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800 XL WINS TITLE

ATARI's 800XL has carried off the prestigious Home Microcomputer of 1985 title in this year's British Microcomputing Awards.

It beat off the challenge from the Amstrad CPC664 and Sinclair's Spectrum in the final to get the nod from the judges.

Bob Harding, Atari UK's sales and marketing boss, is seen right receiving the trophy from Matt Nicholson, editor of What Micro?, the magazine which sponsors the award.

The presentation took place at a Hollywood style award ceremony hosted by Sir Alexander Burnet in the Park Lane Hotel, London.

Recognised as the "Deans" of the computer industry, the event this year attracted more than 1,000 nominations.

Organised by Personal Computer World, the Sunday Times and Theatre Television, the awards "seek to define technological excellence and value for money for the consumer".

While pointing out that What Micro? sponsored the award but did not judge it, Matt Nicholson did concede to Atari that the reason his magazine nominated the 800XL for the honour is the first place.

"The reason we selected the Atari was mainly because of its £130 price tag," he said. "It was just very good value."

"We feel the 800XL is a good computer, with a decent amount of memory, very good graphics and a good range of software that is no longer so expensive."

"That's why we even rate it above a Spectrum."

But the final word was left to an obviously delighted Bob Harding.

"We believe the machine is an unbeatable combination of performance and value for money - and obviously the award judges fully support our view."



Scenes of success: Bob Harding and trophy, with Matt Nicholson

Atari bids to topple BBC

ATARI is poised to launch an all-out bid to capture a major share of the education market.

Effective immediately, it is offering all educational establishments a 20 per cent discount on 8 bit hardware packs and software, and 25 per cent on peripherals.

Spurheading the drive to knock the BBC Micro off its perch in Britain's schools and colleges are two bundled offers containing the 800XL - winner of the Home Microcomputer Award for 1985.

Atari Logo System 1 contains the 844 800XL, Atari 1010 program data recorder, LCSI Atari Logo cartridge, Introduction to Programming through Turtle Graphics, Atari Logo reference manual, Atari Logo

quick reference guide, Atari Basic Booklet, Invitation to Programming I, tutorial software, sound and graphics demonstration software, Role Position rising simulator, plus all leads and power transformers.

The special educational price is £128.88 compared to the recommended regular retail price of £165.20.

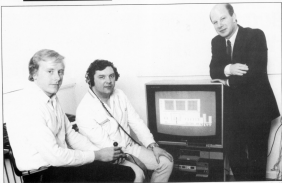
Atari Logo System 2 contains the 800XL, 1050 disc drive, LCSI Atari Logo cartridge, Introduction to Programming through Turtle Graphics, Atari Logo reference manual, Atari Logo quick reference guide, built in Atari Basic, disc operating system software, Home Filing Manager database software, sound and graphics demonstration disc, The Pico 66

adventure game, and all leads and power transformers.

Special education price is £210.25 compared to RRP of £268.55.

Atari is also offering educationalists the 1300X for £114.30, the 800XL for £98.17, 1050 disc drive plus 600B software for £120.43, 1010 program recorder for £22.80, 1028 dot matrix printer for £130.43, 1027 letter quality printer for £163.04, Atari graphics touch tablet plus software for £32.80, and Atari LCSI Logo card manual for £40.69.

Atari's Jon Deen said: "We are in the process of finalising our distribution outlets that will serve users of Atari equipment in education. Orders will be processed directly from Atari UK."



Island Records' James Bradley, Unity Productions' manager of Frankie Goes to Hollywood, and Ocean Software director David Ward preview the new game.

IT'S BARGAIN TIME ... with a cheaper model and free software

ATARI says it is developing a cheaper version of the ST - the 260SE. And it could be available here in the autumn.

The operating system with 2Mk of memory will contain an impressive amount of software on board on ROM, a spokesman told Atari User.

No price has yet been set for the machine, which will be released in the UK at the same time that it comes out in the US.

There is a possibility that it could be on display at the PCW Show in September, but this has not been confirmed.

Downloading

FOR the first time ever file teleloading for downloading to Atari computers has been introduced by Viewfax 256 on Prostat.

Atari owners with Viewstern can copy the software using the built-in downloader in the Minus Technology package.

The program demonstrates some of the capabilities of

Atari's versatile GTIA chip - the television interface chip that converts digital information received from the Atarc chip for screen display.

The software is similar to demonstration programs seen in computer shops.

Written by Jean White, the program uses Basic and machine code and runs on the Atari 800 series and 1300X.

Wait for it

THE fully-integrated spreadsheet/database/word processor package infirly expected from US developer Matrix Software will not now appear, says Atari.

The package was planned as a much cheaper version of the top-selling 1-2-3 for the ST range.

However, Atari is promising that a "very similar" product will soon be available - "a practically identical package with the same facilities at a similar price, under £100", according to a spokesman.

YOUNG Atari users who have difficulty in making up their minds on whether to spend their pocket money on computer games or pop music have a treat in store.

Ocean Software's latest game program, Frankie Goes to Hollywood, comes with a free audio-cassette containing an unexpedited, live recording of the band.

But - before all the kids go rushing off to the shops - the Atari version will not be available until late summer.

The game has been produced in a joint publishing venture between the group, its recording company Island Records, creative producers ZTT and Ocean.

Says Ocean's David Ward: "Datavision is a new idea - players load the game from the program cassette, and then insert the audio-cassette."

"A voice over will describe how to play the game on side one, and on the flip side players can hear some inspirational

A treat for pop fans

music in the form of one of the band's hit recordings".

Frankie Goes to Hollywood is needed selling price of £8.95 for the Atari version, which is the usual price for Ocean's larger-ranging arcade adventure game programs. It will contain more than 12M screens.

The game's scenario is written around the Frankie philosophy, and the possibility of escape from a mind-bending existence into the delights of the Pleasureworld.

To gain entrance, the player must gaze from a shadowy Frankie figure into a computer 100 per cent person by solving graphic puzzles.

These are achieved by travelling from a classic example house, through ordinary living-rooms and bedrooms into computer maze situations, and by solving complex puzzles which require both strategy and skill.

Games go on, says Atari

ATARI has denied that it is putting back from games software production, despite drastically slowing down its programming staff and licensing an increasing number of its titles to independent producers.

The latest games to follow this route is The Pay Off, which was originally produced to promote Atari disc drives. Now its authors, Bigness Software, have gained the rights to produce a cassette version.

But this doesn't mean Atari

has lost interest in the games market.

For from it, sales sales boss Rob Harding - "We see a big future for our 8-bit machines like the 800XL and 130XE.

"We are planning further improvements and developments for this range and will be bringing in our own games and small business software.

"In addition we will be encouraging independent software houses to design programs for these machines".

ST programs lining up

As many as 300 new programs for the Atari ST range could be unveiled at the PCW Show next month.

Development systems have already been delivered to more than 100 UK software houses and most of them are working on more than one program, says Atari.

This means there are almost certain to be at least 350 and possibly as many as 300 ST software titles ready for sale or

in prototype form at the big autumn show.

Atari expects one-third to be serious business applications, one-third productivity including utilities, and one-third recreational including graphics, design, music and games.

"We are making sure the ST software games not only in a wide range but covers all aspects of a variety of applications", Atari's Rob Harding said.

Reason why...

AMERICAN program writers' interest in Atari computers is so high that 400 software developers attended Jack Tramiel's recent address to the Software Publishers Association.

The SFA's executive director, Ken Weech, described Atari's new machines as "the most of the Consumer Electronics Show in Las Vegas".

Tramiel described his activities since he left Commodore and the evolution of his concepts of a new generation of affordable technology.

He let the audience in on the

real reason for his going back into the computer business.

"I was in Japan", he said, "and everyone I was talking to was sitting.

"They were thinking that now Jack's out of computers it's time to go into the US".

Weech said: "Jack Tramiel's enthusiasm was contagious. A broad range of software developers want the machines to succeed.

"If Atari fulfils Jack's promises I think these software publishers would be crazy not to take the bait".

ATARI USER READER OFFER

DOS 2.5 upgrade - and it's free!

"If you've got a disc drive and currently using DOS 2, then you should think very seriously about upgrading to 2.5 as soon as you can get your hands on a copy".

THAT'S what our technical editor André Willey wrote in last month's Atari User, when he gave an enthusiastic review of Atari's new operating system.

DOS 2.5 offers many advantages over DOS 2, which was issued with the Atari 1080 enhanced density disc drives - particularly ease and convenience of use and compatibility with Atari DOS 2.0. It also includes several utilities, including a Diskette, a DOS 2 to 2.5 file converter and a Harddisk for use with the 130XE.

The DOS 2.5 disc also features a "Mini Manual", explaining in detail how to use the new DOS. This can be read or printed using the Atariwriter word processor.

Alternately, for people without Atariwriter, an additional program has been included which displays the "Mini Manual" from Basic, either on the screen or a suitable printer.

Atari User is happy to be able to offer the new DOS 2.5 to readers in one of three ways:

- Send us a blank disc, together with a return postage stamp and the coupon below giving your name and address. Make sure that the disc is adequately packed. There is no charge for this service, but it is limited to one disc per coupon.
- Order our Disk Doubler (details on Page 60) and we will send you, in addition, a brand new disc containing DOS 2.5 completely free of charge. Please use the order form on Page 61.
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Spielberg epic goes on disc

AMERICAN publisher DataSoft's latest releases include five titles for the Atari XL, to be distributed here by US Gold.

Foremost is an action/strategy game based on Steven Spielberg's latest blockbuster film "The Goonies" featuring eight maze-race scenarios of increasing difficulty with players treasure as the goal.

It will cost £9.95 on cassette and £14.95 for the disc version. Another action game is based on the legendary character Zorro whose adventures take him through 10 scenarios. Prices £9.95 for cassette and £14.95 for disc.

DataSoft has also acquired the licenses for Pole Position II and Elevator Action, two of the most popular arcade games in recent years. Prices £9.95 for cassette and £14.95 for disc.

Alternate Reality is a seven part series of fantasy role-playing games, and The City is the only one that must be bought in order to play the others - The Dungeons, The Arena, The Palace, The Wilderness, Revolution and Destiny.

Game play is controlled by a combination of keyboard and joystick and it will be available on disc only for £19.95.

SOFTWARE for the Atari ST system will include utilities from Rising Star Industries according to reports from California.

This firm is understood to have signed an agreement with Atari for its "wildcat" range of software to be distributed with the ST.

First releases are expected to be Valhalla and Valpurg.

ATARI is to raise an additional \$160 million by the summer of 1986 in order to finance its corporate expansion plans.

The corporation also intends to go public some time this summer.

Electronic censor may clean up the bulletin boards

NAUGHTY words of a type that would make even a sergeant major blush are increasingly confronting Atari users who log onto bulletin boards.

All over the UK, system operators are being forced to devote more and more of their time to erasing electronic graffiti.

The obscenity problem has been one that to date has baffled the industry. However according to the latest issue of *Spelink* - a sister publication of *Atari User* - help may be at hand.

It takes a look at a new Naughty Words Editor which is currently being evaluated

by MicroLink, the recently launched nationwide service for micro users.

The man in charge of the project is 39-year-old Tim Clarkson. He explained to *Spelink* just how the Naughty Words Editor should work.

"You initially create a text file or glossary of naughty words or phrases", he is quoted, "as when these turn up in any message the whole of the text is pulled out and put in an obscenity file."

"Later the messages are checked over by the program to see whether it's safe for them to be released".

That's the theory behind it, but in practice - according to

Spelink - it has been presenting more than a few problems.

First of all the systems operator needs to have the vocabulary of a drunken sailor.

The second, and possibly the major pitfall is that certain obscenities can crop up quite harmlessly within words.

One of the words that faces Tim Clarkson is what to do with the species most cherished by birdwatchers, the BT.

"Used in the ornithological context, the word could in no way give offence", he says. "However once it becomes anatomical then eyebrows would understandably be raised."

"So you decide to err on the side of caution and classify it" as a word that might possibly offend.

"What happens then however is that all messages containing with word will suddenly find their way into the obscenity file".

In order to counteract this, the MicroLink editor of good taste has created a text file of phrases - and not individual words.

"This removes part of the problem", says Tim. "We can rule that it is left in as long as it has 'love' or 'breast' in front of it but not 'big'."

It's victory all round..

A RECENT US court battle between Atari and Commodore over alleged theft of trade secrets has ended with both sides claiming victory.

Four engineers who had followed Jack Tramiel from Commodore to Atari were

accused of charges that they took company secrets with them.

The judge said Commodore had failed to prove that the men took any specific plans of the new 286800 disc drive with them, but ordered the engineers to return to Commodore "certain papers which happened to be in their pockets when they left".

The defendants' lawyer said they were "extremely pleased". The judge had "recognised that these four fellows did not steal any computer secrets and Commodore could not prove they did. This was a complete victory".

Commodore disagreed. Vice-president Joseph Reed said: "The judge clearly ruled that they wrongfully appropriated our property. It was a complete victory for Commodore".

32 bit micro on way

ATARI has confirmed it is working on a 32 bit CAD-CAM computer for release later this year - a VAX-1100, mini-powered micro whose selling price has yet to be set.

Reports originating in the US said Atari is aiming to put mini power into a micro selling "at around the \$8,000 mark, at which it will go like hot cakes".

SOFTWARE SPECIALIST

11

Movie Title	Rating
Parasite	9.5
Knives Out	9.3
Jojo Rabbit	9.0
Goodbye, Mr. Goodbye	8.9
Knives Out (Re-release)	8.8
Parasite (Re-release)	8.7
Jojo Rabbit (Re-release)	8.6
Goodbye, Mr. Goodbye (Re-release)	8.5
Parasite (Re-release)	8.4
Knives Out (Re-release)	8.3
Goodbye, Mr. Goodbye (Re-release)	8.2
Parasite (Re-release)	8.1
Knives Out (Re-release)	8.0
Goodbye, Mr. Goodbye (Re-release)	7.9
Parasite (Re-release)	7.8
Knives Out (Re-release)	7.7
Goodbye, Mr. Goodbye (Re-release)	7.6
Parasite (Re-release)	7.5
Knives Out (Re-release)	7.4
Goodbye, Mr. Goodbye (Re-release)	7.3
Parasite (Re-release)	7.2
Knives Out (Re-release)	7.1
Goodbye, Mr. Goodbye (Re-release)	7.0
Parasite (Re-release)	6.9
Knives Out (Re-release)	6.8
Goodbye, Mr. Goodbye (Re-release)	6.7
Parasite (Re-release)	6.6
Knives Out (Re-release)	6.5
Goodbye, Mr. Goodbye (Re-release)	6.4
Parasite (Re-release)	6.3
Knives Out (Re-release)	6.2
Goodbye, Mr. Goodbye (Re-release)	6.1
Parasite (Re-release)	6.0
Knives Out (Re-release)	5.9
Goodbye, Mr. Goodbye (Re-release)	5.8
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Parasite (Re-release)	5.1
Knives Out (Re-release)	5.0
Goodbye, Mr. Goodbye (Re-release)	4.9
Parasite (Re-release)	4.8
Knives Out (Re-release)	4.7
Goodbye, Mr. Goodbye (Re-release)	4.6
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Knives Out (Re-release)	4.4
Goodbye, Mr. Goodbye (Re-release)	4.3
Parasite (Re-release)	4.2
Knives Out (Re-release)	4.1
Goodbye, Mr. Goodbye (Re-release)	4.0
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Parasite (Re-release)	3.3
Knives Out (Re-release)	3.2
Goodbye, Mr. Goodbye (Re-release)	3.1
Parasite (Re-release)	3.0
Knives Out (Re-release)	2.9
Goodbye, Mr. Goodbye (Re-release)	2.8
Parasite (Re-release)	2.7
Knives Out (Re-release)	2.6
Goodbye, Mr. Goodbye (Re-release)	2.5
Parasite (Re-release)	2.4
Knives Out (Re-release)	2.3
Goodbye, Mr. Goodbye (Re-release)	2.2
Parasite (Re-release)	2.1
Knives Out (Re-release)	2.0
Goodbye, Mr. Goodbye (Re-release)	1.9
Parasite (Re-release)	1.8
Knives Out (Re-release)	1.7
Goodbye, Mr. Goodbye (Re-release)	1.6
Parasite (Re-release)	1.5
Knives Out (Re-release)	1.4
Goodbye, Mr. Goodbye (Re-release)	1.3
Parasite (Re-release)	1.2
Knives Out (Re-release)	1.1
Goodbye, Mr. Goodbye (Re-release)	1.0
Parasite (Re-release)	0.9
Knives Out (Re-release)	0.8
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Goodbye, Mr. Goodbye (Re-release)	0.4
Parasite (Re-release)	0.3
Knives Out (Re-release)	0.2
Goodbye, Mr. Goodbye (Re-release)	0.1
Parasite (Re-release)	0.0

Component	Year	Value
Basic Income	2010	10.00
Basic Income	2011	10.00
Basic Income	2012	10.00
Basic Income	2013	10.00
Basic Income	2014	10.00
Basic Income	2015	10.00
Basic Income	2016	10.00
Basic Income	2017	10.00
Basic Income	2018	10.00
Basic Income	2019	10.00
Basic Income	2020	10.00
Basic Income	2021	10.00
Basic Income	2022	10.00
Basic Income	2023	10.00
Basic Income	2024	10.00
Basic Income	2025	10.00
Basic Income	2026	10.00
Basic Income	2027	10.00
Basic Income	2028	10.00
Basic Income	2029	10.00
Basic Income	2030	10.00
Basic Income	2031	10.00
Basic Income	2032	10.00
Basic Income	2033	10.00
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Basic Income	2038	10.00
Basic Income	2039	10.00
Basic Income	2040	10.00
Basic Income	2041	10.00
Basic Income	2042	10.00
Basic Income	2043	10.00
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Basic Income	2045	10.00
Basic Income	2046	10.00
Basic Income	2047	10.00
Basic Income	2048	10.00
Basic Income	2049	10.00
Basic Income	2050	10.00
Basic Income	2051	10.00
Basic Income	2052	10.00
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Basic Income	2093	10.00
Basic Income	2094	10.00
Basic Income	2095	10.00
Basic Income	2096	10.00
Basic Income	2097	10.00
Basic Income	2098	10.00
Basic Income	2099	10.00
Basic Income	2100	10.00

10

Planning and Department	\$9.0	\$3.0
Aquatic Construction Fee	\$9.0	\$9.0
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100

Base Salary	\$60,000	\$60,000
Base Cost	\$100,000	\$100,000
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Books	\$0.00	\$0.00
Company Misc	\$0.00	\$0.00
1st Appointment	\$0.00	\$1.00
Misc. Items	\$0.00	\$0.00

100

Simulation	10/10	250/10
Dark Crystal	10/10	250/10
Mission: Impossible	10/10	100/10
Glenn Gould	10/10	100/10
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10

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Now let's get these variables down to work

WE saw last month how to label strings with variables. This meant that if we were using a string several times in a program we could use a variable instead of it.

For example:

```
A$="AUSTRALIA"
```

means that, from now on, instead of using "AUSTRALIA" in full in our programs, we can use A\$.

PRINT A\$

will print out AUSTRALIA for you. Of course we had to make room for the string by telling the Atari its maximum size with a DIM statement.

The labels we used last month were all single letters of the alphabet followed by \$. The dollar sign tells the computer that it is a string we are labelling — such a variable is called a string variable.

It is called a variable because the "contents" of a variable (in technical terms, its value) can vary throughout

Expand your knowledge of programming with Part IV of MIKE BIBBY's guide through the micro jungle

a program. Program 1 should illustrate the point.

As you will see when you RUN it, the value of A\$ varies as we reassign it during the program. A\$ always takes the last value assigned to it.

You may wonder why on earth you would want to use the same variable for different things, rather than label everything separately. As we shall see, it can be extremely useful.

So far we have restricted our string variables to single letters of the alphabet followed by the \$ sign, such as A\$, B\$ and C\$.

However there is no need for such a limit — provided we follow them with \$. String variables can be made up of several letters, even words. They must, however, be capitals.

Program 1 illustrates the point. It is

our most sophisticated program to date, and is well worth having a close look at.

Incidentally, remember to enter NEW between programs.

Perhaps the first thing to remark upon is that our string variables, instead of being single letters, have grown into actual words. They've still got the \$ at the end, though, to show

```
10 NEW PROGRAM 11
20 NEW DIMENSION% (A$128), (B$128), (C$128)
30 PRINT "ENTER A WORD"
40 INPUT A$
50 PRINT "ENTER ANOTHER WORD"
60 INPUT B$
70 PRINT "ENTER A THIRD WORD"
80 INPUT C$
90 PRINT "A$="A$
100 PRINT "B$="B$
110 PRINT "C$="C$
120 PRINT "END"
```

Program 1

that they're string variables, or labels.

Also, notice that while our labels are in capitals, the strings themselves, inside the quotes, are a mixture of lower and upper case. You'll need some deft manipulation of the Caps key as you type it in.

As you'll probably remember, the PRINT CHR\$(128) at line 30 clears the screen. It is good programming practice to use words for variables, since we can make the label describe

```
10 NEW PROGRAM 2
20 NEW DIM%
30 DIM A$128,B$128
40 PRINT "A$="
50 INPUT A$
60 PRINT "B$="
70 INPUT B$
80 PRINT "C$="
90 INPUT C$
100 PRINT "END"
```

Program 2

what it is labelling. Programs make more sense this way.

Thus we use **NAMES** to label "Mr. Smith", **MONEY** to label "You owe me money", and **THREATS** for "Pay up or else".

This may seem long-winded, but it really does help to make your programs more readable, and hence easier to decipher. For example:

```
50 PRINT "Dear "NAMES
```

really tells you what the line is doing, far more than:

```
50 PRINT "Dear "A$
```

Similarly:

```
PRINT THREATS
```

is more meaningful than

```
PRINT B$
```

The moral is, use words for variables (labels as much as possible).

Actually, you can use capital letters and numbers intermixed for variable names. For example:

```
NAMES$  
RDB$  
CDPOS
```

are all valid string variables.

However they must start with a letter – not a digit – and only capital letters are allowed. This means that:

```
10AYS  
2MORROWS
```

aren't valid.

Also, spaces aren't allowed, so:

```
FIRST NAMES
```

is illegal.

Variables shouldn't start with Basic keywords, as they confuse the Atari, so:

```
PRINTERS
```

is definitely out.

Try entering a program line such as:

```
10 PRINTERS$ = "EPSON"
```

Then LIST it – can you explain what happened? Steer clear of keywords in variable names.

While we're at it, try entering:

```
10 WRITERS$ = EPSON
```

Spot the deliberate mistake? Well, the Atari does and rejects the line – **EPSON** should have been in quotes. If

you now enter LIST, you'll see the Atari has actually included line 10 as a program line – with **ERROR** in front of it.

This habit of the Atari can be rather irritating, but don't forget, you can get rid of a line by simply typing its number and pressing RETURN.

Although it's not likely to affect you at this stage, the Atari limits you to 128 variable names. The good news is that they can each be up to 120 characters long.

One advantage of using variables instead of directly using strings is that we can easily alter the output of the program.

In the case of Program 8, if we want another victim to be the recipient of our letter, just change line 40. For example:

```
40 NAMES$="Mr. Jones"
```

From then on all uses of **NAMES** in the program will refer to Mr. Jones. In this short program it doesn't make a great deal of difference, but in larger ones, if you had used the string "Mr. Smith" every time, instead of **NAMES**, you would be in for a lot of retyping.

So far we have talked about string variables. However there is another kind of variable called a numeric variable.

Numeric variables are labels just as much as string variables are, only they label numbers in such a fashion that we can do sums with them. Try running Program 18.

Line 30 uses the numeric variable **A** to label the number 10. Notice that for a numeric variable we can simply use a letter of the alphabet without following it with the \$ sign necessary for a string.

Also since it isn't a string, the value we are giving the variable doesn't have to be in quotes. Hence line 30 is simply:

```
30 A=10
```

Line 40 prints out 1, not A, of course, but the value that **A** labels, which is 10.

```
10 RUN PROGRAM 18  
10 PRINT ENDLESS  
10 A=10  
40 PRINT A  
10 PRINT 100
```

Program 18

The most interesting part is line 50. Here we multiply the number that **A** labels by two, so that the line prints out 20.

That's the useful thing about numeric variables – you can do sums with them!

Try running Program 19 with the following version of line 50:

```
50 PRINT A+8  
50 PRINT A/8  
50 PRINT A*A
```

If you've been following what I've said so far you could be forgiven for thinking that string variables are for

```
10 RUN PROGRAM 19  
10 A=10  
50 PRINT ENDLESS  
40 A=100  
50 PRINT A$
```

Program 19

labelling words, and numeric variables for numbers.

Life is never that simple. You can, and often do, use string variables for labelling numbers – the point is that you can't do sums with them. Try entering Program 19, which is based on Program 18, using the string **A\$** instead of the numeric **A**.

Once you've entered it, try adding the following line:

```
50 PRINT 2 * A$
```

As you'll soon find out, the Atari rejects line 50 out of hand. This is because you are attempting to do a sum with the wrong type of variable – string instead of numeric.

As with using variables, we do not have to (and should not) restrict ourselves to single-letter labels for numeric variables.

We can use words in a manner strictly analogous to string variables, save that we omit the final \$ sign. And, of course, we don't put what we are labelling in quotes, since it isn't a string.

Have a look at Program 19. This is meant to be a cheery greeting for

```
10 RUN PROGRAM 19  
10 PRINT ENDLESS  
10 A=10  
40 A=100  
50 A$="HEAT"  
50 PRINT "GOOD TO SEE YOU, "NAMES
```

Program 19

someone when they RUN the program in the computer—the sort of thing I often used in my classes.

However as it stands it's a bit restricted—after all, only a small percentage of my students were called MIKE. What's really needed is some way for the Atari to find out the name of the person so that it can tailor the message to suit.

Program VI fits the bill. The trick here is the use of the INPUT statement in line 60. In Program V, line 40 put the value MIKE into NAME\$. In Program VI the variable isn't actually attached to a specific

50 supplies that.

The micro then waits for us to type our reply and send it by pressing Return. Whatever we have typed is then becomes the value of NAME\$—even if we have 50!

Line 70 then prints out the message after line 60 prints out a blank line.

The point of all this is that in Program VI, as opposed to Program V, the value of NAME\$ is not fixed initially, but is decided during the program by the response to INPUT.

This means that every student in the class can now run the program

```
10 RUN PROGRAM VI
20 PRINT "HELLO"
30 RUN NAME$
40 PRINT "WHAT IS YOUR NAME?"
50 INPUT NAME$
60 PRINT
70 PRINT "NAME TO SEE YOU "NAME$"
```

Program VI

value—if you like, you give the program a label, but neglect to tell it what it's labelling. Instead you type:

50 INPUT NAME\$

When the Atari reaches this line it waits until you PUT IN, or INPUT, the value you want NAME\$ to have by typing the value in.

To put it another way, when the computer meets an INPUT statement followed by a variable, it asks you what you want the variable to be—in fact, it actually puts a question mark on the screen.

You are then supposed to type in the answer followed by Return, which, as always, sends it to the computer, which then carries on with the rest of the program.

So when you run Program VI line 60 asks: "WHAT IS YOUR NAME". Notice that we don't need a question mark—the INPUT statement of line

```
10 RUN PROGRAM VII
20 PRINT "HELLO"
30 PRINT "How old are you?"
40 INPUT AGE
50 PRINT
60 PRINT "I don't believe you are "AGE"
```

Program VII

and have the message tailored to themselves.

Incidentally, line 40 is not strictly necessary, but it is only polite to tell people what kind of response you expect them to make. Otherwise they will be left with just a question mark—not too "user-friendly" as the jargon has it.

The semi-colon at the end of line 40 "glues" the question mark, or prompt, as it is known, to the preceding "message". Running the program with it omitted should make this clear.

Remember, when you run Program VII and it asks for your name, you must type your reply then press Return. If you omit Return the Atari won't receive your answer and will continue waiting. This could be incredibly boring!

If you make a typing mistake before you press Return, you can erase it with Delete. Once you've pressed Return, though, you're stuck

with what you've typed.

You can use INPUT with numeric variables as well as strings. Program VII demonstrates this. When you get the prompt, try typing in a word rather than a number and see what happens.

```
10 RUN PROGRAM VIII
20 PRINT "HELLO"
30 PRINT "How many?"
40 INPUT FIRST
50 PRINT "Second Number?"
60 INPUT SECOND
70 PRINT FIRST "multiplied by "SECOND
80 " is "FIRST*SECOND
```

Program VIII

A slightly more serious application of INPUT allows you to calculate the product of two numbers, as Program VIII demonstrates.

Look carefully at line 70 and see if you can work out what's happening. FIRST isn't in quotes, and so the micro will print the number that FIRST labels. "Multiplied by" is printed literally since it is in quotes.

The numeric variable SECOND is not in quotes—it may have them on either side, but the quotes on the left are already paired with the quotes on the far left, so they don't count. The micro will therefore print out the value of SECOND.

"is" is printed literally, since it is in quotes. FIRST*SECOND isn't in quotes, so the sum is done and the answer printed out. Figure 1 should help to make this clearer.

Finally, try altering Program VIII so that it adds or subtracts pairs of numbers.

We've covered an enormous amount of ground this month. I suggest that you spend a good while going over the programs. If you are having problems, re-reading the earlier articles will probably help.

Above all, remember it's a "hands-on" course—you can't expect the examples to make sense until you've typed them in!

```
20 PRINT FIRST ; " multiplied by " ; SECOND ; " is " ; FIRST*SECOND
      |         |         |         |         |
      variable  in quotes variable  in quotes  Calculate then print out answer
```

Figure 1 Mixing variables and strings in PRINT statements

The first couple of issues of *Atari User* carried an advert for Llamasoft's *Psychodelia*.

If you're one of the many people who've been eagerly waiting for *Psychodelia* to appear on the Atari I have some bad news and some good news.

The bad news is that *Psychodelia* isn't going to appear on the Atari. The good news is that Jeff Minter was so pleased with the Atari version he's called it something different — **Colourspace**.

Let's get one thing clear from the start. *Colourspace* is not a game, unlike the rest of Llamasoft's catalogue. It's what Jeff calls a light synthesizer, a software toy.

It's also right on impossible to describe.

If you can imagine an rich-scratch connected to a multi-coloured special effects generator, you might be on the right lines.

You "play" it with a combination of the joystick and keyboard to produce incredible coloured displays.

They can be whirlwind rainbows or cool waves flowing endlessly — it's up to you.

As Jeff points out in a glowing eulogy to Atari machines, all this is possible because the display list can tell the Arctic ship to build any number of screens.

According to the manual, the difference between *Psychodelia* and *Colourspace* is as pronounced as the difference between a Mind and a Ford.

The idea for *Colourspace* grew out of Jeff's interest in rock music and the light shows that accompany rock concerts of the Pink Floyd/Genesis type.

A very comprehensive manual accompanies the tape. It's written in the distinctive Minter style — "imagine that the cursor is a telepathic metagame" — but actually does describe all the many controls with which the parameters are set or manipulated.

I must admit I didn't read

Psychodelia by any other name is just as good

the manual at first. I glanced through while the program was loading and then played for quite a while.

I then kept digging into the manual to discover a new variable and immediately try it out.

The crowd that gathered around sounded like kids on bonfire night. Lots of "Oooh's"

and "Aah's", with a liberal sprinkling of "How does he do that?"

My daughters enjoyed it even more. It has all the competitiveness of a kaleidoscope with all the fun of being able to tweak the controls.

You can even record a sequence of about 15 minutes' worth in memory and

play it back as an endless loop, or record the parameters and joystick/keyboard dynamics to tape and load them back in at a later date.

Quite simply, *Colourspace* is magnificent. It's Atari gem-price at its best and so happy should be without it. Miss one, Jeff — really sorry.

Gill McKnight



HITCH YOUR ATARI TO A STAR GAME

WHAT sort of probability factor would you give to the chances of a cult radio programme going on to become a television series, an LP record, several books, a stage show and is currently being made into a movie?

Highly improbable, right?

Well *The Hitchhiker's Guide to the Galaxy*, by Douglas Adams, has not only achieved all of that already, it has gone one step further.

The immensely successful series now features in a brilliant text adventure, written by Douglas Adams himself and programmed by those masters of artificial intelligence at Infocom.

And believe me the result is magnificent. It has already gone straight to the top of the charts and has just picked up the WH Smith Game of the Year award, probably the first of many such awards.

Hitchhiker looks set to be



one of the all time greats.

Like all Infocom adventures, it is text only, has an immense vocabulary, an amazingly sophisticated input analyzer, screens and screens of fulsome prose, and, because of

the sheer size of the game, comes on disc only.

Even if you've tested the seven pleasures of an Infocom adventure before, I guarantee



Mr Robot sets a tricky scene

you'll never have played one like this.

When was the last time you suddenly found yourself transformed into another character perusing through the game and found yourself talking to yourself, if you catch my drift?

And that doesn't happen just once, either.

You begin the game as Arthur Darr. Your immediate concern is how to stop the local council bulldozing down your house in order to make way for a by-pass.

However that anxiety soon becomes a little insignificant since the Darrs' itself is about to be destroyed by a Vogen Constructor fleet to make way for a galactic by-pass.

If you are familiar with the books, or radio series, etc, you'll find the opening sequences ringing a few bells. But you can't rely on that knowledge for very long — you are soon confronted with more situations that are going to take more than a little lateral thinking to resolve.

Many of the characters from the series make an appearance. Ford Prefect, Zaphod Beeblebrox, Trillian and Eddie, the ever-cheerful shipboard computer. And, of course, the galaxies just wouldn't be complete without Marvin the paranoiac android.

He's still as miserable as ever and his behaviour will surely make you a little paranoid, too.

There's also a host of much-loved subsidiary characters, objects and incidents. Remember the Hallowed Bagdader Room of Traal? He's still renowned and dangerous but very stupid — if you can't see him, he thinks he can't see you.

The heroic Vogen captain with his ever-made useful society is here, and so is the Babal fish, the obtaining of which, incidentally, presents one of the most devious but deliciously amusing, multi-layered puzzles I have ever encountered.

It's almost as if the game is

outthinking you every move. I am not at liberty to reveal just what your ultimate goal in the game is, not that it would help you in the slightest if I did.

But there is one source of help available throughout the game and that's the guide itself.

By typing **CONSULT GUIDE** ABOUT something, chances are you will glean some useful, and certainly hilarious, information which may, or may not, assist you in your mission.

And even when the guide cannot provide data on the selected topic, you're still sure of a variety of witty responses.

If you really get stuck in the game, don't panic. You could do a lot worse than invest a further £3 in a copy of Infocom's Invisibile book — computer hints — for the game.

It is cunningly designed, entertainingly written and great fun in itself. It not only offers help where needed but provides lots of other suggestions to try out when you've finished the game, many of which might never have occurred to you.

The book really does help you to get every last ounce of enjoyment out of the adventure. Only by it when desperate for help or when you've completed the game, as the temptation to consult the clue is overwhelming.

The game comes with a comprehensive manual and includes your very own piece of fluff, pair of pants-sensitive glasses — totally black — and a microscopic space fleet. You must supply your own towel.

Mr. Robot is witty, original, challenging and entirely and faithfully logical in its own crazy world of logic.

The chances of you finding as funny or as superb a game as this between Earth and Magrathea are two to the power of ten million and rising, so don't bother waiting — hitchhike to your nearest dealer now.

Bob Chappell

I MUST admit that when I first loaded **Mr Robot** my immediate thought was "No fun, another levels, ladders and power pits game".

Level 1 presented no difficulty other than determining which jumps were permissible and which were fatal. Level 2 wasn't much harder.

Slowly, though, things started to get a bit trickier. The first sign of trouble came on Level 4 with the boards. They do not sink until you walk on them, whereupon they stay for a few seconds and then explode.

The problem is that you need to walk on them in order to collect all the power pits. It's a one-way journey — once they've exploded there's nothing to walk on. This means that you've got to plan your route around the screen.

Then come the trampolines to launch you on your way, the transporter beams which may jump you out of the microwave beam into the central heating boiler, and of course through all this the Alliance is still intent on your destruction.

Although the game starts off easy, you can select which level you start from. This means that you don't need to work your way up through levels which you've already mastered.

According to the manual only the first five levels are solvable. However in practice you can select any of 23.

Level 13 is a bonus round

with no obstacles, and I found Level 14 remarkably easy, but there are plenty of "killer" levels to keep you busy.

If you've mastered the levels and think you could design better, you can give it a try.

In addition to the game there is a Darr section called the Robot Factory that lets you create up to 26 of your own scenarios. These can be saved to a separate disc.

New scenarios are drawn by picking up pieces with the cursor and simply putting them where you want them. It's very easy. You can play-test your scenarios and keep editing it until satisfied.

Having the same elements to build with, my screen came out looking very much like the real game screens. However I must admit I'm not very creative when it comes to such matters.

If you're a fan for design you could probably combine the elements in a more creative way.

Mr Robot is an American import from Q Entertainment and is being distributed in this country by Zircrosoft. It is only available on disc at £14.95.

This may seem a bit expensive. However, when you consider the game's 23 levels and the facilities to build an extra 26 levels it's fairly to ask you for a bit longer than the average levels and ladders game.

Dave Russell

It's today's male chauvinist world it makes a change to see a game written by a woman — or should I say a female person?

Activision's **River Raid** was written by Carol Shaw and is proof of the fact that women have as much to contribute to computing as men.

The river of the title is divided into sections with a bridge at each end. Your job is to fly your plane up the river and destroy the bridges.

You're constantly moving forward, or rather the screen is constantly scrolling downward, and there are various obstacles to your progress — ships, helicopters and so forth.

You're also using up fuel, but fortunately the river is littered with fuel dumps. You need only fly over them to refill and you can blow them up and earn points if you don't need to top up.

As you get past more and

Carol drops a bombshell or two into a man's world



more bridges the obstacles get more frequent, the enemies get more aggressive and the fuel dumps scarcer.

In fact, as you'll gather from my description, there's nothing

that you'll call innovative about River Raid. However, it does have several things to recommend it.

Firstly the game is well implemented. Scrolling is

smooth even at high speed, response to the joystick is good without being over-sensitive, and the colour-see chip and clear.

Secondly there are options to start at bridges 1, 5, 20 or 50. This means that once you've got the hang of the game you can leap straight in without having to go through the easy sections.

It's also a very fair game. If you destroy a bridge but get killed off before you fly past it you start your next life from that bridge rather than the previous one.

As an arcade fan I enjoyed River Raid. It's accessible enough at lower levels to allow you to get accustomed to it, but challenging enough at higher levels to hold your interest.

Pet Cookson

Pining for Nevada with Pac-Man

I FIRST discovered Pac-Man in Las Vegas (What a name-dropper, I'll). While all around me were pumping money into one-armed bandits, I was oggling the local arcade machine leasing company.

It's an addiction that has stayed with me throughout the years. I've played the game on a variety of machines and for more hours than I care to admit and I still love it.

Imagine my delight, then, to get a review copy of US Gold's release of **Pac-Man** under licence from Bally.

It's described as "the official version of the arcade classic" and is about as close as you can come to the original without actually spraying light

ole around the room for effect. I was pining for the Nevada desert after a few games.

If you don't know what Pac-Man is, I hope you've been very happy in the monastery or convent for the last five years. Like Space Invaders, the game has become part of the micro industry folklore, so I shouldn't need to describe it.

Suffice to say that in the unlikely event of your software collection not containing a version of the game, you should buy this one.

The tape will cost you £9.95 and the disc is £14.95. Either way it's a lot cheaper than going to Las Vegas.

CBM McKnight



ANDRE WILLEY

takes a long hard look at Atari's new half megabyte superstar model 520ST
... and likes very much what he sees

THE new range of Atari machines are probably the most talked-about forthcoming items in the home computer world. The American magazines have been building over with enthusiasm, and the expectations built up so far will be hard to match up to. After all, there **MUST** be a catch, mustn't there?

A 512k machine with the 68000 running at 8MHz, a half megabyte 3.5 inch drive, mouse, GEM with 512 colours, Basic and Logo built in, high-res graphics, Gem-Point and Gem-Write included ... and all for £750?

Well, I'm happy to report that it meets and far surpasses all of my expectations. Let's first re-cap on the general information about the 520ST. It will be part of a whole range of computers - the new generation of Atari micros - and it seems as far ahead of its time now as the 400 and 800 were when they were released.

The old range used the now long-in-the-tooth 8 bit 6800 chip, but the ST runs on the Motorola 68000 processor. It also runs at a little over four times the speed of the 6800, and has so many functions built in that I go a little green with envy every time I read the chip manual.

Atari has thankfully used the full version of the 68000 - with 16 bit address lines. The Sinclair QL, on the other hand, uses an 8 bit version of the chip - guaranteed to slow programs down dramatically. Perhaps QL stands for Queer Logic?

The main board is superbly designed, as we have come to expect from the new Atari team.

The chip count has been kept down by packing many operations normally requiring a number of chips on to single, custom designed super chips.

I won't cover the technical details of all the ones used, but they include high-speed memory management, graphics and DMA management chips - Atari custom design - two serial output chips for the RS-232 and Midi ports, a separate micro processor to run the keyboard and the on-board clock.

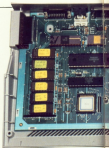
Then there's a Yamaha sound chip complete with three voices, ADPR, a controller for running up to two disc drives, and another for the hard disc interface. Plus six 32k ROM chips containing Gem, Basic, Logo, and so on, and 16 chips to provide the 512k RAM.

The system ROM chips are not yet complete - they should be ready this month, ready for the main release at the PCW show in September - so the machine I got my hands on booted Gem in from disc. Assuming that the full 192k was booted, the floppy disc drive seems quite fast.

Normally Gem will greet you at power-up with its main Desktop window. The concept of "windows" may be new to most of you, but they're basically very simple and useful.

Imagine a window as being a screen display - just like the one you see on your Atari now. However you can have many windows on one display, and move and change them at will.

To do this the mouse comes into play. The Atari mouse is a two-button affair which will copy any movement



SUCCESS, with a capital

you make with it on to the screen.

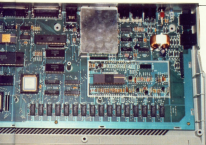
To access a function you simply point the mouse at the relevant icon - computer jargon for picture - and press one of the buttons. Up pops a new window, containing all of your choices for that function.

I only touched the keyboard once during my session with this machine - and that was to test the feel of it. It is a similar type to that used on the 1300X, which I am quite keen on.

In addition to the main desktop segment, there is a cursor key section and a full numeric keypad.

Incidentally, if your mouse breaks down you can use the cursor keys to control Gem, but normally the mouse makes the system so user-friendly that the claim that anyone could start to use it immediately is not unjustified.

The great thing is that, unlike most



620ST... the whole story

ST

user-friendly systems, Qem will not also hold back an experienced user.

Qem itself handles everything that DOS does on your old machine — and a lot more, too. You can get a directory in pictures, or text — and even sorted by name, type, size, or date created. This may be from any attached disc drive, and will be displayed in a window.

If the window is not big enough, or it obscures something else you wanted to read, you can grab the corner with your mouse and drag it all over the screen, change its size — to full screen, if necessary — and scroll the information within the window in any direction.

You can even open another window over the top of it and get the first one back intact whenever you want.

I was, however, most disappointed

that Qem does not make toast, and the kitchen sink implementation was rather poor . . .

The icons try to show you what each file is — and you can define your own icons once you get into programming.

A file is displayed as just that — a file.

You can put any number of files into a "Folder", and even put folders and files into other folders. This is akin to sub-directories and path-following, but without the hassle this usually involves.

If you want to copy a file from one folder to another you can simply open directory windows for each folder, grab the file you want by pressing your mouse button while over it, drag it into the other window, and release the button.

To copy a file onto another disc,

just grab the file and pop it into the icon for drive B. Simple as that. If you decide you don't want a file, just drag it over to the trash can and drop it in. After a quick double-check, bingo it's gone.

Anyone who has had the misfortune to use an IBM to do some of these sort of tasks will realise just how amazing Qem is.

All of these functions could run on a standard TV set, if required, but the ST is capable of much more, and indeed is provided with a high-res monitor as standard.

The lowest display resolution is 320 x 200, which is the same as Graphics 8 with no-text window on the current Atari range, but can display up to 16 colours.

Medium resolution, which wouldn't look too good on a TV set as it uses an 80 column display, gives 620 x 200 with four colours.

If you use the monochrome high-res monitor provided with the system you can see the maximum resolution of 620 x 480. This is slightly higher than that of the Macintosh, but only gives you two colours.

The machine will sense which type of monitor you have and adjust itself accordingly at power-up, although you can pull down a menu to change resolution at will and even save your configuration to disc for next time.

The 512 colour palette can be selected from by using another pull down menu, and you just push the Red, Green and Blue sliders to the level you require. No more trying to remember complex SETCOLOR numbers.

Other pull-down functions include a mini-terminal emulator for the RS-232 port, a calculator and notepad, disc setup menus, and other system configuration details such as clock setting, mouse speed,

and even an alarm clock.

I have not had a chance to see Personal Basic on the ST yet, but if it's anything like Logo it should be great. Both Logo and Basic will be in ROM and still support all of the user-friendly features of Gem.

Logo, and Basic, I'm told, has three main windows, and will let you define others as you need them.

You will program in the editor window, see your graphics in the graphics window (surprise, surprise...) and use the dialog window to receive communications from Logo.

As before, Gem will allow you to move and change the windows as required.

Set up and run a program in one window, and while it's running and rushing its turtle all over the place good old Gem can multitask and you can pull the graphics window over the whole screen - all of this with no noticeable difference in speed of program execution.

From what I've heard, DR's Personal Basic will allow the same sort of facilities. Just imagine, programs and graphics wherever you want them - watch the listing while the program is running. It's like having two TVs going at the same time, each having the resolution of full-screen Graphics 8. When final versions of Basic and Logo are ready, we'll give them a full bench test.

Gem is packed with useful facilities for the programmer, far too many to list here, but they include routines for mouse control, window management and disc control.

Another useful facility is the Gem VDI - that's Virtual Device Interface - a way to generalise control of lots of different types of peripheral, so your program can send information to any of them in the same basic format, and Gem will deal with how each unit handles graphics, text, and so on.

This VDI includes routines for handling different text fonts and sizes, graphics of any description - including bar and pie charts, even in 3D, draws automatically, circles, arcs, ellipses, lines, polygons, pattern-filled areas and much more.

Because VDI is device independ-

THE ATARI ST RANGE

520ST (512K) including high-res monitor, half-Meg drive, mouse and bundled software: £750.

260ST (256K) with built-in 500K drive, mouse and software: £700.

PS354 (500K) 3.5 inch disc drive: £750.

PS314 (1M) 3.5 inch disc drive: £775.

Hard disc 10M-20M storage: £400-£500.

CD ROM compact disc giving a massive 550Kbytes of read-only storage space: £75.

Software should range from about £50 to something over £100, although I'm sure that there will be lots of games software at very much lower prices.

dent, the same set of commands used to generate the display on screen could be sent to a printer or plotter, in colour if your peripheral handles it.

And if you don't want to bother with that, Gem has a screen dump facility anyway. Configurable to any printer type, of course.

All of these facilities are easily accessible from assembly or high level languages, although I don't know how Basic will interact with Gem. It may have commands for some of the above, but probably many of them will have to be accessed by some form of CALL or

USR command.

In addition to these Gem-based features, the machine will support both vertical-blank and horizontal-blank interrupts - useful for synchronising programs to the screen display, and for critical timing requirements.

Sprites are supported by means of the high speed memory management chips, rather than by separate hardware devices.

Screens can also be defined in more than one logical plane for various effects and colour combinations.

Having dealt with how the machine interacts with the user, how does it fare in terms of other contacts with the real world?

Well the back of the ST is crisscrossed with almost every imaginable connection you could want, bar one.

From left to right, we have the power socket, with adjacent power switch and reset button, two Mini ports - IN and OUT - for computer control of single or multiple synthesizers, the TV output and the monitor output, giving analog RGB, composite colour, high-res monochrome and audio, the printer port, a bidirectional Centronics connector, the RS-232 serial port, the floppy disc port for up to two parallel drives, and finally the hard disc interface - which can supposedly transfer data at an astounding 1.5Mbytes per second.



On the left side of the machine is a ROM cartridge socket capable of taking an extra 128k of ROM. The right side features two joystick ports, one doubling as the mouse port.

That's a lot of connections for any machine, and it's quite astounding to have that sort of versatility on a low price micro. The missing socket I mentioned would be an expansion port for extra RAM.

I know that 512k seems a lot, but there's a rule within the computer industry which states that when writing any given program it will quickly expand to fill all available memory. This applies especially to databases and word processors.

Hopefully some clever company will design a RAM pack to fit either the hard disc port or the ROM socket.

Unfortunately at this stage it is not possible to fully review and test any of the applications software or languages. The development systems being shipped to software houses by Atari do not include Gem-Write or Gem-Paint or even Basic, but these will be available in the next few months.

Software houses, of course, do get such things as a C compiler, linker, 68000 assembler and an editor, plus a few thousand pages of documentation.

It will take them quite a while just to wade through the paperwork, but at least there should be some software under development by now.

Hopefully, according to Atari, anyway, there will be about 100 titles available by September for the PCW Show.

That may be a little optimistic, but assuming the software houses are as enthusiastic as they all seem to be, there should be a few completed programs, mostly business oriented, plus many others in various stages of development.

Now for the 64 million dollar question — when can you buy one? The current position, and this may well have changed again before you even read this, is that the first batch of machines, most of which have now been dispatched, went to software houses at about £1,200 for a

development system.

More machines were due to arrive in the UK at the end of July, these being available to major retailers and specialists, but in very limited quantities.

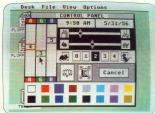
You probably won't be able to actually BUY one of these, but perhaps your local user group can get one, and you can at least have a good look for yourself.

The main launch, by which time a good stock of machines should have arrived, will be at the PCW Show in September, and retailers should get their stock at that time. But who

knows? Read next month's thrilling instalment for a complete change of plans...

I know that many of you will be waiting, like me, with bated breath to buy an ST, and from what I've seen of it, the competition had better watch out, too.

Who in their right mind would buy a BBC B+ at £499 — then spend £250 on a monitor and £150 on a disc drive, when a machine with far better facilities and over 10 times the memory can be brought for £100 less! And as for the Sinclair Quality Laptop, well...



50 far in this series we've looked at the text modes obtained using Graphics 0, 1 and 2. This month we'll start in on the actual graphics modes, or map modes as they're sometimes called.

Modes 3, 5 and 7 can be conveniently taken together because they are all four-colour modes. They differ in the size of the smallest block, or pixel, that can be played on the screen. That is, they offer different levels of resolution and therefore make different demands on memory space.

The pixels in a Mode 3 screen are the same size as those of Mode 0. If you type

GRAPHICS 3

most of your screen will go black and you'll be left with the familiar blue text window at the bottom.

You now have 30 rows of 40 columns on which you can produce your display. Before we start trying to put anything up there, let's get the colour registers sorted out in our minds.

I often think that the designers of the Atari and the writers of the Basic were kept apart in order to produce as many different numbering systems as possible.

I'm not always this cynical - it comes over me when I try to remember all the different schemes for selecting a colour.

Registers 0, 1 and 2 hold the information for the foreground colours and register 4 holds the information for the background colour.

Register 4 defaults to black, while registers 0, 1 and 2 default to orange, light green and dark blue respectively.

We can use the SETCOLOR command to alter these colours. With a clear Graphics 3 screen, try typing:

SETCOLOR 4,13,0

The black background should have been replaced by darkish green because you have changed register 4 to colour 13 with luminance of 0.

When we want to put something on the screen, the COLOR command selects which of the registers to take the colour information from.

It's here where the numbering

Getting to grips with the graphics modes

Part Four of DAVE RUSSELL's series on the Atari graphics modes

starts getting tied in knots, because COLOR 0 selects the background colour information in register 4.

COLOR 1 selects register 0, COLOR 2 selects register 1 and COLOR 3 selects register 2. As you can see, for these three registers the COLOR number is one more than the register it selects.

It's not difficult, but it could have been simpler.

At this point I suggest you press Reset to get back to default conditions and then type GRAPHICS 3 (or GR3 to save a bit of typing). Now let's put something up there.

Try typing:

COLOR 1: PLOT 15,15

This should yield an orange square fairly close to the text window.

The COLOR 1 selects the colour in register 0 (orange) and the PLOT 15, 15 fills the pixel at screen position 15,15 with a block of this colour.

Press Reset again and try entering Program 1. When you Run it, two

things should be demonstrated. Firstly, the size of the orange block gets smaller as we move from Mode 3 through Mode 5 to Mode 7. In other words, Mode 7 has higher resolution than Modes 3 or 5.

Secondly, the orange square 'moves' up towards the top left-hand

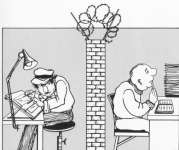
```
IN THE END IN 2 KEEP 0
ON GRAPHICS 3
ON COLOR: PLOT 15,15
ON FOR DELTA(1) TO DIMENSION DELTA
ON NEXT 0
```

Program 1

corner as the mode changes. This illustrates that screen position 0,0 is actually at the top corner.

For many people it seems more natural to think of 0,0 as being the bottom left-hand corner. You'll have to remember this or your displays will have a nasty habit of appearing upside-down.

If you've run Program 1 you'll be



When told the designers of the Atari and the authors of the Basic were kept apart in order to produce as many different numbering systems as possible...

left in Mode 7 so press Reset and go back to GRAPHICS 3.

If you enter:

COLOR 1: PLOT 15,15

again you'll once more have the orange square.

Impassional, isn't it?

In addition to the PLOT command, the other main command for producing displays in these modes is DRAWTO. As you might imagine, this command causes a line to be DRAWN from the last PLOTted position TO the specified position.

If you enter DRAWTO 15,4 a vertical orange line should appear. Try DRAWTO 35,4 to produce a horizontal line.

If you now enter DRAWTO 35,15 you'll see how sloping lines are produced – not very well in a low resolution mode like this, but it's often adequate.

Program II shows how you can produce simple displays using this

```
10 GRAPHICS 3
10 COLOR 1: PLOT 15,15: DRAWTO 15,4
10 PLOT 15,4: DRAWTO 15,15: DRAWTO 35,15
10 PLOT 35,15: DRAWTO 35,4: DRAWTO 35,15
```

Program II

method. It's all in the same colour, but if you add a line:

25 COLOR 2

you can change the colour used by lines 30 and 40.

You can also change the mode number in line 10 to either 5 or 7 and see the effect of increasing resolution.

Because Mode 3 has the same pixel size as Mode 0, the bottom right-hand corner of a Mode 3 screen is position 39,19. If you try to PLOT 39,20 you won't see anything happen because the text window is effectively covering row 20.

However, if you try to PLOT 40,19 you'll get an ERROR 141 telling you that the cursor is out of range.

In Mode 5 the bottom right-hand corner is position 79,39 and in Mode 7 it is 159,79. But while Mode 3 needs only 434 bytes of memory, Mode 5 needs 1174 bytes and Mode 7 needs 4190 bytes. As you can see, the extra resolution costs memory.

You don't need to specify a particular screen point in the PLOT command. You can provide PLOT with an expression to evaluate, the result of which will give the position to be plotted.

Program III gives a brief example

of this. We can't say where each point will be plotted until the random number generator has been used twice.

You can also plot to the screen using the PRINT#0 format that we used in Modes 1 and 2. The only difference is that you can't print an

```
10 GRAPHICS 3
10 COLOR 1
10 PLOT 40,19: GOTO 20
20 PLOT INT(RND(100)+1),INT(RND(100)+1)
30 GOTO 20
```

Program III

actual character like a letter or number.

Being a map mode, pixels are either lit (in a colour) or unlit (in the background colour).

To demonstrate the effect, press Reset and enter QR.3 to get a clear Mode 3 screen. Now type:

POSITION 15,15:PRINT#0,"1"

and you should see the orange square that we started from. Try substituting a 2 or a 3 for the 1 and see the effect.

There are times when it's easier to use the PRINT#0 than PLOT and DRAWTO. Program IV produces a chunky Mode 3 display using a combination of the two methods.

It's not brilliant programming but it might give you some ideas while you're hanging around waiting for the postman to deliver the next issue of Atari User.

```
10 ROW=0:COL=0:J=0
10 IF(150+RND(100))<50 THEN
10 GRAPHICS 3
10 COLOR 1: PLOT 15,15
10 DRAWTO 15,15: DRAWTO 15,15: DRAWTO 15,15
10 PLOT 15,15: GOTO 20
20 POSITION 15,15:PRINT#0 "1"
30 GOTO 20
40 PLOT 15,15: GOTO 20
50 PLOT 15,15: GOTO 20
60 PLOT 15,15: GOTO 20
70 PLOT 15,15: GOTO 20
80 PLOT 15,15: GOTO 20
90 PLOT 15,15: GOTO 20
100 PLOT 15,15: GOTO 20
110 PLOT 15,15: GOTO 20
120 PLOT 15,15: GOTO 20
130 PLOT 15,15: GOTO 20
140 PLOT 15,15: GOTO 20
150 PLOT 15,15: GOTO 20
160 PLOT 15,15: GOTO 20
170 PLOT 15,15: GOTO 20
```

Program IV

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What it offers the micro user...

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe. You can set up your own computerised filing systems, store and update statistics and other information, cross-reference material between files, selectively extract the information you want, perform mailing calculations and design reports to display information from any of the files and in any format you choose.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds clashing to each other on all manner of subjects. The only snag is that the vast majority are single-user boards - which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 90 per cent of MicroLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PPS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages - at a third of the cost

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sundays). The service was intended for people phoning their message to the operator, and it costs £3.00 for 50 words. But you can now use it via MicroLink for only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can have your micro take a telex machine, and can send and receive telex messages of any length. You will be able to

communicate directly to 90,000 telex subscribers in the UK, 11 million worldwide - and even with ships at sea via the telex satellite network. Business people can now send and receive letters after office hours, from home or when travelling. You can log in a telex during the day and instruct MicroLink not to transmit it until after 5pm - and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is open 24 hours a day every day. That means you can access your mailbox whenever you want, and from wherever you are - home, office, airport - even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £25, and then a standing charge of just £2 a month. On-line costs are 30p a minute (between 9pm and three or 10.5p a minute during office hours). There is an additional 2p a minute PPS charge if you are calling from outside the UK. London call area. Charges for telex, telemessages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5

Standing charge: £3 per calendar month or part

Connect charge: 3.5p per minute or part - cheap rate, 16.5p per minute or part - standard rate

Applicable for duration of connection to the British Telecom charge 1 minute

Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday, and public holidays. Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays

Filing charge: 20p per unit of 2,048 characters per month

Applicable for storage of information, such as notes, short notices and faxes. The number of units used is always rounded up to the nearest unit in a day, month

Information Databases: Various charges. Any charges that may be applicable are shown in the before you obtain access to the database

MicroLink PSN service: 5p per minute or part (300) local, 2.5p per minute or part (1200) 70 (local)

Only applies to users outside the UK. London call area

Telnet registration: £18

Outgoing telnet: 5.5p per 300 characters (UK), 11p per 300 (Europe), 16.5p per 300 (US), 21.5p per 300 (Rest of world), £2.75 per 400 (Ship's at sea)

Refused messages sent on the night service are subject to a 50 p per sent discount

Incoming telnet: 5.5p for each correctly addressed note delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 5.5p

It is not possible to deliver a note without a mailbox reference. If a note is returned without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox reference. Each user validated for note and outgoing facility will incur a charge of 4 storage units a month. Further storage charges could be incurred depending on the amount of letter storage and the use made of that code and message file facilities

Teletext: £1.25 for up to 300 words

Railpaging: No charge

If you have a BT Railpager you can be paged automatically whenever a message is waiting in your mailbox

International Mail: For the first 2,048 characters - 20p to Germany and Denmark, 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 2,048 characters - 30p, 15p

These charges relate to the transmission of information by the Datamail service to other Datamail services outside the UK and the life of the Mail. Multiple copies to subscribers to the same system feature on only one transmission charge

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micro.

Talk to the world - by satellite

MicroLink is part of the international Datamail network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mail just like yours. You can contact them just as easily as you do users in Britain - the only difference is that the messages (from your keyboard) go speeding around the world via satellite

What you need to access MicroLink

You must have three things: order to use MicroLink a computer. It can be any make of micro, hand-held device or even an electronic appliance provided it has communications facilities. A modem. It can be a simple Personal type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud, and appropriate communications software

MicroLink

in association with

TELECOM GOLD

Application Form

(We kindly apply to join MicroLink)

I/We () I/We authorize my/our cheque for £5 payable to Datamail Publications as registration fee to MicroLink

I/We () I/We authorize my/our Telnet I/We authorize you to charge an additional £18 to my/our bill for validation

() I confirm that I am over 16 years of age

Signature _____

Date _____

Entered from the following computer

FOR OFFICE USE ONLY:

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Start date _____

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Datamail Publications
Europe House
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Birmingham B67 8PP

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Name

Position

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Postcode Telephone

Commitment of Service
Please indicate month of commitment
Allow 15 days for validation of mailbox

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Whilst Datamail Publications Ltd is the supplier of all the services from the commitment and billing (direct) will be handled by Telecom Gold in agreement with Datamail Publications Ltd. Date of first payment to be on 15th of month following commitment. Please complete billing notification form B, C or D below

A. Direct Debitting Mandate (Enter full postal address of bank branch)

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I/We authorize you (and further notice) to setting to charge to my/our account with you on or immediately after 15th day of each month (unspecified amounts which may be debited) from the instance of British Telecommunications plc - TELECOM GOLD. Bills received 15 days before change is applied to your account

Name of Account to be debited

Account Number

B. Please debit my/our Account/VISA account number

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C. Please invoice the company/institution

() I/We () If you select this option, which is ONLY AVAILABLE to government establishments and public limited companies, you will be sent an authorization form for completion which will require an official order number to accept unspecified amounts

A money-saving special offer from

ATARI USER

THIS

**is your
passport
into the**

exciting world of telecomputing!



Other locations: 1977, road to mountain

IT's by far the fastest growing field in micro-computing. All over the world micros are talking to each other over the telephone line. As well as to the ever-increasing number of public and private databases, bulletin boards, and even about mainframe computers.

We want all Atari User readers to share in the new technology that makes all this possible. So we're offering a unique starter pack at an unbeatable price. It gives you everything you need to get in touch with the big wide world outside:

- Modem
- Software
- Serial Interface

The modern is the amazing Miracle Technology WS2000. One of the most powerful on the market, it provides all the facilities you require. Yet it's simplicity itself to use. Just plug it into a standard British Telecom jack and you're away!

The package also features the superb DataLink serial interface, which links the modem directly to the Atari's peripheral port without the need for the RS-232 serial interface.

The best hardware deserves the best

software to drive it, and with the specially written Multi-Viastern program the package is complete. It supports all the standard baud rates - 1200/75, 75/1200, 1200/1200 and 300/300 full duplex.

Your Atari User package will allow you to talk directly to other computers, to send your own telex messages, to go tele shopping - even to download free software programs directly into your Atari.

You will be able to join Micronet/Prestel, which will immediately open up to you a vast menu of 750,000 pages of information - instant world news, sports, holidays, hotels, train and airline timetables, all regularly updated.

And you can become one of a growing number of enthusiasts who are joining MicroLink, the giant database set up in conjunction with Telecom Gold, which is described more fully in this issue.

But first, send for the Miracle package – and enter the fascinating, limitless world of communications!

Use the order form on Page 61

Don't you think you need a little protection?

ANDRE WILLEY
makes you
an offer
you can't
refuse...

ONE of the main problems with Basic, apart from its poor speed in comparison with machine code, is that once you've finished your masterpiece anyone can LIST it to the screen or printer and copy your ideas.

We've had a number of letters asking if there are any ways to prevent someone from pressing Break or System-Reset and LISTing the program, and luckily there are quite a few things you can do.

Let's take the points in order:

Break is perhaps the easiest of all to protect from. It involves just two POKE instructions:

```
POKE 16,64  
POKE $3774,64
```

To switch the Break key back on again, type:

```
POKE 16,192  
POKE $3774,192
```

Unfortunately the GRAPHICS command will return Break to its normal use, so you must re-POKE the values after each GRAPHICS statement in your program. A simple DOSUB to a subroutine is probably best.

System-Reset is far harder to protect because it was designed as an all-purpose "get-out" key in case your program goes wrong. As such it should function correctly regardless of whatever you have managed to type in.

Luckily there is one way to "capture" the Reset key. One of the functions of Reset is to check that DOS or any cassette loaded program

is still working correctly.

When a boot cassette (or DOS disc) loads in it will set three locations in memory to tell Reset what to do to re-initialise the program just loaded.

Location 0 will contain either a 1, for a disc program, or a 2 for cassette. If it contains 0 then no program was booted.

The other two locations are used to tell the computer the address in memory of a small machine code routine to handle the job of checking the main loaded program.

These locations are different for cassette and disc, but we will use the cassette ones, 2 and 3, as they are simpler.

So in order to trap System-Reset we must first POKE location 0 with 2 - for cassette boot - and locations 2 and 3 with the address of a machine code routine?

What? You mean that some of you aren't machine-code programmers? Okay, let's cheat.

Basic itself is really just one massive machine code program. Normally you never have to think of it as such, because it is designed in such a way that you never really notice how it works.

If we could find a suitable section of Basic to "borrow", we wouldn't have to write any machine code ourselves.

The obvious routine to use would be RUN, so that the program would simply re-start if you pushed Reset.

But that may not be what you wanted. You may want your program



```
10 DEN PROGRAM LISTING: 1  
20 DEN PROTECT: PROGRAM FROM BEING  
   SYSTEM-RESET  
30 DEN STOPPING FOR ERROR: NO/YES  
   CONFIRM:  
40 DEN FOR ERROR: NO/YES CONFIRM:  
   CHANGE LINE 100 TO LINE 1,100  
50 DEN  
60 DEN CHECKED FROM SYSTEM RESET  
100 STOP 000  
110 PRINT 0,00  
120 PRINT 0,100  
130 PRINT 0,100  
140 PRINT 0,0  
150 PRINT 000/000/000/000/000/000/000/000  
   NO/YES PROTECT:  
160 CONFIRM: NO/YES (NO/YES "YES")  
   YES...  
170 PRINT " PROGRAM CONTROL BEING
```

Program!

to go off and do something else rather than start from scratch.

First, let's use the GOTO statement then, but how to tell the computer where to go? Better still, let's use the TRAP command.

If we can convince Basic that an error has occurred after pushing Reset it will jump to a TRAPped line, which may, for instance, disable the Break key again. For instance, if you have typed:

TRAP 800

the program would continue at line 800 after pressing System-Reset. So where inside Basic is the TRAP handling routine?

Atari has so far released three revisions of its Basic, called, with great inspiration, A, B and C.

Version A was shipped in cartridge form with all UK Atari 400 and 800 machines. There were a few very minor problems with it so the new 800B1 and 800B2 machines had Revision B Basic built in.

Unfortunately one or two new bugs crept in to this one also, so Revision C was born. Available on cartridge for £9.95, this Basic is also built into the current XE range of computers.

The TRAP routine on Rev. A was located at 47414 (\$B940), and on Revs. B and C at 47412 (\$B934). Thus you must POKE locations 2 and 3 with the correct values.

For Basic Rev. A - cartridge:

POKE 2,64
POKE 3,165

For Basic Revs. B and C - XL/XE range:

POKE 2,52
POKE 3,165

Don't, incidentally, forget to POKE B,2 as well.

Program 1 shows Break and Reset protection in use.

This method will disable DOS after Reset is pushed. If you are a disc user and you wish to re-enable DOS, type POKE 9,1 and push System-Reset. The system should then be returned to normal.

There are some rather nice little things you can do to stop your

WHICH version of Basic have you got? If you have Basic Rev. A, typing PRINT PEEK(47414) will give a result of 165.

If you have Basic Rev. B or C, typing PRINT PEEK(47412) will give a result of 153, but PRINT PEEK(47412) will print 165.

Any other results from these PEEKs and the Reset protection routine will almost certainly not work.

program being LISTED if it has been loaded but not RUN.

The first is to assemble any variable names so that garbage is printed out instead. Program 2 will do this for you.

It should be typed in on a spare program line, say 32000, run with a

GOTO statement, and then deleted. Don't forget to save an original version because even you won't be able to read or alter your program once it's been assembled.

Without going into too much technical detail, for which see "The Atari Basic Source Book", or "Mapping the Atari", both from ComputerBooks, it works by putting a Return character instead of each variable name in the listing of the program, thus making it a little tricky to read.

Program 11 is even more dramatic. This one won't allow any commands to be typed in after the routine has been run, hence the SAVE command must be in the running portion of the program or you've lost it forever.

This also means that you can't LOAD, or CLOAD, then RUN the program. You must RUN C or RUN D-Routine first.

Again, I won't go into technical details, but this version will make Basic fail to recognise any lines, either program or command, that you subsequently type in. It effectively forgets where to store them.

Dramatic, but quite effective.

One last tip to play about with. Try this:

POKE 302,1

Put it as the first line of the program, and check that it is correct by LISTING it. Try listing it again after you've RUN the program.

You'd better save the program before running that last one. Have fun.

```

10...?
200 PRINT "PRESS 1 TO STOP PROGRAM"
300 GOTO 100
400 GOTO 100
500 GOTO 100
600 GOTO 100
700 GOTO 100
800 GOTO 100
900 GOTO 100
1000 GOTO 100
1100 GOTO 100
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85700 GOTO 100
85800 GOTO 100
85900 GOTO 100
86000 GOTO 100
86100 GOTO 100
86200 GOTO 1
```

Micro Scope

MANDALA is an elementary but very effective program that draws a pattern on the screen.

The program itself is very simple, with only 10 active lines. But the logic behind it isn't trivial.

Try working it out with pencil and paper and you'll soon see the pattern emerging.

No. 4
Mandala

```
10 REM MANDALA
20 GRAPHICS 8:16
30 (0,0) :XPOS 154,98
40 FOR I=0 TO 100 STEP INT(RND(10)+1)
5
60 GOTO 154,154-X
70 GOTO 154,154+X
80 GOTO 154,X
90 GOTO 154,X
99 NEXT I
100 FOR DELAY TO 100-NEXT DELAY
120 GOTO
```

10 A ROM containing the program name.
20 Selects full-screen Graphics 8 mode.
30 Selects colour and plots the starting point.
40-90 These lines define a FOR...NEXT loop which draws the pattern. Each time round the loop four lines are drawn. The changing value of X changes the positions

of the lines. The step size is chosen randomly within the range 1-10 so that variations in the pattern density are produced.

Delay to keep the display on the screen long enough to be seen.

100

110

Start again.

68000 POWER TO THE PROGRAMMER

THE 8 bit microprocessors have been around for over 10 years now. While there have been many improvements in hardware in that time the philosophy of processor design has served quite well.

Now that it is possible to get even more circuitry on to a chip, a new breed of 16 and 32 bit microprocessors are emerging which have power that is not so "micro".

Most manufacturers of the new generation of processors were involved with the earlier 8 bit ones, and

Processor" and is the approach taken by Motorola in designing the 68000 microprocessor.

While the other approaches have been tried with some success measured in sales, it is rumored that most programmers working on these other processors have a 68000 as a pipe fantasy on their office walls.

The secret of this lies in the instruction set, the basic commands that all other commands must be made from.

In a word, it is very "orthogonal",

programming is as sweet as a dream.

Let's see exactly what the instructions are which make it such a joy to use.

Of course I cannot hope to do justice to this in a short article, but I hope to be able to give you the flavour of what's available.

Next month we will look at the addressing modes and finally at the hardware structure.

Finally, the way the memory is organised is in bytes.

Each byte has an address, but, as

MIKE COOK looks at the new breed of microprocessors whose power, he reveals, is anything but "micro"

it is interesting to see how they slowed their development.

One approach is to keep things as similar as possible.

This has the advantage of not requiring vastly new skills, but tends to "freeze in" all the design errors and compromises that were made in the past.

Another approach is to bolt on increasingly more powerful commands giving large new processing power.

This approach produces very powerful processors that do well in bench mark tests but are rather difficult to bend to your particular application.

In other words, a racing car rather like a dragster, unbeatable in acceleration but a swine on the corner!

The final approach is to look at the code that was written on the 8 bit processors and analyse it for sequences.

Which means, find out what the programmer wants to do and then design a processor that will make it easier for him to do it.

This produces a "Programmer's

which means that you don't have to worry about what commands you can perform with what registers on what memory locations.

If you want to do an operation the odds are that there is an instruction/ addressing mode combination to do it.

This will be worked out for you by a good assembler - all you have to do is specify the source and destination of the operation.

While it is possible, and in most cases desirable, to program 8 bit processors in hex, looking up the code for each instruction, this would soon drive you up the wall with the 68000.

There are so many different combinations of addressing mode and instructions that you have to "construct" a machine code instruction from the bit patterns which specify the source and destination locations.

So, in practice it would take you at least 30 seconds to work out each instruction.

Obviously this soon mounts up and becomes totally unacceptable. But with an assembler, however, pro-

gramming is as sweet as a dream.

Let's see exactly what the instructions are which make it such a joy to use.

Of course I cannot hope to do justice to this in a short article, but I hope to be able to give you the flavour of what's available.

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Finally, the way the memory is organised is in bytes.

Each byte has an address, but, as

the data bus is 16 bits wide, the least significant address line is not brought out.

So data is fetched two bytes at a time, known as a word.

All of the internal registers are 32 bits long, which takes four byte addresses or two word locations to store them.

Consequently a 32 bit quantity is referred to as a "long word".

So most instructions can be performed on a byte, a word or a long word.

To simplify matters, all word operations must be performed on even byte addresses.

So, for example, if you want to store a word at address location 4, the most significant byte goes in location 4 and the least significant byte goes in location 5.

This is what I consider to be the right way round as we write the most significant part of a number first. But notice that this is the reverse of the way the 6800 handles numbers.

Now let's look at what registers we

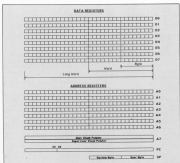


Figure 1: The 68000 Registers

have in the 68000. These are shown in Figure 1.

As you can see, there are quite a lot of them. The two main types are the Data and Address registers and all of these are 32 bits long.

In general, data registers can be very freely manipulated, and most instructions will operate on them.

Address registers, on the other hand, are mainly used to determine what memory address to use.

Address register 7 (A7) is used as the stack pointer, but any other address register can be so used.

All the subroutine return addresses use the A7 register as their stack pointer, so you can have separate data and return stacks.

This is very useful when implementing high-level languages such as Pascal and Fortran.

You may have noticed that register A7 appears to be two registers (and so it is).

The 68000 can run in two modes—supervisor and user modes. This means that your operating system can run in the supervisor mode and your application in the user mode.

This makes trace operations easier as well as error handling.

Each mode also has a separate status register.

There is also a program counter. In most microprocessors this is normally the largest register, but paradoxically here it is one of the smallest.

Only the lower three bytes are brought out, thus limiting the memory to 24 mbytes.

In future versions of the chip these extra locations might be brought out, but there is more than enough memory space for the time being.

The most common instructions used in any program are loading and storing of registers. In the 68000 these have been simplified to a single MOVE command.

The source and destination can be quite freely specified to give you exactly the effect you want.

You can even move data between memory locations without passing through any of the registers.

There is even a "move multiple registers" instruction which allows any number of registers to be quickly saved or restored from memory.

Regarding program structure, there are plenty of conditional branch instructions.

There is also an instruction which

decrements a register and branches if the register has not yet reached zero. I wish I had a pint for every time I have used that combination!

There are the usual collection of logic operations including shifts.

However, a single instruction can specify any number of shifts to left or right.

The big plus of this class of instructions are the multiply and divide instructions.

When using the multiply instruction, only 16 bits of the registers can be used because the result of two 16 bit operations is a 32 bit value.

There are also instructions which allow the operations to be signed or unsigned.

Another class of instructions are the Trap instructions. These are like a single instruction call-to-subroutine.

When they are used, the program goes to an address stored in a fixed memory location, and these locations are known as the Trap vectors.

They are very handy for communicating with the operating system in a standard way.

If all input and output is done through these traps, then programs written for one hardware configuration of the 68000 can easily be modified to run on another.

This is very much the way the CP/M operating system works.

These instructions also allow the expansion of the instruction set by providing an easy way to call Macro commands—the Apple Macintosh makes extensive use of these.

Perhaps the newest of instructions are the Link and Unlink. These are capable of implementing a frame pointer to allow an area of memory to be dynamically allocated and deallocated.

You can use them to store local variables in procedures and to return values when the procedures are finished.

This is vital when procedures are being called recursively.

This feature makes the implementation of Pascal especially easy.

With all these instructions at your command, the task of programming is made very much easier than on an 8 bit processor.

■ *Next month we will see how these powerful instructions combine with a multitude of addressing modes to produce a very versatile instruction set.*

ARE YOU A FRUITI GAMBLER?

If you're one of those people who spend a fortune on the fruit machine in your local, here's a program from CLIVE PALMER to save you money.

Fruiti Gambler is a fruit machine simulation complete with Hold and Nudge features and incorporating a special Gambler feature reel.

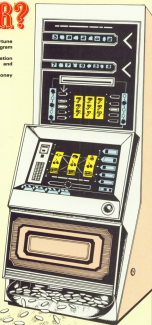
While you're typing it in, think of the money you'll save.

PROGRAM STRUCTURE

50-70	GOTO initialise routines.
90-130	Main program loop.
150-280	Print a reel routine.
280-380	Spin reels 1-3 T1 sheet.
410-600	Nudge routine.
680-900	Test for a win: No Win - Return. Win - Gambler?
910-930	Clear message screen.
930-960	How much is left in bank?
970	Decrement position in reels by 1.
980	Increment position in reels by 1. (used by WIN routine.)
990	Turn all sound channels off.
1010-1070	Scan.
1090-1220	Hold reel routine.
1240-1600	Set up new character set.
1610-1710	Define/initialise main variables.
1730-1860	Draw screen display.
1880-2120	Initialise display list interrupt.
2140-2160	Re-start/finish routine.
2200-2310	Gambler routine.

MAJOR VARIABLES

FRUITM(64)	Contains all fruits for reels.
X(4) & Y(4)	Position of reels.
POS(4)	Pointer showing where we are in reel.
H(32)	Used to determine if a reel is HELD.
REEL(4,32)	Used to hold reel/fruit data.
WIN(11)	Winning amounts for a winning line.
CASHM(12)	Used to change cash into pounds before displaying on the screen.
CASH	How much you have.
PAY	How much you win.



[illegible][illegible]

ONIL of the first major problems to face the unwary adventurer when he takes his first tentative steps in an alternative world is that although the game itself communicates his surroundings in perfect English, on entering his first command the machine seems incapable of understanding it.

Suppose you find yourself "in a large room, with a door to the west. A book lies open on the table". This is a hypothetical example of how an adventure may begin, and yet depending on the sentence analyzer — or parser to the more technical — the responses to instructions given by the player may seem totally incomprehensible.

Let's assume we are dealing with an inquisitive novice adventurer. "Read the book", he types. "I don't understand", says the screen — or something equally helpful such as "th...".

Rule one, Mr Novice, is that most adventures will not understand full sentences, but work on the trusty verb/noun principle. Hence READ BOOK will produce the required response, while READ THE BOOK or anything more elaborate will get the computer's equivalent of a puzzled stare.

So lesson one absorbed, Novice tries again. READ BOOK. "You don't have it". This is getting ridiculous thinks Novice, and hurls the cassette case at the cat.

Rule two, Mr Novice, has just discovered, is that usually to do something with an object found in the game it has to be something you possess. Simply being in the same room isn't enough, even if, as in this case, it ought to be.

Remembering all he has learnt so far Novice tries again. GET BOOK. "O.K. You have it". READ BOOK.

At this point Novice will doubtless receive some vital information about his mission, or possibly a credit plug for another game, maybe a bad joke or perhaps a small clue. Anyway, it is at least a glimmer of progress, and the adventure can continue.

Seeing as there is nothing more of interest far our intrepid hero, Novice decides to leave the room. Earlier said than done. GO WEST. "I can't go in

Learn how to talk to your micro

says Brillig

that direction". WEST. "I can't go in that direction".

Novice reads the text again, which clearly states there is a door to the west. He is just about to learn Rule 3. Frequently games abbreviate movement to the compass points, usually N,SE and W, although occasionally also the NW, NE, SE and SW come into play.

This does not necessarily mean that the game will recognise the full word. W, types Novice, and off he goes into another room, with exits North and East.

I think by now that you get the general idea, so that we can leave Novice to stumble around and explore by himself for a while.

The whole point is that to progress in adventures you need to try and understand exactly what the computer is doing to analyse your input.

Once you understand that then you begin to see how you can avoid spending half your adventure reading the same boring "I don't understand" messages.

What the computer does is store each chunk of your input and compare it with a list of words that it is programmed to understand.

In a simple verb/noun input analyzer, the first chunk will be compared to a list of verbs, and if the computer has that verb the program will branch off to check the noun.

In the example above, the computer checked through a list of verbs and found READ. After that it repeated the process with BOOK in

the list of nouns. Simple, huh?

So now you can see why Novice had this first problem. The computer analysed his input as READ THE. A quick check through the list reveals no such noun as THE, and the computer sends its message.

In some games such as The Pay-Off, the message will tell you where you are going wrong — "You can't READ a THE".

However in many adventures the same error message is repeated time and time again with no clue as to the problem.

It gets more complicated than that though. In a bid to save memory, and therefore add more to the game, the input analyzer will tend to only recognise the first three or four letters of each word.

This means that GET BRON-TOSAURUS is exactly the same as GET BRON. So you don't always need to type out great long words to be understood.

And now we start to see how these new complicated analyzers work. What they actually do is to ignore most of what you type, noting your action, what you are doing it to, and whether it involves some form of modifier, such as LOOK BEHIND THE DOOR.

To my mind therefore, the use of full sentence analysis merely allows the player to type in a more normal, real life instruction, with little or no effect on the likely response, but more opportunity for a typing error.

It does allow the player to input a

ating of commands, to be assigned in sequence, which allows a player to move rapidly through sections of the game already completed and that must be a help.

But aside from that, the temptation is to type GET BOOK rather than PICK UP THE DUSTY RED BOOK FROM THE TOP SHELF, gets me every time.

Now I note from the letters page that at least one person is having a bit of trouble with Lords of Time from our old friends Level 9.

No surprises there, as this is another huge game set across nine time zones, with a vital artefact to collect from each zone.

Without further details of where you get stuck I'm afraid Billig's help can only be guesswork, so if you do have a problem please give me an idea of what you have already covered.

A map would be of assistance as well. And if you have any completed adventure maps send them in - you could help save someone's sanity.

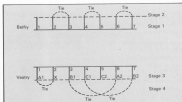
Just in case the problem in Lords of Time is getting started, don't forget that a clock sometimes stops and needs a helping hand. Also Level 9 use a slightly different interpretation of M than most of us. It won't tell you what you are carrying, but may move you in mysterious ways.

Speaking of Level 9, I mentioned last month that the Interpreter files use gives out the occasional glitch. So I have decided to begin a "Glitch of the Month" competition, with an Atari User T shirt as the prize.

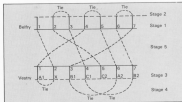
Send your favourite glitch to Atari User, together with your name, and every month I'll announce a winner.

This month, as the contest has only just started, the winner is me, and as we have just looked briefly at Lords of Time, try typing in "Get All" and then try to puzzle out what you would need an *Atari* for. Sorry boys it may seem like victimisation but anyone who uses "Arlo battle glider" as an error message is really asking for all they get.

One last piece of news. Scott Adams' Questprobe 3 . . . The Fantastic Four was due out in July. I'll take a serious look at the series to date next month.



Unravelling that tangle in the belfry



IN last month's problem we left you with some bell ropes to sort out after Quasimodo had left them in a tangle.

The solution is as follows - and you would be well advised to make a map:

1. In the belfry, number the ropes 1-7.
2. Tie 3-3, 4-5, and 6-7.
3. Go down to the vestry, number the ropes 1-7, then pull any rope. If another rope goes up mark the pairs A1-A2, B1-B2 and so on. If nothing happens, that rope must be number 1. Identify it with an X.
4. Tie X-A1, A2-B1, and B2-C1.

5. Return to the belfry and pull rope 1. The rope that moves down is A1 so you can mark that and A2 (you tied them together in step 3).
6. Pull A2 to identify B1 and B2 and so on.
7. Go down, at which point the program says "Quasimodo lies the 7 ropes to the 7 bells".
8. Pull the ropes in the order that will ring them 1-7. Our particular solution was 3,5,4,1,6,7,2 but yours could be different due to the random element.

Drop a brick and solve a problem

AN essential element, indeed almost a definition, of an adventure is that the player moves around, picking up and dropping objects until the game is solved and the program stops.

If you think you have a few good ideas but don't know how to start, you could try writing a program to solve the following problem.

You are in a cave, alone in a system of cavernrooms that stretch into the distance to the East and the West. You are carrying a hod of bricks and five cards on which is written the following:

Card	Empty	Not empty
1	DROP E.3	GET W.3
2	DROP E.3	GET E.5
3	DROP W.1	GET E.2
4	DROP W.3	E.1
5	E.4	STOP

All the caves are empty and all you

have to do is take the role of the computer for a change - in other words obey the instruction on the cards beginning with card 1 which says:

If this cave is Empty THEN Drop a brick, go East, and obey card 2, alternatively Get the brick, go West and obey card 3.

If you follow the instructions correctly you will eventually reach the STOP on card 5. The questions are: a) How many bricks will you drop, and b) How many G/W moves will you make?

A couple of hints - you should never have to go further than 10 caves to the West. Nevertheless, don't try solving the problem with real bricks, there are a lot of moves involved and you probably will need to write a program to solve it.

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Independent Atari Group

Try life in the RAW and you'll opt out of op codes

ROLAND WADDILOVE
takes some of the toil out of
machine code programming
with his RAW assembler

AS you probably know, a machine code program consists of a series of binary numbers in the range 0 to 255, although we normally use hexadecimal or decimal as it's easier to follow.

Even so, programs are very difficult to read. For example, what does \$A5 \$04 mean? Very little I should imagine, unless you know all the opcodes off by heart.

Assembly language is much easier to digest. A mnemonic is used to represent each machine code instruction.

For example, the codes above can be represented by:

LDA \$04

which is much more meaningful. It's not perfect but it's a big improvement.

byte=\$04
LDA byte

is even better.

What an assembler does is to convert these assembly language mnemonics into machine code for you, taking all the hard work and tedium out of it. There's no need to look up the opcodes at all.

Assembly listings are easier to follow and much easier to debug if they don't work first time — and they rarely do.

RAW, the assembler presented here, will allow you to write assembly language programs. The assembly

listing can be saved along with RAW and the machine code ran using the USR function.

Listing 1 shows an example of what is possible with RAW and demonstrates some of its functions. It's a short program to convert any upper case letters in a string to lower case.

To use it, enter:

**X=USR11016,ADRIAN,
LENIARD**

where AS is the string to be converted after assembling the routine.

The assembly listing is entered as a series of data statements. Multiple statement lines are possible by separating the statements with commas and comments can be included by placing them in REM statements.

The first part of an assembler instruction is always three letters. This must be followed by one space if there is a further part. The comma in indexed instructions should be replaced by a full stop otherwise RAW will get confused.

Implied instructions are always one part. For example:

RTS

All other instructions are two part. Like this:

ASL A
LDA 27

10 DATA 000, 0000	100 DATA 014	190 DATA 000, 0000
20 DATA 111000	110 DATA 007	200 DATA 110, 000-1
30 DATA 111000	120 DATA 007	210 DATA 00001
40 DATA 014	130 DATA 10000	220 DATA 007
50 DATA 014	140 DATA 010, 0111, 1	230 DATA 001, 1000
60 DATA 014, 11	150 DATA 000, 000	240 DATA 015
70 DATA 014	160 DATA 000, 0001	250 DATA 000
80 DATA 110, 11	170 DATA 000, 001	260 DATA
90 DATA 014	180 DATA 001, 0001	

The rules are strict but you'll find RAW friendly

Notice the single space between the first and second part. Indexed instructions are also two part, such as:

LOW 1804.9
CMP 1804.9

The seminars need to be replaced by full stops for BAW to understand them, as they believed.

LEWIS, C. 1941. *Phylogeny of the*
Phrynosomatidae. *Ann. Entomol. Soc. Am.* 34: 1-14.

Numbers can be either decimal or hexadecimal. Hex numbers are preceded by \$, a label can be used instead of a number and it's possible to have a forward reference to a label as it's a two pass assembler.

The first instruction must be **ORG** followed by a number. This tells **Ravi** where to place the object code.

They have 13.9, between 10.9 and 16.9, 19.9, 22.9, 25.9, 28.9, 31.9, 34.9, 37.9, 40.9, 43.9, 46.9, 49.9, 52.9, 55.9, 58.9, 61.9, 64.9, 67.9, 70.9, 73.9, 76.9, 79.9, 82.9, 85.9, 88.9, 91.9, 94.9, 97.9, 100.9, 103.9, 106.9, 109.9, 112.9, 115.9, 118.9, 121.9, 124.9, 127.9, 130.9, 133.9, 136.9, 139.9, 142.9, 145.9, 148.9, 151.9, 154.9, 157.9, 160.9, 163.9, 166.9, 169.9, 172.9, 175.9, 178.9, 181.9, 184.9, 187.9, 190.9, 193.9, 196.9, 199.9, 202.9, 205.9, 208.9, 211.9, 214.9, 217.9, 220.9, 223.9, 226.9, 229.9, 232.9, 235.9, 238.9, 241.9, 244.9, 247.9, 250.9, 253.9, 256.9, 259.9, 262.9, 265.9, 268.9, 271.9, 274.9, 277.9, 280.9, 283.9, 286.9, 289.9, 292.9, 295.9, 298.9, 301.9, 304.9, 307.9, 310.9, 313.9, 316.9, 319.9, 322.9, 325.9, 328.9, 331.9, 334.9, 337.9, 340.9, 343.9, 346.9, 349.9, 352.9, 355.9, 358.9, 361.9, 364.9, 367.9, 370.9, 373.9, 376.9, 379.9, 382.9, 385.9, 388.9, 391.9, 394.9, 397.9, 400.9, 403.9, 406.9, 409.9, 412.9, 415.9, 418.9, 421.9, 424.9, 427.9, 430.9, 433.9, 436.9, 439.9, 442.9, 445.9, 448.9, 451.9, 454.9, 457.9, 460.9, 463.9, 466.9, 469.9, 472.9, 475.9, 478.9, 481.9, 484.9, 487.9, 490.9, 493.9, 496.9, 499.9, 502.9, 505.9, 508.9, 511.9, 514.9, 517.9, 520.9, 523.9, 526.9, 529.9, 532.9, 535.9, 538.9, 541.9, 544.9, 547.9, 550.9, 553.9, 556.9, 559.9, 562.9, 565.9, 568.9, 571.9, 574.9, 577.9, 580.9, 583.9, 586.9, 589.9, 592.9, 595.9, 598.9, 601.9, 604.9, 607.9, 610.9, 613.9, 616.9, 619.9, 622.9, 625.9, 628.9, 631.9, 634.9, 637.9, 640.9, 643.9, 646.9, 649.9, 652.9, 655.9, 658.9, 661.9, 664.9, 667.9, 670.9, 673.9, 676.9, 679.9, 682.9, 685.9, 688.9, 691.9, 694.9, 697.9, 700.9, 703.9, 706.9, 709.9, 712.9, 715.9, 718.9, 721.9, 724.9, 727.9, 730.9, 733.9, 736.9, 739.9, 742.9, 745.9, 748.9, 751.9, 754.9, 757.9, 760.9, 763.9, 766.9, 769.9, 772.9, 775.9, 778.9, 781.9, 784.9, 787.9, 790.9, 793.9, 796.9, 799.9, 802.9, 805.9, 808.9, 811.9, 814.9, 817.9, 820.9, 823.9, 826.9, 829.9, 832.9, 835.9, 838.9, 841.9, 844.9, 847.9, 850.9, 853.9, 856.9, 859.9, 862.9, 865.9, 868.9, 871.9, 874.9, 877.9, 880.9, 883.9, 886.9, 889.9, 892.9, 895.9, 898.9, 901.9, 904.9, 907.9, 910.9, 913.9, 916.9, 919.9, 922.9, 925.9, 928.9, 931.9, 934.9, 937.9, 940.9, 943.9, 946.9, 949.9, 952.9, 955.9, 958.9, 961.9, 964.9, 967.9, 970.9, 973.9, 976.9, 979.9, 982.9, 985.9, 988.9, 991.9, 994.9, 997.9, 1000.9, 1003.9, 1006.9, 1009.9, 1012.9, 1015.9, 1018.9, 1021.9, 1024.9, 1027.9, 1030.9, 1033.9, 1036.9, 1039.9, 1042.9, 1045.9, 1048.9, 1051.9, 1054.9, 1057.9, 1060.9, 1063.9, 1066.9, 1069.9, 1072.9, 1075.9, 1078.9, 1081.9, 1084.9, 1087.9, 1090.9, 1093.9, 1096.9, 1099.9, 1102.9, 1105.9, 1108.9, 1111.9, 1114.9, 1117.9, 1120.9, 1123.9, 1126.9, 1129.9, 1132.9, 1135.9, 1138.9, 1141.9, 1144.9, 1147.9, 1150.9, 1153.9, 1156.9, 1159.9, 1162.9, 1165.9, 1168.9, 1171.9, 1174.9, 1177.9, 1180.9, 1183.9, 1186.9, 1189.9, 1192.9, 1195.9, 1198.9, 1201.9, 1204.9, 1207.9, 1210.9, 1213.9, 1216.9, 1219.9, 1222.9, 1225.9, 1228.9, 1231.9, 1234.9, 1237.9, 1240.9, 1243.9, 1246.9, 1249.9, 1252.9, 1255.9, 1258.9, 1261.9, 1264.9, 1267.9, 1270.9, 1273.9, 1276.9, 1279.9, 1282.9, 1285.9, 1288.9, 1291.9, 1294.9, 1297.9, 1300.9, 1303.9, 1306.9, 1309.9, 1312.9, 1315.9, 1318.9, 1321.9, 1324.9, 1327.9, 1330.9, 1333.9, 1336.9, 1339.9, 1342.9, 1345.9, 1348.9, 1351.9, 1354.9, 1357.9, 1360.9, 1363.9, 1366.9, 1369.9, 1372.9, 1375.9, 1378.9, 1381.9, 1384.9, 1387.9, 1390.9, 1393.9, 1396.9, 1399.9, 1402.9, 1405.9, 1408.9, 1411.9, 1414.9, 1417.9, 1420.9, 1423.9, 1426.9, 1429.9, 1432.9, 1435.9, 1438.9, 1441.9, 1444.9, 1447.9, 1450.9, 1453.9, 1456.9, 1459.9, 1462.9, 1465.9, 1468.9, 1471.9, 1474.9, 1477.9, 1480.9, 1483.9, 1486.9, 1489.9, 1492.9, 1495.9, 1498.9, 1501.9, 1504.9, 1507.9, 1510.9, 1513.9, 1516.9, 1519.9, 1522.9, 1525.9, 1528.9, 1531.9, 1534.9, 1537.9, 1540.9, 1543.9, 1546.9, 1549.9, 1552.9, 1555.9, 1558.9, 1561.9, 1564.9, 1567.9, 1570.9, 1573.9, 1576.9, 1579.9, 1582.9, 1585.9, 1588.9, 1591.9, 1594.9, 1597.9, 1600.9, 1603.9, 1606.9, 1609.9, 1612.9, 1615.9, 1618.9, 1621.9, 1624.9, 1627.9, 1630.9, 1633.9, 1636.9, 1639.9, 1642.9, 1645.9, 1648.9, 1651.9, 1654.9, 1657.9, 1660.9, 1663.9, 1666.9, 1669.9, 1672.9, 1675.9, 16

memory are used by the assembler but the rest is free. And

06 **07**

will not the object code address 00
7470, element 0000100.

Space for the object code can be reserved by moving RAMTOP down. RAMTOP is the highest point in memory available to Basic, and

7. 2000年12月1日

will tell you what it is currently set to.
To reserve 1k of memory – four pages
– use:

PERMISSION TO REPRODUCE THIS

then enter a GRAPHICS command to relocate the display list and data.

Please note however, that the first 500 bytes above RAMTOP may be corrupted by scrolling a text window, using CLEAR or clearing the screen.

[illegible][illegible][illegible]

Part II of MIKE ROWE's series on how to give your program displays the professional touch

A CUSTOM display list, mixing several modes on the same screen, can quickly and easily give your display a professional touch.

There are two ways to create one. Firstly you can modify a standard display list created by the operating system after a Graphics call. Secondly you can create an entirely new list from scratch, or even have several display lists in memory at the same time.

Before you start to construct your list there are several problems to be considered.

If you are modifying an existing display list it is safest to use the graphics mode that takes up most memory in your final display list as a starting point for your modified list.

Also try to avoid your screen memory crossing a 4k boundary — 4k, 8k, 12k, and so on to 48k — as it will cause problems. If you must cross a border, say if an 8k mode is used, then when the screen reaches the boundary you need to insert another load memory scan — see last month's article — in the display list to point to the start of the next 4k block of screen RAM.

Different graphics modes take up a different amount of screen RAM per line. If the operating system expects a line to take 40 bytes and in the modified list a line takes only 20, then the data below this line will be shifted half way across the screen.

There are two ways of avoiding problems with this. First you can use "dirty programming" and design your new lines in groups of lines which add to make the correct number of bytes — see examples later.

The other way is to avoid using the operating system for Drawto, Plot or

There are ways round those dirty programming techniques

Plot commands and poke directly to screen memory.

If you are to use Basic commands such as Plot, Drawto or Print on the screen you may need to fool the OS into thinking it is drawing on the correct screen.

This is done by poking location 87 (567) with the Basic graphics mode of the line involved.

Second is the problem of Basic checking: each command to check that it is in the range allowed by the graphics mode it thinks is in use.

This can commonly lead to Basic thinking it is going to print off the screen and giving an error when you know full well that it is on the screen.

This is solved by tampering with locations 88 and 89. These contain the location of the top left corner of screen memory and the OS uses these to calculate the legality of a screen command.

The top corner can be calculated by $PEEK(88) + PEEK(89) * 256$. If

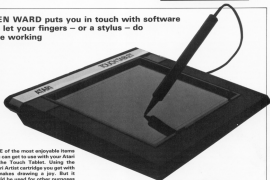
these locations are poked with the memory location of the start of the line to which you want to plot or print, then the start of this line becomes position 0,0 and therefore within legal range.

Knowing the number of bytes taken up per line in each mode is therefore needed as it is for the second point above.

Basic mode	Ascii mode	Bytes per line
0	2	40
1	8	20
2	7	20
3	8	10
4	8	10
5	10	20
6	11	20
7	13	40
8	15	40
9	15	40
10	15	40
11	15	40

On to some examples. The

KEN WARD puts you in touch with software to let your fingers – or a stylus – do the working



ONE of the most enjoyable items you can get to use with your Atari is the Touch Tablet. Using the Atari Artist cartridge you get with it makes drawing a joy. But it could be used for other purposes as well.

The Touch Tablet can be used anywhere a joystick, paddle, light pen or mouse would be used, and it's faster than most.

You don't have to drag the cursor across the screen as with the joystick, paddle or mouse. You place your pen where you want it straight away.

And the advantage over the light pen is that you don't have to pick anything up – you just use your finger or the stylus.

The only problem is that at the moment not a lot of software is available for it. The only commercial program I know of that has a Touch Tablet option is The Music Constructor 2.0 from Electronic Arts.

Having tried it, I can say that the program certainly is a lot easier to use with the Touch Tablet than with a joystick. So it's up to us to supply our own programs until the software houses get around to it.

OK, so where do we start? The tablet can be read by:

PADDLE(n): Horizontal readings
PADDLE(n): Vertical readings

The readings given are between 1 and 228. The horizontal ones are from left, 1, to right, 228, and the vertical ones from bottom, 1, to top 228. So we have two problems to

Take a tablet for more than drawing

overcome before using these readings.

- They have to be related to screen positions – we don't have a 228 by 228 pixel screen to work with. Also in converting the figures to relate to the screen we have to invert the vertical readings. If we are going to use a player/missile for the cursor, we have the added problem of coordinating PIM positions and screen position.

- We have to deal with the cursor wobble common to all variable resistance input devices.

The triggers on the tablet can be read as PTRIG(n) and 1 or as STICK(n). The trigger on the plug-in pen can only be read as STICK(n). So for simple inputs it is easier to use STICK(n). If STICK(n) is 16 then one of the triggers has been pressed.

For example, let's assume we are going to work in Graphics 0. The first thing to do is to relate the 228 reading from the tablet to the 40

characters on the screen.

We could simply divide 228 by 40 which gives us a divisor of 5.7, which would work fine apart from one small problem – it means that for the extreme left and right positions we would be right up against the frame of the tablet.

The ideal area to work in is marked on the tablet, which is far enough in to allow even the biggest finger to get to the edge. Remember, not everyone will want to use the stylus.

So let's look at it in practice:

```

10 GRAPHICS 0
20 X=INT(CHARACTERS/5.7)-1
30 Y=INT(CHARACTERS/5.7)-1
40 POSITION 0,0:7 0,0:0
50 GOTO 20
  
```

If you try this out you'll see that we now have an additional problem –



Figure 2: Using the touch tablet as a keyboard

readings outside the screen range. But it's only a minor one. We can overcome it with a series of IF X<0... IF X>39... IF Y<0... IF Y>39...

If that was all there was to it we would all be cheating out Touch Tablet programs.

Try this one and you'll see the other problems:

```
10 GRAPHICS 7
20 SCREEN=SCREEN-1:IF=1
30 Y=0:GOTO PADDED
40 IF Y=0 THEN GOTO
50 IF Y=39 THEN GOTO
60 IF Y=0 THEN GOTO
70 IF Y=39 THEN GOTO
80 GOTO 10
```

The first is that you have to go slowly to draw a continuous line, and if you were flashing a cursor and checking for trigger and/or key presses it would be even slower.

The second problem is the odd random pixel being drawn as you lift and lower the stylus to the pad.

My solution is a vertical blank routine to read the PADDLES four times, average out the readings, and store the result.

The random pixels problem is a question of checking for a "stylus off" reading. This part I've handled in the basic programming. To save processing time in calculating the X-Y coordinates and checking those out of center range, I've added a routine

to work them all out and store them in an array during the initialization.

The programs that follow demonstrate ways of using the Touch Tablet.

Tablet Zero is a demo of using the Touch Tablet as a selection device.

Tablet B is a Graphics B drawing program. As you will see from this, even with the '80 routine it is painfully slow drawing a continuous line. Part of the problem is that the Graphics B screen has a higher resolution than the Touch Tablet, which means you have to Plot and Draw to.

So now the ball is in your court. If you can improve on my ideas, send them in. And if you come up with a program using the Touch Tablet send that in too.

As a final suggestion of a use for the Touch Tablet, how about an alternative one finger keyboard for handicapped people?

It covers a smaller area than the keyboard, and all the multiple key inputs could be handled as a cumulative input.

The screen for such a program could look like the one shown in Figure 1.

A young handicapped friend of ours has a prototype - and very expensive - speech device that is limited to the number of words that can be stored in its memory and printed on the pad surface. Imagine what could be done with a program such as I've described running with S.A.M. ...

```
10 REM *****
20 REM **
30 REM ** TOUCH TABLET DEMONSTRATION **
40 REM ** BY BOB WOOD **
50 REM *****
60 REM **
70 REM **
80 REM **
90 REM **
100 REM **
110 REM **
120 REM **
130 REM **
140 REM **
150 REM **
160 REM **
170 REM **
180 REM **
190 REM **
200 REM **
210 REM **
220 REM **
230 REM **
240 REM **
250 REM **
260 REM **
270 REM **
280 REM **
290 REM **
300 REM **
310 REM **
320 REM **
330 REM **
340 REM **
350 REM **
360 REM **
370 REM **
380 REM **
390 REM **
400 REM **
410 REM **
420 REM **
430 REM **
440 REM **
450 REM **
460 REM **
470 REM **
480 REM **
490 REM **
500 REM **
510 REM **
520 REM **
530 REM **
540 REM **
550 REM **
560 REM **
570 REM **
580 REM **
590 REM **
600 REM **
610 REM **
620 REM **
630 REM **
640 REM **
650 REM **
660 REM **
670 REM **
680 REM **
690 REM **
700 REM **
710 REM **
720 REM **
730 REM **
740 REM **
750 REM **
760 REM **
770 REM **
780 REM **
790 REM **
800 REM **
810 REM **
820 REM **
830 REM **
840 REM **
850 REM **
860 REM **
870 REM **
880 REM **
890 REM **
900 REM **
910 REM **
920 REM **
930 REM **
940 REM **
950 REM **
960 REM **
970 REM **
980 REM **
990 REM **
```


ATARI users who buy Atari Logo are doubly fortunate. Not only have they acquired a programming language which is friendly to use and will help them to develop a good programming style, but also with it they have a version of Logo with some very special features.

The Atari machines are really very good host computers for Logo. Firstly, because the Logo comes on a ROM cartridge and, because of the way the machine is arranged, it really is a Logo machine.

It doesn't waste valuable memory space reserving vectors, as is done with some disc-based Logos running on what are really Basic computers.

Secondly, the Atari's collision counter routine provides an exciting extension to Logo which allows interesting things to be done with the hardware sprites - resident in the computer, as distinct from the program - which are another feature of the machine.

Thirdly, the Atari has four voices and is capable of producing musical effects. Though possession of a disc drive is an undoubted advantage, it is not essential. Your work can be saved on to cassette.

To get the best from this Logo, though, it is highly desirable that you have a colour television - or you may use a monitor with either the 600XL or 800XL. Atari Logo will run on the 400 and 600XL machines which have only 16K of RAM although this really does not leave much room to do a lot.

The whole point about Logo is that it is intended to be a tool to think with. Unlike some other programming languages, it does not try to force the human to accommodate to the machine, but attempts to create a highly-consistent world which is friendly to the human user.

This is reflected in the Logo data types, words and lists, which really reflect the types of objects which human beings process. What are words? Well, in Logo words are pretty much the same as they are in the human world, collections of characters, terminated by a space.

Symbols are significant in Logo, miss them out and the system will issue an error message.

There are a group of words with which the Logo system starts up

Atari and Logo - just made for each other

called primitives. When you type one of these the system knows what to do.

There is a very simple syntax which indicates to the system how it is to treat any words which it encounters. If there is no mark in front of the word - that is just the word itself - it attempts to evaluate it.

It sees it as a command, either a primitive or a procedure, but more on procedures shortly.

If the word is immediately preceded by a colon, "colon" in Logoese, it means that the value assigned to that word is being called

assigned one, you will get the message saying FIBS HAS NO VALUE if FIBS was the name of the word, which is somewhat more helpful than NO SUCH VARIABLE IN 2080.

Numbers are treated by Logo as being special forms of words. Lists are simply collections of words or other lists. They frequently form the values which get assigned to words.

Lists are indicated, delimited, by the use of square brackets, thus (THIS IS A LIST).

If you MAKE "GREET (HELLO, ATARI TURTLE LOVERS!) and then

DEREK RADBURN
introduces you to a
micro love affair

for - that is, it attempts to evaluate.

However, if there is a double quote in front of the word, such as "TOPS", then the system takes the word literally and does not do anything to it. So PRINT"TOPS would result in TOPS appearing on the screen.

Let's expand this a little by attaching a value to TOPS. This can be done by using the MAKE primitive. In order to work, MAKE has to have two things. The first must be a name (quoted word) and the second may be another word or a list. I'll deal with lists in a moment.

Here's an example: MAKE "TOPS "SPOT. This has now assigned the word SPOT as a value to be called when you type PRINT (TOPS), so consequently SPOT appears on the screen.

If you should attempt to reference a value when a word hasn't been

followed by PRINT (GREET you should be able to predict now what will appear.

You may have noticed that all of the Logo here has appeared in upper case characters. This is because Logo is case-sensitive and does not recognise lower case letters.

With the earlier Atari 400 and 800 machines it is very important to be aware of this, since the Caps/Lower key is directly adjacent to the Return key. Accidentally pressing this key will result in lowercase letters, which will not be recognised by Logo.

By some rather unhappy ergonomics it is necessary to press two keys together - Shift and Caps/Lower - to receive uppercase letters. This feature is particularly helpful to young Atari Logo users.

Turtle graphics is one of the best known and copied features of Logo.



Indeed, it is an all too-common misconception that this is all that Logo is.

I hope by choosing to start with words and lists I have dispelled some of these mistaken notions. Especially, turtle graphics is an example of the friendly human interface in Logo.

We all have bodies, and through them we have a spatial awareness of body geometry. We know which way we are facing, and know our position. We do not use coordinates to guide our movement — we simply go forwards or backwards and make turns, which alter our heading at appropriate times.

Logo uses precisely these commands to control the position of the turtle. It may be a robotic device which runs around on the floor or it may be just a symbolic screen turtle. The Atari one actually does look like one, but most are only triangles.

Whichever is used, both can record their paths by putting down a pen, one of three per turtle. There are four turtles. Their shape can be redefined by the user. This is done by calling the `SETSH` command. This must be followed by the number of the shape to be edited (or created).

Suppose you wish to create shape 1 — you may have up to 15 — then you would type `SETSH 1`. You would be rewarded by seeing an 8 column by 16 row grid.

Shape definition takes place by

moving around the grid using the combination of holding the Control key down and pressing the cursor arrow keys on the right of the keyboard.

The space bar acts as a toggle which, when pressed, fills in empty cells, or clears filled cells, whichever is under the cursor.

There is one point to bear in mind about these user defined shapes. Unlike the original system turtle character they do not alter their orientation to reflect the heading which has been selected. Put simply, this means your planes could be seen flying backwards across the screen, though I prefer multi-coloured flying pigs.

Another special feature of Atari Logo are multiple turtle sprites. It is possible to have up to four turtles, which may have their original shape or be given one defined by the user.

Any of these shapes may be given a velocity by using the `SETSP` command, which affects the currently active turtle. The speed may be between -300 and 300 bytes can guess the effect of a negative input, can't you?

Do not view the world of the turtle as being separate from words and lists — everything in Logo is based on these. For example, let's draw a shape 15. Type: `FD 30 RT 30 FD 30 LT 30 FD 30`. When you press Return, provided you remembered the

spaces, the five commands should execute.

Now try this: `MAKE "WRIGGLE [FD 30 RT 30 FD 30 LT 30 FD 30]`. Clear the screen by typing `CS` and pressing Return. (At this point I shall expect that you already know or have realised the need to press Return.) Now try: `RUN "WRIGGLE`.

The `RUN` command in Logo needs to have list of executable items as its input.

Logo has a nice loop structure, `REPEAT`, which needs two inputs. The first must be a numeric value which tells it how many times to loop. The second must be a list with executable items for it to do.

Try this: `REPEAT 3 "WRIGGLE`. Do you see the connection between `RUN` and `REPEAT`? How that use of `REPEAT` was not too interesting was it? Try this: `REPEAT 6 [RUN "WRIGGLE RT 180 RUN "WRIGGLE RT 120]`.

Another way of achieving the same result is to type `TO "WRIGGLE`. As soon as you typed this and pressed Return notice the change.

Look at the prompt. Instead of the usual toplevel interactive command level prompt of `?`, you will see a `>`. This signifies that you are in the defining mode and have begun to define a procedure.

The computer no longer responds

immediately to what you type. It is storing it and will only execute it when you tell it to. You do this by typing the name which follows TO. You are on the way to defining a procedure.

The change which occurs in the computer's behaviour when the defining mode is first invoked often causes confusion to novices. There are only two ways in which you can leave this mode.

The first is by typing on a line of its own, the word END, in which case the procedure gets defined. The other is to abort the whole enterprise by pressing the Break key.

With the Atari, this does not have the deactivating effect it does with some other machines - Reset does that! Should you press the Break key, definition proceeds no further.

So, to continue, type:

```
TO WRIGGLE
  REPEAT 4 [WRIGGLE RT 100 WRIGGLE
    RT 120]
END

TO WRIGGLE
  FD 50 RT 90 FD 50 LT 90 FD 50
END
```

Notice now that we have a variable attached to WRIGGLE and also a procedure called WRIGGLE. The Logo system sees both as different objects.

To alter a previously defined procedure means entering the editor. This can be done by typing ED "WRIGGLE. It is a full screen editor of the sort usually found with Logos.

What you see on the screen is what you get. Movement around the screen is by the Ctrl and arrow key combination already described. After editing, you may leave and retain your amendments by typing ESC, or abandon the changed version, while still retaining the original unaltered version by typing Break.

Logo is essentially an exploratory environment. Although Atari Logo is accompanied by extremely good documentation, the best way to become accomplished with it is to do it.

In this article I have purposely avoided giving anything which might be an "end". Rather, I have tried to hint at beginnings for your own learning and pleasure.



```
TURNS 12
MULTIPOL 3 3 100
FD 50
MULTIPOL IF 3 100
FD
```

Here are some procedures for you to tinker with. Pretypol brings them all together. Experiment with them and have fun.

This procedure draws a regular polygon of a given number of sides, of a size scaled by the number of sides:

```
TO POLY :SIDES :SIZE
  REPEAT :SIDES CWD (:SIZE / :SIDES)
    RT (:360 / :SIDES)
  END
```

This procedure draws a predetermined number of polygons rotated around an axis:

```
TO MULTIPOL :TIMES :POLY :SIDES :SIZE
  REPEAT :TIMES [POLY :SIDES :SIZE
    RT 360 / :TIMES]
  END
```

This procedure causes three polygonal patterns to be drawn in random colours in random positions. BG gives the value of the background colour. ST shows turtle. FS gives a full screen of graphics - you should be able to deduce the rest. It's important to note that this procedure leaves the system as it found it:

```
TO PRETTYPOL
  MAKE "SCREENCOL BG
  SETBG 4
  ST FS
  REPEAT 3 [CPC:CHOOSCOL CHOOSPOS
    MULTIPOL (:2 + RANDOM 12) (:3 + RANDOM
      10) (:80 + RANDOM 100) (:CHOOSCOL)]
  ST
  FINISHP BG
  SETBG "SCREENCOL
  (ON "SCREENCOL)
  END
```

This procedure chooses a new percolour, but checks to see that it is not the same as the background colour. Notice the IF test. IF is always followed by a list which gets TRUE if the condition tested for is found to be true. Optionally a second list will get executed if the condition is false:

```
TO CPC:CHOOSCOL
  SETCPC PC (:2 + RANDOM 12)
  IF BG = PC PC [CPC:CHOOSCOL]
  END
```

This one simply sets a position for the turtle:

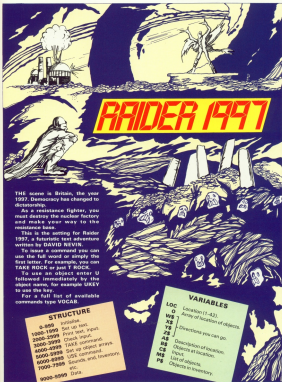
```
TO CHOOSPOS
  PC
  SETX -50 + (RANDOM 100)
  SETY -50 + (RANDOM 100)
  PC
  END
```

This procedure cycles through the three pens:

```
TO PENCHOOS
  IF PC < 3 [SETPC (PC + 1) [SETPC
    0]
  END
```

This procedure waits for a key to be pressed to indicate the user has finished:

```
TO FINISHP
  IF KEYP [STOP] [RECYCLE FINISHP]
  END
```



THE scene is Britain, the year 1997. Democracy has changed to dictatorship.

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This is the setting for *Raider 1997*, a futuristic text adventure written by DAVID REVIN.

To issue a command you can use the full word or simply the first letter. For example, you can TAKE ROCK or just T ROCK.

To use an object enter U followed immediately by the object name, for example UKEY to use the key.

For a full list of available commands type VOCAB.

STRUCTURE

0-999 initial.
1000-1999 Set up room.
2000-2999 First test, input.
3000-3999 Check input.
4000-4999 TAKE command.
5000-5999 Set up object arrays.
6000-6999 USE command.
7000-7999 Sounds, and inventory
 etc.
9000-9999 Data.

VARIABLES

LDC Location (1-42).
O Array of location of objects.
WB }
XE } Directions you can go.
YE }
ZE }
AB Description of location.
BB Objects at location.
CB input.
MB List of objects.
PB Objects in inventory.

[illegible][illegible][illegible]

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MIKE BIBBY gives you the lowdown on . . .

In previous articles we've seen that binary numbers can be added and subtracted just as our more familiar decimal numbers are. And, of course, we can multiply and divide them.

There are, however, other ways of combining two binary numbers that are extremely useful in dealing with computers. They're also easy to use, so let's have a look at them.

Firstly, we'll see how we can NOT a binary number — simple, one-bit numbers first. By the way, we're going to be dealing exclusively with binary numbers this month, so we can drop the % sign.

The rules for doing a NOT are simple:

**If the bit is 1 then it becomes 0
If the bit is 0 then it becomes 1**

If you like, the NOT converts a bit into its opposite.

So NOT 1 = 0

And NOT 0 = 1

Why do we use the word NOT? Well, mathematicians often use the number 1 to mean true and 0 to mean false.

So NOT 1 means not true, which means false, which is 0. That is, NOT 1 is 0. And, as not false is most certainly true, NOT 0 is 1.

If we are to NOT a binary number consisting of several bits, we simply apply the rule for NOT to each bit individually.

So NOT 10110010
becomes 01001101

Some people think of this process as turning the number on its head, so it's sometimes called inverting. Others call it taking the complement of the number.

NOT just works on a single binary number. However, there are other sorts of operations that have a set of rules for combining two binary numbers.

For instance, we can AND two binary numbers. Let's look at the rules for ANDing a single bit with another bit.

When you think about it, there are four possible combinations of bits that we could AND — 0 with 0, 0 with 1, 1 with 0 and 1 with 1.

We write that we are ANDing, say,

The inside story of binary operations

0 with 1 as 0 AND 1.

The rules for ANDing are:

**0 AND 0 = 0 (case a)
0 AND 1 = 0 (case b)
1 AND 0 = 0 (case c)
1 AND 1 = 1 (case d)**

Notice that the only time the result is 1 — true — is when the two bits ANDed are both 1 — true. This helps us to see why we use the word AND to describe the operation.

If you think of the first bit as "this" and the second bit as "that", what we're doing when we're ANDing is asking whether "this and that" is true.

"This and that" can only be true when both "this" is true AND "that" is true — hence the use of AND to describe the process.

For example, consider the statement that it is dry and sunny.

This is true only if dry is true and sunny is true — case d.

If either of the two, or both are false — cases a, b, c — the whole statement is false, since it isn't both dry and sunny.

We can AND pairs of binary numbers of more than one bit — just apply the rules of ANDing to each bit individually.

For example:

**AND 10010110
AND 10110011
gives 10010010**

We can also OR two binary numbers. The rules for ORing a single bit with another bit are as follows. Again there are four possible combinations:

**0 OR 0 = 0 (case a)
0 OR 1 = 1 (case b)
1 OR 0 = 1 (case c)
1 OR 1 = 1 (case d)**

In this case you only get a false result, 0, when both bits are false. If either or both bits are true, 1, the result is true. It's easy to see why we use OR to describe this. If one OR the other OR both is true the whole thing is true.

Let's use the meteorological analogy again. Consider the statement that it is dry or sunny.

This is only false when it is NOT dry and NOT sunny — case a — otherwise it is TRUE — cases b, c, d.

To turn up, with OR the whole thing is true if either or both the things being ORed is true.

As we did with AND, we can OR pairs of numbers with more than one bit — we just apply the rules of ORing to each bit individually.

For example:

**10010110
OR 10110011
gives 10110111**

➔ In the next article we'll look at XOR and the use of masks.

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DELVING INTO THE ATARI'S INNARDS

I BOUGHT an Atari 800X soon after they became available — in the firm belief that the full hardware details would be available, as they were for the earlier Atari 800.

The questions I particularly wanted the answers to are the following:

- How to enable the shadow ROM. Your article on the XT indicates that the technique used is not as easy for the XL.
- The details of the signals and the timing at the edge connectors.

With this information available, manufacturers could attach a variety of peripherals to the XL series. — **Donald W. Sharp, Newcastle upon Tyne.**

The shadow ROM under the Operating System and Basic — that's \$0000-\$BFFF for Basic and \$C000-\$FFFF & \$0800-\$BFFF for the OS — can be switched in and out by changing bits 0 and 1 in location \$D001, as shown in the table with the article in the June issue of Atari User.

However, it can't be done from Basic, as the computer would instantly crash — hence the warning not to try it with a PORG.

Switching either Basic or the OS must be done with a machine code program in control. To stop the OS

running before banking it out, set MMEM (\$D4D8) to zero. Only set it back to \$40 — \$4 decimal — when you have switched the OS ROM back into place.

\$D000-\$DFFF can never be used as RAM, because they contain information vital to other chips such as Audio, Poky and GMA.

There was a very good series of articles about using the Parallel bus in the January to April Atari Magazines (Vol. 3/9 to Vol. 3/12).

I started from scratch, and ended up showing you how to build and run an RS-232 interface via the bus connection.

Bulletin boards

THANKS for an excellent and much needed magazine for the Atari community. Your June issue on communications was especially interesting.

I saw the numbers for bulletin boards and wondered whether you would include

mine in future listings?

The board is Atari based and oriented, called CyberZone, and the number is 01-638 2034. It's a 24-hour auto-answer service. — **Edwin Saunders, via Postal.**

Micro connection

I WOULD like to know whether two Atari can be connected by an ID cable (Program Recorder/Disc Drive card) and a program loaded from one to the other?

Secondly, how do you connect several peripherals which all use the ID interface to your Atari? — **Craig Brady, age 14, Bristol.**

P.S. I typed in the Pulse to suppress the clicking sound on my Atari 400 104, and after trying four times, it still didn't work.

■ A standard ID cable will not allow data to go from one machine to another. By re-wiring "Data-In" to "Data-Out", changing the +5V line and

re-wiring the clock input lines, it might work. Can't say we've ever tried it, though.

The easiest way is to save on to tape from one machine, swap the recorder over, and load it back again on the other. Also, the joystick ports can be re-programmed for direct data exchange.

Perhaps someone out there has done it and would care to write in?

There are two ID sockets on each peripheral in the Atari range, and you simply plug the second unit into the back of the first, and so on.

The codes listed in the letters page in issue 1 from David Schenker work OK, but they are for the XL and XE ranges only. There was some of the new features not available on the old Atari range. Sorry.

Edge connectors

I OWN an Atari 400 and would like to explore its expansion and interlink capabilities. Due to the absence last of an expansion office, I am finding it not at all easy.

I have a project in mind which would need me to access both the data and address bus. Is there any way I can get to these?

I have noticed some edge connectors on the 400's board — could you explain these?

Also, could you tell me if the Atari 400 is directly compatible with the Atari 800 drive, without the expansion interface? — **Edmund McCormick, Leicester.**

■ Information on direct layout, connections, and so on is in the "Technical Reference Notes for the 400/800", published by Atari at £17. It

Jumping into difficulties

I HAVE undertaken to type the Frog Jump game — in your June issue — into my computer.

However, this keeps coming up with Error on Line 340, 350 and 360.

I haven't typed any further, so do not know if there are any other errors.

I am wondering, therefore, if you could advise me of the correct lines for this game.

Also, I have an Atari 800 with cassette, but am thinking of buying a disc drive. Can you tell me if it is possible to record from the cassette to disc?

I HAVE many games on the cassette, but don't want to buy a disc drive if it is impossible to break into the program. — **G. Rowlin, Wotton-in-Thames.**

■ There were no errors in the listing as printed, so you have almost certainly made some typing mistakes.

You don't say what the error number was, but we suspect it was on line 5. If this is the case, you should check Line 50 very carefully and make sure you have entered it as listed.

For example, make sure you

have used 1 — number one — and not I — capital letter I — in strings the L15.

Most commercial games are fairly heavily protected, so you would probably not be able to move them to disc — particularly if they load in more than one section.

However, the time saved in loading possibly outweighs the cost of replacing your favourite games.

You may also be able to recover some of the money by selling the cassette versions to people who haven't yet got a disc drive.

should be available from specialist shops, or mail order from Software Express, Tillics Shop, and others.

The edge connectors you mention are extensions of the processor bus — left in the machine as engineer test points, but it's up to you what you want to do with them.

Don't forget that if you open your machine, you will invalidate your guarantee.

All Atari peripherals — disc drives, printers, cassette recorders, and so on — will connect to any Atari computer directly via the 13-pin socket on the side.

However, if you only have a 104 machine, you would only have about 16k left for programming after DOS loads into memory.

Why the bleeping?

WHEN I got my 800XL I found there was a "bleep" on the screen every third line you went down.

I went to the shop where I got it then and they checked it. It seemed that the "bleep" was on all of the 800XLs.

So please, please tell me what is that "bleep" doing there?

Is it some kind of safety device? — Neil McCulloch, Donny, Wiltshire.

■ We're not sure what you mean but suspect that you're referring to the beep which warns that you are about to exceed the allowable length of program lines. If so, it's certainly meant to happen.

Memory check

I HAVE a 800XL. Every only I'll memory, many utilities crash for games and children don't help me at all.

If I want to order anything I first have to write or telephone the company asking the problem as one hour much memory it takes up.

I am saving up for the 808

ATARI USER Mailbag

We welcome letters from readers — about your experiences using the Atari micros, about tips you would like to pass on to other users... and about what you would like to see in future issues.

The address to write to is:

**Mailbag Editor
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Europe House
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expansion, but for all the people who have only got 128 and will stay with 128 could you please ask your advertiser to show how much memory the product needs?

I know that the 800XL is "going out" but don't rub salt in the wound.

Also regarding the monthly offer — spare a thought for those with no disc drive and put the offer on cassette as well. — E. Pallas, Middleton, Manchester.

Doing it the hard way

CONGRATULATIONS on your magazine.

I have a 800XL which I bought in January and until Atari User was found I had learned practically nothing.

The articles by Dave Russell, Mike Biddy, Peter Biddy and others are so easy to follow that I'm amazed by what I can do already.

I have the books Atari Programming with 88 Programs by Linda M. Schneider and Making the Most of Your Atari by Paul Brink, and although I learned a little bit from these I wasn't learning enough.

I could never figure out what data was well I read Dave Russell's second article on graphics mode. Now I can write small programs using data.

I hadn't got a clue what binary was until Mike Biddy's article on the subject. I've

forgotten for the moment how to write JJ. Now I can convert numbers into binary.

Now about the listings, I tried four times to write 19 that's the term Alphabet Soup into my computer, which told me about three hours each time.

I could never get it to work, so I tore it up in disgust.

I did manage to get Frog Jump to work, but not very well — but that should be because of my joystick.

Submarine works fine, but our Echo Search ran Atari Squash.

I did have a program recorder at one time but could never get it to record any of the listings so I got rid of it.

Now all I have is my computer and joystick, so I have to type in the listings every time — so it would be great if I could get them to word every time.

Any tips please? — Colin Keegan, Holyhead.

■ Our main suggestion is that you buy another recorder or save up for a disc drive. It will save you hours of typing time which you can use to debug your programs.

Defender score

COULD you tell me if there is an Atari user group in Bristol?

Also, having seen that high score on Drop Zone, I would like to see whether anyone can beat my top score on Defender. I managed to reach over 7

million and gave up with over 800 lives — although it took me about 2½ hours.

Can I have more articles and programs on the more complicated side of the Atari computer — machine language techniques, hardware, and so on.

Also, is it possible to get a modem which costs less than £100? — P. Fragapane, Radminster, Bristol.

■ The address of the East Bristol user group is c/o 2 Chivers Hill, Industrial Estate, Fagbarn, Bristol.

The Modem modem costs around £50... but you'll need an 883 module as well. This applies to all the cheaper modems as far as we know.

Frightened off

FOUR times I've about Atari's going "bump in the night" seemed quite appropriate considering my 800XL's penchant for "bumping" when I play the Atari Adams' Ghost Town adventure.

I wonder if other readers have found that their machines take fright in this manner? — J. Hughes, Leicester.

Checking errors

I WISH to comment on Les Boswell's request that some form of typing check program be included in your magazine.

I run a computer club for 5 to 13 year-olds and when I see good programs in magazines I ask the children if they would like to type them in. They do, and enjoy it.

When all these lines have been typed in and they then try to run it, you can imagine how disappointed they are when it shows errors at line 10 and so.

It is then left to me to try to debug the programs. This takes up much-needed time when I could be doing something else for the club.

So you do not agree with

Let that an error-checking program would be of great assistance.

It's a shame that all Atari magazine magazines could not use the same error-checking programs, something like Type II, which I think is the best, in trying to assist their readers.

May I say that you have a good magazine. — **B. Spooner, Pichsburg, Penna.**

Confusing check-sums

I HAVE just bought issue 2 of your great magazine and am pleased to say that it is even better than issue 1.

I find Mr Mike very useful, for how about an article or three on assembly/machine code?

As for the argument over a check-sum routine, my votes depend on which type you decide to offer, as the type tables for Atari and so on are quite confusing. A better type is the one used by Compaq.

You argued that it's good to get some practice at debugging, but if you are an experienced one you might find this very difficult and having a check-sum would reduce the frustration of typing in listings.

Also, if you do want to debug you have not got to use the check-sum if you don't want to.

Finally, as many big American magazines use type tables it must be of some use to American users, and if the type tables are not really used you can always drop them at a later date.

Another article that would be welcome is an explanation of programs showing the use of players/missiles and redrawing the character set as this is ignored in my 8000 manual and I have not discovered any books explaining them simply. — **N. Buckle, Exsford, Kent.**

It's interesting that you don't like Atari's check-sum methods — many people have suggested we use the same method as Atari.

Atari's on the air

CONGRATULATIONS on a brilliant magazine.

I am a radio amateur and have been using — or trying to use — my Atari 800 for radio-based programs.

I have been able to send radio teletype and Morse in both directions and also I have a very good Morse training program.

Unfortunately, whenever I approach software suppliers about programs for radio communications, all I get is "Atari? That's a games machine — we don't keep anything like that".

All this type of software is readily available for such machines as BBC, Spectrum, Dragon, Commodore, Amstrad, to name but a few, what has Atari got that these other machines do not seem to have? Could it be lack of support?

Anyways, if you know anybody who can help, or anybody who wants help, or anybody who is just interested with radio-type programs then can you please pass on my name? — **J.M.B. Shappard, Bristol.**

Typing error

I'M a beginner with the Atari and so your magazine has taught me a great deal.

But unfortunately, with quite a few games which I have typed in, when I run it always produces an error.

I always check the listing as it isn't a typing error.

I typed in Attack Squash and it produces error at line 800. It said game T2D which doesn't even exist.

Could you please help me to understand my computer, and explain to me the error in Attack Squash.

Also, could you please tell me whether there are any groups around the Gillingham area, where I could go to talk to other people with the same

problems? — **G. Gossels, Gillingham, Kent.**

We regretted Attack Squash as it appears in the Atari Book of Games. You're right that line T2D doesn't exist, but the author obviously altered the program so that it never gets to line 800. Hence you must have made a typing error somewhere along the line.

There is a user group in Tunbridge Wells and the contact is Mr T. Chamberlain, 28 Albany Hill, Tunbridge Wells, Kent TN2 3PL.

Switch-on sequence

I HAVE an Atari 800X and my dad has a Tandy TRS-80 colour computer.

In one of the Tandy manuals it says that switching on the computer without connecting it to the television can damage it. May it be this the case?

Also, does it apply to Atari?

mine, as I have a friend with an Atari 800X which he leaves on for long periods of time with the television switched off.

It says in one of the Atari manuals that inserting or removing a cartridge with the computer switched on can damage the cartridge. Can it also damage the computer? — **Peter Shadden, Haleson, Cornwall.**

As far as we know switching a mains on without connecting it to a TV can't do any damage.

Possibly what your Dad's Tandy manuals are suggesting is that you turn on all the peripherals — TV, disc drives etc — before you turn on the micro. This will stop a possible mains "spike" from something like the TV on-off switch damaging your computer.

For the same reason, you should turn the micro off first. Plugging or removing cartridges with the computer switched on could cause damage and should be avoided. It's a bit like surgery without anaesthetic — possible, but not recommended!

Games shortage

PDGM magazine is a most helpful teaching aid into computer programming.

As for the Atari company, I am not full of its games.

On purchasing the Atari 800X I was surprised that Atari did not supply at least one games tape to test the machine.

And the manuals that came with the machine contained typing errors.

The main problem concerned the computer, which would not load. But as an amateur, I had no idea either was the matter.

I then decided that the tapes were all Atari. I had three tested — they were all right.

So I changed the Atari 1050 tape recorder for another one. Still no luck.

In the end I involved a new computer but this would not load either.

This time the Atari tape recorder was at fault, it is now

being repaired.

Throughout this whole episode there was no Atari dealer to ask advice from.

There is also the added difficulty of finding Atari computer games.

Woolworths of Woking and Manchester have depleted their stock and inform me that they are no longer interested in stocking Atari games tapes.

This also applies to all W.H. Smith shops. They only sell Atari books and tapes do no better.

On reflection, I would have done far better buying Commodore, or Spectrum.

At least they sell their own products through their shops, with well trained staff, and not through individual electrical outlets. — **H. Smith, Stafford.**

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