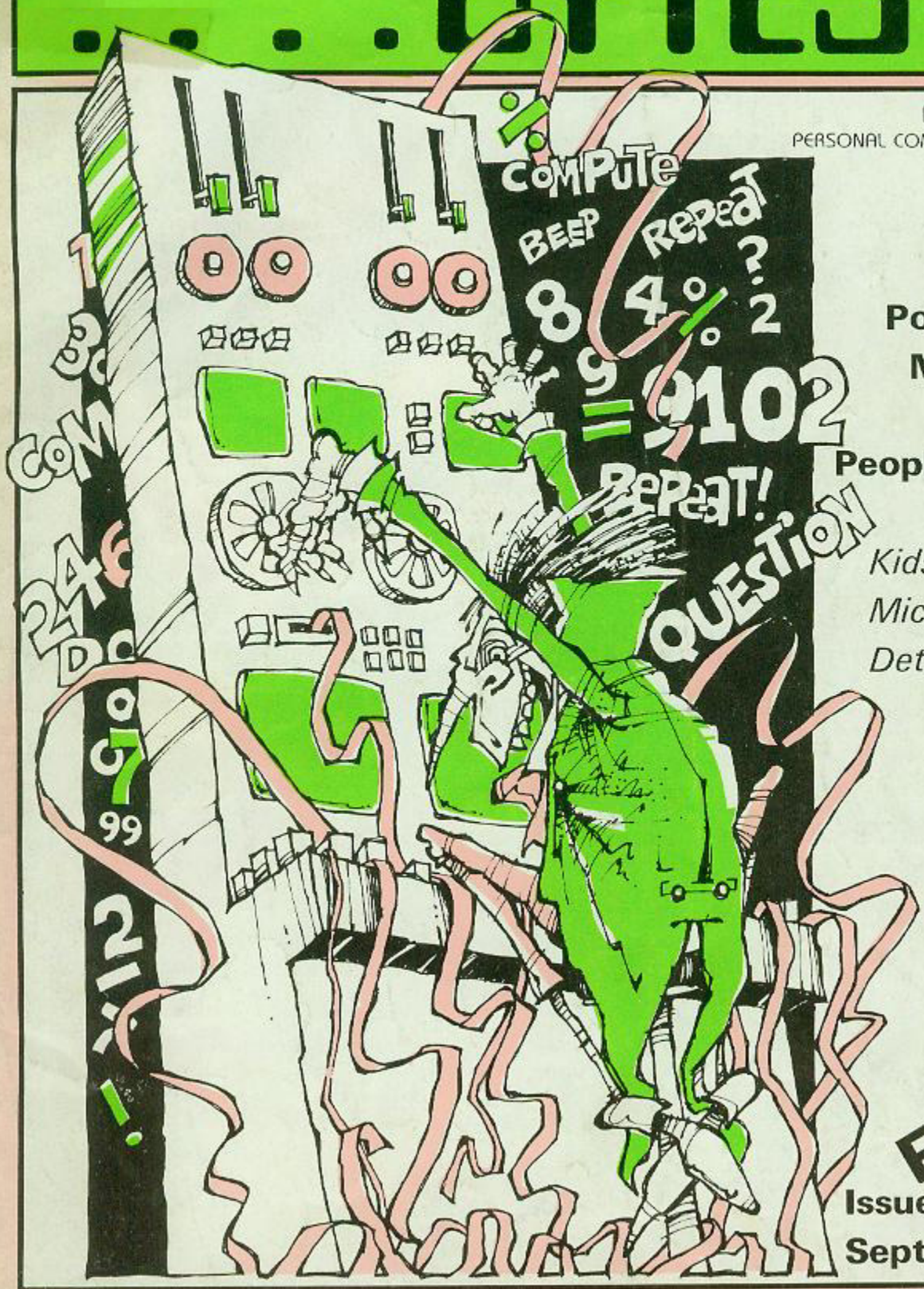
.BITS..8....BYTES..

NEW ZEALAND'S
PERSONAL COMPUTER MAGAZINE



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Issue No. 1
September 1982

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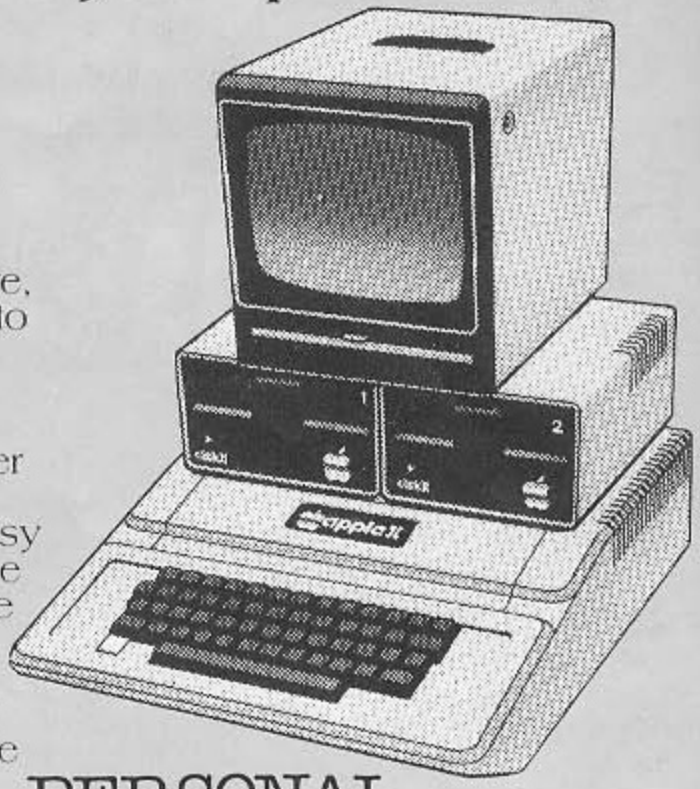

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Contents

BITS & BYTES is published monthly, except January, by Neill Birss and Paul Crooks.
Publishers' address: P.O. Box 827
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Advertising Agent: Richard Saye Advertising
Ph. 794-787
Christchurch
(Dave Telford and Keith Johnstone)

Representatives (advertising and editorial):
Auckland - Cathy and Selwyn Arrow Ph: 491-012
Hamilton - Dave Brown and Mark Bullivant. Ph: 392-200 or 54-692
Wellington - Annie Carrad Ph: 723-431

Technical editor: Chris O'Donoghue
Production: Graeme Patterson, Janine Morrell
Typesetting: Gail Rankin
Cover: Trace Hodgson

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Welcome to your personal computer magazine

Here we are, booted up and ready to run. This magazine is designed to supply information to the hundreds and thousands of New Zealanders who are discovering the potential and pleasure of microcomputers... in their homes, at school, and in the business place.

Yes, there are scores of overseas personal computer magazines. But they are not New Zealand orientated. They have equipment we can't get or can't afford. Their programs don't always fit our way of life: tax aids, are a good example.

BITS & BYTES will bring you the vital New Zealand slant on microcomputing, and we hope to marshal micro enthusiasts to fight for their rights in a land where pressure groups call the shots.

We sincerely believe that the only way this country can have a reasonable future is by keeping up with modern technology. Personal computers are one of the key means of educating and motivating our people in this technology.

Therefore, we find the 40 per cent sales tax on computers, introduced almost flippantly as an adjunct to a tax on photo-copiers, to be:
• Unfair • Unjustified • Uninformed • Unbearable

Join our campaign in the next issues against this iniquitous tax.

Meet the people behind the magazine

Neill Birss is a widely experienced journalist, being a former chief reporter of The Southland Times, assistant publishing manager of Whitcoulls, and news editor of The Press, Christchurch. Keenly interested in technology, he is a home-computer enthusiast. Neill Birss is a graduate of the University of Canterbury in English and Business Administration.

Paul Crooks is also a Canterbury Commerce graduate, and though still in his mid-twenties, is an experienced journalist. He has studied computing, and on an exchange programme in the United States last year looked into the production and administration of personal computer magazines. Paul gained his B. Comm, majoring in marketing and small-business management, studying at first part-time while a reporter for "The Star", of Christchurch, and then full-time.

NEILL BIRSS

PAUL CROOKS

Selwyn Arrow is a senior technician with the Post Office and has been involved in telecommunications and electronics for 22 years.
During that time has has worked in several centres around New Zealand and overseas, and recently spent five years as technical instructor at the Transmission Training Centre in Hamilton.
His previous publishing experience has been in editing club magazines in Dunedin, Wellington, and Hamilton and he has also served as publicity convener for a large national organisation for seven years and two years as a national executive member.
Since moving to Auckland and purchasing a microcomputer he has been involved in the administration of the New Zealand Microcomputer Club, and has been chairman since 1981. From January of that year he has also edited the club magazine, "Micro" and is co-organiser of the annual Microcomputer Exhibition.
As convener of the Sorcerer Users' Group (N.Z.) he writes a bimonthly Sorcerer column for the club magazine. He is planning to extend his cassette-based Sorcerer to include a CP/M disk unit in the near future.
His computer interests cover hardware design and construction, and programming in both BASIC and Z80 assembly language, as well as keeping up to date on new developments in both fields.
Much of his spare time seems to be taken up with writing, making good use of the Sorcerer's word processor. Recently he presented a paper to the Australian Computer Society's Microcomputer Special Interest Group Conference on Software in Canberra.

An Australian, Cathy Arrow has lived in New Zealand since marrying Selwyn. She has worked as a personnel consultant as well as a receptionist and secretary in both countries. Employers have included accountants, real estate firms, business machine retailers and a large stock and station agent.
Interests in scouting, youth hostels, parents' centre and play centre have meant a great deal of committee work and organisation. She enjoys meeting and dealing with people.
Cathy's computing mainly involves using the word processor, and the initial loading of "Munchies" and "Tank Trap" for her three-year-old daughter who, with her six-year-old son, enjoys a variety of activities making it hard for Mum to get more "hands on" experience at the computer.

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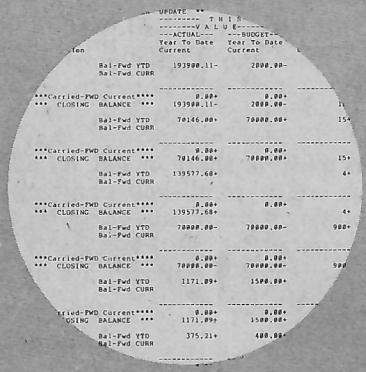

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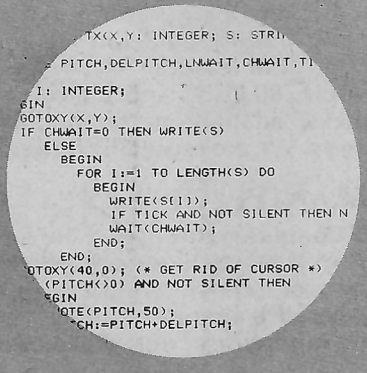

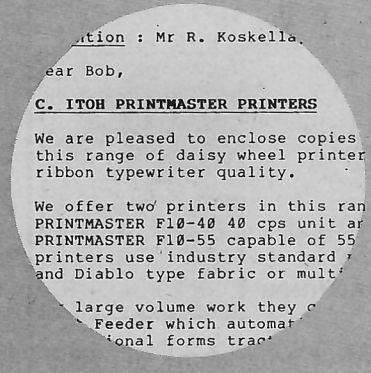

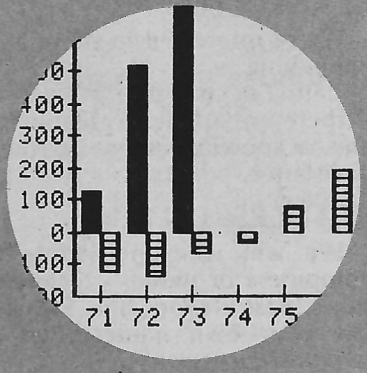

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READER SERVICES

WHAT DO YOU WANT TO READ?

The readers are always right, but the problem is in knowing what they want. Please drop us a line with any suggestions you have for stories or improvements you think are needed to the magazine. Chide us when you think we've done wrong, and we will always be open to story or program suggestions. Don't forget to mark your letter whether it's for publication. Let's hear from you all!

WE WANT PROGRAMS...

If you've got a neat program you'd like to share or sell, let us know. If it doesn't clash with something else we've published or are planning to publish, we may be interested in buying it from you for publication. Drop us a line before you send the program in (not necessary for games programs as long as you explain what it's about and it's in clear, dark print).

.... AND ARTICLES

We are open to suggestions about articles. If you think you may have something of interest for other readers, write in for a copy of our Contributor's Guidelines. We want to have regular columns giving tips to users of at least the more popular brands of microcomputers (such as the Apple, 80 Users and Vic columns in this issue). If you've discovered any tricks, adaptations or modifications write and share them with other users. We are especially interested in hearing from Sinclair users.

... AND PEOPLE

Computer enthusiasts are humans, too. They want to read about people as well as machines and programs. Let us know about the people in your club or school, or just of your acquaintance. People who are doing especially interesting things, or are surmounting personal handicaps, or are otherwise of note will be worth a mention. Let us hear about them.

... AND CLUB NEWS

We're interested in news about your club. Keep us posted on what's happening with your club and tell us if our list of club contacts needs updating or changing. We would welcome a copy of your club newsletter. If there are articles available for reprinting, with payment to the author and acknowledgement to the club, let us know in a note with the newsletter.

READERS' LETTERS

We will welcome letters from readers on any topics related to computers or modern technology. Tell us your gripes, share your good news, pass on your tips. Please use one side of the page, well spaced. But use your own names. Pen names will be acceptable only in rare circumstances.

YOUR PROBLEMS

Something about your computer bothering you? Or perhaps you are baffled by some software. Tell us about it, carefully and in detail, and we'll see if we can get an answer for you. We'll print it in our special readers' problem service. Address your questions to Hints and Help, Bits & Bytes.

FREE CLASSIFIED ADS

BITS & BYTES offers subscribers free classified advertising. (This offer does not apply to commercial organisations or non-subscribing readers). Each subscriber is entitled to a free classified advertisement of up to 20 words in an issue. Each word above 20 will cost 20c. The conditions are: the advertisement must be written clearly with the subscriber's name and address and with the subscriber's signature. It must also bear the subscriber's subscription number (printed on the address label of the magazine) or accompany a subscription order or card.

BBC Microcomputer

The BASIC is close to the Microsoft Standard, but has several important enhancements

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Keyboard:
Full QWERTY layout stepped keyboard with a fifth row of ten user programmable keys. Full set of cursor control keys plus all normal function keys. The switches are of the sealed wafer type encased in a tough thermoplastic mounted in a steel panel within the case.

CPU:
6502 running at 2 MHz.

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Coming up in BITS & BYTES

Feature Articles

Selwyn Arrow, one of our Auckland representatives, recently attended a microcomputer conference in Australia. He presented a paper on New Zealand software to the conference of the Microprocessor Special Interest Group of the Australian Computing Society in Canberra. Next month Selwyn will tell us about the conference and his views on New Zealand software.

Pip Forer will continue his series on computer graphics.

We intend to regularly report on the latest hardware and software becoming available in New Zealand.

Also reports on developments affecting the New Zealand microcomputer scene, including a hard look at sales taxes and duties on computers and programs.

Computer Games

Everyone loves playing games so starting next month Bits & Bytes will feature games programs written by home hobbyists and students, that you can copy and have hours of fun with.

If you have any home-made games or computer puzzles you would like others to share don't hesitate to send us the program listing and your comments explaining how to play. We will pay for any games printed.

As well Bits & Bytes will review the best imported games available and we'll tell you about the most exciting ones.

Remember the games and puzzles you thought of are worth money so write to us today.

Beginners

Confused by computer jargon? Don't worry you're in the majority. We hope to clear some of that confusion with our explanatory notes for beginners, articles pitched at the beginner level and our glossary of computer terms. The glossary begins in this issue and each month we will explain more computer complexities.

Next month Gordon Findlay begins a series explaining BASIC, the programming language most widely-used by personal computers.

Farmers

Cows electronically linked to computers? That's just one of the experiments currently underway involving computers and the farmer. We'll be reporting on this and other computer developments down on the farm. If you're using a micro on your farm write and tell us about the problems and pleasures involved.

In this issue we report on a group of people at Lincoln College producing program for farm use. We'll have articles in coming issues on the growing amount of agricultural software designed to make farms more efficient.

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**********************************
*     DEMONSTRATION HEADER       *
*          CREATED               *
*    TO WELCOME THE ARRIVAL      *
*          OF                    *
*       BITS AND BYTES           *
**********************************
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Expanded business section from October

Our small business and professional section will be in full swing from next month. Included will be:

More from Michael Biel on what programs MicroPro are offering to make businesses more efficient.

A Hawke's Bay lecturer begins a three part series on ensuring that business software really does what you want it to do.

A look at micros in the surgery. What are doctors and dentists using microcomputers for?

Is inventory management a problem for your business? Next month a review of a new book on computer inventory management for small business.

And more...

We will also be bringing you articles on the latest developments involving small business and computers in the United States.

Education

A Hawke's Bay school lets its pupils take computers home at night. The details of this innovative measure will be in next month's issue. And Gordon Findlay will begin a series of tutorials on BASIC, from beginner level.

We're interested in hearing what's happening with the computers at your school, too. Or about any helpful programs or learning methods you've developed. Let us hear about it at Box 827, Christchurch.

High School Students

Want to own your own personal computer? Bits & Bytes will give you the chance to in our exciting competition's starting next month. Also up for grabs will be software and books on computers. More details on page **16.**

Enjoy battling with space invaders and other computer creatures. Check out our computer games and puzzles section starting next month.

We would also like to hear about your experiences with personal computers at school and elsewhere. We welcome any news about your school computer club.

Post that subscription card today

Communications package for micro's

ALBRAN: It keeps the data flowing

By BRENT CARLSSON and ALAN JONES

If recent microcomputer magazines are to be believed, there is considerable interest among personal computer users in microcommunications.

A large number of articles have been appearing detailing simple and complex communications procedures. The US market is resplendent with off-the-shelf communications packages for most popular micros.

The authors have studied many of the readily available packages with a good deal of interest. All those we have seen, however, fall well short of our expectations/desires.

Many do not permit the exchange of anything but ASCII data; some require the local user to open a file manually before one can be received from the remote user and only allow one file to be opened at a time; still others are extremely lacking in scope and/or any reasonable form of line discipline.

It is the purpose of this article to propose a micro computer communciations package based on the procedures used by the grown-ups: the big machines.

Computer communications is not a new idea. The home hobbyist was not the first person to wish to exchange data by phone. Burroughs, IBM et al have been doing just that for a long time and have become pretty good at it, and, in the process, they soon realised the need for a standard way of doing things.

One of the biggest gripes we have with the packaged programs we have seen is that few of them make any real attempt to use an established, standard way of communicating. Take a look at your ASCII code chart. See those funny characters at the beginning of the list? SOH STX ETX DLE ACK NAK etc? They were defined for a purpose. Yet we have seen programs which redefine a completely new set of characters to carry out exactly the same functions the above characters were designed to do.

Overview

ALBRAN (it keeps the data flowing!) comprises many discrete modules, each working with data at one particular 'level' in the communication chain, and each level communicates with its equivalent at the other end of the link. For now, however, we will consider only two levels, the "protocol" and the "access method".

The Protocol

The communications link consists of a physical connection (the phone

Continued Page 29

A Program To Move People By...

About the author:
I am a plant biochemist at the D.S.I.R., and serve as chairman of the Christchurch Microprocessor Users Group (MUGs). My personal computer is a System 80 hay-wired with an LNW expansion interface and, recently, one disk drive. In the brief moments when my son relinquishes "my" computer, I try to practise self-documenting programming in BASIC and sure-to-crash programming in machine code

JAY MANN

When your club has a social evening, what happens? Everyone sticks with the small group that they already know, and no one mixes. So you plan a games night, and the same thing happens. What you need is a way to move the players around in some orderly way, to get as much shuffling as possible, while making sure that everyone gets to play each game once.

The idea is to have a variety of activities running simultaneously. Every twenty or thirty minutes, announce that it's time to move to the next activity. (Make sure each activity can handle the same number of people). At the end of the evening add up the highest and lowest scores, and have some sort of run-off for a few modest prizes.

This program will move your guests around systematically. (I am indebted to Andy Wallace for the idea.) Suppose there are five activities. The first ten people are assigned, two per game. At the end of this first period, half the people will move one game clock-wise, the other half will move one game counterclock-wise... exactly like a "promenade" in square dancing. Meanwhile, the next ten people arriving have been assigned to all games, but these people advance by two games in each round. Ditto for the next ten people. However, since you can generate only (n)x(n-1) unique sequences (wherein is the number of games), for more than twenty players you'll need to provide seven instead of five games. (There must be an odd number of games for this odd approach to work.)

This program (Listing One) is written in Microsoft Basic for a System 80, but should work for any computer. Lines 60 through 170 do some preliminary setups. Change the game names in the data

statement of line 480 to suit your club evening. For less stodgy groups than ours, change the word 'couple' to, say 'person', or 'swinger'.

Lines 190 through 290 form the heart of the program. AIM is a variable that toggles positive or negative, i.e., clockwise or counter-clockwise movement. COUNTER spreads the players around the different games, and is incremented for every second player. DELTA is the size of the jump to the next game number in the next round of play (RN). In line 220 we add or subtract all these computed values from an arbitrarily big number (game number times player number). Then we keep on subtracting GN (the total number of games) in line 230 until the final answer is equal to or less than GN. This is equivalent to division modulo GN, as Pascal hackers will recognize, but it merely is a mathematical way of saying that this array of games 1 through, say, 5, really is a circle rather than a straight line. So game 6 is in fact the same as game 1, if only 5 games activities are used. The final answer is stored in an array B, with dimensions (person number) by (round-number). Because all this takes a bit of time, line 210 lets you see that something really is happening and the computer hasn't locked up.

A summary gets printed to the screen in lines 300-320. Either delete these lines or change them to LPRINTs for hard copy. What you really want are the customized game schedules as shown in Listing Two. Cut these out as they come off the printer and pass them out to your guests. Change the instructions in lines 340-400 as needed to suit the occasion. (Be careful not to have too much liquid refreshment combined with a large number of games, or not many people will manage to make it through to the last round).

This is a trivial program, but one which our Social Club finds invaluable once a year. Some of you might enjoy recoding it in Pascal.

Continued opposite

LISTING ONE

```
10 'GAMES EVENING PROGRAM
20 'JAY D. MANN
    330 CENTAURUS ROAD
    CHRISTCHURCH 2, NEW ZEALAND
    ....
    BASED ON AN ALGORITHM SUGGESTED BY ANDREW R. WALLACE,
    APPLIED MATHS DIVISION, D.S.I.R., LINCOLN
30 ' A PROGRAM TO MIX UP PEOPLE ATTENDING A SERIES OF EVENTS.
THE COMPUTER WILL ARRANGE A SERIES OF COUNTER-MOVING STREAMS OF
PEOPLE,. SO THERE WILL BE AS MUCH MIXING AS POSSIBLE.
40 'CN  COUPLE NUMBER
    GN  TOTAL NUMBER OF GAME LOCATIONS
    RN  ROUND NUMBER
    G$  GAME TO BE PLAYED, ARRAY
    B%  NUMBER ARRAY POINTING TO GAMES
50 '
   YOU CAN CHANGE 'COUPLE' TO 'PERSON' DEPENDING ON THE
CIRCUMSTANCES

60 CLS:CLEAR 1000
70 PRINT"GAMES EVENING SCRAMBLER
...HOW TO ARRANGE  A  SERIES OF GAMES OR ACTIVITIES TO GET AS
MUCH MIXING AS POSSIBLE.  YOU WILL HAVE TO ANNOUNCE, AT FIXED
INTERVALS, THAT IT IS TIME TO MOVE ON TO THE NEXT ROUND.
'
80 DEFINT A-F, H-Z
90 INPUT"NUMBER OF GAMES AVAILABLE";  GN
100 IF  INT(GN/2) = GN/2 THEN PRINT "SORRY, THIS DOESN'T WORK W
ITHOUT AN ODD NUMBER OF GAMES.
PLEASE ADD OR SUBTRACT ONE EVENT AND TRY AGAIN.": GOTO 90
110 INPUT"NUMBER OF COUPLES EXPECTED";  CN
120 DIM B%(CN,GN), G$(GN)
130 GOSUB 420                  'READ IN NUMBER ARRAY
140 GOSUB 450                  'READ IN GAMES ARRAY
150 'INITIALIZE
160 AIM = 1:
   COUNTER = 0:
   DELTA = 1
170 CLS
180 'CALCULATE GAME FOR EACH COUPLE, FOR EACH ROUND
190 FOR A=1 TO CN
200    FOR RN = 1 TO GN
210       PRINT @ 199,A,RN
220       X = GN * CN + (AIM  *  DELTA  *  RN) + COUNTER
230       IF X  >  GN THEN X = X - GN: GOTO 230:   'MODULO GAME NR.

240       B%(A,RN) =  X
250    NEXT RN
260    AIM = - AIM
270    IF AIM  >  0 THEN COUNTER = COUNTER + 1
280    IF COUNTER  >  GN - 1
          THEN COUNTER = 0: DELTA = DELTA + 1
290 NEXT A
300 PRINT"COUPLE","ROUND"
310 FOR J=1 TO GN:PRINTTAB(10+(6 * J)) J;  :NEXT J:
    PRINT:PRINT
320 FOR A=1 TO  CN:
     PRINT A ;  :
     FOR RN=1 TO GN:
      PRINTTAB(10+(6 * RN)) B%(A,RN) ;  :
     NEXT RN:
     PRINT:
     NEXT
330 'NOW TO PRINT UP SCHEDULES FOR EACH COUPLE...
340 FOR A = 1 TO CN:
LPRINT: LPRINT'- - - - - - - - - - - - - - - - - - - - - - - -
': LPRINT
350 LPRINT"GOOD EVENING, YOU ARE COUPLE NUMBER ";  A: LPRINT
360 FOR RN=1 TO GN
370 LPRINT "YOUR ";   N$(RN) ;  " GAME WILL BE ";  G$(B%(A,RN
))
380 NEXT
390 LPRINT:LPRINT"PLEASE MOVE TO THE NEXT ACTIVITY WHEN THE
MASTER OF CEREMONIES ASKS YOU TO.  IF YOU FINISH A GAME EARLY,
THER ARE LIQUID REFRESHMENTS AVAILABLE": LPRINT
400 NEXT A
410 STOP
420 FOR I = 1 TO 10: READ N$(I): NEXT I
430 DATA FIRST,  SECOND, THIRD, FOURTH, FIFTH, SIXTH, SEVENTH,E
IGHT, NINTH, TENTH
440 RETURN
450 'FILL IN STRING ARRAY OF GAMES.  REPLACE DATA LISTS  WITH
YOUR OWN ACTIVITIES.
460 FOR K=1 TO GN:
      READ G$(K):
    NEXT K
470 RETURN
480 DATA DARTS, BOWLS, PING-PONG, POOL, CARDS
```

LISTING TWO

```
GOOD EVENING, YOU ARE COUPLE NUMBER  1

YOUR FIRST GAME WILL BE DARTS
YOUR SECOND GAME WILL BE BOWLS
YOUR THIRD GAME WILL BE PING-PONG
YOUR FOURTH GAME WILL BE POOL
YOUR FIFTH GAME WILL BE CARDS

PLEASE MOVE TO THE NEXT ACTIVITY WHEN THE
MASTER OF CEREMONIES ASKS YOU TO.  IF YOU FINISH A GAME EARLY,
THERE ARE LIQUID REFRESHMENTS AVAILABLE


GOOD EVENING, YOU ARE COUPLE NUMBER  2

YOUR FIRST GAME WILL BE POOL
YOUR SECOND GAME WILL BE PING-PONG
YOUR THIRD GAME WILL BE BOWLS
YOUR FOURTH GAME WILL BE DARTS
YOUR FIFTH GAME WILL BE CARDS

PLEASE MOVE TO THE NEXT ACTIVITY WHEN THE
MASTER OF CEREMONIES ASKS YOU TO.  IF YOU FINISH A GAME EARLY,
THERE ARE LIQUID REFRESHMENTS AVAILABLE
```

A neat way to smoke out the bugs

By CAROL L. MILES

The Graphics Tablet had been plugged in to its slot, its disk booted, and all that would come up on my monitor was pieces of the logo.

I was distraught, and finally gave up the idea of doing doodles in colour via the hi-res system with the Tablet on a 2.5 m wide projection system the use of which I had for that one night only.

Disconsolately, I dumped the Tablet until I could get around to doing some sort of check; the usual procrastination for a disliked job. This time fate was kind, for within three days I was rescured. A slender, stiff package arrived from Apple Pugetsound Program Library. Exchange (A.P.P.L.E. for those "in the know"). Safely sent by air post was the ApTest disk and a well printed short manual by Mike Butler. It was booted as soon as I got home that evening, and Lo! the problem with the Graphics Tablet was solved - a bad RAM on the mainboard. The Tablet was perfectly okay.

A friend with me that evening goggled when I pulled out the old RAM following the advice of the ApTest, plugged in a new TMS4116, and once again checked the Tablet program. Alles in Ordnung; everything okay. She had been absolutely dumfounded that Murphy's Law did not hold and a complete cure was found on my first try.

Carol Miles was born in the United States and attended Northwestern University. Following a stint in the civil service as a physicist she became a photographic engineer. She came to New Zealand with her family in 1965 and ever since has been in the Physics Department at the University of Canterbury. She has patents for various optical devices and has been instrumental in the design of Viewscan, an electronic magnifier designed to aid those partially sighted.

Since that time, about once a month, and certainly before I run any important program, the ApTest will be booted and run.

ApTest is actually a collection of eight tests, three of which will automatically check out each of the ROMs and identify any failings; and each of the RAMs, with an auto-repeat or single pass on the latter RAM tests. The auto-repeat is useful if you have any sort of intermittent bug, or a problem which may only show up after the computer has been running for some time. An example would be a thermal degradation due to too many accessory boards in the bus slots and no fan - simple overheating through overload.

The ApTest is really a compendium of programs of several authors. Mike Butler has other short programs besides RAM and ROM tests; for example, one will check out a D.C. Hays Associates Micromodem II (if you have one), another will verify your disk controller ROM. Steve Wozniak contributed a disk speed test, which requires the use of a blank disk. Were you to use a good disk filled with programs it would be "clobbered" during this test. I keep a special disk just for speed checks since the disk comes out with a polished surface showing that it has had a good going-over by the moving head.

Finally, Charles Suitor contributed a Diskette Alignment Test which checks out the alignment of any disk against any other treated as a standard. It is important to remember that this is not an absolute test, but is relative to the disk you chose to use. The test results are reported on the screen as the second versus the first disk's relative alignment, with enough information to decide if the drive needs adjustment (with instructions how to do it) or if the trouble is serious enough - head wobble or erratic speed - for the drive to go back to the service centre.

ApTest is menu-driven, and hardly takes more than a glance at the excellent, if short, manual to get it to function well and usefully. All-in-all it's an excellent tool, if just for the peace of mind. I use it as one of my prime hardware verification tools for my Apple II, and would warmly recommend it to you. Oh yes, one little caution: A.P.P.L.E. programs are sold to members, so join this user's group first.

Note: Apple Puget Sound Library Exchange group is an Apple user club based in the state of Washington, U.S.A. The membership fee for foreign members is $75 U.S. for the first year and $50 U.S. annually thereafter. Members are supplied with a list of products and a monthly copy of the club magazine CALL Apple.

Computers in the schools:

Exploring the issues and the myths

By NICK SMYTHE

The recent decision of the Customs Department to place penal duty on a special educational offer of Apple computers has sparked much heated debate in both educational and commercial circles. It has served to flush into the open more than the usual quota of myths and misinformation. Are there lessons here for the learning?

Two questions we could initially ask are whether the Apple offer is dumping, and secondly whether it is, in international terms, particularly special. At this moment the Apple II is a well-advertised and fast-selling product world-wide. In the international market it is not yet ageing into complete obsolescence. Unlike some electronics products dumping (in terms of getting rid of) old equipment) is hard to apply as a term here.

Nor is the price particularly special given the various intermediary dealers that have been cut out on the deal. At $1200 it probably would be an example of a loss-leader. At $2000 you could purchase the items retail in the United States. The apparent cost slashing reflects the high initial costings in New Zealand as much as any losses inherent in the offer.

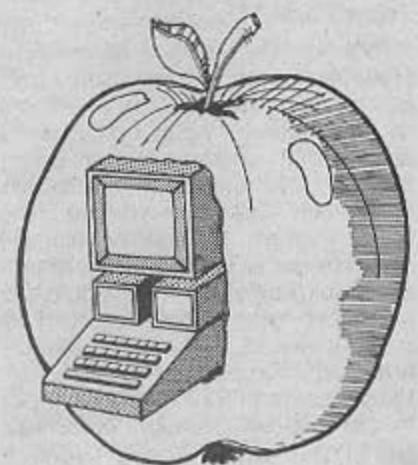
Protecting local manufacturers is a different issue. Apple is clearly using its corporate strength to help promote itself into the school market with aggressive salesmanship. Here perhaps we have a case that a local product needs protection. This is the view of Polycorp. But to what degree can we sustain the argument that a single Apple in schools will really affect schools when they move on to the networked groups of several machines for which the Poly was designed? An Apple presence would give familiarity with one machine but hardly prejudge the issue. Quite a few schools in New Zealand initially bought TRS-80s and then moved to Apples. They may well move on again. Without some form of central funding the larger developments will, for most schools, still be some years away.

We could ask whether the two machines are mutually exclusive? Do they offer the same facilities? If we examine the present arguments two important myths are exposed. Firstly, that hardware is central in school computing, and secondly, that all computers are the same.

The first of these could hardly be denied too strongly. Our attention is focused on the wrong issues. There are many machines with similar capabilities to the Apple and Poly in terms of graphics, colour, operating languages, and other features.

However, no machine is of any value without software (programs) to drive it. It is the software that present lessons, it is the software that takes more time to develop, and it is the software that one hopes will last for some time. By concentrating on the hardware we miss the point that the capabilities of the systems will depend on what programs we can put into it. This is not just a matter of ready teaching units but of alternative languages and programming tools.

The main relationship between the choice of computer and the software it has is that a very numerous computer gets to share the costs of any program production over a lot of users: its programs can be cheap. A machine with small numbers isolates itself from a wide user community and inevitably has expensive software and less of it. A large user community, (and some machines number over 500,000 users), means a large choice to buy from and a large market to sell to. Software, not hardware, is the key issue.



Secondly there is the question of whether there is a single, ideal school computer. There seems to be an implicit assumption that either Apple or Poly is the right choice. Certainly there are benefits in having a standard school operating system so that all schools can use the same programs. But some machines perform some tasks better than others. The Poly scores as a classroom machine for one reason in that it is built far more robustly than the Apple. It is a sealed unit. This very strength in one areas weakens it in another. The great joy of the Apple is being able to take its lid off and plug various laboratory devices into its peripheral slots. In some teaching uses this flexibility is very useful..

Keeping Apples out as a strategy to protect the home producer seems, in this light, rather short sighted. Penal duty is not protecting a market so much as denying a useful (and subsidised) resource to schools. Even if every school got Poly machines next week those Apples would still be a useful resource.

A final red-herring which has been aired is that if Apple were to gain the dominance in schools this would leave the market open for domination by a single, American firm and the education system could then be squeezed by a monopoly. This idea fails to stand up to scrutiny. There are now at least five machines on the international market that will run any Apple software. These are basically in competition with each other. Any of these could be used to run a developed software base at any time. It would be hard to argue that, of the two present contenders, the Apple is the candidate of potential monopoly.

Continued over

An Apple for the teachers...

The special offer of an Apple computer system to schools closed on July 23 with 372 orders for the educational package, at one-quarter the normal school price.

The offer consisted of an Apple II plus computer, one Apple disk drive, the monitor III 12in green screen with integral stand, and 30 BASIC programming tutorial manuals - all for $1200. The cost to schools is usually $4812.

After a complaint from the Polycorp organisation the Customs Department then ruled that a "dumping duty" of $820 be paid on each Apple II educational system. Despite protests and submissions from CED Distributors the Minister of Customs (Mr Allen) upheld the duty. The Government would have collected more than $260,000 in revenue from schools with this duty.

Rather than being asked to pay $1200 for the Apple II educational system and $820 to the Government, Apple has now increased the total price to schools to $2020. No duty will need to be paid, it believes. This will bring the price to less than half the normal purchase price for schools.

The availability of LOGO to many schools so soon after its release by Apple will mean that New Zealand will have an early opportunity to get established with this forerunner of future education methods.

AUCKLAND REPORTER

"Anything that the Poly can do, the Apple can do - the reverse is not the case." That's the statement of Mr Brian Eardley-Wilmot, sales manager of CED Distributors, which has the Apple franchise for New Zealand.

He was referring to the complaint from Polycorp that led to the Customs Department's imposing a dumping penalty on the $1200 Apple offer to schools, a matter which seemed still not resolved at the time of going to press.

Mr Eardley-Wilmot said the Apple was the machine better suited for educational purposes. It has a wider range of educational software already available.

"Poly was frozen about one year ago whereas the Apple computer is being continuously enhanced. Twice last year and once this year. This process is going on all the time, but it still remains the Apple II."

"The Apple II can now run BASIC, full UCSD Pascal, LOGO, Fortran, COBOL, FORTH and LISP. It can utilise CP/M and OS9 operating systems, and with suitable plug in boards it can use software for many microprocessors, including the Z80, the 6809 and the 68000. Hard disks are now available from 5MB (million bytes) to more than 100MB capacity."

One quarter (120,000) of Apple II's throughout ththe world were in educational establishments, giving a significant availability of educational software. Even before Apple's offer to schools more Apples were in use in New Zealand schools than any other computer. "Therefore there is more educational software available from overseas and locally," Mr Eardley-Wilmot said.

"We understand that Poly software was originally produced on Wellington Polytechnic Apples. And that a recent sent high school teachers' in-service computer awareness course at Wellington Polytechnic used Apple II's.

"For anyone even to consider that a billion dollar company like Apple Computer Inc was taking any action to slow down Poly's entry into the export market was absurd. "Apple's main competitor at this time is IBM."

Because Apple competed on a world market economies of scale enabled its products to be less expensive than those of small companies with very limited capital and a small home market. "This market is made even smaller by Poly's stated policy that is is specifically designed for the education market."

Of Polycorp's applying for the dumping tax, Mr Eardley-Wilmot said, "It was ridiculous of Polycorp management to embark on this in the first instance. They must have realised that schools would have the financial penalty put on them."

Apple is one of the two best sellers of microcomputers in New Zealand. Students familiar with Apple computers at school can extend this usage when leaving as Apples are in wide use in many businesses, professions, and industries.

A large majority of software and plug-in peripherals are not produced by Apple Computer Inc. This means that schools are not "locked-in" to any particular supplier or manufacturer of software or hardware. Apple says it wants people to produce complementary hardware and software.

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We are witnessing a commercial sparring match made serious only by the eventual educational effects of its outcome. What needs to be said is that, at their market price, neither of these machines is particularly competitive on the world market. The newly released BBC computer is cheaper and more powerful than either. The Apple II is rumoured to be shortly replaced by an enhanced, cheaper (but program compatible) new model. Clive Sinclair of ZX-81 fame is about to release a colour successor complete with a networking capability and a promised $240 disk drive.

In microcomputing it is always true that if you wait something better turns up. Usually the delay is not merited. But for once that advice may be worth heeding. The Apple II and Poly are in a very competitive world and just at the moment a lot of new, impressive rivals are emerging. We may just be in a short period of slack water between waves of new machines.

Many teachers are saying that the choice of a recommended computer has come too tardily. It would be ironic if in the heat of competition it actually came too soon.

Executive's fighting pledge

"We intend to be around for some time." When Janice McKenzie, education services manager of Polycorp New Zealand, Ltd, says that you feel it's more than a hope - it's a fighting pledge.

Polycorp is not saying how many of the robust Poly machines have been sold to New Zealand schools, but business certainly has not dried up. Mrs McKenzie has just overseen the installation of Polys at Southland Girls' High School, and there is interest from at least one Government Department, and from an overseas State.

One of the best sales has been to Rotorua, where four high schools each have a network of 10 Poly machines, plus another in the high schools board office with a link to a Prime mini-mainframe.

When conceived of in Wellington, the Poly was spoken of as a teaching machine for computer assisted learning, says Mrs McKenzie. But it has now four main roles in the school:

- In computer awareness.
- In computer-assisted learning, with the lessons augmented from disks.
- In computer studies and programming. It is used in learning programming, and can be used by computer clubs.
- In school administration. A good administration program is being developed, allowing for student databases as well as accounting tasks.

The systems are designed with the teacher in mind who know little of computer operation. All a teacher has to know is how to use a subject menu (each subject disk has one), using four control keys. The teacher uses the computer when it is convenient in the lesson; the run can be broken and continued at will.

It is not cheap (see panel), but, Mrs McKenzie says, the machine has many sophisticated features. "The standard pushed the price up," she says.

Janice McKenzie, education services manager of Polycorp New Zealand, Ltd, and a Poly unit.

Polycorp sees one of its strengths as being that the courseware is written by New Zealand teachers for New Zealand school curricula. The impact of this comes home when you see a colour simulation showing how winds dump their moisture as rain on the West Coast of the South Island and then parch Canterbury as the hot nor' westers.

The courseware written for the trial period last year is rapidly being supplemented by teachers with access to Poly's writing new material, says Mrs McKenzie. Already a group has started up among teachers willing to swap or share programs.

All programs come with documentation in the form of either student or teacher notes, exercises, or task sheets.

Available or on the drawing board are programs for computer awareness (15), computer studies, mathematics, accounting, technical drawing, geography, physics, biology, remedial English, and other subjects.

One of Mrs McKenzie's tasks is training, and this is provided at the buying school in three facets:

- General systems management; i.e. becoming familiar and confident with using the hardware, floppy disks, etc.
- Introduction to BASIC
- Use of the computer-assisted-learning modules in the classroom.

Mrs McKenzie, a former geography teacher, also deals with sales and customer services. Polycorp has a very small executive: apart from Mrs McKenzie there are the general manager, and engineering manager, and an executive assistant.

A private company, Polycorp's shareholders are the Development Finance Corporation, 75 per cent; and the software firm, Progeni, 25 per cent. (It is not tied software to Progeni, however).

A factory in Newton makes the Poly, which has a 70 per cent New Zealand content, the printed circuit boards being made in Auckland and the cases in Paraparaumu.

A score (at least) of colours

The Poly system is a complete package of hardware, software, courseware, and training.

In network mode, one to 16 Poly units can be connected to a single network controller incorporating 8in flexible disk storage.

Polling is used to identify each Poly and to determine whether any data transactions are to be performed.

A closed ring carries synchronous serial data.

Extensive error detection and recovery is provided to make sure information is not being lost because of disturbances caused by actions such as turning off a unit in the middle of data transfer.

The Poly console unit incorporates in one case the main processor, keyboard, and video unit. Robustly constructed, but light and easily handled (Jan McKenzie handles it with ease), there is a minimum of switches and cables.

A Motorola 6809 8-bit processor with 16-bit arithmetic, 64K bytes of RAM and 20K of ROM, a built-in speaker for sound, and a programmable time and memory management unit are the features.

The QWERTY keyboard has 71 keys, upper and lower case, four-cursor-control keypad, a numeric calculator/help key (allowing the user to break temporarily out of a program to perform, say, a calculation for a school problem) and special next, back, and repeat keys for computer-assisted-learning courseware modules.

The 35cm colour screen on the VDU can produce up to 21 colours with texturing. (This is the official total, the programmers believe they can obtain about 50 shades).

A wide range of screen formats is possible including dual 40 col x 24 line text; single 480 x 204 pixel graphics; and dual 240 x 204 pixel graphics.

The screens are displayed singly or in a range of combinations using mixing or overlaying.

The Poly network controller, besides controlling the system of one to 16 Polys, stores programs and links to any peripheral with an RS232C interface. Features are: a 6809 internal processor, a 1 x 8in flexible disk drive, 64K of internal storage, 600K of disk storage and the RS232C port, a POLYSYS operating system, compatability to read and write to FLEX format disks, POLYNET communication with broadcast facilities, and facilities for up to three extensions of disk capacity, each of 600K.

A Poly processor is available without network capability, but it has all the other features and can be upgraded to composite 6809/Z80 processor capacity for CP/M compatability.

SCHOOLS PRICE

Prices to schools (thus sales tax-free) for typical configurations are:

- **Console unit ready for networking (with a processor and 64K of RAM and 20K of ROM) and a disk drive . $8090**
- **Single-user system with disk storage but no networking facilities (84K total) $6865**
- **Office stand-alone system with monochrome terminal, no disk extension (64K total) $5000**
- **Single-user system with serial interface for cassette recorder and printer. Not connectable to a network or disk drive (84K total) $4110.**

OPERATING SYSTEM SOFTWARE

The POLYSYS operating system is designed for use in teaching and training, especially where there are clusters of console units linked in network mode to a central-disk storage unit.

No programming expertise is required to operate the system, and the unique broadcast feature allows all units to be loaded simultaneously with the same courseware program.

POLYSYS manages all desk accesses and the placement of files on disks. This complete handling gives security of data and simplicity in file handling by programmers.

The FLEX operating system is available on the Poly system, enabling the use of a wide range of business software. Polycorp will also soon release a CP/M operating system for use on the two stand-alone systems.

PROGRAMMING SOFTWARE

POLYBASIC comes free with the system. It is an extended BASIC interpreter embodying all the standard commands with simple but powerful extensions to handle the special features of the Poly, including screen-handling and graphics. There is a compilation option. Two levels have been implemented on the equipment: 16K POLYBASIC for colour, multiple screens and advanced graphics; and 24K POLYBASIC for colour, multiple screens, and super-graphics.

PILOT is also supplied free with the system. This is a simple user language allowing those with little expertise in programming to write their own interactive teaching programs. POLYPILOT is compatible with common PILOT with extensions to use Poly features. Standard POLYBASIC statements can be mixed with PILOT and therefore use the high-resolution graphics and multiple screens.

Omegasoft Pascal, developed in California and including features for handling teletext, colour, and chunky graphics, is entered and edited on the Poly screen editor, which is included on all Poly units. Omegasoft assembler for 6809 code is available with the Pascal option.

The screen editor enables editing use of text that appears anywhere on the screen in all programming languages and the word-processing package.

Polycorp is proud of its video screens. These are transparencies, one in front of the other, two for text, three for graphics, and one for special background. Each screen may be switched on or off and mixed as required.

Continued opposite

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The programmer may determine when particular screens are to be displayed and to which one data and graphics are to be written.

Screens with text and graphics can be simultaneous and text and graphics can be superimposed without removing the original.

The screens are available in the following order of overlay priority:

- Text 1
- Graphics 1 (240 dots across)
- Text 2
- Graphics 2(240 dots across)
- Fine graphics 3 (480 dots across)
- Background (half intensity colour)

Free mixing of text and graphics is possible, text windows having to be specified

The use of simple select and display functions allows screens to be prepared when they are not displayed. Each new screen to be displayed can be built up before being switched on to the video. This allows very effective animation by rapidly switching from one screen to another.

The overlapping of screens allows one diagram to be fixed while the second diagram in any animation moves either in front of it or behind it, without the necessity of having to redraw parts of the diagram.

The Poly console unit uses the teletext character set for specification of data on text screens. This allows upper and lower case, seven colours, reverse video, two types of chunky graphics, flashing fields, non-displayed fields, background for characters, ASCII control codes for cursor control and double-height characters.

The graphics screens allow the specification of graphics as either aline or boundary description; the displaying of forms anywhere on the screen independent of their original position, the filling of the area within a defined boundary with any regular pattern of pixels

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A micro enthusiast's guide to Sydney

By ROGER ALTENA

Recently on holiday in Sydney I indulged my hobby by hunting out all the microcomputer-related shops that I could find.

Since I own a Commodore computer, I was especially on the lookout for accessories for my machine. Much to my disappointment, the only PET that I saw was on a video clip in the Australian equivalent of "Ready to Roll". It appears that Commodore is nowhere near marketing the PET as strongly as in New Zealand. Software for the PET was also restricted to packages such as Avalon Hill games, which produce versions of the game for the three main brands of micro's all on the one cassette.

The most popular brand of micro was (surprise!) the TRS80. This includes the Model 3 and, more recently, the Color Computer (complete with American spelling). The amount of push behind these products is amazing. For example, while I was in Sydney, Radio Shack was holding a large exhibition at Centrepoint, the major shopping centre in the city. There must have been above 200 computers spread over six or seven rooms, demonstrating educational, recreational and business software including Visicalc and Scripsit. One room was full of Color Computers running various games. I particularly enjoyed "Dino Wars" and "Skiing".

Other brands featuring in the market are Atari, Apple System 80 and Sorcerer. Also popular were several brands of video games (one which included a great version of baseball) and dedicated chess, backgammon and Othello-playing computers. Most major department stores will sell these in their games department.

I recommend the following places (in no particular order):

• Computerland, ground floor, 31 Market Street. This shop sells all major brands, software, reading matter and accessories. Also being displayed was a Corvus hard-disk drive for the Apple.

• Computerwave, lower ground floor, Myers Building, 436 George Street. A little corner demonstrating Apple, Atari, Texas Instruments and Sorcerer. A good place to go at lunchtime for a game of "Star Raiders!".

• City Personal Computers. Another store selling most major brands. A good selection of books and magazines (including lots of cheap back issues) and a lot of software.

• CISA, 89 York Street. It must have the largest collection of computer literature in Australia! Also sells software and accessories.

• Dick Smith, 125 York Street. I was impressed by the Votrax voice synthesis system they had running there, although it was a touch expensive (over $A500). Also selling were the new Dick Smith Printer (a Seikosha GP80M with a different label), and various other bits and pieces.

• Tandy Radio Shack, 77 York Street. A shop full of TRS gear, if you are into that sort of thing. Again, the strong marketing these things get is evident

There are also several shops in the suburbs. Also spotted in the central city was the IBM shop, with several small business computers on display.

Watch out when shopping in Australia as costs may be deceptive. When the price of an object is converted to New Zealand dollars and duty is paid, that object may not be as cheap as it first seemed.

While in Sydney, a good source of information is the yellow pages (under data processing), and it is a good idea while still in New Zealand to make up a list of places to visit by going through an Australian computing magazine with a map of Sydney.

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Auckland's micro show

By CATHY ARROW

The most successful New Zealand microcomputer exhibition to date drew a record crowd of 2500 to this one-day event in Auckland on Saturday, June 19.

This annual event is organised by the N.Z. Microcomputer Club, Inc., a voluntary organisation with a membership of nearly 200.

The visitors were obviously fascinated with the excellent variety of microcomputer technology and applications displayed by the 28 companies in the commercial section.

These ranged from the Sharp hand-held microcomputer, which includes a tiny printer, to large capacity multi-user computer systems built into a desk.

Much public interest was shown in the two microcomputer-controlled industrial robot arms that are part of a University of Auckland project.

Other eye-catching displays were a light pen which could draw dots, circles and lines in several colours directly onto the BMC screen, the Osborne 1 business computer, the size of a portable sewing machine, the VIC20 colour micro, which is half the size of a briefcase, and a computer-controlled cash register system which automatically updates the stock quantity and prints out lists of replacement items as well as sales totals.

Great interest was shown in the club members' computers and equipment. These ranged from home-built computers such as Dream 6800, ETI 660, S100, 2650, etc, to commercially available machines showing a wide range of personal and home-computing applications. The most popular of these appeared to be the Commodore microcomputers with over a dozen PET's on display.

Computer games also proved popular with younger persons, especially those games with colour and suitable noises.

Information about the various microcomputer user groups which form part of the New Zealand Microcomputer Club was available at the club stand, along with details of the launching of "Bits & Bytes" Copies of the club magazine, "Micro", had sold out by mid-afternoon and the inquiries about membership kept the volunteers minding the stand very busy all day.

Many new members joined the club on the day so that they, too, could learn more about this useful "wonder of the eighties", and the club is still receiving applications and inquiries through the post and by phone as a result of the publicity.

With several of the visitors to the exhibition being interested enough to travel from as far afield as Hawke's Bay, Wanganui, Palmerston North, and Whangarei to attend this year, the Auckland based groups are doing their best to spread the "good word" about personal computing.

One commercial exhibitor, Viscount Electronics, even travelled all the way from Palmerston North just for the show. Its stand featured Instant software and a good range of hard-to-get magazines and books.

The remainder of the exhibitors were from the Auckland region. Several featured items new on the market. These included the Fujitsu Micro 8, the locally designed and produced full-colour modification for the System 80, and the New Zealand-designed Poly educational computer.

Also on display and for sale were a wide range of printers of many types, visual display units from Philips, memory chips from VSI, and printed circuit boards from Minitech.

Two very popular stands were those of the book shops. They did a brisk trade selling all kinds of microcomputer and "Dungeons & Dragons" series books.

Most of the microcomputer interest groups from the Auckland area were in attendance with their own displays.

The Auckland Technical Institute and at least one school were there to show off their microcomputers and provide information on computing courses.

One aspect not able to be included was on-stage presentations to highlight home, personal, and small-business applications. This was mainly because lack of time, organisers, and a separate room large enough to house the interested crowds.

All the commercial exhibitors questioned were very happy with the organisation.

Several exhibitors reported that they had more people view their products in one day than they usually see in a year. Sales directly attributable to the event from just two exhibitors total $32,000! Many others have suggested that prospective sales are sure to greatly increase this total.

The organisers are already planning the Fourth Annual Microcomputing Exhibition for 1983, and so in the words of most of the exhibitors, it will be back again next year, bigger and better.

What to look for in your first machine: where and how to buy

By JOHN WIGLEY

Some of the common questions new members of our club as ask: "What computer should I buy?"; "Is such and such a computer a good one?"; or the most difficult question of all, "What computer do you recommend?"

Let's assume that you are thinking of buying your first computer and you are as confused as I was. You will have been to a few shops and talked to a few people, and the confusion will remain. Let's be systematic and make the final big decision a series of small decisions.

For a start let's redefine our questions:

Question one - What use have YOU for a computer? Business? Education? Hobby?

Expanding the answers to question one we can look at these as follows:

Business users, a subject I do not intend to deal with in any depth. If you are interested in buying a computer for business use, then all the other points I have to make are important, but buy from a professional who can give you full support in servicing.

Education (a) Professional educators are quickly dealt with as the school or institute will already have some policy on this as compatibility is all important.

(b) Home education can be likened to hobby use; learning to use your computer is an education!

Hobby use - by far the main interest and the one I intend to deal with at length. What reason do you have? or what did you tell your wife? "Johnny can learn to use this at home, it's just like the one they have at school and we want him to get the best education he can."

I am quite blunt about it, to me it is a piece of equipment like a model railway or a hi-fi system, to be played with, to learn, to understand how it works, and to enjoy it.

Let's quote Rodney Zaks, who is the head of the Sybex publishing company: "Buy the cheapest computer you can, and assume that it will be the wrong choice. Play games with it, learn to program it. On the basis of that experience you can then decide what you want in a computer and make an intelligent choice when the time comes to move up."

It just so happens that I bought my first computer after making a decision along these lines.

Now New Zealand is a different market from America, where $1200 will buy a complete system with change to spare. So in New Zealand we have to be a little more careful in our decision. Shipping costs, our iniquitous sales tax, and our dropping exchange rate all raise the price of computers to double or treble the American price. So while I agree with his statement, our first computer is not so easy to choose or pay for.

Our next question is, "What is the key to buying a computer?" - software; languages; support; service; self-education; self-fulfilment.

Software - This should be a major factor in any decision. Without software a beginner is lost. Good programs are hard to write, so you need a wide choice that you can purchase, or dare I say it, borrow, or swap with friends.

Languages - Most machines nowadays run BASIC so this is pretty standard. However, each manufacturer has done his best to ensure that his BASIC is slightly different from everybody else's. So you are really confined to BASIC programs for your type of machines. The ability to run other types of languages is important as you move into programming e.g. FORTH, Pascal, C, RUNIC, COBOL and other large numbers of languages are available

Support - Another major factor. What does the maufacturer make available to allow you to expand your system? Is technical information available? Does the manufacturer put out additional manuals, etc? Have a good look at this before making a decision.

Service - To me this is the most important criteria. I can speak from bitter experience. Make sure servicing is available and that you are not going to be left in the lurch. If the retailer goes out of business, will the distributor service your machine?

Self-education and Self-fulfilment - Not the least of our reasons for buying a computer. Learn and educate yourself and success with this leads to a sense of self-fulfilment. Very important and good for the ego.

Now let's look at the big three plus one in computers.

- TRS80 (Tandy)
- Commodore
- Apple
- Sinclair

The **TRS80** started the popular computer boom. It was the first and has spawned copies such as the System 80, C/Micro, Video Genie, PCM80, all names for the same computer made in Hong Kong, which is compatable with the TRS80. The original TRS80 has gone from 4K memory to 16K to 32K with expansion box and from Model 1 to Model III and the latest Model 16. Plenty of software and accessories are available.

Continued over

From Page 19

What to look for in your first machine

Commodore came into the market as a complete package. The first on the market to offer this, but nearly everyone does now. Not for Commodore the dangling wires and tape-recorders stuck all over the place, but a complete unit. Once again there is plenty of software and the VIC is one of the cheapest computers on the market.

Apple followed the line of expandability. It set out to produce a basic unit that could be expanded to cover any need. By making technical details available it encouraged other manufacturers to make accessories available for the Apple. Plenty of software and accessories are available, but at a price. The Visicalc program gave Apple a tremendous boost and sold a lot of computers.

You are now ready to go shopping. Take some time, wander around the shop and have a good look. Probably a particular computer will stick out as being the one you are most interested in. At this stage, talk to the retailer and get him to give you a demonstration. Sit down and have a go yourself.

Don't be shy. Make sure you can operate the computer and get it to do some of the things the salesman did.

Now comes the important part. Take your cheque book, Visacard or Bankcard in your right hand and firmly place it in your back pocket. DO NOT remove it. Say thank you very much and leave the shop clutching in your left hand the glossy brochures and business card of the salesman. Go home, read the literature and if you still think this is the machine for you, contact the special interest/user group for that machine (refer to the club list in "Bits & Bytes").

What if there is no special interest group? As a first-time buyer, choose a model that has an active special interest user group. Go to a meeting or talk to members who will be pleased to demonstrate their machines to you and answer your questions. They will be happy to help a beginner. Discuss with members the accessories needed and find out about servicing and the attitude of your retailer. If everything checks out then you are set to buy.

Take your list of queries and questions back to your retailer, by now he should be your friendly retailer and make sure you get satisfactory answers.

Sit down in front of the computer which should be set up exactly as you intend to buy. Switch on and load and run a couple of programs. Run them through, switch off, and take a deep breath. Now is the time to talk turkey. Keep your stanglehold on your money (by now your right hand will be numb) and discuss terms with the retailer.

What follows is nothing more than "Consumer" has been preaching for years. It's your money! Service is the responsibility of the retailer, this is well established by law.

Price is between you and the retailer and the best of luck.

Guarantee (this is the crunch). If the machine is as good as the retailer says then he will be happy to give you a guarantee and I don't think 90 days is long enough. Anything he says he should be prepared to put in writing.

If you need finance remember the retailer loses nothing by this so you are still in the bargaining seat.

Now you have bought your computer, from a dealer of trust, at the best price and with a proper guarantee.

As you expand your system you will go back and purchase from him. Satisfaction all round. Good luck and good buying.

(This is the text of a recent presention to the N.Z. Microcomputer Club by John Wigley Reprinted with permission from "NZ Micro" and the author.)

TELL US WHAT YOU THINK

The producers of BITS & BYTES are interested in getting reactions, suggestions, and criticism from readers. We want to know what the micro enthusiasts want. So put pen to paper or hook up the printer and send your comments to:

Freepost No. 125
BITS & BYTES
Box 827
Christchurch

You don't need a stamp if you address your envelope carefully in this way.

NEW PANASONIC

Panasonic's new 16 bit microcomputer has been introduced into New Zealand by the Microcomputer Electronic Company only a month after its release in Japan.

The Panasonic JB3000 provides flexible computing power across a broad spectrum of user requirements. It ranges from a 96K RAM, 160Kbyte floppy disk storage unit up to a 224K RAM, 4.8 Megabyte floppy disk storage unit and beyond, with total flexibility within this range.

The system is entirely modular with CPU, cathode ray tube (CRT), disk drives, printer and appropriate interconnecting devices able to be configured and tailored to suit the end-user's system and budget specifications.

The system also includes a colour CRT option and either an 80 column or 132 column dot matrix printer.

The JB3000 will start at approximately $4000.00 and at the top end of the price spectrum with such options as colour CRT, 132 column printer and multiple 8" disk drives included, will sell at approximately $13,000.00.

There is a wide range of application software available to run on the JB3000 due to an ingenious utility which converts CP/M software to MSDOS Software. MSDOS is the operating system under which the application packages run on the JB3000.

The use of MSDOS creates a direct path to the UNIX operating system which, from reports of the 1982 National Computer Conference held recently in Houston, Texas, will be the most widely used operating system for all computers.

The Micropro Products such as WordStar, CalcStar, DataStar, etc, are also able to be used on the JB3000.

Strange micro organism smites Auckland

By PAUL BRIGGS

In the Western world, New Zealand has developed several unique features. Because of geographical isolation, all imported goods have to be shipped by sea or air, a fact of life which has raised the income of those involved in this trade quite considerably.

A small country population in a country much suited for agriculture has meant any goods of a reasonable technological level have to be imported. Viewing on television of overseas programmes has developed a taste in our society for sophisticated items of necessity such as cars, high fidelity, stereo systems, heated toilet seats, etc. The same overseas influences have unfortunately failed to bestow a comparable purchasing power, a characteristic that some claim is a fault of New Zealanders themselves. Such an accusation can of course be dismissed as patent nonsense.

A combination of all the above have led to the typical consumer scenario of a hard-working individual who just manages to buy what he or she desires, but then finds that it is out of date in one or two years. Reselling the item at a loss and purchasing the current model is usually financially impossible. This situation has created a mild malaise, Modificatus generalum, commonly known as customising. This affliction explains the appearance of hot rods, tin-can-and-string stereos, and some rather dangerous electric toilet seats.

Unfortunately, this disease has recently cross-fertilised with the microcomputer rash, Giganteus calculatus (Dad-can-we-have-one-to-play-space invaders-too?) to produce a virulent mutant, Computeris improvisus, or hardware hacking.

DISEASE CHARACTERISTICS:

Many symptoms of C. improvisus are shared with G. calculatus:

- Little spare time and money.
- Social life whose magnitude begins four places to the right of the decimal point.
- Spouses who suddenly find a spa pool in the backyard (coinciding with the appearance of an Epson MX80 printer at the computer table).
- The ability to talk for hours on end without any word being understood by a non-sufferer.
- Red watery eyes (similar to those of TV addicts).
- Rather large and alarming barrier defences to prevent invasion by neighbouring children.

However, some effects of the pathogen are unique:

- A tendency to salivate on reading electronics magazines.
- Burn marks and holes in trousers, carpets, desk tops, etc.
- Loitering near technical bookshops.
- Accumulation of electronics spares (see: Rubbish, junk), often displacing the car from the garage.

CASE STUDY:

Several simultaneous outbreaks of C. improvisus have occurred recently in the New Zealand Microcomputer Club. John Dyer, John Briggs, and David Dobbs were seen by various people to disappear into their dwellings for days on end, uttering strange mumblings and attacking component boards with a determination rarely seen outside TV quiz games (the ones with expensive prizes). It seems that all three were involved with System 80 microcomputers (also known as C-Micro, Video Genie, PMC80, TRS80 in various countries) and were in the situation previously described: all liked the computers they owned (along with large software collections) but wished to expand the computer to full configuration (cheaply) and have some of the features available on the other newer brands of computers, such as colour. The following events resulted:

John Briggs, besides installing upper-lower case characters, developed a small board that fitted inside the case and which gave a full colour display while still retaining standard 64 character-per-line graphics; eight colours are produced, and any combination of background and foreground colour can be individually set at any of the 1024 screen locations. Other software selectable features included were the activation of a relay to enable sound effects through the external cassette port and the ability to set background colour brilliance at full or half intensity to allow easier reading of the text. The board is software compatible with all known programs, but will not give you breakfast in bed.

John Dyer decided that expansion units for the system were too expensive, and created a compact circuit which controlled disk drives, again installed inside the case. Just plug in the disk drives and start performing serious data handling and storage (no hobbyist I know can really justify this, but I found 4002 reasons any way). The board runs two disk drives and will support all major disk operating systems.

Dave Dobbs took time off from blowing up TV sets to improve System 80's by removing the streaks from the video display, improving the cassette reliability, internally expanding the memory to full 48K user RAM, and running the unit double speed 4MHz clock frequency). He must be fit because he was not even sweating after all these accomplishments.

One of the side effects of C. improvisus is mild personality distortion, and this is evidenced by all three victims suddenly becoming generous and offering all the above upgrading to System 80 type owners for a small consideration.

Several medical authorities have concluded from the evidence presented here that the sufferers are beyond remedial treatment and should serve as a living reminder to the normal (is that possible?) people, of the inherent dangers of our hobby.

However, the author is inclined to believe that those mentioned are possibly more sane than most

Editors' note: The author of this article, Paul Briggs, in brave pursuit of his case study sadly became too closely involved and has joined the ranks of the stricken.

(Reprinted by kind permission of his doctor).

MicroPro On A Star Trek To N.Z.

By PAUL CROOKS

MicroPro, one of the world's leading producers of general business software, is about to become more of a force in the New Zealand market.

A force both in terms of sales effort - and in efforts, including legal action if necessary, to halt software piracy.

This was revealed by the Pacific regional manager for MicroPro, Mr Michael Biel, on a visit to New Zealand in August.

While here he concluded an agreement appointing Christchurch based company, MicroAge, primary distributor in New Zealand for MicroPro's range of general applications programs for business.

"So far we have adopted a passive marketing role outside the United States and Canada - from now on it will be an active role," explained Mr Biel.

Under the agreement, MicroAge will produce from master disks MicroPro programs including the well known WordStar, which is the biggest selling word processing program in the United States and probably in the world.

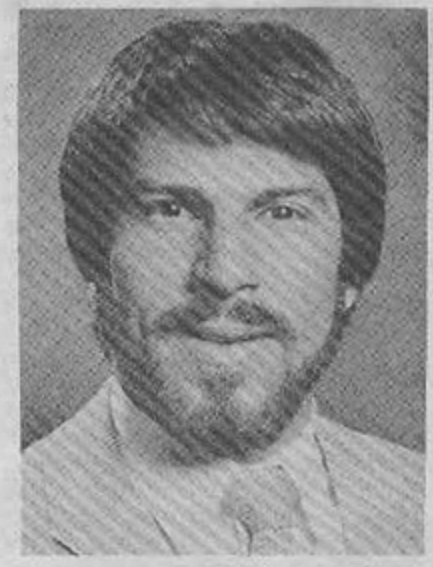
Other existing New Zealand MicroPro dealers will work in with MicroAge to strongly market WordStar and other programs such as DataStar, CalcStar, SuperSort, MailMerge, SpellStar and WordMaster which can run on virtually all CP/M based microcomputers.

Sales of WordStar and the other programs to date in New Zealand have been "fairly minimal" but Mr Biel expects that to change in the near future.

Judging by MicroPro's overall sales performance he could well be right. Sales have grown from $220,000 in the company's first year of operation (1978) to an estimated $30m this year and sales are expected to double again next year - making it the slowest sales year since the company's inception.

To further aid New Zealand sales efforts, Mr Biel will make quarterly visits here from MicroPro's Californian headquarters. At this stage the company has no plans to establish a field officer or a full office in New Zealand.

But software pirates be warned, MicroPro is now taking a harsh legal approach world-wide to piracy. Software piracy, whereby cheap copies are made of a company's program, could cause the death of the software industry if it continues at its present high levels, warns Mr Biel.



Mr Biel

"In Europe there are nine illegitimate copies of WordStar for every legitimate one and in South East Asia the numbers are even higher," he said. Nine months ago MicroPro and Digital Research brought the first software piracy case to court in the United States. But when served with the court papers, the company closed its doors and the principals fled.

MicroPro and Digital are currently considering litigation against another 30 companies.

In New Zealand lawyers for MicroPro and MicroAge will get together and see what can be done under New Zealand copyright laws.

But one step the two companies are taking to make software piracy harder is ensuring that all customers sign an end user agreement stating they will not copy a disk without permission or allow anyone else to copy a disk.

Mr Biel says MicroPro's programs are the most popular CP/M product line in the world and are ideal for serving the general application needs of businesses and offices.

Next month we look at MicroPro's products in more detail including their interactive or "family" nature and at the new programs and packages MicroPro will be releasing soon.

NEW MEANINGS TO WORD PROCESSING

By PAUL CROOKS

Who said word processors are just for juggling words? An enterprising national company with its Head Office in Christchurch has extended word processor uses much further than that.

These innovative uses are summed up in three words - "marketing support role" - by Mr Paul McCoy, manager of Andrews and Beaven's materials handling division.

But those three words cover an array of tasks that the Company word processor, a CPT 8000 supplied by Computer Consultants Ltd (CCL), has been assigned.

The majority of the tasks are designed to aid the marketing efforts of the division's New Zealand wide sales team. Some of the tasks are being accomplished successfully at present - others are scheduled to be introduced in stages up until the end of the year.

The word processor's first marketing function was coping with the material handling division's centralised quotation system.

Under this system any of the divisions sales staff, selling forklift trucks and other equipment in 21 branches throughout the country, can request a quotation through Andrews and Beaven's internal communications network.

Using standard information stored in the memory of the word processor, a quotation is prepared and in the mail back to the branch concerned (on that branch's letterhead) within four hours.

Mr McCoy says this system has three major advantages; the production of high quality, accurate quotations, reduced administration time at branch level and improved head office visibility of field activity.

This Andrews and Beaven developed system has been examined by overseas forklift dealers and similar systems installed by dealers in the United States.

But centralised quotations is only part of a larger marketing support role Mr McCoy envisaged for a word processor.

Now, with the help of two specialist programs developed by CCL, the success of the marketing support concept seems assured.

One program does all the financial calculations for the division's price book. Previously it took one person up to 20 hours a month to laboriously do these calculations by hand - now it takes an hour a month.

The CPT 8000

The word processor operator simply calls up any variable that needs to be changed, inserts the new value and the new prices are printed out.

But the division's most ambitious extension of its marketing support programme is currently being implemented in three stages.

Mr McCoy was reluctant to reveal full details but the result will be a word processor based data base that is used to generate vital information and reports for the sales team and management.

Nearly all the different steps and forms required, from initial inquiry into the division's products, sales proposals/quotations, recording of an order, invoicing, follow-up information to customers, until final payment are now produced and recorded on the word processor.

By the end of the year, all forklift sales records (sorted by different categories) will also be stored on disk for easy access.

A by-product of the development of this system has been the discovery that word processors can produce cheaper copies of documents than photo-copiers.

With its centralised quotations the division found it needed at least five copies of each quotation but not all the copies needed to be as high quality as those produced on the printer.

Mr McCoy thought of carbonless packs (each pack containing five copies) and trials proved the sheet feeder could feed these into the printer. The result - the number of copies needed at less cost than photocopying.

Mr McCoy believes a marketing support role is a totally new concept for a word processor and points out its in addition to normal word processing functions such as direct mail and repetitive letters and reports.

The division now has two principal operators who work on the word processor alternate weeks and two other back-up operators.

Mr McCoy describes the reaction of principal operators, Julie Rutland and Adele Parkinson, to the Word processor as enthusiastic and both now play a large part in designing the system for any new application on the word processor.

Mr McCoy says the word processor has justified its expense in the time saved in the production of the price book alone. Other more intangible benefits include the quality and accuracy of quotes guaranteed and staff enthusiasm.

The equipment has proven to be excellent, according to Mr McCoy with little downtime and swift response when servicing has been needed.

As far as the future is concerned, Mr McCoy feels there will always be new ideas from people that can be put into practice on the word processor.

GRAPHICS: Behind the Pretty Pictures

By PIP FORER

Once upon a time computers never had the temerity to doodle. All they were allowed were a few printed numbers and perhaps some staid upper-case alphabetic characters. Those few who wanted a doodling computer had to pay the price, and it was high.

Later on some enterprising people began selling really cheap computers. These engaging products with names like Pet, Apple and TRS-80 had to sell to a wide market and the people shrewd enough to design such machines were shrewd enough to know what made them sell: games. Games require graphics to be really exciting. A little later, when people like Warner Brothers (Atari), Texas Instruments and Ohio Scientific started getting into this market the precedent was established. By the time the giants like DEC and IBM started looking down to this level it was irreversible. The wide range of serious uses of graphics in business and education had made graphics a standard option.

Now graphics are a really nice idea but they eat up a lot of computer memory and computer power. They also appear in a bewildering variety of forms on different machines. There is a very good argument that graphics have become the major barrier to programme portability between machines. They have also become a major area for the misleading advertiser. You thing 'High Resolution with 128 colours' is pretty unambiguous? Think again.

This article is an introduction to some fo the characteristics of microcomputer graphics. It is not a machine review as such but takes certain ideas and sees how particular machines have dealt with them. What emerges is a complicated picture (pardon the pun) of the various trade-offs offered by different systems. We will encounter some well known and Some new names as we review microcomputer graphics: Apple, Poly, Commodore, Atari, VIC, Sinclair, IBM, DEC, the BBC microcomputer (also known as the Proton), ACT SIRIUS, Hitachi and NEC to name a few.

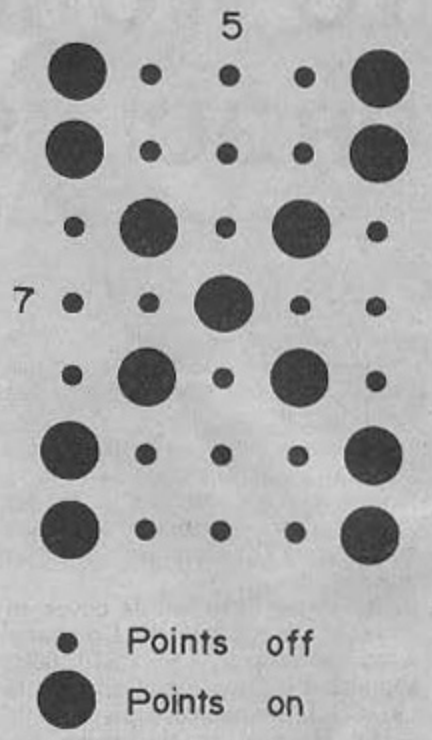
We need some graphics concepts to discuss the properties of these machines. The first of these concepts is that of screen resolution. It is perhaps in this area that is is hardest to make out what microcomputers are really offering.

Resolution

A computer screen for graphics is made up of a rectangular arrangement of dots rather like tiles on a floor. Resolution (also called density) is a measure of the number of points (= pixels = picture elements) on a computer screen. In microcomputers the talk is of low-resolution versus high resolution graphics. The former is usually something like 40 X'axis by 40 Y axis points: this gives rather chunky pictures. High resoltuion comes down to something around 200 by 200 points or more. To professional graphics men this is still just medium resolution but is near the vertical limit of the number of dots that a domestic television can display. Just for the simplicity we will call it high resolution.

How do different microcomputers deal with resolution? The answer is in a variety of ways. Two need mention here. The first is the distinction between character graphics and vector graphics. The other is the way in which different levels of resolution are offered.

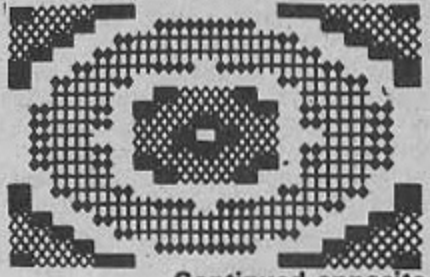
If you have ever looked really closely at a computer screen (or less closely at a computer print-out) you will know that the text on a screen is composed of dots. The figure X shown here illustrates the idea. The letters appear on the screen in a rectangular arrangement of so many rows by so many characters width. A typical arrangement is 20 or 24 lines each of 40 characters. In total this amounts to 480 characters that can be simultaneously displayed. The ones you see on the screen at any time come from a particular area of computer memory (RAM) where they exist as a code number. (An A as in Apple or ASCII is code number 65 for instance). Part of the computer is constantly looking into



the RAM to see what it should display on the screen and transferring the codes to the screen via a character generator. This converts the code number by lighting certain pixels into a sequence of dots in a matrix forming a character.

Take in X figure

What has this got to do with graphics? The answer is that the early machines used this sort of idea to produce graphics. They began by offering a more complex character generator that did graphics characters (small spaceships, hearts etc, etc). Some moved on to allow the user to define whole character sets for themself. The great benefit of this approach was that a full screen of patterns, such as this one from a Pet, used under a kilobyte of



Continued opposite

memory. (An Apple high resolution screen takes up 8K). You can even give some extra information in terms of the background and foreground colour for each character to get colour graphics. Using suitable characters you can get some very pretty effects.

Take in graphic picture

Now each character is typically 8 pixels by 7 pixels and you have a screen of 40 characters by 24 characters, well that gives you 280 by 192 points. However you can only access these points through the coarser 40 by 24 mesh.

This is character graphics. They can be pretty but they are hard to use if you want to get accurate high-resolution figures. They are very undemanding on computer memory but very demanding on the skill of the programmer. No one pixel can be accessed without reference to the full character it is in. As each character is given by lit/unlit pixels (which can be colour 1/colour 2 pixels) then each character can only contain 2 colours at any time if in colour mode. This technique for getting graphics therefore has great limitations but is cheap for small computers. Apart from the early Pet and the TRS-80 this idea is also used by the ZX-81, the Texas Instruments TI-99 and the more recent Tandy Colour Computer. It is offered as an option by the Atari, IBM Personal computer, the Sirius, Compucolor II and many other machines. One of the few not to offer it (since it has alternative methods of character display) is the Apple II.

The alternative is vector graphics. here all the pixels can be (more or less) independently accessed. Usually this is by a command that is something like PLOT or HPLOT which allows the user to draw a point or line at specified locations on a screen using a screen co-ordinate system of some kind. Here the resoltuion is given by the independent X and Y locations that are available on the horizontal and vertical axes. Many machines offer this sort of facility in addition to character graphics. Sometimes the two options can be mixed on the same screen to get good effects as with the Atari 400 or 800.

Vector graphics allow far freer use. They are not so easy for drawing a single pre-defined shape on a screen but they generally program more easily. Most machines have this capability but in some it is limited to use with low resolution and/or just vertical or horizontal lines.

Which brings us to the question of resolution. What do different machines offer? In general what they offer is dictated by a simple trade-off. The more points you display (and the more colours you use) the more memory is required in the computer. Some machines use a very rigid arrangement: they offer just one resolution. The first Pets did this: character graphics on the text layout was all that was available. Others give options. The Apple for instance has a low resolution (max 40 x 48) and a high resolution (280 x 192) mode. In the former 16 colours are available on any of the pixels. In the latter only 6 are available and these are not available completely freely at every location. This two-tier arrangement is quite common. Several machines offer text (with character graphics possibilities) in one area of RAM with high resolution possibilities in another area.

Less common but becoming more so is the idea of flexible resolution levles. This is most advanced in the Atari machines where 11 possible resolution/text combinations are offered ranging from a very high resolution black and white mode down to multi-coloured coarse graphics. The Apple III is another machine offering more than two resolution levels and again here the trade off is number of points against independent colours. The main difficulty with this is that the user needs to take care since changing resolution alters the area of his machine that is required to map the screen (i.e. provide the information on which the image is built up).

The idea of resolution seems very simple. You can express it as the number of points on each axis (X times Y)..... except there are problems With the Apple for instance not all the colours can appear on every horizontal position: each one has only 140 positions it can plot to of the 280 total. And when one looks at it closely half the colours plot half a dot left from the other half. Where is a nice simple formula for that?

Resolution is hard to get to grips with. Machines using character graphics claim they have high resolution but this is a dubious claim. Beware of specifications that will not live up to your needs. The fact that the essential screen element is an 8 x 7 matrix really does cramp what you can easily do. The means by which the graphics gets written to the screen is an important factor in judging the practical meaning of resolution. Yet the claims still get made. Advertisements love to play on the ambiguity here. They also love to play on the definition of the number of colours a machine can display... and that brings in more questions of resolution.... but more of that next month. Copyright: P. Forer

Dr Pip Forer is a lecturer in geography at Canterbury University. He has written a book on computer simulations for schools and is preparing another book for a leading American publisher.

TYPEWRITERS OUT

Addressing a conference of school principals, Educationists and Trade Union Leaders at Cambridge in July, the British Minister of Industry and Information Technology said that the last manual typewriter will leave the production line this year and the last electric typewriter is to be made next year.

He said that in future there will be visual display units, word processors and self-correcting electronic typewriters with built-in memories.

Prof. T. Stonier, Professor of Science and Society at Bradford University said that eight out of every 10 (U.K.) schools had received or applied for Government grants to purchase microcomputers. He urged the Government to put microcomputers not only into schools but also into every home where there are children, as he forecast that school-based education will in future be based in the home.

Lincoln grows a software farm

New Zealand's farmers have expressed a tremendous interest in microcomputers. That's the opinion of Dr Peter Nuthall, head of the Kellogg Farm Management Unit at Lincoln College, which is developing farm software.

Fifteen hundred farmers throughout the country were surveyed recently, and 47 per cent of the 860 or so who responded said they would eventually buy a microcomputer. And 56 per cent of the respondents thought that a micro would be of some use to them.

"There is tremendous interest. But what will follow is yet to be seen," Dr Nuthall says.

"People will find microcomputers are not all a bed of roses to run. We don't have the general infrastructure up and down the country yet. If the micro breaks down, where will they get it fixed? If software breaks down you just can't ring up and get it fixed."

The Lincoln unit is financed by the W. K. Kellogg Foundation of Michigan (of breakfast cereal fame) with the objects of creating and supplying computer-based management aids to the New Zealand farmer. A philanthropic organisation, the Kellogg Foundation is active mainly in the fields of health, agriculture, and education.

The college supports the unit in general and with related work; for example, a research fellow is doing work on a Viewdata type system.

DR NUTHALL

It began work in August, 1980, and several programs have been developed. Because it cannot cope with all the inquiries it is getting for them, agents are being appointed throughout the country.

The software is designed to run on a number of machines, but Dr Nuthall says these need a minimum memory of 64K, and should have dual disk drive.

The Kellogg unit is adapting the software for as many machines as possible. "The policy is that if any organisation likes to leave a suitable version of their machine at the college we will get software up and running on it."

Dr Nuthall warns the farming community that it must be aware of what is entailed in setting up efficient software. About $40,000 has been invested in the Kellogg unit's financial investment system and it is to be developed further.

It takes up to four years for a package to settle down, and Lincoln is dedicated to maintaining and developing its software. (Dr Nuthall envisages the Kellogg unit continuing after its grant runs out, self-financed from software sales).

"If you buy something like Visicalc you know it is well tested; if you buy agricultural software and know it's only been written for a year or two it could cost you money," he says.

A newsletter goes to about 500 farmers and continual field days, demonstrations, and training sessions help the unit keep in touch with farmers.

Dr Nuthall has detected a change in the attitude of farmers to microcomputers over the last two years, and attributes their increasing interest to the declining real price of machines and to increased publicity about computers.

Apart from the intangible benefit of management planning, the benefits of micro's for agriculture are hard to weigh up. A farmer might, perhaps, save as much as $500 if he took computerised records to his accountant, but this is conjecture.

However, Dr Nuthall and his team have no doubts about the future use of micro's. Apart from the available software shown in the accompanying panel, the unit is developing programs covering feed budgets, stock records, and paddock records.

Much interest in the Kellogg unit software has been expressed in Australia, and there has been some interest in Britain, particularly in programs for sheep-farming, but the laws and regulations of America tend to limit its application there.

The unit has benefited not only farmers: there have been great spin-offs for teaching, and its work has helped stimulate interest in computer studies among all Lincoln students. Each final-year student now does some programming, and makes use of the unit software, though it is run on the college's mainframe through one of 35 terminals.

Microcomputer packages available from the Kellogg unit at Lincoln College, or through an agent, are:

Crop gross margin	$250
Sheep (breed replacements) gross margin	$250
Sheep (buy replacements) gross margin	$250
Cattle (breeding) gross margin	$200
Investment analysis	$50
Table mortgage calculations	$30
Financial information system	$600
Cash flow	$90
Dairying (town-supply) analysis/management	$250
Stock reconciliation	$50

NEW does not always end the old

By GORDON FINDLAY

This column will report some 'tricks of the trade' for users of the TRS-80, or System-80 computers. Many are original, others have been around for a while, and are part of '80 folk-lore.

First, a real life-saver. How many times have you typed 'new', then realised that you haven't saved your (BASIC) program? This little routine, which can be entered from the keyboard, will restore your program, provided that you haven't turned off of course! The first step is to enter a short machine code routine as the following series of POKEs:

```
POKE 16688,42
POKE 16689,164
POKE 16690,64
POKE 16691,116
POKE 16692,205
POKE 16693,248
POKE 16694,26
POKE 16695,205
POKE 16696,89
POKE 16697,27
POKE 16698,195
POKE 16699,25
POKE 16700,26
```

Once you have done this, activate the routine by typing SYSTEM, and answering the *? prompt with /16688 (enter).

Voila! Your program is back again! This routine works only because the NEW command does not remove your program from the machine's memory. Rather, the command just resets certain pointers (memory locations telling the system where the program lives) to values which make the interpreter think that the program memory is empty. The tiny machine-code routine you enter with the POKEs uses two of the subroutines in the level II ROM which fix up the pointers as the program is edited.

This routine will also work (sometimes) if you accidentally CLOAD before CSAVEing. If you notice that you have done this, hit RESET quickly, and try the above routine. Sometimes it works, because the CLOAD command first issues a NEW, but sometimes things have gone too far to make recovery possible.

TAPE APPEND

Here is a method for tape users to append one program to another, that is, to add a program onto the end of another. This might be used to add a set of library subroutines to the end of a program. There are 4 steps:

1. Type in, or CLOAD the first program, or part of program - with the lower line numbers.
2. Type PRINT PEEK (16633) - note this number printed.
3. If this value is 0 or 1, CLOAD the second program or part - with the higher line numbers. BUT if the value is greater than 1, first type: POKE 16548, PEEK (16633)-2; POKE 16549, PEEK (16634) then CLOAD the second part.
4. After the CLOAD is complete, type POKE 16548,233, POKE 16549,66 and the two programs have become one, and you can CSAVE, RUN or edit it.

Of course, the two programs must have completely separate line numbers - the ranges must not overlap at all. If any of the line numbers in the second part are less than those in the first, the result will not be satisfactory - it will be a mess!

Gordon teaches mathematics at a Christchurch high school. He has tinkered with several different brands of microcomputers although he now has a System 80 at home. He has also written several articles for overseas computer magazines mostly on mathematical subjects.

A SOUND ROUTINE

Most people now have their machines modified for sound, and you have probably heard some of the fantastic sound effects used in commercial programs. But you will soon find that they are unobtainable from BASIC - it is just too slow. But you don't know machine code? Never mind - here is a simple sound generator subroutine which you can incorporate into your BASIC programs, and which is capable of producing a wide variety of sounds.

The sounds produced are variable in both pitch - how high the sound is, and in duration - how long it lasts. The routine must be POKEd into high memory, and protected there. A sound is produced by calling the subroutine with a USR () statement from BASIC.

Here is a step-by-step procedure to follow:

First, protect memory for the machine code. Turn on your computer, and answer the MEMORY SIZE? (or READY?) question with 65506 for a 48K machine, or 32738 for 16K. The following lines of BASIC will poke the sound routine into this protected memory:

```
10MM = 65507 (make this 32739 for a 16K machine)
20 POKE 16527, INT (MM/256)
30 POKE 16526, MM - 256* (INT(MM/256))
40 FOR I = -28 TO -1 (make this 32739 to 32767 for 16K)
50 READ J
60 POKE I, J
70 NEXT I
80 DATA 205, 127, 10, 62, 1, 14, 0, 17, 0, 0, 69, 47, 230
90 DATA 3, 179, 211, 255, 13, 40, 4, 16, 246, 24, 242, 37, 32, 241, 201
```

These lines may seem funny to you. What is happening is this: line 00 gives the address of the music subroutine. This is broken up, and POKED into two reserved locations in lines 20 and 30. The FOR loop (lines 40 to 70) poke the numbers in the data statements into memory, where they form the subroutine. The reason for the peculiar numbers in line 40 need not concern us here. You need not understand the subroutine, or the way it is stored, you can just include the lines above and enjoy them!

Your program produces sounds by giving two variables DU (the duration) and PI (the pitch) whatever values necessary, and including the statement X = USR (256*DU plus PI) to actually produce a sound. Try adding these lines to the lines above:

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VIC

By DOUG MILLER

The VIC screen format control is an interesting area to get into. Normally it has 22 characters horizontally and 23 lines vertically with each character made up of an 8 x 8 dot matrix. All these values are controlled by 5 registers in the 6561 chip.

However, the interesting part is that these five registers can be changed by the user.

CONTROL REGISTER No. 1 is at location 36864 (normal value 12). By increasing the value of this location by two the position of the first row of characters is moved one column to the right, therefore the display can be moved left or right across the screen.

CONTROL REGISTER No. 2 is a location 36865 (normal value 38). By increasing the value by 4 the display area can be moved down the screen. An interesting trick is to poke this register with a value greater than 130 - this causes the display to drop off the screen and is a quick method of blanking the screen.

CONTROL REGISTER No. 3 (location 36867) determines the number of rows in the display (normal value 174). The number of rows can be varied from 1 to 32 (value 192). However there is a catch, the screen width must also be reduced so as not to exceed 506 bytes in the video RAM. Also the screen editor cannot be used while in this mode.

CONTROL REGISTER No. 4 at location 36866 is the most interesting. It controls the number of columns in the display - this means that the Vic screen can be expanded up to 27 columns, but again we have the catch of not exceeding 506 bytes in the video, and no screen editor. Try poking 36866,129. To restore the screen poke 36866,128 (normal value is 128).

CHARACTER SIZE: As the size of the characters is also changeable we can change the 8 x 8 matrix to a 16 x 8 by increasing the value in location 36867 by 1, i.e. poke 36867, (peek (36867)+1).

Other neat programming tricks in a VIC:

Poke 36869,242 - sets lower case - display.

Poke 36869,240 - returns VIC to upper case.

Sys 64802 - gives a soft reset

Poke 37148, (peek 37148) and 241 or 14 - turns the cassette motor on.

While a poke 37148, (peek 37148) or 12 and not 2 - turns it off.

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```
100    DU = 12:    PI = 40:
X = USR (256*DU plus PI)
110    DU = 24:    PI = 90:
X = USR (256*DU plus PI)
120    DU = 18:    PI = 10:
X = USR (256*DU plus PI)
```

When you run the program, you should hear three notes.

Useful ranges for duration and pitch are: duration 0 - 125, pitch 1-255. The higher the number PI, the lower the tone. Using this subroutine you can generate very high pitched sounds indeed - much higher than BASIC allows.

Unfortunately, there is no way of generating a silence ('rest') with this subroutine - the shortest duration obtainable is with DU = 0, and this produces a click.

Some of you may not have a sound modification mode - if not, of course, you won't hear the sounds! I will try to obtain details of a modification for TRS-80s and System-80s for a later column.

For a final demonstration, delete lines 100-120 above, and add this fragment:

```
100 DU = 5*RND(20)
110 PI = 10*RND(25)
120 X = USR (256*DU plus PI)
130 GOTO 100
```

Eventually you will hit the break key! Experiment with the sound generator - it adds a lot of interest to programs!

The next column will present some useful graphics routines.

ATARI

By MARK BULLIVANT and DAVID BROWN

A problem which faces most New Zealand Atari owners is the lack of constructive information on his or her computer.

Althouth Atari BASIC is well covered in the manual included with every BASIC cartridge, information on Atari's operating system is sparse. Granted that hardware manuals and source listings are available through the many New Zealand Atari distributors, but they presume a high level of technical knowledge on the part of the reader.

For those reasons we will be contributing to this magazine a series of articles dealing with all aspects of Atari software and hardware. Several specific subjects that will be covered in depth are:

- The in's and out's of Atari input/output.
- Device handling.
- BASIC and operating system interaction.
- Utilities for BASIC.
- Player-missile graphics.

We also invite you to contribute your ideas

About the Authors:

We have been involved with small home computers for several years and our experience includes Apples, TRS80's, ZX80's, ZX81's and, of course, the Atari.

Mark Bullivant works for a large electronics firm which is the New Zealand importer and agent for the Atari. Dave Brown has worked for the last three years as a Post Office telephone technician. The two have worked together on the Atari for 10 to 12 months and have been involved in a large amount of BASIC and machine-language programming, to produce utilities to aid basic programming, i.e. auto line numbering and auto line delete, etc, while not forgetting the games department.

We hope to be writing for "Bits & Bytes" on all of the aspects of the Atari covered above, as well as on some of the more tricky aspects such as, custom displays, i.e. graphics 7 at the top and bottom of the screen and several lines of text in graphics 1, 2, or 0 in the middle (real tricky, but good fun experimenting).

ALBRAN:

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line via modems) and a protocol. A protocol is a set of rules which governs the manner in which data may be presented on the line, and is responsible for ensuring that the data goes to the right place and gets there correctly and with the minimum delay. ALBRAN uses CCITT V24 standard modem interface signals and Bisync-3 (BSC-3) line protocol.

This protocol is certainly the most widely used today. Virtually all suppliers of telecommunciations equipment supply BSC-3 as a standard option for the line protocol.

While not the most modern of protocols it does have a number of advantages from the home hobbyist's point of view. It is extremely well defined and documented. It is relatively easy to implement, and requires little in the way of specialised hardware.

Bisync is short for BInary SYNChronous - and this form of communications is designed for use on a synchronous line, as could be provided by any one of a number of readily available synchronous communications chips.

Most hobbyists, however, tend to use asynchronous ports for communication and accordingly it is intended to implement this protocol on an asynchronous line. At first glance this may seem somewhat incongruous. However, since most of the functions peculiar to asynchronous/synchronous lines are taken care of by the hardware the micro need never know which type of line is actually in use.

There are about 35 versions of this protocol in existence. Many of the differences are very slight and many versions are compatible.

The reasons for variations depend on the applications which use the protocol. One version is easily modified to conform with another. In any case, it is certainly much easier to get two protocols talking if they both have an identical design structure to start with, than if they are based on totally different philosophies. (Iso-Async and SDLC would never exchange even the time of day).

The version ALBRAN uses is IBM Transparent Point to Point BISYNC. A full description of this protocol can be found in "GENERAL INFORMATION - BINARY SYNCHRONOUS COMMUNICATIONS" (available from your local IBM stockist).

The word, "Transparent", in the title means that anything can be transmitted - not just text data. ASCII, EBCDIC, machine code, your latest enciphered messages - it matters not what the data is - it can go down the line unhindered.

"Point to point" means that the link involves two stations only, as opposed to multipoint where many stations can share one line with a host computer. The point-to-point link requires no more specialised hardware than a phone at the end of a (working) Post Office line and an acoustic modem. It is limited in that communications can only be established between two machines on one line at a time; but, it is cheap.

Having made a physical connection between the machines, the protocol oversees the transmission and reception of data across that connection.

It is not intended to give a complete description of the protocol here, as to do so would run to a many-paged manual.

Briefly, however, the protocol wraps the data to be transmitted in an "envelope" to identify the start and end of the data and tacks on a 'BCC" (Block Check Character) at the end. This "BCC" is the result of a calculation which is designed to give as unique as possible a result for any given message.

The protocol may also require special characters to be inserted into the data (don't worry - they'll be removed at the other end) to prevent "line control" sequences appearing unintentionally. By doing this, any data can be transmitted across the line, and the receiving station can validate the data it has received, or request a retransmission if the data it received, was corrupted.

Further, BSC-3 performs a limited sequence check on data at the line level to guard against any single block getting lost down the line (a block is one lot of data wrapped in an envelope).

The Access Method

In any reasonable communications link between computers, it should be possible to establish communications between any number of physical devices. For example, it should be possible to transfer data not only from console to console or disk to disk, but from disk to printer, disk to console, console to printer, disk to tape, etc.

In a good communications system, it should be possible for a file transfer, say from disk to disk, to be going on which the users carry on a polite conversation from console to console.

These facilities are provided by the Access Method, which is the means by which the micro avails itself of the communications line.

ALBRAN contains a number of tasks (specialised programs dedicated to controlling one device) each having the ability of conversing with any task on the other end of the line and any number of which may be active at one time.

Each task appends a short identifier to the head of the data. This indicates where this block comes from, where it is going to, and a sequence number (to prevent the communications getting out of step) and hey presto (well almost), that one phone line can be set a-buzzing with several simultaneous conversations between individual devices at the two ends.

How does one micro know what devices exist at the other end of the line? When the communications line is first made, the two machines have a quick chat to agree on what devices each other has. This is done automatically when ALBRAN senses that a link has been established, or it can be manually overridden from the console if desired to limit the devices that the remote user can access.

About the Authors

Brent Carlsson and Alan Jones work for Databank Systems Ltd, a large network by world standards and the largest non-governmental computer network in the Southern Hemisphere. Alan was involved with communications software when Databank installed their first teleprocessing link over ten years ago, and Brent is active writing and maintaining software interfacing the myriad different-coloured terminals

Continued over

Floppy disk drives:

Dual 4040 and the single 2031 compared

By ROGER ALTENA

For the last few months, Commodore New Zealand have been selling the latest product available for CBM and PET personal computers. Aimed more at the hobbyist than the small business owner, the 2031 single floppy disk drive offers all the convenience of a disk drive for a reasonable outlay. If needed, a second 2031 can be added later.

Recently I had lent to me by Commodore Computer Limited a 2031 disk drive. I took the opportunity to make some comparisons with my own 4040 disk drive.

A few superficial differences were apparent. Extra ventilation slots have been added at the rear of the drive above the transformer which certainly were needed.

There is only one LED on the front of the drive which doubles as both an activity indicator and an error light. The LED is on during disk accesses but flashes on the occurrence of an error.

And this time a right-handed person has designed the machine; the IEEE cable can be plugged into a disk drive to the right of the computer without having to twist it to come in from the opposite side.

Commodore describe the 2031 as being exactly the same as half of a 4040 disk drive. This statement definitely needs rewording: a better way of putting it would be to say that to the software, the 2031 is practically identical to a 4040.

However, using the 2031 reveals several differences.

The most noticeable of these is speed - the 2031 is twice as slow as the 4040. This is rather surprising considering that the same work is being done in both cases. The only explanation I can put forward is that one processor is doing the work in the 2031 that two processors do in the 4040.

At a guess, what happens is this. In the 4040, data is first transferred from the disk to a buffer by one processor. The second processor works in parallel with the first, moving data from the buffer to the computer. With the 2031, one processor must do the work of transferring both from the disk, and from the vuffers to the computer. Consequently, internal operations (such as initializing a disk) will take as long on both machines, whereas operations such as loading programs will take twice as long as with a 4040. Another factor may be the reduction in internal RAM to cut costs or to remain compatible with the similar VIC disk drive.

Hopefully, the speed difference will not be critical, since the 2031 is unlikely to be used in a business application. The results of a few speed tests are included below:

Action	2031	4040
Save 16K program to empty disk	35 sec	17 sec
Load 16K program as only file on disk	17 sec	8 sec
Save with replace only file on disk	43 sec	22 sec
Catalog disk with 22 items	4 sec	4 sec
Catalog disk with 75 items	11 sec	8 sec

Another disadvantage that may not affect as many people is the difference in the DOS. With the 2031, Printing DS$ on Power-up gives the message "CBM DOS V2.6 2031", suggesting that a modified version of DOS 2.5 (from the 8050 disk drives) is being used. This may catch some people who use disk utility programs written for the 4040 drive.

The most obvious trap is the shifting of the memory location for the disk buffers. A buffer may be thought of as a half-way station for data. Whenever data is written to the disk (and the same applies to

Roger Altena works for the Auckland Savings Bank and is a committee member of the New Zealand Microcomputer Club. His main interest is software and he has written a large number of programs including the one to display flight information on VDUs at Auckland International Airport. He has worked on various computers, both big and small, and is familiar with more than 10 programming languages. He is a Bachelor of Science graduate in mathematics from Auckland University.

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used by the various banks to central mainframes.

They are initially developing two versions of ALBRAN: one to run under the CP/M operating system and one for TRS-80 (to run under any of the standard operating systems available for that machine). The TRS-80 version is being written in assembler, and the CP/M version is being written in assembler (for the low-level modules) and C (for the high-level stuff). Full documentation and source code will be made available to enable APPLE, PET, etc versions to be developed by anyone who should feel so inclined.

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A comparison between the new 2031 single floppy disk drive and the 4040 dual floppy disk drive for CBM and PET personal computers.

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data read from the disk), it accumulates in the buffer until the buffer is full, and then the whole buffer is written at once to the disk

Several utility programs for the 4040 use these buffers to extract information from the disk - one example is "MODIFY T&S", which lets you examine individual bytes on a disk. On the 4040, the buffer used is at hex address $1700. This means that in the program you will find the command

PRINT 1, "M-R"; CHR$(0)CHR$(17).

On the 2031, the corresponding buffer is at address $0300, which means that the above CHR$(17) must be changed to CHR$(3) for the program to work.

Further disadvantages are also apparent. With dual disk drives, copying disks is a cinch - simply place the original in one side, the target disk in the other and COPY files from one disk to the other.

For single drive systems, one must resort to loading and saving (for programs) or writing a file transfer program to copy data files across. Making a backup of a disk becomes a major undertaking. Fortunately, a disk backup program exists for the 2031, but this involves swapping disks and takes quite a long time (it works, though - I wrote it!). The program is available from Commodore.

Less bothersome annoyances are the smaller amount of storage available (170K as opposed to 340K) and the need for programs and data to be on the same disk.

With dual drives, one disk can contain all the programs (write protected) and the other the data files. This speeds up access and is very convenient.

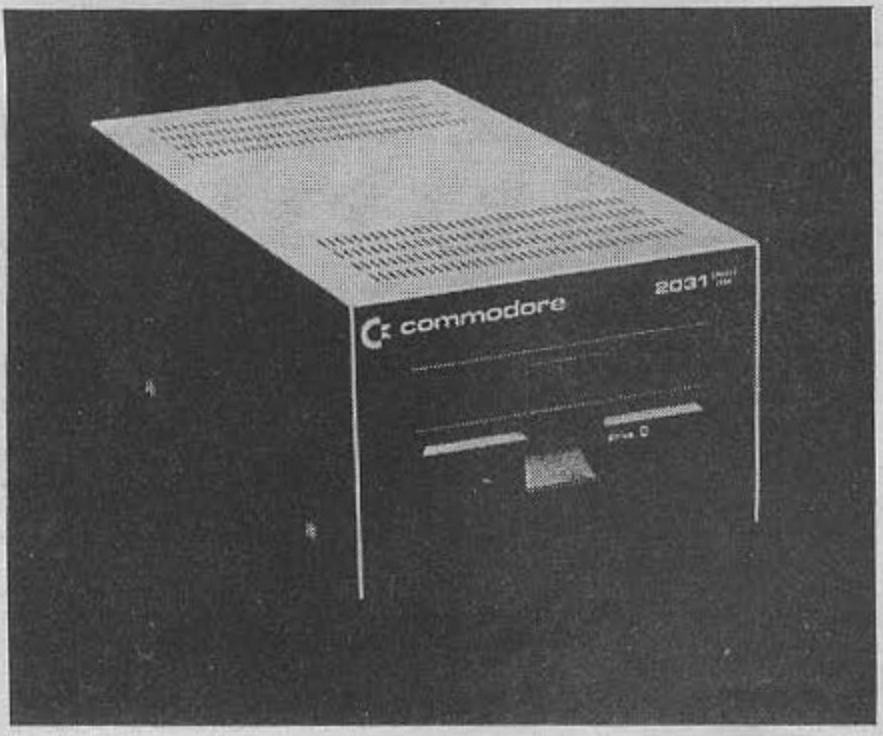
Still, you can always buy another 2031 later when funds permit. However, you will need two separate IEEE cables and you'll also need to set up the second drive with a different device number each time you turn it on.

But why buy a single disk drive at all?

The answer is the price. While $1695 is rather a lot of money, it is a great deal less than $3414. the price of a new 4040 drive. For a system that doesn't get too much use, one drive is plenty. However, for the more serious user, a dual drive system is probably a better idea.

And what were my overall impressions?

I think the 2031 is certainly worth considering. Although not as fast or usable as my 4040, and rather more than few "DISK ID MISMATCH" errors, I would recommend a 2031 to anyone who can afford one. I like being able to load huge programs in seconds rather than minutes. I like being able to read from one disk file and write to another (very handy in writing text-handling programs, compilers and so on). I like having all my programs on just a few (?) disks rather than two or three dozen cassette tapes. To all you cassette users: keep saving and soon you'll be saving!



How to customise your Apple disks

By PIP FORER

An inevitable experience for floppy disk users is watching a long catalog appear for a disk with no concise statement of what is on it. How nice it would be to have a clear, banner heading of the disk's contents such as some commercial software (for instance Higher Text II) employs using mysterious 'S' files.

It can be done and the program to do it is published here. This program writes directly to any directory sector on a DOS 3.3 diskette (track 17). It will create a fancy heading to your catalog listings with minimal trouble.

The correct sequence for using this program is as follows:

1. Take an initialised but blank diskette.
2. Run this program to create your catalog header
3. Then save or copy any programs you want across to the disk. They will appear in the catalog after the heading.

With this program you can create artistic effects at the top of your catalog and, by embedding control characters in the text, make it hard for any other person to remove your header by deletion or in a copy (unless of course they too have this program).

The listing is given below along with a typical run. As you can see the program requests you to specify the track and sector for treatment and then a series of file names. These are bogus files taking no room on disk. Only seven files can be specified at once. That is all a single sector of diskette can hold. Each filename has a 30-character maximum length. By choosing suitable file names a good header can be produced for the catalog listing. It is stressed that you must use this from sector 15 downwards. On a fresh disk a lower value to start will appear at first as a zero catalog. Be warned though that it is dangerous.... it will wipe anything already on a sector off.... you will lose all your file directory information for existing files.... you could regret it.

The program works by using a routine of DOS called RWTS which is referred to on pages 94-8 of the DOS 3.3 manual. RWTS is an acronym for Read and Write to Sector and can be called from DOX 3.3. by a jump to a subroutine at $3d9 (985). The full specifications are in the manual but this application is set up to write to a particular sector of disk that is formatted as a directory sector. The POKE statements of lines 12-25 simply prime various parameters to let RWTS do this.

```
]CATALOG

DISK VOLUME 254

B 001  ********************************
R 001  *    DEMONSTRATION HEADER      *
A 001  *         CREATED              *
S 001  *   TO WELCOME THE ARRIVAL     *
S 001  *          OF                  *
S 001  *     BITS AND BYTES           *
S 001  ********************************
A.008  CATHEADER
```

The program works by directly writing bogus directory sectors onto disk so that the CATALOG command will list them. A 256 byte directory sector on DOS 3.3 is comprised of two parts. The first is a header component of 11 bytes. All but bytes 2 and 3 are unused. Bytes 2 and 3 specify where the catalog directory continues. This is usually the next sector down from the current one. Byte 2 gives the track and 3 the sector.

The second part of the directory sector comprises up to 7 sequences of 35 bytes each. Each of these gives the information relating to one file. The first two bytes give the location of the track sector record. This is a sector containing a list of the sectors that comprise any particular file. In this case we set all the dummy files to have a track/sector list location at the directory sector (line 100 starts this. The array B() holds the data for a single bogus file header).

The third byte specifies the file type. Full details of this are given on page 131 of the DOS 3.3 manual but basically it is possible to set values that do not correspond to the normal usage. Thus you can get an 'S' file or 'A' or 'B' files that will not be recognised as Applesoft or Binary files if you try to load them. You are given a choice on what value to enter here. An 8 always gives 'S'.

The next 30 bytes contain the file name and this is what you use to create the header effect. Finally the last 2 bytes are involved in defining the length of the file in sectors.

All our program does is allow you to specify the values for these various parameters. The program then POKEs these into an area of memory (at location $2000 in this instance) and at the end of the operation uses RWTS to place this data onto disk. The bulk of the program (lines 28-240) simply arrange for this information to be input from screen prompts.

The only puzzling thing here is why we add 128 to the ASCII code of the file names which is what line 210 does. The answer (which will

Continued opposite

not jump out of the manual at you) is that the APPLE has 2 sets of codes for characters. In normal use the A for instance has an ASCII code of 65. To free this set of values on disk the Apple actually uses a second set of letter codes 128 above the normal ones. Thus A becomes 193. (See page 139 of the Applesoft manual). For various reasons DOS uses this character set of ASCII values. If you try placing normal letters into the directory without this you may have problems

Remember that the file directory starts at sector 15 and works back to zero. Have fun with this: it is a useful little gimmick from time to time.... but be careful.


```
1   HGR : TEXT
2   HOME
3   DIM B(34)
4   REM  *** FANCY CATALOGER ***
5   REM  ***     PIP FORER     ***
10   REM  SET UP RWTS TABLES
12   FOR I = 16384 TO 16392: READ
     B: POKE I,B: NEXT I
15   DATA     169,64,160,10,32,217,
     3              ,96,0
18   FOR I = 16394 TO 16410: READ
     B: POKE I,B: NEXT I
20   DATA          1,96,1,0,18,6,0,9
     6,  0,32,0,0,2,0,0,96,1
21   DATA     0,1,239,216
24   REM  NOW SPECIFY HEADER
25   FOR I = 24576 TO 24579: READ
     B: POKE I,B: NEXT I
28   PRINT "CATHEADER : ALLOWS CRE
     ATION OF"
29   PRINT "FILE NAMES TO GIVE A H
     EADER"
30   PRINT "CATALOG. USE ";: INVERSE
     : FLASH : PRINT " ONLY ";: NORMAL
     : PRINT "WITH A FRESH DISK"
31   VTAB 6: HTAB 6: PRINT " USE W
     ITH CARE": PRINT
32   PRINT "CATALOG SECTORS START
     AT 15 AND"
33   PRINT "WORK DOWN IN MULTIPLES
      OF 7 FILES."
34   PRINT "THIS PROGRAM WIPES THE
      FIRST"
35   PRINT "OR ANY CHOSEN SECTOR.
     FID FROM ANOTHER"
36   PRINT "DISK WILL CONCATENATE
     FILES POST HEADER": PRINT
37   PRINT "NB LESS THAN 7 FILES W
     RITTEN WILL": PRINT "HANG TH
     E CATALOG AT THAT POINT": PRINT

40   PRINT : PRINT : INPUT "ENTER
     SECTOR NUMBER (15 DOWN TO 0)
      ";Q:T = 17
41   HOME : VTAB 10
45   IF Q < 0 THEN 999
50   POKE 16398,T: POKE 16399,Q
60   FOR I = 8192 TO 8202: READ B:
       POKE I,B: NEXT I
61   DATA          0,17,14,0,0,0,0,
     0,0,0,0
65   POKE 8194,Q - 1
70   INPUT " HOW MANY FILES (0<K<8
     )";K
71   HOME : HTAB 19: PRINT "WRITIN
     G TO SECTOR ";Q
80   IF K < 0 OR K > 7 THEN 70
90   FOR W = 1 TO K: FOR X = 0 TO
     34:B(X) = 0: NEXT X
95   VTAB 12: CALL  - 958
100  B(0) = T:B(1) = Q
101   INPUT "WHAT LETTER FOR FILE
     (S,R,B,A)? ";A$
102   IF A$ = "B" THEN B(2) = 64
104   IF A$ = "R" THEN B(2) = 16
106   IF A$ = "S" THEN B(2) = 8
108   IF A$ = "A" THEN B(2) = 32
109   IF B(2) = 0 THEN 101
120   FOR X = 3 TO 32:B(X) = 160: NEXT
     X
130   VTAB 15: PRINT " ENTER YOUR
     TITLE BELOW..MAX 30 ": PRINT
     "LETTERS..USE ! AS GUIDE"
135   PRINT " THIS IS FILE NO.";W;
     " OF ";K
140   PRINT " !!!!!!!!!!$$$$$$$$$$
     !!!!!!!!!!"
150   INPUT Z$
200  Z =  LEN (Z$)
210   FOR X = 1 TO Z:H =  ASC ( MID$
     (Z$,X,1)):H = H + 128:B(X +
     2) = H: NEXT X
215  B(33) = 1:B(34) = 0
220   VTAB W + 1: PRINT Z$
230   FOR I = 0 TO 34: POKE 8192 +
     11 + (W - 1) * 35 + I,B(I): NEXT
     I
240   NEXT W
450   REM  NOW ACTIVATE RWTS
500   CALL 16384
900   PRINT  CHR$ (4);"CATALOG": PRINT
999   END
```

The microcomputer club

By SELWYN ARROW

Microcomputer clubs and interest groups are certainly flourishing in several centres throughout New Zealand.

In the Auckland area the largest group is the New Zealand Microcomputer Club, Inc., with almost 200 members. Within the club there are a dozen user groups. Some of these have followings large enough to hold their own regular meetings, while one or two of them consist of just a few enthusiasts for a particular type of micro.

The club publishes "Micro", a regular bimonthly magazine, to keep its members, both local and around the country, informed of goings-on.

The club library has a good collection of magazines and books available to members on a monthly loan basis.

Monthly club meetings are quite popular. Usually they draw a crowd of between 40 and 90 to observe, and sometimes participate, in presentations on such diverse topics as "tips on buying a micro for home and hobby use," "stroll into Adventure," to an annual general meeting well and truly rounded off with a wine and cheese.

Another popular activity is the Saturday computer workshops, held monthly, where members bring along their micros (and their lunch). to show off their latest hardware and software to all and sundry.

One project eagerly awaited by most members is to set up a local Computer Bulletin Board System (CBBS) in Auckland. This electronic bulletin board will enable microcomputer club members throughout New Zealand to "talk" to each other, or a computer at the clubrooms, via a modem linking their computer to their telephone. This project depends very much on the provision of a disk based computer system, probably at the clubrooms, and the acquisition of the necessary CBBS software.

A start has recently been made by the club on an S100 based system so that we will be able to incorporate a CP/M standard disk operating system and "get on the air" as soon as possible. This system will also have the extra functions of providing a centralised location for the club membership, financial, and library issue records, as well as having the terminal available for use by members.

A problem we have in common with all clubs is that there is only a small number of members who are prepared to help out with most of the work, but the future possibilities for microcomputer clubs are open ended as the public are only just becoming interested in this

fascinating subject of microcomputers and their uses.

Another microcomputer interest area which is enjoying a great deal of progress but which is still in an early stage of development is Computer Education Societies. The Auckland society was formed one year ago by a group of teachers from both primary and secondary schools, and colleges, in the area. Their objectives are to further the involvement of computers in all areas of education.

They have been directly involved in establishing computer awareness and literacy courses. Holding seminars on computer studies course guide notes for teachers. Holding teachers' seminars in computing and geography, accounting, biology, junior awareness, sixth form certificate and seventh form applied mathematics.

These were well supported and were a source of information and interest to those attending.

Other projects include: compiling a register of articles, books and films on microcomputer-education related topics, establishing an educational program library, writing useable educational programs, and corresponding with the Education Department, Government, and the media on educational computing matters.

After the formation of the Auckland Computer Education Society others have also been formed in the Waikato, Central Districts and in Christchurch, with another likely in Dunedin soon.

All the microcomputer interest groups and clubs in the Auckland area joined forces early this year to form the Combined Microcomputer Users Group (CMUG). The aims of this group are to act as a non-controlling, central body where common activities can be combined for the mutual benefit of microcomputer users throughout New Zealand.

Representatives now meet monthly at this "summit meeting" which exists to co-ordinate activities and save duplication of effort. Several wide-ranging projects are under action by specific working parties, with members drawn from several groups.

These include: design and production of acoustic coupled modems; establishment of communications software and protocol standards to make efficient use of the modems; establishment of Computer Bulletin Board Systems, arranging beginners computing courses, and, of course, social events.

It has been stated that New Zealand has the optimum population size of just over three million, to provide successfully a bibliographical and database facility on a national scale for all libraries.

One project now under development is the New Zealand Bibliographical Network, based on a mainframe computer in Wellington. This database is designed to be accessed by all libraries: national, city, town, country, and school.

Continued opposite

scene....

From opposite page

The national access to such a facility will depend on suitable data communications being available to each library, and each potential user's having to acquire the expertise in using the facilities, when they come on-line in 1983.

By then a network will have been established between the National Bibliographic Centre and regional centres in the major cities by high-speed leased data links. One of the problems facing this project will then be to link all participating school libraries to their nearest centre.

For the foreseeable future, permanent, leased data links would be far too costly for each of the many schools in a region so a trial network is to be established using acoustic coupled modems at selected school libraries. These will utilise the switched telephone network to obtain the required bibliographic information.

To this end CMUG is now involved with the New Zealand Education Department's School Library Service to provide the expertise in modem and interface design, software production and customising, and the necessary communications protocols, for this trial.

This ties in well with CMUG's major project, that of producing a low cost CCITT full duplex standard, acoustic coupled modem. This modem project is now into the production phase, so that as soon as the protocol standards have been finalised and the communications software is available the bibliographical trial can begin.

CLUB CALL... CLUB CALL... CLUB CALL...

ATARI 400/800 USER CLUB

Approximately one year after the Atari hit the New Zealand market, a Hamilton user club has been started. The club has 30 members and its over-all aim is to provide resources for you, the owner-user. The club plans to make available through other users a software-exchange library to help you with your programming and to circulate new ideas, etc, through magazine articles and club newsletters. The club has recently sent out is first newsletter and will continue sending it to new members as they join.

If you own an Atari 400 or 800, or you are interested in joining the user club to find out what it's all about, please send the following information:

Your Name
Address and city
Phone No.
Atari equipment
Experience

Address it to ATARI 400/800 USER CLUB, and send it to P.O. Box 6053, HAMILTON.

We look forward to hearing from you and sending you our first newsletter.

AUCKLAND TRS 80 USER GROUP

The Committee for the 1982/83 year has been elected as follows: President: Ron Feasey, (09) 469-455; vice president: Ian Campbell (09) 678-199; secretary: Olaf Skarsholt (09) 817-8698; treasurer: Des Cowie, (09) 534-1478; publicity: John Bickerstaff (09) 263-8882, Louis Ingle (09) 267-3236, Paul Briggs (09) 267-2508.

The group encourages the participation of all interested members and user with Z-80 based microcomputers i.e. TRS-80 compatible or similar. Bring your machine and/or yourself to share interests and enthusiasm. Meetings held at VHF Clubrooms, Hazel Ave., Auckland, on the first Tuesday of each month.

Subscriptions: Full $12.00: Students and Country $6.00: Family $18.00.

Continued over

CLUB CALL... CLUB CALL... CLUB CALL...

From previous page

Speciality displays for the September meeting will be the TRS-80 Colour Computer.

AUCKLAND OSI USER GROUP

Meetings of the OSI User Group are on every third Tuesday of the month. They are held at the VHF Group 66 Clubrooms at the end of Hazel Ave, Mount Roskill, (off Dominion Rd), Auckland.

CHRISTCHURCH MICRO PROCESSOR USERS GROUP

Covering all types of microcomputers, this group meets on the second Wednesday of each month in room C232 at 7.30 at Christchurch Polytechnic. All are welcome.

The group splits its time evenly between hardware and software and the meetings look at new micros, programming languages, home-made computers and so on.

CHRISTCHURCH APPLE USERS GROUP

Established about a year ago, this group meets on the first Wednesday of every month at 7.30 p.m. in the Computer Laboratory at Christchurch Teachers College in Dovedale Ave.

An informal steering committee plan the format of each meeting and a newsletter is usually distributed before each meeting telling members what is coming up.

After a successful open night recently on Apple graphics, attended by about 60 people, the group intends to have more such occasions open to all interested members of the public

CHRISTCHURCH 80' USERS GROUP

Confined to topics concerned with Z80 based microcomputers, this group meets on the last Wednesday of the month, at 7.30 p.m. in the St John's Church hall in Latimer Square.

Meetings usually contain a discussion, a talk on a particular subject, a demonstration and a cup of tea. All interested people are welcome.

MOTOROLA USER GROUP

The Motorola User Group is a New Zealand wide group of microcomputer exponents, with the main aim of research and development in many areas but based around the 6809 CPU. The group promotes an SS50C bus 6809 disk-based system, and develops its own hardware and software. Membership is limited to those working with 6809 computer systems and prepared to pool knowledge and expertise. No formal meetings are held, but a newsletter is published about every three months.

NZ MICRO COMPUTER CLUB NEWS

The club will now be holding its popular computer workshop each month, on the Saturday following the club meeting (first Wednesday of each month).

Both are held in the VHF Clubrooms, at the end of Hazel Ave, Mount Roskill, Auckland. We usually find there is a very useful exchange of interest and enthusiasm on all computers at these workshops. So this is a good chance to bring your computer to get (or give) help on hardware and software problems. Bring your lunch as we start at 9 a.m. and finish about 5 p.m.

Membership of the club is open to all persons. The annual fee is $12.00 due on July 1, or $6.00 for a half-year from January 1. Student membership (up to secondary level) is $6.00 a year or part thereof. Application forms are available from: the Secretary, NZ Microcomputer Club, Inc., P.O. Box 6210, Auckland.

At the May annual meeting a full committee was elected with no problems (or coercion). The contact details and main computer interest of this year's members are:

Name	Position	Home
Selwyn Arrow (Sorcerer)	Chairman, editor	491-012
Trevor Sheffield (2650)	vice-chairman, exhibition convener	676-591
Rod Llewellyn (Sorcerer)	secretary, librarian	607-971
Beryl Brown	treasurer	818-8134
Kerry Koppert (S100)	committee	695-355
Ray James (LNW)	committee	585-517
Lawrence Wilkinson (S100)	committee	598-660
Doug Miller (CBM)	committee	449-617
Roger Altena (CBM)	committee	278-5262
John Wigley (Video Genie)	committee	483-631
Olaf Skarsholt (TRS-80)	committee	817-8698
Peter Parsonage (System 80)	committee	535-5060
Tony Margetts (System 80)	committee	276-9765
Bruce Given (Apple)	committee	667-720
Peter Cawdron (Apple)	committee	591-794

NZ Microcomputer Club - User Group Meetings

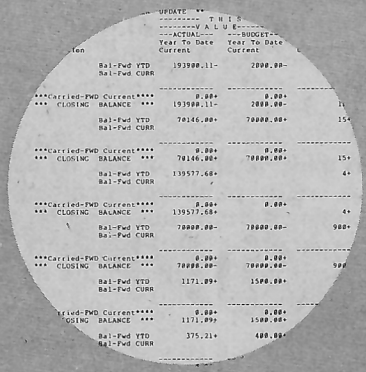
ATARI USER GROUP

The Atari User Group which was established at the beginning of 1982, is now holding monthly meetings in the VHF clubrooms. These are on the first Monday of each month, starting at 7.30 p.m. All Atari owners and prospective owners are welcome.

Continued next page

Your computer is judged by the way it writes...

NEWSFLASH ~ Following recent bulk-buying negotiations in Japan, we now offer much lower prices for Pro/Writer.



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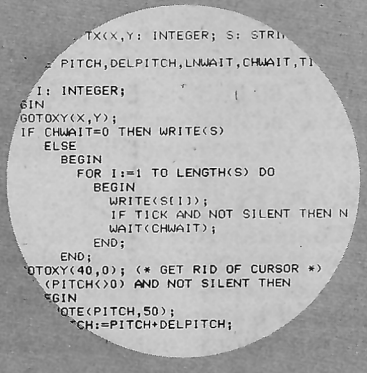
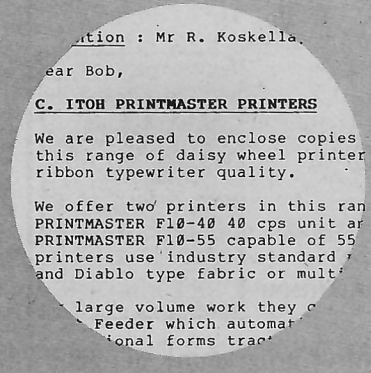
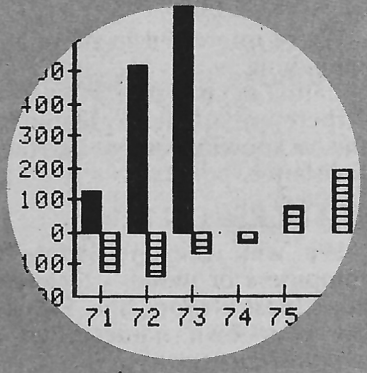
Dot Matrix







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COMMODORE USERS GROUP

The Commodore Users Group meets on the third Wednesday of the month at the VHF Clubrooms, Hazel Ave, Mount Roskill, Auckland, starting at 7.30 p.m.

Activities planned at most meetings are of a workshop nature. These will include:

1. Help with your programming problems. Some so-called experts will be there to help and advise. Please bring your computer if possible.

2. Program listings on to paper for those people who don't have a printer.

3. Help for those who want more technical knowledge about the internal workings of their machines. Some diagnostic programs will also be available if you would like to test or check your disk/computer etc.

4. Also the group library will be open to accept your programs or alternatively for you to collect some that are of interest to you. If you are going to place your programs on to tape please bring your computer along as time will be a critical factor.

A great new committee has been formed for the Commodore User Group. Your committee members are: Bob Kilham, president; Robert Altena, secretary/treasurer; John Horthorne, Julie Jones, Malcolm Levarre-Waters; Doug Miller, Commodore Liaison; Roger Smeed, library.

These people need your help to make the group a success. If you feel that your interests are not being catered for please tell us.

Subscription fees have been set at $5 a year or whatever to cover basic costs. See Roger Altena for payment of these.

Good news: A discount scheme has been arranged with Commodore Computers and covers all books, ribbons, disks, petpack software, manuals, etc.

ELECTRIC APPLE CHANGES

This report, previously published in Wellington, is now the sole concern of New Plymouth schoolteacher, Noel Bridgeman. Noel is the organiser of the National Apple Schools Network.

PROGRAM PUZZLE

Dear "Bits & Bytes",

In writing some programs to solve a few transcendental equations - purely as a self-imposed exercise - I came across this interesting APPLE II plus curiosity.

Can any of your readers supply the explanation to this little puzzle? Run the two programs listed.

The first program goes mildly haywire after 6.2. The second program runs well.

— CAROL MILES

PROGRAM ONE:

```
10 FOR R = 1 TO 10 STEP 0.2
20 PRINT R
30 NEXT R
```

```
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
6.2
6.39999999
6.59999999
6.79999999
6.99999999
7.19999999
7.39999999
7.59999999
7.79999999
7.99999999
8.19999999
8.39999999
8.59999999
8.79999998
8.99999998
9.19999998
9.39999998
9.59999998
9.79999998
9.99999998
```

PROGRAM TWO:

```
10 FOR R = 10 TO 100 STEP 2
20 PRINT R/10
30 NEXT R
```

```
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
3
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4
4.1
4.2
4.3
4.4
4.5
4.6
4.7
4.8
4.9
5
5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6
6.1
6.2
6.3
6.4
6.5
6.6
6.7
6.8
6.9
7
7.1
7.2
7.3
7.4
7.5
7.6
7.7
7.8
7.9
8
8.1
8.2
8.3
8.4
8.5
8.6
8.7
8.8
8.9
9
9.1
9.2
9.3
9.4
9.5
9.6
9.7
9.8
9.9
10
```

If anyone can help Carol with this problem, would they please write to the editors of BITS & BYTES

MICRO CLUB CONTACTS

CMUG (Combined Microcomputer Users Group): c/- P.O. Box 6210, Auckland, Selwyn Arrow Phone (09) 491-012 (h), or Brian Anderson (09) 275-5598 (h). All club enquiries welcome.

The following 12 User Groups are part of the N.Z. MICROCOMPUTER CLUB Inc, P.O. Box 6210, Auckland.

APPLE Users Group: Bruce Given, 12 Irirangi Rd., One Tree Hill, Phone (09) 667-720 (h).

ATARI Microcomputer Users Group: Brian or Dean Yakas, Phone (09) 8363-060 (h).

COMMODORE Users Group: Doug Miller, 18 Weldene Ave, Glenfield, Phone (09) 444-9617 (h), 497-081 (w).

CP/M Users Group: John Lamb, 11 Martin Ave, Remuera, AK5, Phone (09) 546-192 (h), 771-729 (w).

DREAM 6800 users: Peter Whelan, 22 Kelston St, New Lynn, Auckland, Phone (09) 875-110 (h).

DGZ80 users: Nigel Kai Fong (09) 502-013 (h), 89 Wheturangi Rd, Green Lane.

KIM users: John Hirst, 1A Northboro Rd, Takapuna, phone (09) 497-852 (h).

LNW users: Ray James, phone (09) 30-839 (w), 585-587 (h).

SORCERER Users Group (NZ): Selwyn Arrow, phone (09) 491-012 (h).

ZX80/81 users: Doug Farmer phone (09) 567-598 (h).

1802 Users Group: Brian Conquer, phone (09) 655-984 (h).

2650 Users Group: Trevor Sheffield, phone (09) 676-591 (h).

All the above contacts can usually be found at N.Z. MICRO CLUB meetings, or via our postal address (see above).

Other Club and Group details from around New Zealand.

SYMPOOL (NZ SYM User Group): J. Robertson, P.O. Box 580, Manurewa, Phone (09) 266-2188 (h).

ACES (Auckland Computer Education Society): Ray Clarke, 1 Dundas Pl, Henderson, Auckland, Phone (09) 836-9734 (h).

OSI USERS GROUP (AK) Vince Martin-Smith, 44 Murdoch Rd, Grey Lynn, Auckland.

NZ TRS 80 USERS GROUP (AUCKLAND): Olaf Skarsholt, 203a Godley Rd. Titirangi, Phone (09) 817-8698 (h).

ATARI 400/800 USER CLUB: Dave Brown, P.O. Box 6053, Hamilton, Phone (071) 54-692 (h).

ELECTRIC APPLE USER GROUP conact: Noel Bridgeman, P.O. Box 3105, Fitzroy, New Plymouth 720-432 (h).

TARANAKI MICROCOMPUTER SOCIETY: P.O. Box 7003, Bell Block, New Plymouth: Francis Slater, Phone (067) 84-514.

MOTOROLA USER GROUP: Harry Wiggins, (ZL2BFR), P.O. Box 1718, Palmerston North, Phone (063) 82-527 (h).

OSBORNE USER GROUP: Dr Jim Baltaxe, 18 Matipo St, Palmerston North, Phone (063) 64-411.

HAWKES BAY MICROCOMPUTER USERS GROUP: Bob Brady, Pirimai Pharmacy, Pirimai Plaza, Napier, Phone (070) 439-016.

WELLINGTON MICROCOMPUTING SOCIETY Inc. P.O. Box 1581, Wellington. Meetings are held the 2nd Tuesday each month at 7.30 p.m., Block 2, VICTORIA UNIVERSITY.

CHRISTCHURCH MICROPROCESSOR USERS GROUP: J. D. Mann, 330 Centaurus Rd, Cashmere, Christchurch. Phone (03) 325-652.

CHRISTCHURCH '80 USERS GROUP: David Smith, P.O. Box 4118, Christchurch, Phone (03) 63-111 (h).

CHRISTCHURCH PEGASUS USERS GROUP: Don Smith, 53 Farquhars Rd, Redwood, Christchurch, Phone (03) 526-994 (h), 64-544 (w), ZL3AFP.

CHRISTCHURCH APPLE USERS Group: Paul Neiderer, C/- P.O. Box 1472, Christchurch, Phone (03) 796-100 (w).

If you can update or add to this information or advise us of any microcomputer activity anywhere in New Zealand then please drop the editor a line.

An ABC of computer complexities

A

Applications program: A program written to carry out a specific job, for example an accounting or word processing program.

B

BASIC: An acronym for "Basic All-purpose Symbolic Instruction Code." The most widely-used, and easiest to learn, high level programming language (that is a language with English-like instructions) for microcomputers.

Binary: The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

Bit: Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

Boot: To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program, which means the computer doesn't do what you wanted it to do when you wrote the program.

Byte: Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

C

Character: Letters, numbers, symbols and punctuation marks each of which has a specific meaning in programming languages.

Chip: Common term for an integrated circuit etched on a tiny piece of silicon. A number of integrated circuits are used in computers.

Computer language: Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer. See also Programming languages and Machine language.

Courseware: Name for computer programs used in teaching applications.

CP/M: A disk operating system available for microcomputers using a particular microprocessor (that is the 8080 and Z80 based microcomputers such as the TRS 80 and System 80). See also Disk Operating Systems.

Cursor: Not somebody who curses a computer but a dot on a video that indicates where the next character will be shown.

D

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or Floppy disk, is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is actually an assembly of several discs of hard plastic material, mounted one above another on the same spindle. The Hard disk holds much more information - up to hundreds of millions of bytes - while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk Operating System: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See Disk Operating System.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

E

Execute: A command that tells a computer to carry out a user's instructions or program.

F

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Firmware: Programs fixed in a computer's ROM (Read Only Memory); as compared to software, programs held outside the computer.

Floppy disks: See Disks

H

Hard disks: See Disks.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information. The parts of the computer which you can kick.

High-level Language: Any English -like language, such as BASIC, that provides easier use for untrained programmers. There are now many such languages and dialects of the same language (for example MicroBASIC, PolyBASIC etc).

I

Input: Any kind of information that one enters into a computer.

Input device: Any machine that enters information into a computer. Usually done through a typewriter like keyboard.

Interactive: Refers to the "conversation" or communication between a computer and the operator.

Continued over

An ABC of computer complexities

From previous page

Interface: Any hardware/software system that links a microcomputer and any other device.

I/O: Acronym for "input/output".

K

K: Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024)

Kilobyte: See K.

M

Modem: Acronym for "modulator-demodulator." An instrument that connects a microcomputer to a telephone and allows it to communicate with another computer over the telephone lines.

Machine language: The binary code language that a computer can directly "understand".

Mass storage: A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

MB: Represents a million bytes.

Megabyte: See MB

Memory: The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory, inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.

Memory capacity: Amount of available storage space, in Kbytes.

Menu:

Menu: A list of options within a program that allows the operator to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly set into programs without knowing any technical methods.

Microcomputer: A small computer based on a microprocessor.

Microprocessor: The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

N

Network: An interconnected group of computers or terminals linked together for specific communications.

O

Output: The information a computer displays, prints or transmits after it has processed the input. See Input and I/O.

P

Pascal. A high-level language that may eventually rival BASIC in popularity.

PEEK: A command that examines a specific memory location and gives the operator the value there.

Peripherals: Any external input or output device that communicates with a microcomputer, for example disk drives.

Personal computer: A small computer for one's own use, whether in the home, school or business.

POKE: A command that inserts a value into a specific memory location.

PolyBASIC: The version of BASIC that runs on the Poly computer.

Printer: Device that prints out informations onto paper.

Program: A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

R

RAM: Acronym for "random access memory". Any memory into which you "read" or call up data, or "write" or enter information and instructions. Any memory in which an operator can gain direct access to any memory location at any time.

ROM: Acronym for "read only memory". Any memory in which information or instructions have been permanently fixed. ROM cannot be changed except under highly unusual conditions.

S

Simulation: Creation of a mathematical model on computers that reflects a realistic system.

Software: Any programs used to operate a computer.

Storage: See Mass storage.

System: A collection of hardware and software where the whole is greater than the sum of the parts.

T

Tape: Cassette tape used for the storage of information and instructions (not music).

V

VDU: Acronym for "visual display unit". A device that shows computer output on a television screen.

W

Word: A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

Write to us

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