbank rates in Singapore cents for 12 currencies are now available. Interbank rates are the exchange rates at which banks trade among themselves. Rates are reported at the close of the market at 3 p.m. Singapore time, and the data base is updated soon after. The data, which goes back to 1 January 1975, is provided by the Overseas Union Bank (OUB). OUB is one of the leading locally incorporated banks.

The twelve currencies available are: Australian dollar, Dutch guilder, French franc, Hong Kong dollar, Indonesian rupiah, Japanese yen, Malaysian ringgit, pound sterling, Saudi riyal, Thai baht, U.S. dollar, and West German mark. In addition to these, a trade-weighted currency index is calculated each day and forms part of the Singapore Market Currency data base. OUB has kindly supplied the formula to determine the index.

The index takes into account the volume of trade between Singapore and 12 major trading partners whose currencies are mentioned above. Together, these countries account for 72 per cent of Singapore's total foreign trade. The individual currency is weighted to reflect its relative economic significance. A weight is assigned to each partner-country currency in proportion to its average trade with Singapore for 1979/1980. The index itself is a geometric average of changes from base rates in December 1971 when the Smithsonian Central Rates were adopted. It indicates the strength of the Singapore dollar relative to the 12 currencies.

The CURRENCY data base can be accessed through either 39 *MAGIC* or 81 *CURRENCY*. ■

*Herman Adhiyatma, Singapore*

## Trustee Savings Bank Says Yes to Prospect 2

The Trustee Savings Bank (TSB) is one of Britain's leading personal banks, with more than 11 650 branches throughout the United Kingdom. More than 8 000 000 customers hold 14 000 000 accounts. Customer funds at the end of 1982 amounted to 6.4 billion pounds.

Like most large, complex organizations, the TSB undertakes an annual corporate planning cycle to ensure that its strategic decisions are soundly based. In this way, the TSB can stand back and survey the entire scope of future changes over varying time periods. An overview such as this is vital when a business is planning development.

In the planning process at the TSB, specialists from many areas within the bank work together. For those in the personnel department, a comprehensive work measurement scheme translates projected changes in business, organization, and working practices into workloads and manning requirements.

While this level of information is adequate to answer some of the financially based questions attached to the development of policies, it is only the start of the process from the personnel manager's point of view.

Given a series of facts and assumptions concerning personnel, the Prospect 2 program provides computer modelling techniques for predicting and planning personnel requirements. In this way, the TSB can work towards answering three main questions:

- How will the demand for staff be changed by a proposed course of action? For example, how will new services, changes in business mix, new methods, and new technology affect staffing requirements?
- What is the likelihood of satisfying staff requirements? For example, will the appropriate number of employees with the required skills and grades at a particular location be available?
- How can differences between desirable and practical courses of business and staff development be reconciled?

To answer these questions, it is necessary to determine the effects of business objectives on:

## ... Trustee Savings Bank

- The number of people in a particular job grade (or grade size)
- Recruitment
- Age profiles in each grade
- Promotion opportunities
- Training and development policies

It is also important to assess the sensitivity of the plan to fluctuations in such variables as:

- The rate at which staff is lost due to retirements, dismissals, and resignations (or wastage rates)
- Availability of suitable recruits

While it is possible to undertake this activity manually, the volume of arithmetic calculation is immense. The true value of the exercise is only realized if results can be produced rapidly enough to enable decisions to be changed, and results recalculated.

## Prospect 2

For this reason, the TSB uses computerized models in the Prospect 2 program for its manpower planning. Prospect 2 is used to test the effect of changes in personnel policies on recruitment, promotion, retirement, grading, and career development.

To run the model, information is entered relating to the staff in each grade, together with assumptions specifying wastage, recruitment, promotion profiles, and targets for the size of grades at different points in time. The computerized models are run, on the whole, by non-data processing specialists.

During the run, the model produces reports on the feasibility of attaining the targets under the defined assumptions.

If there isn't the staff available to fulfill a specified promotion from one grade to another, or if staff isn't reduced to that specified in a grade through wastage, several options are offered. You can accept the new situation, amend the assumptions, or stop the run.

At the end of a run, two major types of output are available:

**Grades Report** shows the age by grade structure at the beginning and end of the run. This allows analysis of issues such as:

- How is the age structure of each grade changing?
- Is the proportion of staff in each group changing?

**Flows Report** provides details of all the estimated movements i.e. flows into, through, and out of the system as a result of applying the policies and assumptions embodied in the current run of the model. It helps answer questions such as:

- How many trainees do we need to recruit?
- Are we "growing" enough of our junior staff to meet our estimated need for managers in the future?
- What are the opportunities for promotion?
- Can early retirement resolve a promotion blockage?

The Institute of Manpower Studies, developer of the Prospect 2 program, is willing to make it available to others. Prospect 2 is available on the SHARP APL Service, and can be used with I.P. Sharp's general-purpose Human Resources System.

If you would like more information about Prospect 2, please contact your local I.P. Sharp representative or:

Bernard Weyman  
Institute of Manpower Studies  
University of Sussex  
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I. P. Sharp

# newsletter

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## technical supplement 43

### Searching, Part V

This article is continued from *Technical Supplement 41*.

#### Searching by spelling

Very few people spell perfectly. Even fewer type perfectly. So, programs which tolerate variations in spelling are often easier to use than those which do not.

A large percentage of typing errors fall into four categories [2]:

- 1) Substitution of a single letter
- 2) Deletion of a single letter
- 3) Insertion of a single letter
- 4) Transposition of two adjacent letters

What we would like is a function which searches lists of words, trying to match a word (presumably misspelled) with one of the possible misspellings that these four rules suggest. The function listed below (and its sub-functions) do just that. The function presumes that the words in the right argument are each misspellings of some word in the left argument. It tries to match each of the words in the right argument with some transformation of one of the words in the left argument. If it finds a match according to one of the four rules listed above, it returns the index of the matching word. Otherwise it returns  $\square IO +$  the number of words in the left argument. Obviously, it presumes that a search has already been made for a strict match. (See Part II of this series in *Technical Supplement 38* for appropriate algorithms).

```

▽ POSITIONS←LIST SPELLINGSEARCH ITEMS
;CTR;LMT;WORD;ROW
[1] ITEMS←(1┐2┐ρITEMS)ρITEMS
[2] POSITIONS←(1┐ρITEMS)ρ(1┐ρLIST)+□IO
[3] CTR←□IO-1
[4] LMT←(ρPOSITIONS)+□IO-1
[5] LOOP:CTR←CTR+1
[6] →(LMT<CTR)ρEND
[7] WORD←(φv\φ' '≠ITEMS[CTR;])/
ITEMS[CTR;]
[8] ROW←LIST SPELLINGSUBSTITUTE WORD
[9] →(ρROW)ρFOUND
[10] ROW←LIST SPELLINGDELETE WORD
[11] →(ρROW)ρFOUND
[12] ROW←LIST SPELLINGINSERT WORD
[13] →(ρROW)ρFOUND
[14] ROW←LIST SPELLINGTRANSDPOSE WORD
[15] →(ρROW)ρFOUND
[16] →LOOP
[17] FOUND:POSITIONS[CTR]+ROW
[18] →LOOP
[19] END: ▽

```

The example below demonstrates its use:

```

L+5 7ρ'THOMSONPOLIVKAHERMAN METZGERIVERSON'
W+4 7ρ'HERMANNIVESRONPOLIVA METZGAR'
L SPELLINGSEARCH W
3 5 2 4

```

Obviously, all of the interesting work is being done by the four subroutines which handle the four possible types of errors. Let's find out how they work.

```

▽ ROW←LIST SPELLINGSUBSTITUTE WORD
;MATCH
[1] MATCH←1=LAST+.≠(┐1┐ρLIST)+WORD
[2] ROW←(1=+/MATCH)/MATCH┐1 ▽

```

## ... Searching

*SPELLINGSUBSTITUTE* presumes that information has been lost. That is to say, it presumes that one letter has been substituted for another. Therefore, it must count the differences between the words in the search list and the word to be searched for. If there is just one word in the search list which differs in just one position from the word being searched for, it is a single letter substitution, and its index is returned.

```

∇ ROW←LIST SPELLINGDELETE WORD
;MATCH;POSSIBLE;ROTATE
[1] POSSIBLE←(1 0 +ρWORD)ρWORD
[2] ROTATE←(ι1↑ρPOSSIBLE)-□IO
[3] POSSIBLE←(-ROTATE)φ
' ',ROTATEφPOSSIBLE
[4] MATCH←∨/1=LIST+.≠φ((1↑ρPOSSIBLE),
-1↑ρLIST)↑POSSIBLE
[5] ROW←(1=+/MATCH)/MATCHι1 ∇

```

*SPELLINGDELETE* also presumes that information has been lost by the deletion of a letter. It creates a matrix containing all possible insertions of one blank in the word being searched for. This blank represents the letter which was deleted. If the word were 'APPLE', the matrix would be the following:

```

APPLE
A PLE
AP LE
APL E
APLE

```

The rows of the matrix are then compared to each word in the search list. Then the number of positions which differ are counted. If the search list were:

```

APPLE
CHERRY
PEACH

```

then a difference of 1 position would be found between rows 2 and 3 of the matrix of insertions, and row 1 of the search list. Since only one word in the search list differs in a single position, 1 (the index of the word) would be the result.

```

∇ ROW←LIST SPELLINGINSERT WORD
;MATCH;POSSIBLE;ROTATE
[1] POSSIBLE←(2ρρWORD)ρWORD
[2] ROTATE←(ι1↑ρPOSSIBLE)-□IO
[3] POSSIBLE←(-ROTATE)φ
0 1 ↓ROTATEφPOSSIBLE
[4] MATCH←∨/LIST∧.=φ((1↑ρPOSSIBLE),
-1↑ρLIST)↑POSSIBLE
[5] ROW←(1=+/MATCH)/MATCHι1 ∇

```

*SPELLINGINSERT* doesn't need to count differences. Since it presumes that no information has been lost, just something added, it can look for exact matches. It creates a matrix of all possible deletions of one letter from the word being searched. If the word were 'APPLE', the matrix would be the following:

```

PLE
ALE
APE
APL

```

Then the function compares the words in the search list to the rows of this matrix. If just one word from the search list matches, its index is returned.

```

∇ ROW←LIST SPELLINGTRANSPOSE WORD
;POSSIBLE;ROTATE;MATCH
[1] POSSIBLE←(-1 0 +ρWORD)ρWORD
[2] ROTATE←(ι1↑ρPOSSIBLE)-□IO
[3] POSSIBLE←(-ROTATE)φ(ROTATEφ
POSSIBLE)[;(φι2),2+ιρWORD]
[4] MATCH←∨/LIST∧.=φ((1↑ρPOSSIBLE),
-1↑ρLIST)↑POSSIBLE
[5] ROW←(1=+/MATCH)/MATCHι1 ∇

```

*SPELLINGTRANSPOSE* also does exact matching. It too presumes that all original information is available, just in scrambled form. It generates all transpositions of two adjacent letters from the word being searched for. If the word were 'CHERYR', then the matrix of transpositions would be the following:

```

HCERYR
CEHRYR
CHREYR
CHEYRR
CHERRY

```

## ... Searching

This matrix is then compared against the search list, and if exactly one word matches one of the transpositions, its index is returned.

While these functions demonstrate nicely the similarities among the four sub-problems, they are not the fastest possible solutions. The functions listed below work several times faster, particularly on larger arguments. The insertion and transposition algorithms are based upon work done by Isaac Ohayon.

```

▽ ROW←LIST SPELLINGDELETE2 WORD
;ROWS;COLS;POSSIBLES;MATCH
[1] ROWS←1↑ρLIST
[2] COLS←-1↑ρLIST
[3] POSSIBLES←(ROWS,COLS,COLS-1)ρ
((ROWS×COLS×COLS)ρ(COLS×COLS)ρ
0,COLSρ1)/,COLS↓LIST
[4] MATCH←v/LIST∧.=ϕ(-1↑ρPOSSIBLES)↑WORD
[5] ROW←(1=+/MATCH)/MATCH⊃1 ▽

```

This second deletion algorithm works quite differently from the first. It generates all possible deletions from the list, and compares these to the word being searched for. The replicate-compress-reshape approach takes less time than the rotate-catenate-rotate method in the original, and the  $\wedge.=$  is much less expensive than the  $+.\neq$  in SHARP APL.

```

▽ ROW←LIST SPELLINGINSERT2 WORD
;WIDTH;COLS;SIZE;POSSIBLE;MATCH
[1] WIDTH←ρWORD
[2] COLS←-1↑ρLIST
[3] SIZE←WIDTH×WIDTH
[4] POSSIBLE←(WIDTH- 0 1)ρ(SIZEρ0,
WIDTHρ1)/SIZEρWORD
[5] MATCH←v/LIST∧.=ϕ(WIDTH,COLS)↑
POSSIBLE
[6] ROW←(1=+/MATCH)/MATCH⊃1 ▽

```

The second insertion algorithm is more similar to the first version than the deletion is. But once again, the rotate-drop-rotate combination is beaten by the reshape-compress-reshape method in the second.

```

▽ ROW←LIST SPELLINGTRANSPOSE2 WORD
;WIDTH;COLS;SIZE;MATCH;SIZE
[1] WIDTH←ρWORD
[2] COLS←-1↑ρLIST
[3] SIZE←WIDTH-1
[4] INDEX←((SIZE,WIDTH)ρ1,WIDTH)+
(SIZE,WIDTH)ρ 1 -1 ,SIZEρ0
[5] MATCH←v/LIST∧.=ϕ(SIZE,COLS)↑
WORD[INDEX]
[6] ROW←(1=+/MATCH)/MATCH⊃1 ▽

```

Finally, the transposition algorithm uses a set of calculated indices to do the rearranging more quickly than the rotate-index-rotate method of the first version.

As you can see, in each of these cases the most straightforward method is not necessarily the fastest. But in programming, it is very important to understand the problem *before* attempting to find the optimal solution. So these first attempts serve an important purpose. Moreover, the optimal choice may differ from APL system to APL system. When I tried these algorithms on another APL implementation, the second versions still won, but the difference was much less pronounced.

## Conclusion

This article concludes the series on searching. You have seen a variety of algorithms for searching different types of objects, and searching in different ways. We hope that you have learned some new ways to use APL, and that we have provided you with some useful functions you can incorporate into your own applications. All of the functions described in this series can be found in workspace 777 SEARCH on the SHARP APL Service.

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*Acknowledgements:* Thanks to J. Henri Schueler, Isaac Ohayon, and Doug Keenan for their help in preparing this article. ■

*Robert Metzger, Rochester*

**SHARP APL System Reliability**

The SHARP APL Service was operational 99.3 per cent of its scheduled hours of service in the five years ending 31 December 1982.

The SHARP APL Service is currently scheduled to run from Sunday 11:00 UTC through to the following Sunday 02:00 UTC. You can check the schedule and any future changes by loading the workspace 1 *NEWS*, and displaying *SCHEDULE*. Changes in the operating schedule are announced in the signon message.

The workspace 999 *RELIABILITY* contains detailed information on the operation of the SHARP APL Service since April 1976. For each year, you can find out, by month, the number of times the system was down, the total downtime, and the number of scheduled hours the service was operating expressed as a percentage.

Type *REPORT* to get statistics on the current year. For information on previous years, type *REPORT81* for 1981 figures and so on. Since 1980, more detailed information is available on a monthly basis. Typing *JAN82* gives you a specific diagnosis of the outages that occurred that month. ■

<i>SHARP APL SYSTEM RELIABILITY</i>			
1983			
	<i>OUTAGES</i>	<i>MINS-OUT</i>	<i>o/o UP</i>
<i>JAN 83</i>	2	32	99.9
1982			
<i>JAN 82</i>	33	1120	96.8
<i>FEB 82</i>	9	456	98.7
<i>MAR 82</i>	18	573	98.5
<i>APR 82</i>	10	609	98.4
<i>MAY 82</i>	20	1257	96.6
<i>JUN 82</i>	5	112	99.7
<i>JUL 82</i>	10	359	99.1
<i>AUG 82</i>	1	28	99.9
<i>SEP 82</i>	8	85	99.8
<i>OCT 82</i>	1	23	99.9
<i>NOV 82</i>	7	242	99.4
<i>DEC 82</i>	8	477	98.8

... Trustee Savings Bank

**FASTNET**

Report on Flows

SUMMARY OF FLOWS FROM JAN 1983 - JAN 1984					
INTERNAL PROMOTION FLOWS					
INTO	OUT OF			TOTAL	
	MGMT	SEN	CL JUN CL	IN	
MGMT	-	1	-	1	
SEN CL	-	-	89	89	
JUN CL	-	-	-	-	
TOTAL OUT	-	1	89	90	
WASTAGE					
	MGMT	SEN	CL JUN CL	TOTAL	
RETIREMENTS	7	14	3	24	
WASTAGE	4	24	92	120	
TOTAL LEAVERS	11	38	95	144	
RECRUITS					
	MGMT	SEN	CL JUN CL	TOTAL	
RECRUITS	-	-	197	197	
TOTAL RECRUITS	-	-	197	197	
TOTALS					
NUMBERS AT:	MGMT	SEN	CL JUN CL	TOTAL	
JAN 1983	140	500	650	1290	
JAN 1984	130	550	663	1343	
NEW JOBS	-10	50	13	53	
VACANCIES	1	89	197	287	
ENTRIES	1	89	197	287	

FASTNET is a project network analysis planning system which can process a single network as simply and as inexpensively as possible.

FASTNET is designed particularly with the needs of the first-time user and the user with the small project in mind. To understand the benefits of FASTNET, let's first look at what is meant by **project network analysis**.

**Project network analysis**

Project network analysis, sometimes called **critical path analysis** or program evaluation and review technique (PERT), is a method for representing the planning details of a project using a diagram which shows the events and activities of the project linked together in the order in which they must occur. For instance, in changing a flat tire, we know that first we must jack up the car before we can remove the wheel. The diagram gives us a representation of the sequence and inter-relationships involved in completing the project successfully. In such a diagram, we can locate at least one chain of activities which must be done in a fixed order such that the sum of all their durations is the shortest time in which the project can be completed. We call this chain of activities the **critical path**.

Briefly the method used is to draw the diagram, insert the duration of each activity, and then analyse the model. The sequence of times which determine the total project time (the critical path) is extracted, and the times available for carrying out all the constituent activities are calculated. Once the project begins, comparison of actual times with allocated times enables us to control the performance of the project. Project network analysis is thus a technique for determining how a project's available resources may be deployed to complete a project in the shortest time, and in the most cost-effective manner.

**FASTNET highlights**

FASTNET has a wide variety of features. It can perform critical path analysis, resource aggregation and scheduling, and simple cost analysis. It enables you to select and sort information for reports with complete freedom as to

### ... FASTNET

which data fields and records should be used. It has a built-in facility enabling you to produce a drawing of your network on your terminal. For those who need it, there is a library facility enabling you to store projects and to share the information with other users, or to have several users using and updating the same network.

The low running cost and simplicity of FASTNET are achieved by limiting its scope to the processing of one single network and by holding all the functions and data within the compass of the active workspace.

FASTNET is used in immediate execution mode. That is, the commands typed by the user are actually APL functions and variables which are executed immediately as entered. Thus the user has complete freedom to use the commands in any sequence he finds useful.

For the newcomer to project network analysis techniques, FASTNET provides a system which has a minimum of computer commands to learn and with which he can explore the techniques and develop his experience without having to worry about the overhead costs.

For the SNAP user, FASTNET provides an alternative for those odd one-off projects which are time-consuming to do manually but which do not justify the set-up costs of SNAP because they do not need its extensive facilities. If a FASTNET user should decide later he needs more facilities, he can easily transfer his data to a designated SNAP network in a couple of minutes.

For the do-it-yourself enthusiast, FASTNET is a construction kit of functions and variables which can be used to produce a customized project planning system quickly and easily. The input data and calculated results are available and easily incorporated into your own functions.

FASTNET in its present form has been in use for well over a year and has been used for planning and controlling projects which range from the installation of computer software to the building of a complete new village in the Far East. The latter is probably the most ambitious use of FASTNET to date and involved a single network of nearly 400 activities. ■

*Nick Telfer, Warrington*

### System Security

System security concerns all users of a data processing system. As a user, you might ask, "How reliable is the system? How secure is the system, and my data and programs, from loss or misuse?"

I.P. Sharp recognizes the importance of these concerns, and has implemented the following procedures and safeguards to increase the security of the SHARP APL Service and SHARP APL.

#### Security of the I.P. Sharp Data Centre

The I.P. Sharp Data Centre occupies a floor of a new office tower in Toronto's financial district. From this site, I.P. Sharp offers its timesharing service. The Data Centre has instituted procedures and safeguards that give security against failure, fire, intrusion, physical theft of data, and loss of data.

**Security against failure.** The Data Centre has a backup computer and backup disk, electrical, and mechanical equipment.

The Data Centre draws its power from the downtown Toronto grid, one of the most reliable public grids in the world. The power supply from the grid to the machine room is fully duplicated. And the Data Centre has its own diesel-powered generator for the unlikely event of an extended loss of public power.

**Security against fire.** The Data Centre meets the most rigorous of Canadian fire protection standards. If a fire is detected, alarms ring in the Data Centre, at the ground-floor security station, and in the building control centre, all of which are continuously staffed. Response times of the Toronto emergency services are excellent.

The Data Centre site has ionization detection, an extensive water-sprinkling system, an elevator for fire fighters, and a smoke exhaust system. It is monitored locally and remotely at all times.

### ... System Security

**Security against intrusion.** I.P. Sharp restricts access to its Data Centre offices and further restricts access to the Data Centre itself. Operators are always on duty, and they accompany service technicians on the floor at all times. The operators are constantly aware of system activity with video display terminal monitors, and an alarm panel keeps them informed of environmental conditions and problems.

**Security against theft of data.** I.P. Sharp follows strict procedures for the handling of outbound tapes and printouts. Recipients of outbound material must be able to show appropriate identification.

**Security against loss of data.** The Data Centre backs up data and programs daily, weekly, and monthly, and keeps these copies both on and off site.

The Data Centre's tape library is equipped with a fireproof vault for all critical and important tapes, including the current backups.

### Security of SHARP APL

In a SHARP APL environment, either on the SHARP APL Service or at an in-house installation, all computing is done interactively in only one language, SHARP APL. No user can leave APL to communicate directly with the operating system. SHARP APL is owned by I.P. Sharp, and is developed and maintained exclusively by a small set of I.P. Sharp employees.

**Privacy of user accounts.** Every task on a SHARP APL system must belong to a particular user account; but the use of a particular account requires that the initiator of the task know that account's number and password.

Sign-on numbers for users are generated randomly; and each number's owner can assign an eight-character password to that account (there are many trillion permissible passwords). The password is truly secret; the system maintains only an encoding of the password, not its plaintext. When you sign on, the password you enter is encoded and compared with the value on record.

SHARP APL includes a Usage Inquiry System that any user can use for his own account, and that timesharing coordinators can use for all accounts in their domain. Because gross variations in usage patterns (sign-ons, characters transmitted or received, CPU usage, and storage) can indicate misuse of an account, the Usage Inquiry System is a valuable auditing resource.

**Privacy of workspaces.** A workspace is one way you store programs and data in SHARP APL. A workspace is of fixed size, and a task can have only one active workspace at once.

You can load a workspace only if you know its name; however, no one but you can display the names of your stored workspaces.

You can lock a workspace by requiring a password whenever it is loaded. As well, you can seal a workspace which prevents it from being copied, and locks all programs in the workspace.

**Privacy of programs.** You can lock a program. This prevents anyone—even you—from displaying or changing the program. Thus you can let others use a program you've locked without the fear of their discovering or changing the program's contents. A locked program can safely contain passwords or passnumbers, sensitive data, or proprietary algorithms.

**Privacy of files.** You can also store programs or data in a file. No user has any access whatsoever to any of your files unless you explicitly grant access to that user.

SHARP APL file access control is extremely flexible. You can specify which users can access a file, what specific actions each of those users is permitted to do to the file, and you can specify "passnumbers" (i.e. all-numeric passwords) that a user or program has to give when it wants to perform certain actions. By using passnumbers in locked programs, you can control the file access for any specific user to precisely those records or fields that are appropriate.

### ... System Security

**Passive monitoring.** The SHARP APL Service includes a passive monitoring program called USERLOG. This program records every unsuccessful attempt to sign on a user number, to load a locked workspace, or to access a file. (The log does not record the incorrect passwords or passnumbers, so mere mistypings don't provide clues to system-breakers.) USERLOG can reveal unusual activity. A certain number of failed accesses are to be expected, but in the case of a large number, an investigation may be made.

Your own applications systems can record successful access of files or workspaces.

**Public applications software.** I.P. Sharp makes applications software products available to users of the SHARP APL Service and to in-house customers. All of these products have been written by and are the exclusive property of I.P. Sharp, and all have been thoroughly inspected to make sure that they in no way secretly corrupt your data or programs.

**For more information** about security or for assistance in making your in-house installation more secure, contact your I.P. Sharp representative or the I.P. Sharp Data Centre manager in Toronto. A new *System Security* leaflet covering the points in this article in more detail will be available soon from your local I.P. Sharp office. ■

## Easier Access through Datex-P and PSS

Recently we announced a direct link between the I.P. Sharp Network and the Datex-P service in Germany, and earlier in 1982, we established a direct link between the I.P. Sharp Network and the PSS network in the United Kingdom. Now access through these public networks has been simplified.

The Datex-P and PSS networks provide local dial access to the I.P. Sharp Network in several cities in Germany and in the United Kingdom that are not directly served by our network. The new procedures remove the delay you encountered when you were opening an account with the network operators (i.e. Deutsche Bundespost and British Telecom). Now you do not need to have additional passwords or user identities issued for each user. And you pay only the normal phone call charges to the network operator.

In Germany, the sign-on procedure through Datex-P has also been simplified as a result of this change.

For a complete description of the new sign-on procedures, load the workspace 1 *NETWORK*, and enter *DATEXHOW* or *PSSHOW*. The dial-up numbers for these networks have not been changed. ■

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## New Dial Access Numbers

### Kitchener/Waterloo

300 cps 519 886-4870

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## Book Ends

### Using the I.P. Sharp System (new)

This reference is intended for new SHARP APL users, especially those who want to use an application already set up for them on the SHARP APL Service. It covers how to get started, how to run applications, how to save and control workspaces, how to resolve common problems—in fact, almost anything you need to know to use a terminal. Ask your local I.P. Sharp office for your copy.

November 1982, 28 pp., n/c

### SHARP APL Pocket Reference (new)

The *SHARP APL Reference Card* has now been superseded by this completely revised and expanded reference booklet. This source lists and describes all primitive operators and functions now available on SHARP APL. No APL programmer should be without it.

November 1982, 37 pp.

### SUPERPLOT User's Guide (new)

SUPERPLOT is I.P. Sharp's business graphics package. It allows you to plot your own data from any one of our public data bases, on a wide variety of plotting devices and terminals. The new manual is completely revised, and many illustrations show *all* the features (such as pie charts, bar charts, split plots and scatter plots) now available.

October 1982, 168 pp., \$12.00

### FASTNET Users' Guide (new)

Many I.P. Sharp customers already use SNAP for project planning and project management using network analysis and critical path techniques. FASTNET complements SNAP, and is designed especially for users with smaller networks. The *FASTNET Users' Guide* tells you all you need to know to make productive use of this versatile and economical package. (See the article in this issue of the *Newsletter*.)

March 1983, 68 pp., \$6.00

### Aviation Data Base Reference Guide (new)

This handy reference guide is similar in format to the *Financial and Economic Data Bases Reference Guide*. It is designed to be a quick reference source for data base accesses and data definition. It replaces the *Aviation Data Bases Reference Card*.

1983 Spring edition, 28 pp., \$2.00

### Business International Data Base Manual (new)

The Business International (BI/DATA) data base is of interest to all companies doing business internationally. It has two parts: the first is a set of time series data covering up to 300 variables for 131 countries, for national accounts, trade, industrial production, private consumption, currency, labour, and demographic statistics. The second part contains periodically revised macroeconomic forecasts for selected countries.

December 1982, 50 pp., \$5.00

### DISCLOSURE II Data Base Manual (new)

The DISCLOSURE II data base contains current and historical facts and figures for over 8 500 publicly owned U.S. companies. The primary source of data is the reports that companies file with the U.S. Securities and Exchange Commission. (See the article in the January/February 1983 issue of the *I.P. Sharp Newsletter*.)

March 1983, 80 pp., \$10.00

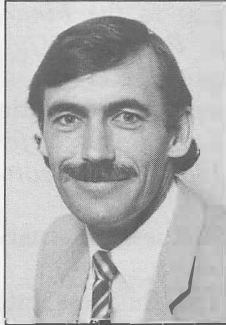
Grant Clarke, Toronto

## Brisbane

I.P. Sharp recently opened a new office in Brisbane, with **Steve Tucker** as branch manager. This is our fourth office in Australia.

Steve is a graduate of the University of Auckland, with an M.Sc. in mathematics.

His varied career took him to Calgary as a programmer/mathematician with Imperial Oil Limited. He then returned to his native country to head a statistics group in the New Zealand Government Research Centre. Later he joined an engineering consultancy in New Zealand, where he managed an in-house minicomputer system. Before joining I.P. Sharp last fall, he was project leader, systems design, with a commercial minicomputer manufacturer in Australia. ■



Sylvain will be leading the commercial development of I.P. Sharp services in the French-speaking area of Europe, with special emphasis on the development of corporate systems. ■

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## DISCLOSURE II Seminars

If you are interested in tracking competition, investment opportunities, and marketing and financial conditions in the United States, then plan to attend a half-day seminar on the DISCLOSURE II data base at no charge.

The guest speaker at the upcoming seminars is Steven Goldspiel of Disclosure Incorporated. For more information, contact your local I.P. Sharp office. ■

## Paris

**Sylvain Baron** has recently been appointed marketing manager in the Paris office. He is a graduate of the Ecole de Physique et Chimie de Paris, specializing in physics and mathematics. Sylvain began his career as a physicist with the largest nuclear research centre in France. He then joined IBM France as a marketing representative, where he first started using APL. Three years later in 1972, he rejoined the French Atomic Energy Commission in the data processing department, when it became the CISI service bureau company.

After he developed an APL service for CISI, he was seconded to SIA Computer Services Ltd. in London (a subsidiary of CISI), where he established another APL service. Before assuming his new responsibilities with I.P. Sharp, he was the head of technical support for CISI in Paris.



Dallas . . . . April 27

Chicago . . . . May 25

On Saturday, February 12, we were stunned by news from Amsterdam that three of our colleagues had been killed in the crash of a light plane.

They were Geoff Oxe, Eddie Fritz, and Maarten Blokland. All three had positions of responsibility and they will be sorely missed.

Maarten Blokland, though not strictly an employee in Amsterdam, had long been closely associated with the Company as a consultant, most recently in the area of package software sales. His tremendous range of personal contacts served him, and the Company, extremely well.

Eddie Fritz was one of the longest-serving employees in Amsterdam, enjoying the immense respect of clients and employees alike for the depth of his technical knowledge, and ability to impart it to others. More recently, his reputation had spread much wider than Holland, due to his

involvement with the APL system distribution group. Eddie had a wife and two young children

Geoff Oxe joined IPSA London six years ago, from a background of service in the armed forces, and later with Massey Ferguson. His work in the communications group took him to Amsterdam just over three years ago, where he was a mainstay in the maintenance of the IPSA network in mainland Europe. His responsiveness to problems was a source of great admiration from all users of the IPSA network. Geoff's wife and three children all live in England.

It was typical of the working relationship between all three men and their colleagues that they were spending their leisure time together learning to fly. We have lost not only colleagues, but friends.

We all share the sorrow of their respective families, to whom we extend our heartfelt sympathies.



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