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Vol. 3 No. 12

April 1988

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All major listings in this issue are accompanied by checksums to help overcome typing mistakes. For full details of how they work, see the article on page 23 of the November 1987 issue of Atari User.



Add TEN new commands to Atari Basic with this latest package from Atari Inc.

**SEE PAGE 42**

*The phenomenal growth in demand for Atari computers means a much bigger home for the BIG show...*

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Amor/ST User	in Soft	Provision Software
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# ATARI USER NEWS REVIEW

## 'More to the Atari than just games'

The capabilities of the Atari 8 bit micro are not being fully utilised, according to Keith Masses, general manager of Software Express.

"Serious programs such as word processors, spreadsheets, databases and programming languages are being overlooked in favour of cheap cartridge and cassette-based games", he said.

"We have no problems selling budget titles, but when it comes to anything over £10 it would appear that there is no go and for 8 bit users.

"It's a great pity because the machine is more than capable of handling serious applications".

Software Express (021-328 3588) produces a number of packages for the Atari such as the Start word

processor for £29.95, the FynCalc spreadsheet at £49.95 and the FynFile database also at £49.95.

"Even though the prices are relatively cheap compared to other full function programs, sales are very low indeed", said Keith.

"The problem may be that many newcomers to the Atari just don't know that it is more than a games machine.

"If they could only look beyond the joystick they would get a lot more out of their money".

### ON THE SERIOUS SIDE . . .

*ATARI users who want more than entertainment from their machines have a new source of serious software.*

Valer Software has just completed development of a desktop publishing and circuit board CAD program for Atari 8 bit machines, and wants to hear from prospective users.

Richard Praeger of

Valer (0203 617000) told Atari User: "We believe the aspirations of the average 8 bit user extend further than games.

"I am sure a lot of Atari owners are interested in getting more from their machine and we would like to hear from them.

"If the response is good enough then we will set up a creative user group".

## Fresh from the USA

The range of acclaimed Atari 8 bit programming aids from American company OSS is to be made available in the UK.

Frontier Software (0423 871481) is importing them in its role as distributor for ICD Inc. of Illinois, which recently took over OSS's product line.

An alternative to Basic, the fast programming language Ardor blends the best elements of Pascal and C. It is available on cartridge for £49.95, and toolkit disc for £79.95.

Macro assembler and editor Macro85, for serious assembly language pro-

grammers, includes the powerful DDT screen-oriented debugging program. The cartridge costs £69.95 and the toolkit disc £79.95.

Download compatible with standard Atari Basic but with an additional 45 commands, Basic XL supports all Atari 8 bit micros. The cartridge is £39.95 and the toolkit disc £79.95.

Basic XL has all the commands and is designed for the Atari 5200 to make better use of the memory but still retain compatibility with Atari Basic. The cartridge costs £49.95.

ATARI Corporation's computer activities continue to prosper. The company has just reported net sales of \$140.5 million for the last quarter - up 58 per cent from the previous year's \$88.8 million.

Income was 53 per cent up at \$21.3 million. This means net sales for the year stand at a record \$552.8 million - a rise of 61 per cent over the previous year. Income was up 48 per cent at \$73 million.

Atari President Sam Tramiel said: "The computer segment of our business continued to grow at a record pace, contributing over 51 per cent of our net sales for the year".

## Pirates are under fire

ATARI has been showing Far East software pirates that it means business.

The company has obtained court injunctions against six Singapore firms alleged to have infringed its copyright and design patents.

The move follows the recent inclusion of computer software under Singapore copyright laws.

Atari has also seized a large consignment of games cartridge originating in Taiwan and destined for European markets.

## New games group formed

A MAJOR international publisher has joined forces with a new software house to launch an exclusive entertainment label for the Atari. Mandarin combines the marketing muscle of the European Group, parent company of Database Publications, in a series of joint ventures with some of the UK's top programming teams.

The first title to be released by Mandarin is an adventure trilogy, Time And Magic, from Level 9.

"We believe that Level 9's programming skills, together with Mandarin's knowledge of the marketplace, abilities in printing and packaging, and its understanding of the need to get products out on time, will be an unbeatable combination."

Fast to Page 2 ▶

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**Company searches** – Obtain facts about any British limited company in seconds, and fully analysed financial information on over 180,000 major companies.

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**Satellite** – Get through to New York in just five seconds – or try into the BBC computer in Llandudno, which links you to 600 databases throughout Europe.



## Two recommended packages

**If you have an 850 interface:**  
Pace Highgrade manual modem + cable (ST18.15) PLUS Mini Office II (ST19.95)  
Total price: £128.10

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Miracle W62800 V21, V22 modem + Datapoint interface + cable + Datapoint software.  
Total price: £149.95

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## Show's the place for big savings

EXHIBITORS are forecasting record savings on hardware and software at this month's Atari User Show.

It takes place April 22 to 24 at Alexandra Palace, London, and a survey conducted by Atari User reveals that potential savings to visitors should total well in excess of £100,000.

The event will also be the launching pad for a number of exciting new Atari 8 bit products.

Red Hat Software will be unveiling its latest bargain price compilation games packs, which include the popular titles Mud Jan, Deadknought, and Space Wars.

Seen at the show for the first time will be the new quality games publisher Mandarin Software. The company has produced an excellent adventure for the Atari 800 - Time and Magic.

The move to the larger exhibition space provided by Alexandra Palace further emphasises the increasing popularity of products on the Atari.

Previous venues have

proved too small for the ever increasing numbers of exhibitors and visitors.

One of the many special attractions to be seen in the West Hall will be the games arcade. A large bank of machines will be available for playing the very latest titles from leading software houses.

Centre stage at the show will be leading Atari dealer Silco Distribution with a massive 68 square metre stand.

It will be displaying the UK's largest ever range of software and hardware at the show. The company is also offering free registration to its Atari user groups.

## No Star Wars

ATARI User has received many letters pleading for a version of the top-selling game Star Wars.

Despite interest shown by Atari User readers, Domark says it will not be releasing an Atari 8 bit version.

release. It is our aim that our label will become synonymous with quality, providing the Robin Payco of software games for the Atari. And what better way to start than with Level 9?"

The first game to be released, Time And Magic, has up to 68,000 words of text, 708 locations and a 10,000 word book containing detailed play guide and short story.

To help players who get bogged down with the intricacies of the game, Level 9 is providing comprehensive clue sheets free of charge. The game costs • £14.95 on tape or disc.

## THE GALLUP CHART

## TOP 20 SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
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3	▲	POLE POSITION Atari	12.99
4	•	FEUD Mastertronic	1.99
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17	▼	STORM Mastertronic	1.99
18	•	COLONY Mastertronic	1.99
19	▼	DIZZY DICE Players	1.99
20	▼	RIVER RAID Firebird	1.99

Compiled by Gallup/Microscope

New from Atlantic is League Challenge which goes straight to the number one spot. You can read the review in this issue.

The only full-priced title in the Top Ten this month is Pole Position from Atari, yet there are seven new entries and re-releases, including a new title from US Gold - Platform Perfection.

### 4 From Page 8

tionist", says Peter Austin of Level 9.

Mandarin's involvement with the innovative games software house is the first of a series of joint ventures.

"We find ourselves in the position that, unlike many other publishers, we don't have to rush out titles to maintain cash flow", says Chris Payne, spokesman for the new venture.

"Mandarin couldn't be more sound financially - we have £1 million in the kitty - so we are in a superb position to be able to pick and choose not only our partners, but also just what products we decide to

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# DESIRE

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1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.

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HAVE you by now managed to digest last month's somewhat technical delve into the inner secrets of Atari Basic? It's not really as complex as it first seems, is it? This time we'll be continuing from where we left off and taking a look at the way program lines are encoded — or tokenized.

Looking back for a moment you will remember the example program we wrote using `LET` time:

```
15 LET NUMBER=128
16 PRINT NUMBER
```

Line 16 tokenized to give us the codes 5, 0, 15, 16, 0, 128, 45, 14, 65, 16, 0, 0, 0, 0, 27 and line 15 gave us the somewhat shorter sequence 10, 0, 3, 0, 32, 128, 22.

As a quick reminder, the first two digits of each line represent the line number in standard 4800 line high format and the next two give us the total number of bytes contained in the tokenized line. The final 22 is a marker to tell Basic it has reached the end of the current line.

All the bytes in between represent the program lines themselves, with numbers of 128 and over referring to variables — as stored by Basic in the variable name table. These tokenized lines will be used whenever you run the program, and are only ever converted back into text form when you decide to use `LIST`.

This time we'll be considering a slightly more complex program — shown as Listing 1 with the tokenized version in Figure 1. It contains a number of features we haven't looked at yet, the most important being strings and multi-statement lines.

The first thing to note is that there are four variables in the program — `TEXT$, A, B` and `C`. These are given the first four variable name tokens, so `TEXT$` is referred to by the number 128, `A` by 129, `B` by 130 and finally `C` by 131.

This is, of course, the order in which the variables were first referred to

```
10 DIM TEXT$(255)
20 TEXT$="HELLO"
30 PRINT A: PRINT B: PRINT C
40 REM THE END
```

Listing 1: Simple example program

```
10 0 15 16 30 128 58 14 64 32 0 0 0 0 0 44 22      10 DIM TEXT$(255)
20 0 15 16 64 128 46 14 5 72 68 76 76 76 22      20 TEXT$="HELLO"
30 0 16 7 32 129 20 11 32 130 20 15 32 131 22      30 PRINT A: PRINT B: PRINT C
40 0 13 13 0 64 72 68 32 68 76 68 166            40 REM THE END
```

Figure 1: The tokenized structure of Listing 1

# LET'S TRY TACKLING TOKENISING

**ANDRÉ WILLEY** continues his in-depth examination of the way Atari Basic is structured

when the program was typed into memory.

Line 10 is easy to work out and differs little from the lines we have seen before. The token 20 refers to the word `DIM`, and 10 and 44 are the open and close bracket symbols. As we have already seen, `TEXT$` is given the token 128, and the number 20 is coded somewhat lengthily as a numeric constant in binary coded decimal. See last month's article for more information on BCD coding.

Line 20 contains something completely new — the string assignment `TEXT$="HELLO"`. Once tokenized, it looks like this:

```
20 0 15 16 64 128 46 15 0 72 68 76 76 76 22
```

You should know by now that the first four numbers — 20, 0, 15 and 16 — mean that the line number is 20 and it is 16 bytes long. But the rest of the codes are new.

Firstly, the token 64 means `LET` — because what we intend to type was `LET TEXT$="HELLO"`, even if we omitted the word itself.

This use of token 64 is referred to as an implied `LET` — if we typed in the full version of the line all that would change would be that the 64 would be

replaced by a 6, the normal token for `LET`.

The digit 128 tells Basic we want to use the first variable `TEXT$`, and 46 represents the equals sign. The number 15 signifies the start of a string constant in much the same way as the number 14 always precedes a BCD numeric constant.

The string is coded very simply as a single byte to indicate the length of the string — in this case five characters — and then the text in standard ASCII form. Finally the line is terminated with the normal 22.

Line 30 gets a little more complex since it contains three different statements, each separated by a colon. This line tokenizes to:

```
30 0 16 7 32 129 20 11 32 130 20 15 32 131 22
```

which in turn breaks down into these four segments:

```
30 0 16      7 32 129 20
11 32 130 20
15 32 131 22
```

The first part is simple enough to decipher, since we've seen its form a number of times before. The 30 and the 0 give the line number 30 and the 16 gives us the total number of bytes in the tokenized line — count them and see. We also already know that 32 is the standard token for `PRINT` and that the numbers 129, 130 and 131 are simple variable references.

The token 22 signifies the end of the

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#### 4 From Page 12

line, so it's not too difficult to see that 20 must indicate the end of a statement within a multi-statement line — rather like the colon in the original text version. This just leaves us with the numbers 7, 11 and 16 at the start of each successive statement to explain.

In the same way that Basic stores the total length of the line, so it must also keep track of the length of each statement within that line.

So far we have seen only a single statement on a given line, so we see two identical length values — the distance to the end of the line being the same as that to the end of the first (and only) statement.

However, in this case we see that the second length byte in fact refers to the length of just the first statement. To be more accurate, it provides an offset to the beginning of the next statement.

The value of 7 in the tokenized version of **PRINT** A gives the total number of bytes that must be counted to take you from the start of the line to the last byte of that first segment — the very next byte will be the start of the following statement.

Similarly the number 11 at the start of the second statement tells us that the third statement will begin 12 bytes in from the start of the line — since the second one finishes at byte 11.

Finally the last statement on a line will always contain the same offset value as the total line length byte — the offset to the next statement being the same as the offset to the next line. This is why the special cases we have looked at so far — in which there is only one statement on a line — always have the same number for the line offset as they do for the statement offset.

The last line of our sample program is probably the simplest of them all. After the line number and the two identical length bytes comes the single token **END** meaning **REM**. This is followed by the rest of the **ASCII** text — terminated in this case with a carriage return byte (10) instead of the normal code 27. This is done so that you are able to use a **Control-X** — **ASCII** code of 27 — in your text.

A **DATA** statement would be coded in exactly the same way, but with a token value of 1 followed by the **ASCII** text.

It would obviously take far too long to give examples of all the individual tokens used by Atari Basic, but you should by now understand the general format of a line.

For further information Figures 3, 4 and 5 give a complete breakdown of all the available tokens and their meanings. The first token of any statement will always come from Figure 3, and it may be followed by either some **ASCII** text — such as in the case of **REM**,

**DATA** or **ERROR** lines — or more normally by a mixture of the tokens listed in Figures 4 and 5 plus various numeric or string constants.

You will notice from the list of arithmetic and string operations given in Figure 4 that some characters seem to have more than one possible token. This is especially notable in the case of the open bracket and the equals signs, and is due to the fact that they can be used in a variety of functionally quite different situations.

For example, the equals symbol may be used to assign a value to a numeric variable — as in **LET A=10**, or to a string — with **LET TEXT="HELLO"**. It can also be used for comparison of either strings or numbers — such as **IF TEXT="NO" THEN END** or **IF A=MAX THEN 10**.

Similarly the open brackets character can be used within a mathematical formula to access a subscript, inside a **GOSUB** statement or as part of a function call such as **PRINT CHR\$(A)**.

Each usage of the character has its own unique token, and these various special cases are listed alongside each token.

One other point of interest concerns the useful trick of abbreviating commands when you are typing in a program. I've no doubt that many of you prefer to use **GR**, instead of the much longer **GRAPHICS**, or **L**, instead of **LIST**. But how does Basic know that typing **S** means **SOUND** rather than **SECOND** or even **SETCOLOR**?

The answer lies in the structure of Figure 3. When Basic discovers a dot within a command, it scans through the table starting at the top, until it finds a match for the few characters it has been given. Thus, since **SAVE** comes before any other word starting with **S**, this becomes the first match and the command is read as **SAVE**.

If you just type the dot without any other characters the match will be made on the very first token in the table — giving you a very quick way to enter **REM**s.

This technique works with any command, but not with functions. Thus there is no way to shorten **PAUSE**, for example, because it is a function call, as listed in Figure 4. Also some abbreviations have dubious advantages — such as **FOR**, instead of **FORE**. It can't be shortened any further because using **P**, as in **PO**, would result in the command **POINT** being generated.

Unfortunately we are stuck with the command table order as defined by Atari in the Basic rom.

■ Next month I'll conclude this tour of Basic's inner workings with a program which will enable you to see these systems in action for yourself.

Token	Basic keyword	Token	Basic keyword
0 (000)	<b>REM</b> (followed by text terminated with a Carriage Return)	38 (010)	<b>POINT</b>
1 (001)	<b>DATA</b> (as for <b>REM</b> )	39 (011)	<b>XIO</b>
2 (002)	<b>INPUT</b>	40 (012)	<b>ON</b>
3 (003)	<b>COLOR</b>	41 (013)	<b>POKE</b>
4 (004)	<b>LIST</b>	42 (014)	<b>PRINT</b>
5 (005)	<b>ENTER</b>	43 (015)	<b>RAD</b>
6 (006)	<b>LET</b>	44 (016)	<b>READ</b>
7 (007)	<b>IF</b>	45 (017)	<b>RESTORE</b>
8 (008)	<b>FOR</b>	46 (018)	<b>RETURN</b>
9 (009)	<b>NEXT</b>	47 (019)	<b>RUN</b>
10 (010)	<b>GOTO</b>	48 (020)	<b>STOP</b>
11 (011)	<b>DO TO</b> (same as <b>GOTO</b> )	49 (021)	<b>POP</b>
12 (012)	<b>DO UNTIL</b>	50 (022)	<b>? (same as PRINT)</b>
13 (013)	<b>TRAP</b>	51 (023)	<b>GET</b>
14 (014)	<b>END</b>	52 (024)	<b>PUT</b>
15 (015)	<b>CONT</b>	53 (025)	<b>GRAPHICS</b>
16 (016)	<b>COM</b> (same as <b>DIM</b> )	54 (026)	<b>PLOT</b>
17 (017)	<b>CLOSE</b>	55 (027)	<b>POSITION</b>
18 (018)	<b>CLR</b>	56 (028)	<b>DCG</b>
19 (019)	<b>DEC</b>	57 (029)	<b>DRAWTO</b>
20 (020)	<b>DIM</b>	58 (030)	<b>SETCOLOR</b>
21 (021)	<b>END</b>	59 (031)	<b>LOCATE</b>
22 (022)	<b>NEW</b>	60 (032)	<b>SOUND</b>
23 (023)	<b>OPEN</b>	61 (033)	<b>UPUNT</b>
24 (024)	<b>LOAD</b>	62 (034)	<b>SAVE</b>
25 (025)	<b>SAVE</b>	63 (035)	<b>CLOAD</b>
26 (026)	<b>STATUS</b>	64 (036)	(implied LET)
27 (027)	<b>NOTE</b>	65 (037)	<b>ERROR</b> (followed by the <b>ASCII</b> text and a Carriage Return)

Figure 3: Reserved tokens used by Atari Basic (always the first token of a statement)

Token	Meaning	Token	Meaning
9-12	Unused	36 (024)	*
14 (002)	Remark constant	37 (025)	+
	Insert six bytes hold	38 (026)	-
	It's BCD value	39 (027)	/
15 (007)	String constant Insert	40 (028)	NOT
	byte is length, then	41 (029)	OR
	string contents	42 (030)	AND
16 (010)	"	43 (031)	( write arithmetic expression)
17 (011)	Iduring for Start	44 (032)	(
	of Expression)	45 (033)	=
18 (012)	(parameter separator)	46 (034)	=
19 (013)	\$	47 (035)	:=
20 (014)	(end of statement)	48 (036)	<
21 (015)		49 (037)	<=
22 (016)	Carriage Return)	50 (038)	<=
23 (017)	GOTO	51 (039)	<=
24 (018)	GOSUB	52 (040)	<=
25 (019)	TO	53 (041)	+
26 (020)	STEP	54 (042)	( unary plus)
27 (021)	THEN	55 (043)	( unary minus)
28 (022)	#	56 (044)	( for subscript)
29 (023)	<	57 (045)	( for array)
30 (024)	<=	58 (046)	( in GOTO statement)
31 (025)	<=	59 (047)	( for function call,
32 (026)	<=	60 (048)	eg: in "CHRS")
33 (027)	<=		
34 (028)	<=		
35 (029)	<=		
36 (030)	<=		

Token	Function
61 (030)	STRB
62 (031)	CHRB
63 (032)	USR
64 (033)	ASC
65 (034)	VAL
66 (035)	LEN
67 (036)	ADR
68 (037)	ATN
69 (038)	COS
70 (039)	SIN
71 (040)	EXP
72 (041)	EXP
73 (042)	EXP
74 (043)	EXP
75 (044)	EXP
76 (045)	EXP
77 (046)	EXP
78 (047)	EXP
79 (048)	EXP
80 (049)	EXP
81 (050)	EXP
82 (051)	EXP
83 (052)	EXP
84 (053)	EXP
85 (054)	EXP
86-127	Unused
128-255	Reserved for variables

Figure 10: Operator tokens used by Alan Bates

Figure 11: Function tokens used by Alan Bates

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# Give us the tools and...

Atari XL computers are arguably the best 8 bit home micros available and are certainly the best value for money. Even the XL range is inferior to the XL in some ways - just ask a machine code programmer.

It is amazing that the internal design of the XL has remained virtually unchanged since 1979, when the first Atari 400 was introduced. Unfortunately, some areas of its performance do tend to betray its ancient origins. For example, Atari Basic is notably lacking when compared to other versions of the language used by other computers.

Being an inventive lot, Atari enthusiasts frequently write utility programs to make up for Basic's deficiencies, and lots have been published in *Atari User*. The snag is that although such additively fulfill a requirement, it normally has to be loaded into memory as it is required. This means that it can take programmers a relatively long time to perform straightforward tasks.

The problem is not that Atari Basic is a bad language - it is more a case of it being incomplete. Even essential program development commands like line renumbering and deletion are conspicuous by their absence. Thus, you can go out and buy alternative versions of Basic but they cost nearly as much as the computer itself, and you run the risk of your programs being incompatible with standard machines.

What we need is an extended Atari Basic which is compatible with the standard one, but with additional program development functions. We want the functions to execute quickly, with the minimum of typing and without having to renumber complicated commands. We also have to retain as much memory as possible because a large Basic language is not much use if there is not enough memory left for a program.

## MICK RANDLE gives full details of the Atari User Programmer's Toolkit



THE Atari User Toolkit offers 10 additional Basic commands and is totally compatible with standard Atari Basic. It consumes only 128 bytes of user memory and it even leaves Page 0 - memory addresses 1638 to 1791 - free.

All the Toolkit commands are useful and are easy to remember and use and several, like line renumbering, can be found in other computers as built-in utilities. But some of the new commands are exclusive to the Atari community.

Toolkit loads into memory via an octabyte file on tape or disc. When it has loaded you can begin your programming session and forget about it until you need it. As previously mentioned, the total cost in terms of user memory is only 128 bytes. This is achieved by placing the main code in the unused ram beneath the Basic ram chip, and switching between the two banks as required.

The code which handles this switching is 128 bytes long and resides in low memory. Figure 1 explains the computer's memory allocation. Notice that we have effectively squeezed 19k of code into the 8k area from \$A000 to \$BFFF.

The Toolkit commands are called from Basic's direct command mode - they execute when you type them rather than during program execution.

### Renumbering

You may remember your program lines from base line 10, in line incre-

ments of 10, by typing REN. All line references, such as GOTO 100, are automatically altered to reference the new line number. You can vary the base line and the line increment by entering them after the command, separated by a comma.

Toolkit checks to see if your new line numbers are acceptable before altering your program, so there is no chance of ruining your work. Variable line references, such as GOTO LINE, cannot be renumbered because Toolkit cannot determine how a variable may change.

Similarly, references to non-existent lines cannot be renumbered because they are programming errors. Toolkit continues to renumber the program, displaying alert messages where appropriate.

As an aid to legibility, all renumbered line references are set to 99999 so that you can easily identify the offending statement.

### Deleting lines

The line deletion command is an important and long overdue addition to Atari Basic. Just type the DEL command followed by two line numbers separated by commas, and all lines within the specified range will be removed from your program.

The first line number should obviously be lower than the second one, but again if you make a typing error Toolkit will tell you rather than ruin your program. Make sure that the

remainder of your program makes no reference to the missing lines, so no checking is performed by Toolkit.

A good way to find such references is to remember the program with the **REM** command, which will expose any references to the now non-existent lines.

## Strip utility

The **STRIP** command is a sort of selective line deletion utility. It deletes all **REM** statements from the program whether they are short **REM**s at the end of multiple-statement lines, or full-line **REM**s.

Their removal makes a routine more difficult to understand, but on the other hand it reduces the size of the program and increases its speed of execution. It has always been good programming practice never to **GOTO** a **REM** line, although many programmers do it. Test for such references by using the **REM** command as above.

## Changing variables

Sooner or later every programmer reaches the stage where a variable name is no longer appropriate to its function.

Suppose you are using *X* to represent the number of remaining lives in a game program. As the program grows you decide that **LIVES** would have been a more descriptive name, but you leave it as *X* because you don't feel like altering all occurrences of the variable.

The **CHANGE** command allows you to change the *X* to **LIVES** simply and quickly, and all occurrences of the variable will be altered automatically.

Full checking is performed by Toolkit to prevent you from making a mess of your program by duplicating an existing name, or changing the variable to a different type such as converting a string variable to an array.

## Listing variables

You may find that you receive a duplicate name error when using the **CHANGE** command, and you are not sure exactly what variables you are using. Find out by using **VAR**, which not only lists each variable in memory, but also displays every line number it appears in.

Unused variables are indicated and are wasteful of memory, so rather than invent a new one you could change the name of a redundant variable with the **CHANGE** command.

## Removing click

Every time you press a key you will hear the familiar click through the monitor loudspeaker, which can drive many programmers to distraction. A poke can switch it off, but I don't know anyone who can remember either the memory address or the number to **POKE** in it.

The **CLICK** command saves you the trouble. The funny thing is that many people actually miss the sound when it has gone, so if you find you want it back just type **CLICK** again.

## Perfect Listing

A major bugbear for Atari users is the fact that the computer is capable of displaying more characters than a printer is capable of printing. The printer interprets many characters as print control codes in a similar way that the computer interprets the **Control+Clear** combination as a screen control code.

It is no coincidence that the **Control+Shift** key is serialised. That is why you sometimes find that when listing a program with the command **LIST "B"**, a machine code listing may make your printer perform a dozen line feeds and print the rest of your listing in Greek.

Toolkit's **LISTING** command gives you a full printed listing without any of the above problems on any Epson or Epson-compatible printer with bit-image graphics capability.

## Changing bases

Intermediate to advanced programmers often need to convert a

decimal number to its hexadecimal or binary equivalent. This usually means a frenzied search for the calculator or a book containing conversion tables.

Not any more. Just type **VAL** and the decimal number for an immediate

Form to Page 24 in

Operating system rom
- (\$C000 to \$FFFF)
BI Basic rom and BI Toolkit rom
(\$4000 to \$BFFF)
Screen memory
(Size varies with graphics model)
Free memory for programs
(Size varied)
128-byte Toolkit handler
(Address varies with system)
Operating system and basic ram
(Size varied)

Figure 1: How the Atari allocates memory

Command	Example	Purpose
<b>CHANGE</b> address	<b>CHANGE X,LIVES</b>	Change variable name
<b>CLICK</b>	<b>CLICK</b>	Toggle key-click
<b>DEL</b> list1,list2	<b>DEL 100,200</b>	Delete line range
<b>DIR</b> drive	<b>DIR 2</b> or <b>DIR B</b>	Dir. directory P.u.
<b>GRT</b>	<b>GRT</b>	View GRT listing
<b>LISTING</b> start,end	<b>LISTING</b> or <b>LISTING 10,100</b>	Full Atari listing
<b>VAR</b>	<b>VAR</b>	Variable X-reference
<b>REN</b> start,end	<b>REN</b> or <b>REN 1,1</b>	Renumber program
<b>STRIP</b>	<b>STRIP</b>	Remove REM statements
<b>VAL</b> number	<b>VAL 2</b> or <b>VAL 255</b>	Number conversion

Figure 2: The Toolkit's to new Basic commands



If you have a lot of discs full of programs you've written yourself or typed in from Atari User you may have noticed one of the less satisfying features of the disc directory — it's very messy.

If you've got a packed disc, finding out if a particular file is on it would involve looking carefully through the entire directory. But, wouldn't it be a lot easier if the directory was in alphabetical order?

This would mean that if you had a number of files concerned with one program, all of which had the same filename but a different extension, they would now appear together on the disc directory. It's not really a vital facility, but it makes it a lot easier to keep track of where files are. And DirSort is just the program to do it.

It will work on Dos 2.0 or Dos 2.5 discs in single or enhanced density. Although it ignores deleted and unlisted files, it may under unusual circumstances crash if a file has become corrupted. This has never happened to me yet, but if you suspect a file to be faulty, use the Verify Disk option in the DISKFIX.COM utility supplied with Dos 2.5 to make sure the disc is safe.

If you don't have access to Dos 2.5 and are still using Dos 2.0, make a backup of your disc just in case a bad file causes DirSort to corrupt the disc

further. Corruption is very unlikely but it's better to be safe than sorry.

Also since a disc has been sorted, deleted files cannot be unlisted using DISKFIX.COM, even if the disc has not been written to since the file was deleted. So make sure you won't be wanting to recover any deleted files before you sort the disc.

Don't try to sort commercial discs, even if they seem to have normal directories. Some discs store program data in the directory sectors and sorting this would be fatal.

If you've got an assembler type in Program 1 and then type:

**ASM, F D DIRSORT.BIN**

to produce a binary file on your disc. I used MAC68 to assemble the code

but it should be easy to modify it so that it will assemble on the Atari Assembler Editor cartridge.

Those who don't have an assembler should type in Program 1. Remember to use Get it Right! to check it and save a copy to disc before running it. When you are sure everything is OK, Run it and it will produce a binary file which can be executed from Dos.

If you think the principals of disc storage interesting and want to find out more about it, Atari's Technical Reference Notes and Computer's Mapping The Atari both contain a lot of useful information. Compute also publish a book by Bill Wilkinson called Inside Atari Dos.

Turn to Page 17

### How Dos stores files on disc

To understand how you go about sorting the directory it's useful to understand just how Dos 2.0 and Dos 2.5 store files on disc.

When you save a file, the file management system — FMS — stores information about it in the directory. This is stored in sectors 381-386 on your disc and each of these eight sectors holds the directory information for eight files, giving a maximum of 64 files.

Each record is 16 bytes long and consists of a flag byte which indicates the file status — locked, deleted or unused. Two bytes each are used for the number of sectors in the file and where on the disc the file begins, with another 21 bytes for the filename and extension.

So sorting the directory involves reading the directory sectors into memory, sorting them into order and writing them on to the disc again. I've used a simple insertion sort algorithm which involves searching through the directory and finding the record which

should be last in the directory.

This record is then swapped with the last record and the process is repeated, only this time we decrease the number of records to sort by one, ignoring the last record.

Eventually we reach the situation where the number of records to sort is one, which means we have finished. This isn't a particularly fast or clever algorithm but it is easy to implement and since we are working in machine code it is still pretty fast.

While that may seem on the face of it to be all there is to sorting the directory, in reality things are a little more complex. This is because of the way in which Dos stores the files themselves.

Each sector of a file consists of 128 data bytes, a pointer to the next sector in the file, a count of the number of bytes used in the sector and a note of the file number. The file number is used to verify file integrity.

So all the sectors of the first file in the directory have zero as their file number and so on — remember that

machine code programmers count from zero, not one. If the file number in the sector and its place in the directory are different, the FMS reports an error.

However, since we have re-ordered the directory, the file numbers no longer match those in the directory, which makes it necessary to alter all the file numbers in each file.

We do this by first of all finding where the file starts from the information in the directory record. Using the pointers to the next sector in each sector of the file, we have to thread our way through each file on the disc, changing the numbers to their new values as we go. This takes rather a long time as we have to read every sector on the disc that contains program data and then write it out again.

That's a rough outline of the program. We read the directory in, sort it, write it out again and then thread our way through each file, our way through each file, changing its number. The first three stages only take a few seconds but the last can take upwards of 10 minutes on a really full disc.

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## HINTS AND ALGORITHMS

In our March issue we set out a programming challenge to test a roulette gambling method. The strategy was always to bet on the red numbers and if you lost, to double the bet until you won.

This month we present you with a plain English description of how to translate the betting strategy into a program. You can refer to the March issue to compare the techniques here with the original problem.

In the next edition of Atari User we will give you a no-frills program that will do the job, along with suggestions for further improvement. You can check this against your own efforts and perhaps sort out any points you had difficulty with.

Remember, as far as a program is concerned there are as many right answers as there are wrong ones, but the solutions I favour are simple and reliable.

I will avoid, as much as possible, using fancy tricks or so-called clever programming techniques, as most of the time they are not necessary.

So, without further ado, I present the hints for the casino problem...

THERE are many ways of writing a program. One method is called top down programming, where you plan the subelement level of your code first and work down, subdividing the problem until you reach the nitty-gritty.

I prefer to write the main routine first and build the rest of the program around it. This is usually known as bottom up programming although I call it middle out, as the first routine you write ends up in the middle of the code and you put all the fancy extras around it. Let's see how we can program this problem using the bottom up method.

There are 37 positions on the roulette wheel, ranging from 0 to 36, so the first thing we have to do is to produce a number in that range. In general, the standard number function `INT(RND*(N+1))` will generate a number between 0 and N. So to get our roulette value we use the expression `INT(RND*37)`.

Having spun the wheel we need to see if the number generated is a red number, in other words have we won? The red numbers are:

```
0,4,11,16,17,
11,8,10,13,18,
11,11,15,20,25,26
```



## It's a challenge!

**Mike Cook helps you pick up the gauntlet to solve quite a devious programming problem**

We could test these against our random value from each spin with a separate `IF` statement but this would take 10 lines.

```
IF RND<15/37 THEN
IF RND<10/37 THEN
IF RND<10/37 THEN
```

There is a rule in computing that when you find yourself writing nearly identical lines of code, there is an easier way to do it.

In this case the answer is to use an array to hold the red number data, so that we need only have one `IF` statement inside a loop.

Before we enter the loop we must set a variable - `WIN` would be a good name. Then if one of our array values matches the spin we change its value to something else.

However, we need to initialise the array at the start of the program by reading the red numbers from a data statement.

Having found out whether we have won, appropriate action can be taken -

either add twice the bet money to our pot if we have won, or double the bet if we have not. At this point we need to test if we have the amount to cover the bet in our pot - if not we are broke and the run ends. Otherwise we subtract our bet from the pot and try again.

We should also keep track of how many bets we have placed. That should be easy, simply increment a counter every time - and look for some criteria for when to stop, other than losing all our money.

For example, we could stop when we have doubled our initial pot, or when a certain number of bets have been laid. It would also be useful to keep track of the largest bet we have had to place.

Finally to stop the program looking boring when it's running, after each bet let's print its value and what's in the pot as well as the bet number every spin of the wheel.

Well, what are you waiting for? Get rapping away at that micro and I'll see you next month with a solution.

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# NEWS...NI

## More power, speed for MicroLink

MAJOR improvements to MicroLink have been announced, following the successful outcome of prolonged negotiations with Telecom Gold.

The enhancements are based on speeding up connect time on the system, with the aim of bringing down the cost to subscribers.

"With the vast increase in sales traffic in particular over

### Costs will be cut

the last few months, one of our top priorities has been to simplify the sending of messages", said the head of MicroLink, Derek Maslin.

"Our programmers have achieved a significant breakthrough which we are now

implementing. We are also completing the switch to our new Prime 9950 computer which provides more than four times more power than has been available to MicroLink subscribers to date.

"The other big development is the opening of 3600 baud access to the MicroLink computer - doubling the speed at which users can transmit and receive data".

## Now disabled study at home

PHYSICALLY disabled people in London are being helped toward employment with the aid of MicroLink.

Over the next three years 60 homebased residents of the Borough of Greenwich

will be given the chance to study computing and information technology in their own homes.

Aim of the scheme, funded by the Urban Aid Programme and Greenwich Council, is to

enable trainees to eventually either gain employment as sub-contractors for businesses or to become self-employed in computer-related activities such as programming, word processing or desktop publishing.

Each trainee is being provided with a computer, modem and printer. A tutor will regularly visit each trainee to sort out any problems and to check on their progress.

"But there will also be a constant 24 hours a day computer link to the base at Greenwich ITeC through MicroLink", said tutor Marion Robinson.

"The first 20 students start this year and should be fully trained after twelve months."

"During the year we hope employers will be found who are willing to provide work experience for the trainees".

## Wanted - a disaster

If anyone out there has recently found disaster turning into a crisis, there could be a silver lining to their troubles.

A company on MicroLink specialising in providing locations for films and still photography is asking other users to help.

"We've got a stinker of a job", says spokesman Neil Gathorne.

"Our brief is to find a location for a photo to illustrate an advert for a smoke detector."

"We need a recently burnt-out detached house whose roof timbers are charred and standing out against the sky - we're so desperate, any part of the country would do."

"We're offering a small reward to any MicroLink user who finds the building we eventually use".

## Laying it on the line

WHISPER is it Mary Whitehouse is about, but MicroLink subscriber Keith Channing is looking for people who like to take their clothes off.

Not that there's anything naughty going on. Keith is membership secretary of CORAL - standing for Clothes Optional Recreation and Leisure - which is a beach, camping, and general outdoor naturalist group.

At present he is trying to bring together all those MicroLink subscribers who are naturalists so that they can chat about their pastime via electronic mail.

## DIAL FOR A DEMO

COMPUTER users who haven't yet seen the massive range of facilities MicroLink has to offer can now logon directly for a free interactive demonstration - and all from the comfort of their own home or office.

All they need is a 1200/2400 baud modem and telephone connection to 01-583 1275.

Once online, at the >PAD prompt simply key CALL 72 then Return. When asked to sign on, key ID MAQ111 then

Return. The password DATA-BASE, followed by Return, will bring up the menu.

There are four sections to browse through - communication, information, services and leisure - each describing a different aspect of the system.

"This free demo vividly illustrates that MicroLink has lots to offer everybody from hobbyists to business executives", said head of MicroLink, Derek Maslin.

It is immensely pleasing, though as we adventurers would stoutly maintain, unsurprising and only natural, to see that adventures are still very much up there with the other types of entertainment software when it comes to the inevitable round of sales award ceremonies.

One of the accolades recently dished out at such a prestigious software industry awards binge was for the adventure of the year.

If you take a quick peep back at the January issue of *Ami User*, you'll see that my vote for the best adventure went to Infocom's *Swordfall*, which marked the welcome return of Floyd the mischievous, scatterbrained, but ultimately lovable characterbox of a robot.

To my mind, *Swordfall* has one of the most engaging and teasing plots, with superb writing, imaginative puzzles and, without a shadow of a doubt, the most dramatic ending ever written for a computer adventure game. And, the piece de resistance, *Swordfall* has *Plotit*.

Now I don't like to boast about my undoubtedly fine judgement, but the aforementioned prize for best adventure of the year was awarded - you've guessed, of course - to none other than *Swordfall*.

Runner-up was Rainbird's *Guild of Thieves* which, if you look once more at my list in the January issue, was also my second-placed favourite.

So there you are. Any unbiased observer simply has to be forced to the conclusion that either the judge first read Rouloc's column and decided that his impeccable assessment was good enough for them and

# In the best possible taste

just followed his lead, or that they all have the same unquestionably excellent taste as myself. Well, that's my opinion and I'm sticking to it!

Looking back just once more - promise - to my list of best adventures you'll notice that in third place is the very funny and innovative Hitch-Hiker's Guide to the Galaxy. This leads me neatly, and quite coincidentally, to my next piece of news.

Although it's not just about adventures, I simply must tell you about a smashing paperback that my good friend Brilling - of *ST User* fame - has just kindly loaned me. Oh you know, once I picked up this book with my hot little hands, I just couldn't put it down until I had read every one of its 162 highly entertaining pages.

The paperback has the words *Don't Panic* written in large friendly letters on the front cover and is called *The Official Hitch-Hiker's Guide to the Galaxy Companion*. It has been written by Neil Gaiman, is published by Time Books of 66 St Giles High Street, London WC2N 6LH and costs a merely £3.95.

The DRINKING - I can't hope that title cut again in full or I'll be here all day and there are still plenty of toffs to be browbeat before bedtime - charts the complete history of the famous series and includes many extracts not previously published, mainly because they were cut from final versions.

Everything you ever wanted to

know about *The Guide*, the making of the different series - radio, book, TV and so on - the characters and the life and times of the original author, Douglas Adams, is here. And there's a whole chapter on the famous computer game, hence it's relevance to this column.

Neil Gaiman has written the whole thing in a witty and light-hearted style that blends perfectly with the material itself. There are bags of quotes, interviews, anecdotes and insights. It really makes you want to go back to

Turn to Page 28 ▶

## WENDY'S RAVES

Here's a list of Wendy Adams's favourite adventures. Although it doesn't quite match mine - but who's to quibble - it does reflect the point that everyone has different tastes. Thanks Wendy.

1. *Swordfall* (Infocom)
2. *Hitch Hiker's Guide to the Galaxy* (Infocom)
3. *The Pawn* (Rainbird)
4. *Jewels of Darkness* (Rainbird/Level 9)
5. *The Dark Crystal* (Sierra On-Line)
6. *The Guild of Thieves* (Rainbird)
7. *Spellweaver* (Infocom)
8. *Ballyhoo* (Infocom)
9. *Grime Ranger* (Rainbird)
10. *Mordori's Quest* (Melbourne House)
11. *Suspect* (Infocom)
12. *The Hulk* (Scott Adams)

by  
Rouloc



1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26



# More for your dollar

**ANDRÉ WILLEY** takes a look at some US products to supercharge your Atari



The SpartaDOS range

COMPANIES in the USA have been producing 8 bit Atari products for many years, but their products always had the disadvantage of being rather expensive in this country. UK dealers had to order their stock directly from US wholesalers, giving rise to some pretty hefty shipping and customs charges.

Recently, however, one or two UK Atari distributors have struck deals to supply US products at very reasonable prices. There are still only a few available and in future issues of *Atari User* we'll take a look at some of them, but for the moment let's consider the SpartaDOS range of products by ICD, now released by Frontier Software.

SpartaDOS is probably the most sophisticated disc operating system for the 8 bit, and knocks spots off Dos 2.5 and the happily now extinct Dos 2.

It supports multiple sub-directories (known as folders on the ST), full time date stamping of files, full random access to any byte within a file, batch command files, hard disc access, and a whole host of more specialist features.

It also keeps most of its code locked away under the operating system so you get more free memory for your programs. Even with the most powerful configuration (version 3.2) you will still have 32,801 free bytes available to Basic, and the smaller versions can leave as much as 38,176 available. These figures should be set against 32,774 with Dos 2.5 and 32,800 with no Dos at all.

If you also use ICD's R-Time 8 battery backed-up clock cartridge the current time and date will always be available, and they will be stamped on each new file created. The clock module plugs into the standard cartridge port and has a replacement socket on the top for another cartridge.

I have tried it with every cartridge I've got - Action!, MacPac, Basic/XX, AtariWriter and so on - and it seems completely transparent to everything. There is even a 2: driver which allows you to access the disk directly from Basic.

However, where SpartaDOS really

Operation	Dos 2.5	SpartaDOS	SpartaDOS + US Doubler
Format only (Single)	24.0	32.9	23.9
Format only (Double)	28.6	-	23.9
Format + write Dos (Single)	39.0	32.5	33.9
Format + write Dos (Double)	48.0	-	33.9
OPEN, write 10,000 bytes, CLOS (Single)	12.8	11.8	6.3
OPEN, write 10,000 bytes, CLOS (Double)	16.3	-	7.9
OPEN, read 10,000 bytes, CLOS (Single)	10.7	10.4	4.4
OPEN, read 10,000 bytes, CLOS (Double)	18.2	-	3.8

Dos 2.5 Double density figures refer to enhanced density mode. Your double density is only available with a US Doubler

Figure 1: 1988 Speed comparison table (in seconds)

comes into its own is in conjunction with another ICD product – the US Doubler. This comes in the form of two new plug-in ICs for your 1050 drive which not only give it the ability to work in true double density but also speeds up the data transfer rate considerably.

The installation instructions are clear and concise, but you will need to take your 1050 apart to get at the motherboard. Although there is no reason why a complete novice shouldn't be able to fit the chips – it's not a difficult task – some cautions should be exercised since opening up the casing invalidates your guarantee.

Once you've got into the drive – and some are so well constructed you'll virtually need a coin opener – you must remove the two existing ICs from their sockets and install the ICD replacements.

Some older 1050 drives were fitted with slightly different chips – and if you have the wrong type you have the option of chiselling out and sending off for the matching US Doubler ICs, or of making a very simple adjustment to two jumper leads on the board. This second option does require the use of a soldering iron, so think carefully if you do happen to find yourself in this situation.

Once installed, and it is only the work of half an hour once you've read the instructions, your drive is supercharged. Upon booting your SpartaDos master disc the old buzz, beep, beep sound is replaced by a staccato burst of machine-gun fire.

Reading data from the disc is roughly four times faster than with a standard 1050, but after allowing for seek time – the time taken to move the head around the disc – the average speed increase is nearer three times. The increase in speed of writing is slightly less at roughly twice as fast – see Figure 1 for full benchmark timings.

The other major feature of the US Doubler is to give access to true double density, giving 1804 per disc as opposed to 904 in single or 1304 in enhanced density.

Doubler density actually uses 720 sectors per disc, as with single density, but each sector contains 256 bytes of data rather than 128. This does mean that you'll have to remember to format and write in standard mode if you want to give a disc to someone without a US Doubler, but this is very simple since SpartaDos is intelligent enough to detect what type of disc it is using.

SpartaDos has so many features that it's impossible to describe them all in full, but Figure 2 will give you some idea of its amazing power and

Disc 3.5	SpartaDos	Function
A	DIRS	Disc directory, any drive (Disc 2.0 format)
B	CAR	Go to cartridge (if present)
C	COPYCOPY	Copy files (multiple drives)
D	ERASE	Delete files (multiple drives)
E	RENAME	Rename files on disc
F	PROTECT	Protect files from accidental erasure
G	UNPROTECT	Remove erasure protection from files
H	WR	Write Dos files (formatted during format by XMIT)
I	XMIT	Format disc (see also ANMT)
J	DUPDISK	Duplicate whole disc
K	SAVE	Save binary file (see also APPEND)
L	LOAD	Load binary file (see also OFF_LOAD)
M	RUN	Run machine code at given address
N	NO	Create MEM.SAV (SpartaDos is shipped in memory)
O	ACOPY	Copy files (single drive) (see also SPLCOPY)
P	ANMT	Format Single Density Disc 2.0 mode
	APPEND	Save binary file at end of existing file
	AUTODAT	Select batch file to run when Reset is pressed
	BASIC	Turn internal Basic on or off
	ONOFF	Set filename to load when no Dos present on disc
	BOOT	Modify hard disc drive access number
	BYPASS	Give current disc statistics
	CHKDISK	Change timestamp stamp on file(s)
	CMTS	Change volume name of disc
	CHVOL	Make new sub-directory
	CREDR	Change default path details for current drive
	CWD	Set system date
	DATE	Delete sub-directory (must be empty)
	DELDIR	Show path to specified sub-directory
	DIR	Disc directory (Extended format: timestamp/bytes)
	DUMP	Print file as ASCII + hex digits to screen
	KEY ONOFF	Time-ahead buffer on or off
	LOCK/UNLOCK	Protect whole disc from write operations
	MDUMP	As for DUMP, but to print memory contents
	MMEM	Show current Dos parameters/values
	MMEM	Load menu system (may be set as default)
	OFF_LOAD	Binary load file, with offset
	PAUSE	Wait for a key to be pressed (in batch files)
	PORT	Change the RS-232 configuration
	PRINT	Ring screen output to another device like P or C
	PUTTRM	Add run address to binary file
	RD	Set up remotes (many configurations available)
	RPM	Test disc drive rotation speed
	RS232	Load RS-232 driver for 850 module/P-R connection
	TIME	Set system time
	TDUNE	Load timestamp header line routine
	TD ONOFF	Turn timestamp line on or off (requires TDUNE)
	TREE	Show all sub-directories (alphabetical)
	TYPE	Show Ascii file contents on screen
	VERIFY	
	ONOFF	Turn disc write verify on or off
	XDV	Turn off IO collection (usable PRINTbatch mode)
	CHAND	Activate 2: for timestamp handling from Basic
	-filename	Execute batch command file (interpreter = BAT)
	-filename	Execute machine code file (interpreter = COM)
	On	Select new default drive number, n

Figure 2: Dos 2.0 and SpartaDos features comparison

flexibility when compared with Dos 2.0.

I particularly liked the timestamp stamping of files and the excellent sub-directory facilities – and also their ease of use from Basic and other languages. I prefer to use command

processors rather than menu systems for ease of use, but that said, a very comprehensive menu system is available for beginners.

Whichever of the many configura-

## 4 From Page 28

items you decide to use, the manual provides clear instructions for every feature, even down to such things as file formats and fully documented machine code access.

SpartaDoc can also read, write and format Dos 3.2 discs automatically, so you need never worry about which type you currently have in the drive. It can even handle a hard disc if you

happen to have one.

I've come across a couple of minor quirks, but nothing too serious. One thing I did find was that files opened for access in update mode will be extended in size if you try to read a byte beyond the current end-of-file marker.

This is acceptable when writing additional data, but when reading I feel you should receive an error message. For example, if you have a disc

file containing a single line of text and you try to read in two lines while in update mode, the file will quickly be extended to fill all available space on the disc.

The moral is never read beyond the end of a file in update mode.

I would thoroughly recommend both SpartaDoc and the US Doubler, and at £49.95 they're a give-away compared to the import prices - you'd have paid £79.95 for the US Doubler alone.

The R-Time II is also quite useful, but by no means essential unless you are using a mass storage device such as a hard disc - after all you can always use the TIME and DATE commands at the start of a session. Otherwise it's still a little pricey at £49.95.

However, if you are still using an unmodified 1050 with Dos 2.0, now is the time to move up to the power and flexibility of SpartaDoc.



US-DOS with R-Time II and cartridge fitted

Product: SpartaDoc	£29.95
US-Doubler	£29.95
SpartaDoc 4 US-Doubler	£49.95
R-Time II cartridge	£49.95
Supplier: Hammer Software, PO Box 113, Harrogate, North Yorkshire, YO2 0BE.	
Telephone: (0423) 67140	

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Atari Data Bank	£19.95	£29.95	£10	£12.95

**Turn to page 61 to take advantage of this superb offer**

# Software

## SCENE

### On-the-ball management simulation

**Product:** League Challenge  
**Price:** £15.99  
**Supplier:** Atlantic, 28 Station  
 Road, London SE20 5AG  
 Tel: 01-771 8802

This is a game of management that allows you as a footballer while to take the hot seat and grow your worth by taking charge of a league team.

You have the chance of aiming for Division One, and maybe even completing the double by being voted Manager of the Year.

League Challenge is loaded in two parts - the main program followed by a short amount of data. Once loaded you are asked to sign on the dotted line and select your team. There are 66 names available to choose from or you can use your own 14 character name.

The screen displays are mainly text but there are some graphics during matches.

You view the actual game with the mid-week options - looking over your playing staff as well as your club's statistics. You can load and save data here to allow you that mid-season break to relax.

The save option only saves the necessary data, so the main program has to be loaded first.

Mid-week decisions lead you into the preparation for your first league match. Your earlier training choice may well determine your fate on Saturday. Do you choose an easy session or do you put your players through their paces? It's up to you, but the cost

of training increases with your level of choice.

Now it's on to team selection time. The ratings for defence, midfield and attack are shown along with both teams' fitness rating allowing comparisons to be made.

Individual players have both a skill and a fitness level which vary from one to nine. The former remains the same throughout the season but, fitness will fluctuate depending on whether a player is resting or playing.

You can change your team's formation, by selecting and removing players to field a combination which best matches your opponents.

League Challenge then switches to a very basic graphics mode which is, however, sufficient for playability. So sit back and watch the action as the goal-mouth highlights are shown.

Once it is all over, the match result is displayed along with any injuries incurred. The results of the other matches in your division are also shown with a full league table.

Your weekly turnover is shown at the end of each match - you can go into debt, but only to the amount of £250,000. Pass this and the club is declared bankrupt and the game starts afresh.

So be careful when you buy players. But make sure you have the money in the bank before writing that cheque because it won't bounce - you will - right back to the start. Players



available for transfer are shown from time to time and as a maximum of 16 players is allowed in a squad at any one time remember to leave a space for that star signing.

There are 16 league matches to be played in a season together with knock-out cup matches.

An important consideration for cup matches is fitness. If a replay is necessary the option for team selection is not available, so it may be advisable to use players with a high fitness rating.

When the season is over you receive a bonus payment which depends on your league position. The top three teams are promoted while the bottom three are relegated.

You keep the same players for the start of the following season, but their skill and fitness levels may change.

As in all it is a good game - not an original theme, but it does have variations on

other similar ones. It's very easy to use and offers entertainment for both novice and expert.

The screens change quickly and only the match highlights are shown, so there's no time for tedious to set in. Sound could have been used to add atmosphere to the match highlights; it would have been nice to hear the roar of the crowd when a goal was scored.

The graphics are a little on the weak side and the game deserved more time and effort being devoted to this area. But overall playability is the most important factor. Everyone likes glossy graphics and sound but if - as in this case - the game is addictive and enjoyable then that's what counts the most.

**Keith Pattison**

Sound	8/10
Graphics	4
Playability	8
Value for money	8
Overall	7

# Software

## SCENE

### Nerve-tingling combat

Product: Computer Ambush  
Price: £75.99  
Supplier: Strategic Simulations, Units  
332 Madderley Way, Moford,  
Birmingham B35 9AX.  
Tel: 021-358 2288

"THUS those unable to understand the dangers inherent in employing troops are equally unable to understand the advantages of doing so."

This is a quote taken from *The Art of War* by Sun Tzu around 500 BC which makes reference to the tactical deployment of troops in a battle.

Computer Ambush from Strategic Simulations - 501 - is a wargame based on this theme and one that superbly captures the nerve-tingling excitement and fear of war.

The game puts you in command of a troop of American 101st in France during World War II pitted against a squad of German soldiers in a small village.

You can choose whether you want a computer or human opponent, and depending on your choice you are offered a list of different scenarios.

You can select from various options such as sound on or off, whether you can see the enemy or not, and

how long each play turn lasts. These will affect the game, so choose wisely.

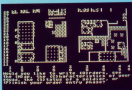
As with all SSI simulations, the game is split into different sequences of play, or phases as they are known - entering commands for the deployment of troops, allowing the computer to resolve the battle situations, receiving reports on the results and save a game.

A map of the village can be displayed at any time but the full map is too large to be shown in its entirety. When this option is chosen you are asked which role of the map you want to appear at the bottom of the screen and only segments are shown.

Because the game is based on the individual actions of all soldiers, each has his own characteristics which affect his actions within a given scenario - very similar to characters created in fantasy role-playing games.

The players' characteristics include rank, name, body weight, physical strength, dexterity and so on.

Each soldier can be given many different orders, entered in an abbreviated form. For example PS means prepare to shoot and H4 is the order to engage in



Your view of the combat

hand-to-hand combat. At any time during the game any soldier's status report can be called giving, for instance, his position or any wounds he has received.

The main command is brought into play by using M followed by parameters that control who goes where, and the distance and manner in which progress is made, for example, crawling or running.

The rules here are quite involved, but are explained in great detail in the manual.

Three types of weapons are available - five types (shot action and automatic rifles), explosives (hand grenades) and hand-to-hand weapons (knives and bayonets). Here again, the rules are involved, but they are well covered in the literature.

One section contains dossiers on the individual soldiers on both sides. I particularly liked this as it made for interesting and amusing reading.

The American soldiers have what can only be called Yankee names such as Sergeant J.G. "Buck" Padocks, Corporal Rodney "Rich-Boy" Richfield and P.F.C. Alejandro "Gunner" Garity.

The same applies for the Germans, with names like

Obergelheiter Erick Braun and Obergelheiter Ludwig "Lover" Schneider. I was left in no doubt who I was fighting.

The packaging is superb. The box contains a rule book, game disc, two mapboards, grease pencils and two squad cards.

This is quite a complicated game to get to grips with but once you have achieved a good working knowledge of the rules the simulation will flow quite smoothly - and you do have the help of quick reference sheets.

The computer interpretation of the mapboard is well done and very easy to follow. And the map you can draw on is an invaluable aid and a very good idea.

I found it very easy to totally immerse myself in this challenge and there was more than one occasion when I was panicking when the Germans had me cornered. Even though it carries quite a hefty price tag - £75.99 - it's well worth every penny.

Neil Fawcett



The opening screen

Documentation	10
Graphics	7
Playability	10
Value for money	10
Overall	10

# Software

## SCENE

### Flight of fantasy

**Program:** Space Shuttle  
**Price:** £2.99  
**Supplier:** Firebird, 44-78  
 New Oxford Street, London WC1A 1PD  
 Tel: 01-279 6002

If the title sounds familiar it's because this is a budget re-release of a 19834 game from Activision. Firebird has snapped up all Activision's old titles, so we can look forward to seeing some old favourites again.

You are in control of the shuttle *Discovery* on its 101st mission and your target is an orbiting satellite 370 nautical miles above the Earth.

Your mission is to launch, rendezvous with the satellite and return safely to Earth as many times as you can using minimum fuel.

There is one snag – every time you dock with the satellite its orbital path becomes more and more erratic. Your success in coping with this aberration is evaluated at the end of your mission.

There are three levels to pursue. The first is *Auto-simulate*, where the shuttle flies practically by itself, and all you have to do is dock with the satellite.

The second is *Simulator*, which is a simulation of the flight controlled by you and the computer. Here you have to use most of the available keyboard commands and life turns out not to be quite the bed of roses you thought.

Really STS 101 is a fully fledged shuttle flight where every key command is available to you, and you have the ability to abort all functions when and where you like.

This level is far fast funster with 10 pairs of hands, qualified NASA astronauts, and Janis! User reviewers or lunatics.

Your flight begins with the

launch. You have to activate the engines and ignite them at the right time or the mission will be aborted.

After a successful lift off you must keep the engines at the right power – the computer displays the exact amount of thrust to use – and follow the digital course readout.

Once in space you have to stabilise orbit by opening the cargo bay doors and adjust your position so you have visual contact with Earth. This is achieved by setting your nose down.

Once a stable orbit is achieved you have to match your speed, relative position – X, Y and Z axes – and successfully rendezvous with the satellite.

All this involves major keyboard use, major joystick use and constant reading of the instructions so that you know what are doing.

Once all this insanity is complete you must turn the shuttle around, fire the engines and decelerate to leave orbit. Don't forget to close the cargo bay doors and set the correct pitch and course for re-entry.

At last, the landing! The pitch must still be at the correct setting and right turns must be made to keep the shuttle on course.

Once sonic booms have

been made by your shuttle and the chase plots, the shuttle becomes a glider. Before you reach the runway you must deploy the landing gear. Once the wheels touch, keep the nose down and slow to a stop. That wasn't too difficult was it?

When landing is complete, the computer displays a numeric value showing what mistakes you made as, if you didn't make any – which seems extremely unlikely – the number of dockings you successfully

accomplished. For a title that was released four years ago, I'd say this has done very well indeed.

On the negative side there are too many commands to handle at once. I know it's supposed to be a shuttle, but this is going a bit too far.

Also the evaluation messages at the end of your mission could have been written on screen rather than you having to resort to the instructions for enlightenment.

Talking of the instructions, the acronyms are a nuisance, as you have to keep looking up what TASM means while burning up in re-entry!

Apart from some bad points *Space Shuttle* performs well. The graphics aren't mind-shattering, and the sound limited to rumbles and bangs, but it is enjoyable and at a very good price.

Robert Swan



Graphics	8
Sound	4
Playability	4
Value for money	7
Overall	6

# Software

## SCENE

### Strictly for aces

**Product:** *Ace of Aces*  
**Price:** £9.99  
**Supplier:** SSG/US Gold (subs)  
 23, Halford Way, Halford,  
 Birmingham B26 3AJ.  
 Tel: 021-358 3388

CHOCOLATE away! Ginger, and it's out into the wide blue yonder blasting the odd German ME109 fighter as we play *Ace of Aces*, the new World War II flight simulator from Accolade – an American company which trades in Britain through USI Gold.

After the initial loading sequence you are presented with a very attractive title screen and the strains of Land of Hope and Glory with machine-gun fire accompaniment.

In the nicely animated briefing room you are faced with the choice of a real mission or a practice flight.

This is indicated by the Group Captain pointing at a board with a stick. Using the joystick you move the stick to your selection and press fire to make your choice.

The practice option offers you daylight, train or U-boat – and I strongly recommend it to enable you to become accustomed to the controls.

Mission offers you the choice of train, U-boat, V-1 bombs or bombers. After

you have chosen you will receive your intelligence report which will give you details of your target, the weather, recommended weapon you will need and your orders.

Once these have been taken in you go on to take a look at a map of England and France which shows your location – mid-Channel – the position of the your target and all major cities.

After this you must load up your Mosquito materials fighter with bombs, rockets, fuel and cannon shells and prepare to take off.

This is indicated by a series of black and white freeze-frame photos of a Mosquito, running, fuel (presumably yours), the propeller whirling away, the chocks being pulled away and then you waving good-bye from the cockpit. This very original idea adds considerably to the atmosphere.

Next comes another boring loading sequence, which when you have a tape version is exceptionally tedious.

Finally, after nearly 25 minutes, you get airborne. The game uses a split screen with the view from the cockpit showing white clouds rolling in the wind at the top.



Your instrument panel is shown at the bottom and indicates airspeed, radar, compass, altitude and artificial horizon. A nice feature is that as you move your joystick, the stick displayed on-screen moves too.

If at any point during the game you double click the fire button the screen will switch between the pilot's, engineer's or bombardier's view of the aircraft. Using the game technique you can also view the map you saw early on.

Unfortunately, this way of selecting views can pose some problems. When in a dog fight with a German plane it is very easy to double click the fire button at the wrong time.

As you look bewildered, at these unwanted views or at the status screen – brought up by pressing the speaker – the Germans can still fire at you and you can do nothing about it.

Also some joysticks have difficulty responding to the double click, so it would have been better if Accolade had the keyboard controlling this function.

I found this a very hard, if not impossible game to play as no indication of your status is available to you without viewing the appropriate screen.

Accolade could have at least displayed a short message when your plane catches fire or your navigator gets killed.

Having said this, the

graphics are excellent. There is a wide variety of styles, from cartoon figures in the briefing room to the still-frame photographs as you prepare to take off.

It's a shame that such a potentially good game has been spoiled by a poor choice of controls.

There is a nice use of sound throughout ranging from Land of Hope and Glory to the Last Post when you die, and the sound of explosions when you take off is nicely implemented.

Overall I found it very frustrating. The loading time from tape is ridiculous – far too long to sustain interest. And when you finally start flying you can't really test very long against an enemy who can fire at you while you can't fire at him.

However, the game shows potential and it is always nice to see American software in Britain. It would be good to have more transatlantic games made available.

As simulators go, *Ace of Aces* is one of the best I have seen and definitely up there with the leaders.

If you have the patience of a saint and a very low blood pressure this is the game for you. All said and done it is well worth the price.

Ruth James



Sound	5
Graphics	4
Playability	4
Value for money	4
Overall	4

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and 1050 drives, 1029 printer, 1970 recorder, 544 disc programs, plus Commodore 1705 monitor and leads, no reasonable offer refused. Tel: Haverly 01 587 7326.

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■ Atari hyperdrive ver 2 disc drive enhancement for 1050. Hardware/software package, enables true double-density, faster read/write, backup up protected software similar to 1050ii. Happy architect computer £90. Tel: 01 588 2817.

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# 5 LINERS



## FONT LOADER from Gary Hudson

THIS short program contains two machine code routines. One loads a font into memory and the other re-installs the character set if you accidentally press Screen Reset.

To use it all you have to do is change FONT.SET in line 20 to the name of the new set you wish to load. The routines contained within this program can easily be removed and used in your own programs.

### PROGRAM BREAKDOWN

- 10 Loading the top of memory and pokes in the machine code
- 20 Opens a channel to the disc file containing the font
- 30 Reads in data from the disc and re-installs Reset protection
- 40 Machine code load routine
- 50 Machine code jumped to when Reset is pressed

### VARIABLES

- MEM Holds the current top of Basic memory
- X, Y Used to poke in the data

```
10 MEM=PEEK(1000)-1:POKE 100, MEM:POKE 1
20 MEM=PEEK(1000), 0:FOR POK TO 65535:G
30 NEXT POK:GOTO 1
40 OPEN "FONT.DAT" FOR INPUT #1:IF PEEK(100)
50 THEN POKE 100, 1:PEEK(1000)=POKE 100,
PEEK(100)
60 GOTO 10000:CLOSE #1:POKE 1, PEEK(100)
70 POKE 1, PEEK(1000):GOTO 11:GOTO 10
80 POKE 100, 100, 100, 100, 100, 100, 100,
100, 100, 100, 100, 100, 100, 100, 100,
100, 100, 100, 100, 100, 100, 100, 100,
100, 100, 100, 100, 100, 100, 100, 100
```



```
10 GOTO 100
20 GOTO 100
30 GOTO 100
40 GOTO 100
50 GOTO 100
```

## LEGGIT from Eric Liddell

THERE you are, sat waiting and having a lovely time when suddenly you hear a tremendous bang. When you look up you see a nearby volcano starting to erupt.

Huge pieces of rock and ash are flung into the air and you must dodge them in an attempt to get to the safety of a nearby cave represented by a green square at the bottom-right corner of the screen.

This is a simple but very addictive joystick controlled game. The positions of the falling rocks are totally random, and if one lands on you it will give you quite a headache. If you don't

make it to the cave, simply press a key for another game.

### VARIABLES

- X, Y Horizontal and vertical position of the player
- DX, DY Horizontal and vertical direction of player
- A, B Random positions of the falling rocks

```
10 RANDOMIZE TIMER:GOTO 1:POKE 0, 0:RANDOM
20, 0:RANDOM:PO, 0:RANDOM:G, 0, 0:RANDOM:G
30:PEEK(100)=PEEK(1000):GOTO 17:GOTO
40:RANDOM:RANDOM:POKE 100, PEEK(1000):GOTO
50:RANDOM:RANDOM:POKE 100, PEEK(1000):GOTO
60:RANDOM:RANDOM:POKE 100, PEEK(1000):GOTO
70:RANDOM:RANDOM:POKE 100, PEEK(1000):GOTO
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```



```
10 GOTO 100
20 GOTO 100
30 GOTO 100
40 GOTO 100
50 GOTO 100
```

```
10 GOTO 100
20 GOTO 100
30 GOTO 100
40 GOTO 100
50 GOTO 100
60 GOTO 100
70 GOTO 100
80 GOTO 100
90 GOTO 100
100 GOTO 100
110 GOTO 100
120 GOTO 100
130 GOTO 100
140 GOTO 100
150 GOTO 100
160 GOTO 100
170 GOTO 100
180 GOTO 100
190 GOTO 100
200 GOTO 100
210 GOTO 100
220 GOTO 100
230 GOTO 100
240 GOTO 100
250 GOTO 100
260 GOTO 100
270 GOTO 100
280 GOTO 100
290 GOTO 100
300 GOTO 100
310 GOTO 100
320 GOTO 100
330 GOTO 100
340 GOTO 100
350 GOTO 100
360 GOTO 100
370 GOTO 100
380 GOTO 100
390 GOTO 100
400 GOTO 100
410 GOTO 100
420 GOTO 100
430 GOTO 100
440 GOTO 100
450 GOTO 100
460 GOTO 100
470 GOTO 100
480 GOTO 100
490 GOTO 100
500 GOTO 100
510 GOTO 100
520 GOTO 100
530 GOTO 100
540 GOTO 100
550 GOTO 100
560 GOTO 100
570 GOTO 100
580 GOTO 100
590 GOTO 100
600 GOTO 100
610 GOTO 100
620 GOTO 100
630 GOTO 100
640 GOTO 100
650 GOTO 100
660 GOTO 100
670 GOTO 100
680 GOTO 100
690 GOTO 100
700 GOTO 100
710 GOTO 100
720 GOTO 100
730 GOTO 100
740 GOTO 100
750 GOTO 100
760 GOTO 100
770 GOTO 100
780 GOTO 100
790 GOTO 100
800 GOTO 100
810 GOTO 100
820 GOTO 100
830 GOTO 100
840 GOTO 100
850 GOTO 100
860 GOTO 100
870 GOTO 100
880 GOTO 100
890 GOTO 100
900 GOTO 100
910 GOTO 100
920 GOTO 100
930 GOTO 100
940 GOTO 100
950 GOTO 100
960 GOTO 100
970 GOTO 100
980 GOTO 100
990 GOTO 100
1000 GOTO 100
```

If you've written any useful or interesting free time programs, why not send them to us to grace our pages?

We pass 0294 by search engine  
modelling and

You should give a full description of the routine and any other details that

## Win £25

are relevant. And copies, but if you want your material returned please enclose a suitably stamped envelope.

Simply send a copy of the program on disc or tape together with the documentation - preferably as a word processed file - to:

Adult User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4BP.

## JARGON

One of the most amazing programs you can write for your computer is what is known as a word-word generator, and that's precisely what Jargon II. It will randomly string together two words to give you some computer speak. Any words can be placed in the data statements to produce your own jargon.

Some examples of computer programs using the data file are:

1. *Adaptation*  
 2. *Evolution*  
 3. *Speciation*  
 4. *Extinction*

Programs originate  
Library Media:  
User registers:

## EXAMPLES

- A1** Passes an `apex` to read the words from the data into the string
- A2** A random number to tell the computer how many words to read before printing the word

 Get it right!

1990	1991	1992
1993	1994	1995
1996	1997	1998
1999	2000	2001
2002	2003	2004
2005	2006	2007
2008	2009	2010
2011	2012	2013
2014	2015	2016
2017	2018	2019
2020	2021	2022
2023	2024	2025
2026	2027	2028
2029	2030	2031
2032	2033	2034
2035	2036	2037
2038	2039	2040
2041	2042	2043
2044	2045	2046
2047	2048	2049
2050	2051	2052
2053	2054	2055
2056	2057	2058
2059	2060	2061
2062	2063	2064
2065	2066	2067
2068	2069	2070
2071	2072	2073
2074	2075	2076
2077	2078	2079
2080	2081	2082
2083	2084	2085
2086	2087	2088
2089	2090	2091
2092	2093	2094
2095	2096	2097
2098	2099	2100
2101	2102	2103
2104	2105	2106
2107	2108	2109
2110	2111	2112
2113	2114	2115
2116	2117	2118
2119	2120	2121
2122	2123	2124
2125	2126	2127
2128	2129	2130
2131	2132	2133
2134	2135	2136
2137	2138	2139
2140	2141	2142
2143	2144	2145
2146	2147	2148
2149	2150	2151
2152	2153	2154
2155	2156	2157
2158	2159	2160
2161	2162	2163
2164	2165	2166
2167	2168	2169
2170	2171	2172
2173	2174	2175
2176	2177	2178
2179	2180	2181
2182	2183	2184
2185	2186	2187
2188	2189	2190
2191	2192	2193
2194	2195	2196
2197	2198	2199
2200	2201	2202
2203	2204	2205
2206	2207	2208
2209	2210	2211
2212	2213	2214
2215	2216	2217
2218	2219	2220
2221	2222	2223
2224	2225	2226
2227	2228	2229
2230	2231	2232
2233	2234	2235
2236	2237	2238
2239	2240	2241
2242	2243	2244
2245	2246	2247
2248	2249	2250
2251	2252	2253
2254	2255	2256
2257	2258	2259
2260	2261	2262
2263	2264	2265
2266	2267	2268
2269	2270	2271
2272	2273	2274
2275	2276	2277
2278	2279	2280
2281	2282	2283
2284	2285	2286
2287	2288	2289
2290	2291	2292
2293	2294	2295
2296	2297	2298
2299	2300	2301
2302	2303	2304
2305	2306	2307
2308	2309	2310
2311	2312	2313
2314	2315	2316
2317	2318	2319
2320	2321</	

[illegible]

GTIA TEXT  
from Andrei Gliman

One of the problems with Graphical Mode 11 is that it has no text window, which can be frustrating at times. This program starts with a Mode 0 screen, pokes location 500 with 100 and then pokes location 80 with 11 to make the computer think that it is in Mode 11.

A Display Unit interrupt is also set on the last minute. Once all this is

**✓ Get it right!**

11	12	13
14	15	16
17	18	19
20	21	22
23	24	25
26	27	28
29	30	31
32	33	34
35	36	37
38	39	40
41	42	43
44	45	46
47	48	49
50	51	52
53	54	55
56	57	58
59	60	61
62	63	64
65	66	67
68	69	70
71	72	73
74	75	76
77	78	79
80	81	82
83	84	85
86	87	88
89	90	91
92	93	94
95	96	97
98	99	100

later the program draws a picture using 16 colours to show you that you are in a QTGA mode.

[illegible]

# Tyrants of Torment

**GAVIN DAVIDSON**  
puts you in control  
of a hi-tech buggy  
to try and save the  
world from total  
destruction by evil

It is the year 2027 and mankind is in dire straits. After the Great Destruction control of the world was seized by evil dictators. This catastrophe was detailed many years after in the Book of Mankind.

Apparently Arthur Gredit, a high-ranking Portuguese officer, phoned the President to say he was coming next

for some coffee and beer. Due to interference on the telephone line the President misinterpreted and thought he said: "The commies have begun to bomb", which is when the Great Depression began.

All but a handful of resistance fighters have survived death at the hands of the tyrants. Now the time has come for someone to undertake an almost suicidal mission to overpower them. A super hi-tech buggy equipped with all the latest weapon systems, has been put at the disposal of some brave soul. [Click](#) [here](#) [and](#) [you](#) [are](#) [interested](#).

The approach to the tyrant's stronghold has been strewn with mines, so your buggy has been equipped with a suspension system that allows you to jump over them. Furniture defense fighters command

Have this book, so you have *minutes* to try to deal with them effectively.

Remember to use **Get It Right** when typing the programs in and save a copy before running it. Be especially careful with the data statements.

The Start key begins the game and Select will change the level of play. There are 21 levels, but you can only select up to level nine to start. To advance to the next level you must complete six miles in your league.

Distance completed and your score are displayed at the bottom of the screen. Twenty points are awarded for destroying a defence fighter and 10 for completing a mile. You only have one bonus, so be very careful.

The panel opposite shows all the controls, so on with the salvation of the world - it's up to you now.

### PROGRAM RELEASED

PROGRAMMER'S INDEX	
66-120	Configure the Display List for the screen
130-160	Draw the mountains using sine and cosine tables
170-180	Display List Interrupt used to get eight shades of colors on the screen
180-230	Redefine custom characters
240	Machines code subroutines used for the main game loop
270-330	Level select routine - if line 230 is removed you can select any of the 21 levels to play
340-360	Routine to change the difficulty level
360-380	Rugby destroyed routine
380-400	Completed level routine
400-420	Machines code area for the main game loop

```

00 0000 *****
04 0000 * PRIORITY OF MESSAGE *
08 0000 * DT *
12 0000 * MESSAGE CATEGORY *
16 0000 * CTR COUNT FROM *
20 0000 *****
24 00000000 * (PAGE) PCL.1 *
28 0000 *****
32 0000 * DT *
36 0000 * DT *
40 0000 * DT *
44 0000 * DT *
48 0000 * DT *
52 0000 * DT *
56 0000 * DT *
60 0000 * DT *
64 0000 * DT *
68 0000 * DT *
72 0000 * DT *
76 0000 * DT *
80 0000 * DT *
84 0000 * DT *
88 0000 * DT *
92 0000 * DT *
96 0000 * DT *
100 0000 * DT *
104 0000 * DT *
108 0000 * DT *
112 0000 * DT *
116 0000 * DT *
120 0000 * DT *
124 0000 * DT *
128 0000 * DT *
132 0000 * DT *
136 0000 * DT *
140 0000 * DT *
144 0000 * DT *
148 0000 * DT *
152 0000 * DT *
156 0000 * DT *
160 0000 * DT *
164 0000 * DT *
168 0000 * DT *
172 0000 * DT *
176 0000 * DT *
180 0000 * DT *
184 0000 * DT *
188 0000 * DT *
192 0000 * DT *
196 0000 * DT *
200 0000 * DT *
204 0000 * DT *
208 0000 * DT *
212 0000 * DT *
216 0000 * DT *
220 0000 * DT *
224 0000 * DT *
228 0000 * DT *
232 0000 * DT *
236 0000 * DT *
240 0000 * DT *
244 0000 * DT *
248 0000 * DT *
252 0000 * DT *
256 0000 * DT *
260 0000 * DT *
264 0000 * DT *
268 0000 * DT *
272 0000 * DT *
276 0000 * DT *
280 0000 * DT *
284 0000 * DT *
288 0000 * DT *
292 0000 * DT *
296 0000 * DT *
300 0000 * DT *
304 0000 * DT *
308 0000 * DT *
312 0000 * DT *
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320 0000 * DT *
324 0000 * DT *
328 0000 * DT *
332 0000 * DT *
336 0000 * DT *
340 0000 * DT *
344 0000 * DT *
348 0000 * DT *
352 0000 * DT *
356 0000 * DT *
360 0000 * DT *
364 0000 * DT *
368 0000 * DT *
372 0000 * DT *
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380 0000 * DT *
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392 0000 * DT *
396 0000 * DT *
400 0000 * DT *
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412 0000 * DT *
416 0000 * DT *
420 0000 * DT *
424 0000 * DT *
428 0000 * DT *
432 0000 * DT *
436 0000 * DT *
440 0000 * DT *
444 0000 * DT *
448 0000 * DT *
452 0000 * DT *
456 0000 * DT *
460 0000 * DT *
464 0000 * DT *
468 0000 * DT *
472 0000 * DT *
476 0000 * DT *
480 0000 * DT *
484 0000 * DT *
488 0000 * DT *
492 0000 * DT *
496 0000 * DT *
500 0000 * DT *
504 0000 * DT *
508 0000 * DT *
512 0000 * DT *
516 0000 * DT *
520 0000 * DT *
524 0000 * DT *
528 0000 * DT *
532 0000 * DT *
536 0000 * DT *
540 0000 * DT *
544 0000 * DT *
548 0000 * DT *
552 0000 * DT *
556 0000 * DT *
560 0000 * DT *
564 0000 * DT *
568 0000 * DT *
572 0000 * DT *
576 0000 * DT *
580 0000 * DT *
584 0000 * DT *
588 0000 * DT *
592 0000 * DT *
596 0000 * DT *
600 0000 * DT *
604 0000 * DT *
608 0000 * DT *
612 0000 * DT *
616 0000 * DT *
620 0000 * DT *
624 0000 * DT *
628 0000 * DT *
632 0000 * DT *
636 0000 * DT *
640 0000 * DT *
644 0000 * DT *
648 0000 * DT *
652 0000 * DT *
656 0000 * DT *
660 0000 * DT *
664 0000 * DT *
668 0000 * DT *
672 0000 * DT *
676 0000 * DT *
680 0000 * DT *
684 0000 * DT *
688 0000 * DT *
692 0000 * DT *
696 0000 * DT *
700 0000 * DT *
704 0000 * DT *
708 0000 * DT *
712 0000 * DT *
716 0000 * DT *
720 0000 * DT *
724 0000 * DT *
728 0000 * DT *
732 0000 * DT *
736 0000 * DT *
740 0000 * DT *
744 0000 * DT *
748 0000 * DT *
752 0000 * DT *
756 0000 * DT *
760 0000 * DT *
764 0000 * DT *
768 0000 * DT *
772 0000 * DT *
776 0000 * DT *
780 0000 * DT *
784 0000 * DT *
788 0000 * DT *
792 0000 * DT *
796 0000 * DT *
800 0000 * DT *
804 0000 * DT *
808 0000 * DT *
812 0000 * DT *
816 0000 * DT *
820 0000 * DT *
824 0000 * DT *
828 0000 * DT *
832 0000 * DT *
836 0000 * DT *
840 0000 * DT *
844 0000 * DT *
848 0000 * DT *
852 0000 * DT *
856 0000 * DT *
860 0000 * DT *
864 0000 * DT *
868 0000 * DT *
872 0000 * DT *
876 0000 * DT *
880 0000 * DT *
884 0000 * DT *
888 0000 * DT *
892 0000 * DT *
896 0000 * DT *
900 0000 * DT *
904 0000 * DT *
908 0000 * DT *
912 0000 * DT *
916 0000 * DT *
920 0000 * DT *
924 0000 * DT *
928 0000 * DT *
932 0000 * DT *
936 0000 * DT *
940 0000 * DT *
944 0000 * DT *
948 0000 * DT *
952 0000 * DT *
956 0000 * DT *
960 0000 * DT *
964 0000 * DT *
968 0000 * DT *
972 0000 * DT *
976 0000 * DT *
980 0000 * DT *
984 0000 * DT *
988 0000 * DT *
992 0000 * DT *
996 0000 * DT *
1000 0000 * DT *

```

[illegible][illegible]



1. **RESEARCH AND ANALYSIS**  
 2. **REPORT PREPARATION**

**MANY** of you have written in probing our new *Get It Right!* checksum program, and one reader from Berkshire added a comment which set us thinking.

If each line can generate its own unique checksum, why is it not possible to reverse the process and regenerate the original line from the special checksum value? After all, the four checksum bytes exactly represent the original line, don't they?

After some thought we can now bring you a program which at least goes part way to solving this problem. Since Atari Basic uses a small number of fixed tokens to make up all its lines, it is quite possible to regenerate a program except for the contents of strings, DATA statements and REM statements. These could obviously contain any text and since they are processed separately by GOTO in any case (see my source code listing and *forum* in the November 1987 issue of *Atari User* 1987 for information) there just isn't enough information to recreate them reliably.

However, everything else can be generated from just the four byte checksums, so once you have created the final program file you should load it into memory and connect the string and data contents from the full listing - REMs may safely be ignored. You should make sure that the normal GOTO tape or disc was loaded when you turned on the computer because this new program will access some of its internal machine code routines to save time and space.

# Checksum Buster

**Tired of long listings?  
André Willey has one  
solution to the problem**



To use it, simply type in the program and run it, be careful with the DATA statements because they contain machine code to access the Basic core which might crash the computer if mis-typed. When you run the program you will be asked to enter checksum values one by one, and you should hit Return on its own to finish. To start with try entering just the first 10 or 20 checksums to see how the system works before going on to attempting a full program.

You should then enter a filename to save the newly generated program - C: for cassette or D: FILENAME.BAS for disc. Once the program has finished writing you should reload and

LOAD it from tape or disc:

```
LOAD "C:\CHECKSUM.BAS"
```

for disc.

The original program will now be almost complete in memory. All that is then left to do is to LIST it and use the screen editor to complete any lines containing strings or DATA from the original listing. These will be flagged on screen with asterisks to remind you of the correct number of characters.

■ Next month, I'll show you how this program works, and other applications of the same principle. In the meantime, reading the article on information on page 2 will give you some clues.

```
10 REM NEW 32 EXPANDER PROGRAM
20 REM WRITTEN BY ANDRÉ WILLEY
30 REM 128K RAM, APRIL 1988
40 REM
50 NAME=PROGRAM
60 REM NUMBER=0001,LINEAR,FILE=000
70 PRINT:PRINT
80 GOTO 100
90 POSITION 2,0:PRINT "HOW MANY CHECKSUMS DO YOU WANT TO REVERSE?"
100 IF THEN PRINT "ENTER THE FIRST CHECKSUM VALUE (0-255):"
110 IF THEN PRINT "ENTER THE SECOND CHECKSUM VALUE (0-255):"
120 IF THEN PRINT "ENTER THE THIRD CHECKSUM VALUE (0-255):"
130 IF THEN PRINT "ENTER THE FOURTH CHECKSUM VALUE (0-255):"
140 IF THEN PRINT "ENTER THE FIFTH CHECKSUM VALUE (0-255):"
150 IF THEN PRINT "ENTER THE SIXTH CHECKSUM VALUE (0-255):"
160 IF THEN PRINT "ENTER THE SEVENTH CHECKSUM VALUE (0-255):"
170 IF THEN PRINT "ENTER THE EIGHTH CHECKSUM VALUE (0-255):"
180 IF THEN PRINT "ENTER THE NINTH CHECKSUM VALUE (0-255):"
190 IF THEN PRINT "ENTER THE TENTH CHECKSUM VALUE (0-255):"
200 IF THEN PRINT "ENTER THE ELEVENTH CHECKSUM VALUE (0-255):"
210 IF THEN PRINT "ENTER THE TWELFTH CHECKSUM VALUE (0-255):"
220 IF THEN PRINT "ENTER THE THIRTEENTH CHECKSUM VALUE (0-255):"
230 IF THEN PRINT "ENTER THE FOURTEENTH CHECKSUM VALUE (0-255):"
240 IF THEN PRINT "ENTER THE FIFTEENTH CHECKSUM VALUE (0-255):"
250 IF THEN PRINT "ENTER THE SIXTEENTH CHECKSUM VALUE (0-255):"
260 IF THEN PRINT "ENTER THE SEVENTEENTH CHECKSUM VALUE (0-255):"
270 IF THEN PRINT "ENTER THE EIGHTEENTH CHECKSUM VALUE (0-255):"
280 IF THEN PRINT "ENTER THE NINETEENTH CHECKSUM VALUE (0-255):"
290 IF THEN PRINT "ENTER THE TWENTIETH CHECKSUM VALUE (0-255):"
300 IF THEN PRINT "ENTER THE TWENTY-FIRST CHECKSUM VALUE (0-255):"
310 IF THEN PRINT "ENTER THE TWENTY-SECOND CHECKSUM VALUE (0-255):"
320 IF THEN PRINT "ENTER THE TWENTY-THIRD CHECKSUM VALUE (0-255):"
330 IF THEN PRINT "ENTER THE TWENTY-FOURTH CHECKSUM VALUE (0-255):"
340 IF THEN PRINT "ENTER THE TWENTY-FIFTH CHECKSUM VALUE (0-255):"
350 IF THEN PRINT "ENTER THE TWENTY-SIXTH CHECKSUM VALUE (0-255):"
360 IF THEN PRINT "ENTER THE TWENTY-SEVENTH CHECKSUM VALUE (0-255):"
370 IF THEN PRINT "ENTER THE TWENTY-EIGHTH CHECKSUM VALUE (0-255):"
380 IF THEN PRINT "ENTER THE TWENTY-NINTH CHECKSUM VALUE (0-255):"
390 IF THEN PRINT "ENTER THE THIRTIETH CHECKSUM VALUE (0-255):"
400 IF THEN PRINT "ENTER THE THIRTY-FIRST CHECKSUM VALUE (0-255):"
410 IF THEN PRINT "ENTER THE THIRTY-SECOND CHECKSUM VALUE (0-255):"
420 IF THEN PRINT "ENTER THE THIRTY-THIRD CHECKSUM VALUE (0-255):"
430 IF THEN PRINT "ENTER THE THIRTY-FOURTH CHECKSUM VALUE (0-255):"
440 IF THEN PRINT "ENTER THE THIRTY-FIFTH CHECKSUM VALUE (0-255):"
450 IF THEN PRINT "ENTER THE THIRTY-SIXTH CHECKSUM VALUE (0-255):"
460 IF THEN PRINT "ENTER THE THIRTY-SEVENTH CHECKSUM VALUE (0-255):"
470 IF THEN PRINT "ENTER THE THIRTY-EIGHTH CHECKSUM VALUE (0-255):"
480 IF THEN PRINT "ENTER THE THIRTY-NINTH CHECKSUM VALUE (0-255):"
490 IF THEN PRINT "ENTER THE FORTIETH CHECKSUM VALUE (0-255):"
500 IF THEN PRINT "ENTER THE FORTY-FIRST CHECKSUM VALUE (0-255):"
510 IF THEN PRINT "ENTER THE FORTY-SECOND CHECKSUM VALUE (0-255):"
520 IF THEN PRINT "ENTER THE FORTY-THIRD CHECKSUM VALUE (0-255):"
530 IF THEN PRINT "ENTER THE FORTY-FOURTH CHECKSUM VALUE (0-255):"
540 IF THEN PRINT "ENTER THE FORTY-FIFTH CHECKSUM VALUE (0-255):"
550 IF THEN PRINT "ENTER THE FORTY-SIXTH CHECKSUM VALUE (0-255):"
560 IF THEN PRINT "ENTER THE FORTY-SEVENTH CHECKSUM VALUE (0-255):"
570 IF THEN PRINT "ENTER THE FORTY-EIGHTH CHECKSUM VALUE (0-255):"
580 IF THEN PRINT "ENTER THE FORTY-NINTH CHECKSUM VALUE (0-255):"
590 IF THEN PRINT "ENTER THE FIFTIETH CHECKSUM VALUE (0-255):"
600 IF THEN PRINT "ENTER THE FIFTY-FIRST CHECKSUM VALUE (0-255):"
610 IF THEN PRINT "ENTER THE FIFTY-SECOND CHECKSUM VALUE (0-255):"
620 IF THEN PRINT "ENTER THE FIFTY-THIRD CHECKSUM VALUE (0-255):"
630 IF THEN PRINT "ENTER THE FIFTY-FOURTH CHECKSUM VALUE (0-255):"
640 IF THEN PRINT "ENTER THE FIFTY-FIFTH CHECKSUM VALUE (0-255):"
650 IF THEN PRINT "ENTER THE FIFTY-SIXTH CHECKSUM VALUE (0-255):"
660 IF THEN PRINT "ENTER THE FIFTY-SEVENTH CHECKSUM VALUE (0-255):"
670 IF THEN PRINT "ENTER THE FIFTY-EIGHTH CHECKSUM VALUE (0-255):"
680 IF THEN PRINT "ENTER THE FIFTY-NINTH CHECKSUM VALUE (0-255):"
690 IF THEN PRINT "ENTER THE SIXTIETH CHECKSUM VALUE (0-255):"
700 IF THEN PRINT "ENTER THE SIXTY-FIRST CHECKSUM VALUE (0-255):"
710 IF THEN PRINT "ENTER THE SIXTY-SECOND CHECKSUM VALUE (0-255):"
720 IF THEN PRINT "ENTER THE SIXTY-THIRD CHECKSUM VALUE (0-255):"
730 IF THEN PRINT "ENTER THE SIXTY-FOURTH CHECKSUM VALUE (0-255):"
740 IF THEN PRINT "ENTER THE SIXTY-FIFTH CHECKSUM VALUE (0-255):"
750 IF THEN PRINT "ENTER THE SIXTY-SIXTH CHECKSUM VALUE (0-255):"
760 IF THEN PRINT "ENTER THE SIXTY-SEVENTH CHECKSUM VALUE (0-255):"
770 IF THEN PRINT "ENTER THE SIXTY-EIGHTH CHECKSUM VALUE (0-255):"
780 IF THEN PRINT "ENTER THE SIXTY-NINTH CHECKSUM VALUE (0-255):"
790 IF THEN PRINT "ENTER THE SEVENTIETH CHECKSUM VALUE (0-255):"
800 IF THEN PRINT "ENTER THE SEVENTY-FIRST CHECKSUM VALUE (0-255):"
810 IF THEN PRINT "ENTER THE SEVENTY-SECOND CHECKSUM VALUE (0-255):"
820 IF THEN PRINT "ENTER THE SEVENTY-THIRD CHECKSUM VALUE (0-255):"
830 IF THEN PRINT "ENTER THE SEVENTY-FOURTH CHECKSUM VALUE (0-255):"
840 IF THEN PRINT "ENTER THE SEVENTY-FIFTH CHECKSUM VALUE (0-255):"
850 IF THEN PRINT "ENTER THE SEVENTY-SIXTH CHECKSUM VALUE (0-255):"
860 IF THEN PRINT "ENTER THE SEVENTY-SEVENTH CHECKSUM VALUE (0-255):"
870 IF THEN PRINT "ENTER THE SEVENTY-EIGHTH CHECKSUM VALUE (0-255):"
880 IF THEN PRINT "ENTER THE SEVENTY-NINTH CHECKSUM VALUE (0-255):"
890 IF THEN PRINT "ENTER THE EIGHTIETH CHECKSUM VALUE (0-255):"
900 IF THEN PRINT "ENTER THE EIGHTY-FIRST CHECKSUM VALUE (0-255):"
910 IF THEN PRINT "ENTER THE EIGHTY-SECOND CHECKSUM VALUE (0-255):"
920 IF THEN PRINT "ENTER THE EIGHTY-THIRD CHECKSUM VALUE (0-255):"
930 IF THEN PRINT "ENTER THE EIGHTY-FOURTH CHECKSUM VALUE (0-255):"
940 IF THEN PRINT "ENTER THE EIGHTY-FIFTH CHECKSUM VALUE (0-255):"
950 IF THEN PRINT "ENTER THE EIGHTY-SIXTH CHECKSUM VALUE (0-255):"
960 IF THEN PRINT "ENTER THE EIGHTY-SEVENTH CHECKSUM VALUE (0-255):"
970 IF THEN PRINT "ENTER THE EIGHTY-EIGHTH CHECKSUM VALUE (0-255):"
980 IF THEN PRINT "ENTER THE EIGHTY-NINTH CHECKSUM VALUE (0-255):"
990 IF THEN PRINT "ENTER THE NINETYETH CHECKSUM VALUE (0-255):"
1000 IF THEN PRINT "ENTER THE NINETY-FIRST CHECKSUM VALUE (0-255):"
1010 IF THEN PRINT "ENTER THE NINETY-SECOND CHECKSUM VALUE (0-255):"
1020 IF THEN PRINT "ENTER THE NINETY-THIRD CHECKSUM VALUE (0-255):"
1030 IF THEN PRINT "ENTER THE NINETY-FOURTH CHECKSUM VALUE (0-255):"
1040 IF THEN PRINT "ENTER THE NINETY-FIFTH CHECKSUM VALUE (0-255):"
1050 IF THEN PRINT "ENTER THE NINETY-SIXTH CHECKSUM VALUE (0-255):"
1060 IF THEN PRINT "ENTER THE NINETY-SEVENTH CHECKSUM VALUE (0-255):"
1070 IF THEN PRINT "ENTER THE NINETY-EIGHTH CHECKSUM VALUE (0-255):"
1080 IF THEN PRINT "ENTER THE NINETY-NINTH CHECKSUM VALUE (0-255):"
1090 IF THEN PRINT "ENTER THE HUNDRETH CHECKSUM VALUE (0-255):"
1100 IF THEN PRINT "ENTER THE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1110 IF THEN PRINT "ENTER THE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1120 IF THEN PRINT "ENTER THE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1130 IF THEN PRINT "ENTER THE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1140 IF THEN PRINT "ENTER THE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1150 IF THEN PRINT "ENTER THE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1160 IF THEN PRINT "ENTER THE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1170 IF THEN PRINT "ENTER THE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1180 IF THEN PRINT "ENTER THE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1190 IF THEN PRINT "ENTER THE TWO HUNDREDTH CHECKSUM VALUE (0-255):"
1200 IF THEN PRINT "ENTER THE TWO HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1210 IF THEN PRINT "ENTER THE TWO HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1220 IF THEN PRINT "ENTER THE TWO HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1230 IF THEN PRINT "ENTER THE TWO HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1240 IF THEN PRINT "ENTER THE TWO HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1250 IF THEN PRINT "ENTER THE TWO HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1260 IF THEN PRINT "ENTER THE TWO HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1270 IF THEN PRINT "ENTER THE TWO HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1280 IF THEN PRINT "ENTER THE TWO HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1290 IF THEN PRINT "ENTER THE THREE HUNDREDTH CHECKSUM VALUE (0-255):"
1300 IF THEN PRINT "ENTER THE THREE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1310 IF THEN PRINT "ENTER THE THREE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1320 IF THEN PRINT "ENTER THE THREE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1330 IF THEN PRINT "ENTER THE THREE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1340 IF THEN PRINT "ENTER THE THREE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1350 IF THEN PRINT "ENTER THE THREE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1360 IF THEN PRINT "ENTER THE THREE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1370 IF THEN PRINT "ENTER THE THREE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1380 IF THEN PRINT "ENTER THE THREE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1390 IF THEN PRINT "ENTER THE FOUR HUNDREDTH CHECKSUM VALUE (0-255):"
1400 IF THEN PRINT "ENTER THE FOUR HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1410 IF THEN PRINT "ENTER THE FOUR HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1420 IF THEN PRINT "ENTER THE FOUR HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1430 IF THEN PRINT "ENTER THE FOUR HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1440 IF THEN PRINT "ENTER THE FOUR HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1450 IF THEN PRINT "ENTER THE FOUR HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1460 IF THEN PRINT "ENTER THE FOUR HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1470 IF THEN PRINT "ENTER THE FOUR HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1480 IF THEN PRINT "ENTER THE FOUR HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1490 IF THEN PRINT "ENTER THE FIVE HUNDREDTH CHECKSUM VALUE (0-255):"
1500 IF THEN PRINT "ENTER THE FIVE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1510 IF THEN PRINT "ENTER THE FIVE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1520 IF THEN PRINT "ENTER THE FIVE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1530 IF THEN PRINT "ENTER THE FIVE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1540 IF THEN PRINT "ENTER THE FIVE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1550 IF THEN PRINT "ENTER THE FIVE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1560 IF THEN PRINT "ENTER THE FIVE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1570 IF THEN PRINT "ENTER THE FIVE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1580 IF THEN PRINT "ENTER THE FIVE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1590 IF THEN PRINT "ENTER THE SIX HUNDREDTH CHECKSUM VALUE (0-255):"
1600 IF THEN PRINT "ENTER THE SIX HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1610 IF THEN PRINT "ENTER THE SIX HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1620 IF THEN PRINT "ENTER THE SIX HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1630 IF THEN PRINT "ENTER THE SIX HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1640 IF THEN PRINT "ENTER THE SIX HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1650 IF THEN PRINT "ENTER THE SIX HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1660 IF THEN PRINT "ENTER THE SIX HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1670 IF THEN PRINT "ENTER THE SIX HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1680 IF THEN PRINT "ENTER THE SIX HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1690 IF THEN PRINT "ENTER THE SEVEN HUNDREDTH CHECKSUM VALUE (0-255):"
1700 IF THEN PRINT "ENTER THE SEVEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1710 IF THEN PRINT "ENTER THE SEVEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1720 IF THEN PRINT "ENTER THE SEVEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1730 IF THEN PRINT "ENTER THE SEVEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1740 IF THEN PRINT "ENTER THE SEVEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1750 IF THEN PRINT "ENTER THE SEVEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1760 IF THEN PRINT "ENTER THE SEVEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1770 IF THEN PRINT "ENTER THE SEVEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1780 IF THEN PRINT "ENTER THE SEVEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1790 IF THEN PRINT "ENTER THE EIGHT HUNDREDTH CHECKSUM VALUE (0-255):"
1800 IF THEN PRINT "ENTER THE EIGHT HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1810 IF THEN PRINT "ENTER THE EIGHT HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1820 IF THEN PRINT "ENTER THE EIGHT HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1830 IF THEN PRINT "ENTER THE EIGHT HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1840 IF THEN PRINT "ENTER THE EIGHT HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1850 IF THEN PRINT "ENTER THE EIGHT HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1860 IF THEN PRINT "ENTER THE EIGHT HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1870 IF THEN PRINT "ENTER THE EIGHT HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1880 IF THEN PRINT "ENTER THE EIGHT HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1890 IF THEN PRINT "ENTER THE NINE HUNDREDTH CHECKSUM VALUE (0-255):"
1900 IF THEN PRINT "ENTER THE NINE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
1910 IF THEN PRINT "ENTER THE NINE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
1920 IF THEN PRINT "ENTER THE NINE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
1930 IF THEN PRINT "ENTER THE NINE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
1940 IF THEN PRINT "ENTER THE NINE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
1950 IF THEN PRINT "ENTER THE NINE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
1960 IF THEN PRINT "ENTER THE NINE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
1970 IF THEN PRINT "ENTER THE NINE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
1980 IF THEN PRINT "ENTER THE NINE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
1990 IF THEN PRINT "ENTER THE TEN HUNDREDTH CHECKSUM VALUE (0-255):"
2000 IF THEN PRINT "ENTER THE TEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2010 IF THEN PRINT "ENTER THE TEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2020 IF THEN PRINT "ENTER THE TEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2030 IF THEN PRINT "ENTER THE TEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2040 IF THEN PRINT "ENTER THE TEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2050 IF THEN PRINT "ENTER THE TEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2060 IF THEN PRINT "ENTER THE TEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2070 IF THEN PRINT "ENTER THE TEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2080 IF THEN PRINT "ENTER THE TEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2090 IF THEN PRINT "ENTER THE ELEVEN HUNDREDTH CHECKSUM VALUE (0-255):"
2100 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2110 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2120 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2130 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2140 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2150 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2160 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2170 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2180 IF THEN PRINT "ENTER THE ELEVEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2190 IF THEN PRINT "ENTER THE TWELVE HUNDREDTH CHECKSUM VALUE (0-255):"
2200 IF THEN PRINT "ENTER THE TWELVE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2210 IF THEN PRINT "ENTER THE TWELVE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2220 IF THEN PRINT "ENTER THE TWELVE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2230 IF THEN PRINT "ENTER THE TWELVE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2240 IF THEN PRINT "ENTER THE TWELVE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2250 IF THEN PRINT "ENTER THE TWELVE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2260 IF THEN PRINT "ENTER THE TWELVE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2270 IF THEN PRINT "ENTER THE TWELVE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2280 IF THEN PRINT "ENTER THE TWELVE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2290 IF THEN PRINT "ENTER THE THIRTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2300 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2310 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2320 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2330 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2340 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2350 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2360 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2370 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2380 IF THEN PRINT "ENTER THE THIRTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2390 IF THEN PRINT "ENTER THE FOURTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2400 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2410 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2420 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2430 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2440 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2450 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2460 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2470 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2480 IF THEN PRINT "ENTER THE FOURTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2490 IF THEN PRINT "ENTER THE FIFTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2500 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2510 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2520 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2530 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2540 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2550 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2560 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2570 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2580 IF THEN PRINT "ENTER THE FIFTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2590 IF THEN PRINT "ENTER THE SIXTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2600 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2610 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2620 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2630 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2640 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2650 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2660 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2670 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2680 IF THEN PRINT "ENTER THE SIXTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2690 IF THEN PRINT "ENTER THE SEVENTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2700 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2710 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2720 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2730 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2740 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2750 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2760 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2770 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2780 IF THEN PRINT "ENTER THE SEVENTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2790 IF THEN PRINT "ENTER THE EIGHTEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2800 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2810 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2820 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2830 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2840 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2850 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2860 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2870 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2880 IF THEN PRINT "ENTER THE EIGHTEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2890 IF THEN PRINT "ENTER THE NINETEEN HUNDREDTH CHECKSUM VALUE (0-255):"
2900 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
2910 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
2920 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
2930 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
2940 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
2950 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
2960 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
2970 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
2980 IF THEN PRINT "ENTER THE NINETEEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
2990 IF THEN PRINT "ENTER THE TWENTY HUNDREDTH CHECKSUM VALUE (0-255):"
3000 IF THEN PRINT "ENTER THE TWENTY HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3010 IF THEN PRINT "ENTER THE TWENTY HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3020 IF THEN PRINT "ENTER THE TWENTY HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3030 IF THEN PRINT "ENTER THE TWENTY HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3040 IF THEN PRINT "ENTER THE TWENTY HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3050 IF THEN PRINT "ENTER THE TWENTY HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3060 IF THEN PRINT "ENTER THE TWENTY HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3070 IF THEN PRINT "ENTER THE TWENTY HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3080 IF THEN PRINT "ENTER THE TWENTY HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3090 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDREDTH CHECKSUM VALUE (0-255):"
3100 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3110 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3120 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3130 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3140 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3150 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3160 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3170 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3180 IF THEN PRINT "ENTER THE TWENTY-ONE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3190 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDREDTH CHECKSUM VALUE (0-255):"
3200 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3210 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3220 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3230 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3240 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3250 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3260 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3270 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3280 IF THEN PRINT "ENTER THE TWENTY-TWO HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3290 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDREDTH CHECKSUM VALUE (0-255):"
3300 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3310 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3320 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3330 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3340 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3350 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3360 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3370 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3380 IF THEN PRINT "ENTER THE TWENTY-THREE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3390 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDREDTH CHECKSUM VALUE (0-255):"
3400 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3410 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3420 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3430 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3440 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3450 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3460 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3470 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3480 IF THEN PRINT "ENTER THE TWENTY-FOUR HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3490 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDREDTH CHECKSUM VALUE (0-255):"
3500 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3510 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3520 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3530 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3540 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3550 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3560 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3570 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3580 IF THEN PRINT "ENTER THE TWENTY-FIVE HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3590 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDREDTH CHECKSUM VALUE (0-255):"
3600 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3610 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3620 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3630 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3640 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3650 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3660 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3670 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3680 IF THEN PRINT "ENTER THE TWENTY-SIX HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3690 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDREDTH CHECKSUM VALUE (0-255):"
3700 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3710 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3720 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-THIRD CHECKSUM VALUE (0-255):"
3730 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-FOURTH CHECKSUM VALUE (0-255):"
3740 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-FIFTH CHECKSUM VALUE (0-255):"
3750 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-SIXTH CHECKSUM VALUE (0-255):"
3760 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-SEVENTH CHECKSUM VALUE (0-255):"
3770 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-EIGHTH CHECKSUM VALUE (0-255):"
3780 IF THEN PRINT "ENTER THE TWENTY-SEVEN HUNDRED-NINTH CHECKSUM VALUE (0-255):"
3790 IF THEN PRINT "ENTER THE TWENTY-EIGHT HUNDREDTH CHECKSUM VALUE (0-255):"
3800 IF THEN PRINT "ENTER THE TWENTY-EIGHT HUNDRED-FIRST CHECKSUM VALUE (0-255):"
3810 IF THEN PRINT "ENTER THE TWENTY-EIGHT HUNDRED-SECOND CHECKSUM VALUE (0-255):"
3820 IF THEN PRINT "ENTER THE TWENTY-EIGHT HUNDRED-THIRD CHECKSUM VALUE (0-25
```

# This Toolkit is a MUST!

**ATARI  
USER**  
*exclusive!*

Programming becomes so much easier when you've got the right tools for the job. With this Atari User package you can add TEN new commands to Atari Basic to dramatically improve your performance. PLUS your Atari will generate meaningful error messages instead of cryptic numbers.

Toolkit automatically boots in from cassette or disc and makes use of a normally unused area of memory.

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Gives the name of all used variables and a list of all their occurrences.

**£5.95 tape**  
**£7.95 disc****TO ORDER PLEASE USE THE FORM ON PAGE 61**

# REVERSI BELEBZI

By OLIVER CHAPPELL



**THIS** is an adaptation of the traditional game played on a board with 64 squares. The objective is to obtain the most counters at the end of the game – when all 64 squares are coloured in. The players, in this case you and the computer, take alternate turns to place a counter on the board. You have green counters and the computer red.

They can only be placed on the board sandwiching one or more of the computer's counters in between two of your own. They must be in a straight line – horizontally, vertically or diagonally. No counters can ever be taken off the board, and no player can have consecutive turns unless his opponent cannot move.

The game starts with four counters in the centre of the board – two for each player – and the game expands from there. It is worth noting that counters in the centre of the board are not much of an asset as they can be

easily surrounded and recaptured.

It is therefore advisable to have edge pieces, and an even more distinct advantage to secure the corners, as these can't be altered. Having said that there is only one way to perfect your play – practice.

To place your counter all you do when the **YOUR MOVE** prompt appears is press the keys 1 to 8 twice – first for the vertical coordinate and then for the horizontal one. The computer will record the move on the screen and turn over all the necessary counters.

There are, at your disposal, several functions which can either help, pass your move over to the computer or even cheat.

Firstly there is **Help**, which after a few seconds will give you the coordinate which will allow you to take the most counters on the board. Secondly comes **Swap** which changes all the computer's counters into yours and

vice versa by reversing the colours. This is a useful feature if you are in a sticky position.

**Pass** allows you to pass your move over to the computer. This must be used if you can't go, but at times it can be to your advantage. You can also quit at any stage or use the **Judge** function which will assess the state of play at any time by giving a percentage result as to who is in the stronger position.

The game ends when all the positions on the board are occupied or either player has no counters left and is therefore unable to win.

Remember to use **Get it Right!** when you type the program in and be extra careful with the data statements: They are part of a short machine code routine and could crash the computer if entered incorrectly.

Turn to Page 88 ▶







# NEW LOW PRICE ST!



**£260** +VAT=£299

## ONLY FROM SILICA

There is nothing that can compare with the immediate value for money offered by Atari 520ST-PM. For only £260 (+VAT-£299), you can purchase a powerful 512K RAM computer with a 40 key keyboard (including numeric keypad), MOS interface, 68000, a graphics 40/102 colours monitor controller, and a 5.25" floppy disk drive. The 520ST-PM has a 10 megabyte built-in, and comes with a lead to allow you to plug it straight into any domestic colour extension box. The main monitor is also built-in to the keyboard, so there are no messy external boxes. You couldn't wish for a more compact, powerful and stylish unit. Atari 520 computers are now being manufactured in the UK, using top quality British components, giving you a wide variety of applications and the best in growing all the time. And, that's not all. When you buy your new 520ST-PM, for any Atari 520 computer from Silica Shop, you will get a full video, including a FREE Atari ST Starter Kit worth over £150. Read the 520ST-PM Owner's Manual on the unit, to see why you should buy your new high power, low price 520ST-PM from Silica Shop, the UK's first Atari Specialists. For further details of this range of Atari 520 computers and the FREE Atari ST Starter Kit, complete and return the reply coupon below.

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**PLEASE SEND ME FREE LITERATURE ON THE ATARI ST**

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Do you already own a computer?  
 If so, please state the model:





— *Journal of the American Medical Association*

[illegible][illegible]

# SOFTWARE *Solutions*

## Your programming problems solved by ANDRE WILLEY

LET'S get cracking straight away with a letter from Philip Carter from Frome in Somerset who is having a few problems with his BASIC.

While I was playing around with my micro I decided to write a Basic trigonometry program. When I got round to the tangents, sines, cosines and inverse tangents I came across the problem that my machine did not seem to accept the trig statements correctly. Instead it gave ERROR 9 AT LINE 122, which was simply:

```
122 LET A=10000
```

This also happened for the sines and cosines and the inverse tangent. Since Error 9 means an array or string error, and I'm using neither, is there something wrong with my robot?

Firstly I don't think that there's anything much wrong with your computer — your problems stem from a slight misunderstanding of how Basic handles trig operations. To be strictly accurate, Atari Basic only supports three fundamental trigonometry operations — sin, cosine and inverse tangent (or arctangent as it is more commonly known).

The commands to use are SIN(number), COS(number) and ATN(number), so your use of the command TAN was not recognised. However, Basic still tried to make sense of the statement by assuming you were talking about an array variable called TAN. Since you had obviously not DIMmed such an array, it finally gave up and resorted to giving you an Error 9 — for an undimensioned array reference.

I suspect that the other errors might have been caused by your using SIN(number) or COS(number)

instead of the shortened SIN and COS which are required. These too would have been interpreted as undimensioned arrays.

So how do you work out such things as tangents when Basic doesn't seem to provide a command for them? Luckily trigonometry is entirely logical, and just about any function can be calculated from the main three we've seen so far. You will also need to use some other mathematical operations — most notably natural logarithms and square roots, both of which are readily available.

You don't require the base 10 logarithms given by LOG(number), but these based on powers of the mathematical value of e, or 2.71828. These are given using the LOG function, and antilogs are given by using EXP, which returns a result given by raising the number to the power of e.

For example, if you think back to your school days and good old Pythagoras, the tangent of an angle is calculated using the very simple formula of side divided by cosine. In computer terms, the tangent of the variable X would be given by:

```
LET TANX=(X)/(COSX)
```

Don't forget that some values for various trigonometric formulae are illegal — there is no tangent of the angle 90° for example because cos 90° equals zero, and you can't divide by zero.

You should also decide whether you want to work in degrees or radians — selected by using the DEG or RAD commands. There is obviously no point testing for an angle of 90° when you're working in radians — you should instead check for a value of  $\pi/2$ .

The panel on the following page

lists some of the more common trig functions and how to derive them, but make sure you test for any illegal values as you'll have another error on your hands. Don't forget there are lots more formulae if you need them — check out Appendix C of your Atari Computer manual, or consult your local library for books on trigonometry.

### Slow clock?

Next we have an international enquiry from Mr A. Grinbauer from Holland. It's nice to see so many letters coming in from abroad, and the standard of the English rather puts us Brits to shame when it comes to learning foreign languages — the nearest thing I come to a second language is *Arabic*! Anyway, Mr Grinbauer writes:

I must first tell you that you are selling the Best English Atari magazine I have ever read. Keep up the good work. As I was reading my manual I discovered the following line:

```
Processor 4001  
Clock Speed 1.18 Mhz
```

Isn't that a little slow for a great computer like this? For instance, the AMCR 280 processor has a clock speed of 8.0 MHz. As I know nothing about this I would like to know just what the clock speed is used for and if it has anything to do with the calculation speed of my TRAK.

In order to function, a CPU chip like the 6802 must be able to work in close association with all the other chips inside the computer. This means that

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## SOFTWARE Solutions

### 4 From Page 48

It must regulate its own tasks to match the speeds of the core chips, the IO devices and, in the Atari's case, the special graphics and sound chips. If they did not all run in perfect synchronization the entire would instantly crash.

In order to keep to this strict timing a tiny crystal inside the casing of the micro sends out a very fast stream of pulses which are then used by all of the major chips to time their various activities. Thus the 6802 knows exactly when to ask the ram for information, and also when POREY will be ready to accept a byte of sound data.

The crystal inside a European Atari oscillates at 3 Mhz — three million times a second. The display chip Amdc needs nearly half of these cycles for its own use, so the 6802 gets left with, as the message says, 1.59 million clock cycles every second.

The MSX machine you mentioned has a clock speed of 8 Mhz, or 8 million cycles per second, but you won't find it runs that much faster than your Atari for two main reasons.

Firstly the 8 Mhz clock will also have some cycles "stolen" by special display chips similar to, but nowhere near as powerful as, our very own ANTIC.

Secondly, although they are both 8 bit microprocessors, the 286 and the 6802 function quite differently internally. The former has a more powerful set of registers for calculations and many more instructions, but it often uses up a lot more clock cycles to do each job. In general terms, a 286 would take three to four times as many cycles as a 6802 to perform a given task.

So overall there will be little difference in CPU instruction speed between a 6802 running at 3 Mhz and a 286 running at 8Mhz. Any differences between the speeds of execution of Basic programs are more likely to be due to the skill of the writers of the Basic interpreter used on the machine in question.

Atari Basic is fairly fast in itself, but is held in check by the maths package in the operating system. This means that overall Atari Basic is nowhere near as fast as such machines as the BBC Micro, but if you tried a machine code comparison you'd see little or no difference.

### Email uploading

THE final letter this month comes in by electronic mail from a Dave on MicroLink's Atari section:

*I use my Atari and a modem to talk to the MicroLink system, and I want to prepare electronic mail and other text while offline so that I can transmit my messages in a block and log off again.*

*I am unable to get Mini Office II to upload text to the bulletin board, or to use the WPMail feature. When I'm trying to upload, the text appears about two inches in from the left of my TV screen, and this means that the MAIL command is not detected by MicroLink. I don't know why I cannot upload to the BB, but maybe it's a related problem?*

*In both cases I save my word processor file in Ascii text format, but the commands do not seem to register when I try to upload the file. Any help would be much appreciated.*

As this was an electronic mail question I have obviously also sent an online answer to Dave, but the solution may well interest other Email users.

When you edit a document using the Mini Office II word processor you have the option of saving the text in internal format — which stores all the embedded control codes and formatting commands — or of storing a straight Ascii text version.

MicroLink — like most other Email services — requires its messages to be

in standard Ascii text form, with any commands at the start of the line. You can, for example, use the command SEND to post your letter on to the system, or EDIT if you decide you wish to do some online editing or QUIT to abort the current mail item.

What has happened in this case is that you have saved the Ascii text with the margin still set for printing normal letters — at 10 characters. This means that each line of text in the file starts with 10 blank spaces, and so the mail commands are not recognised. MicroLink does not strip spaces off the start of each line in the same way that Basic does because you might wish to use spaces to offset some portion of your letter.

All you need to do is to re-set your Mini Office II left margin to zero, which can be done with embedded commands or via the menu system. Then save the document as an Ascii file and go to the communications program.

Log on to the remote system (such as MicroLink) and go to the mail section. You should then type Control-Shift-T — or use the menu — in order to select the filename to transmit. The filter mode should be set to Standard Ascii.

When you're ready to send, press the Start button and off it will go. This method should allow you to prepare text off line and then transmit it with the minimum of fuss to almost any electronic mail system — all from your humble II bit Atari.

■ Well, that just about wraps it up for this time. Keep those letters coming in — especially if you're still struggling with your first few programs on your new Atari II bit computer.

TRIG	BASIC
Tangent(X)	SIN(X)/COS(X)
Inverse sine(X)	ATN(SIN(X)*10+10)
Inverse cosine(X)	ATN(COS(X)*10+10)
Cotangent(X)	1/COS(X)/SIN(X)
Inverse cotangent(X)	ATN(X)+10
Secant(X)	1/COS(X)
Inverse secant(X)	ATN(COS(X)*10+10)/COS(X)
Cosecant(X)	1/SIN(X)
Inverse cosecant(X)	ATN(SIN(X)*10+10)/SIN(X)

Calculated in degrees - change any number 00 to 002 for radians

Derived trigonometric functions

## Mercenary: The Second City

LAST month we published a map to this superb science-fiction adventure game. To complement it here is a useful checklist to the keys and objects you will find. Just tick them off when you get them.



### Key checklist

- |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### Object checklist

- ☐ Antenna
- ☐ Antigrav (AG)
- ☐ Anti-time bomb (ATB)
- ☐ Bed
- ☐ Catering provisions (CP)
- ☐ Chair
- ☐ Chart
- ☐ Cheese
- ☐ Coffin
- ☐ Database
- ☐ Energy crystal (EC)
- ☐ Essential 12338 supply
- ☐ Flag
- ☐ Gold
- ☐ Grenade
- ☐ Kitchen sink
- ☐ Lamp
- ☐ Large box (LB)
- ☐ Mechanical (M)
- ☐ Medical supplies (MS)
- ☐ Metal detector (MD)
- ☐ Music stand
- ☐ Nuclear fuel
- ☐ Nonviable (ND)
- ☐ Oven

# Your HINTS & TIPS

- ☐ Pass
- ☐ Photon emitter (PE)
- ☐ Poweramp (PA)
- ☐ Prestidium
- ☐ Signs
- ☐ Table
- ☐ Transmitter
- ☐ Useful ornament (UA)
- ☐ Winchester
- ☐ Web

● You may photocopy this page to save cutting your magazine if you wish.

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Wolf Area (MSX)	9.95	4.95

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## TRANSDISK IV

Commercial tapes CAN be  
transferred to disk!



## READ ON!



Are you tired of waiting for cassette games to load? Would you like to transfer them to disk for faster, more reliable and convenient loading? You may have heard or read that this is not possible. Well, not only is it possible, but there is a program, Transdisk IV, that will do it all automatically. You require no knowledge of cassette protection technology! To put it simply, Transdisk IV will read ANY dual cassette, (single, multi-stage, non-standard format, S&B - no problem!), remove the protection, then place it on to disk for you. Plus, loaded and run the new disk version of a cassette program requires just one keypress from a convenient, automatic menu disk.

The rest of this, the most powerful tape to disk utility for the Atari is just £24.95 inclusive of first class delivery. Also comes complete with comprehensive instructions which were originally written with the cassette upgrader and first time disk user in mind.

Requires: Atari 8000X, or 1300X Computer with disk drive and cassette recorder.

Remember, that not only will you save money on upgrades to disk (if they are available) but many games are only available on cassette anyway so Transdisk IV has to be a worthwhile investment!

Send an SAE or phone for more details of this utility.

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# It's a moving experience

Continuing his Basic programming series LEN GOLDING introduces simple animation techniques

So far we've seen how to produce text displays and static pictures anywhere on screen. The next step is to make the images move around — computer animation in fact.

All arcade games use movement in one form or another, and the Atari computers have some very sophisticated built-in animation facilities — notably *Player-Missile* — PM — graphics. We'll get on to these in due course, but they are quite difficult to understand and usually require machine code to make them work, so we'll steer clear for the present.

It's relatively easy though, to produce fast animation using ordinary keyboard characters, and this month we show you how to do it. We'll encounter the IF...THEN command, together with the joystick functions STICK and STICK, we'll also take our first look at subroutines, using the commands GOSUB and RETURN.

Armed with these new techniques you will be able to write your first joystick-controlled games, and we've listed one to demonstrate the basic principles behind arcade action.

In order to create the illusion of movement you must first plot your character, then quickly erase it and print it again in an adjacent position. So long as there is no background to disturb, this is very easy. Try this:

```
10 PRINT CHR$(211);CHR$(148) (Use the cursor  
to get up to 14 14)  
20 ASCII=150:PRINT CHR$(ASCII)  
30 GOTO 100  
40 FOR V=1 TO 50:PRINT "X";V:GOTO 100  
50 PRINT CHR$(148);CHR$(150) (Use  
cursor keys to  
get next X  
50 NEXT V
```

This prints a small ball which

apparently moves across the screen from left to right. The cursor is also printed, which is rather distracting, but you can turn it off by POKE 752,1 followed by a PRINT statement, as we'll see shortly.

We can make the program more interesting by using a joystick to control the movement.

A joystick is just a simple switching device which can generate numbers between 0 and 15, depending on the stick position — see Figure 1. If you plug a stick into port 1, the number which



Figure 1: Numbers produced by a joystick

shows its current position — 0 to 15 — is automatically stored in a function called STICK00.

This behaves like an ordinary variable, except that the computer's operating system sets it up for you and updates it automatically every 50-th of a second. All you have to do is check the current value stored in it, for example by:

```
PRINT STICK00
```

and this will reveal the joystick's current position. There's also a function —



#### ◀ From Page 83

movement if the ball hits either boundary.

The best complex way of doing this is to nest the second IF...THEN statement inside the first. Change lines 70 and 80 to read:

```
70 IF STICKIN > 0 THEN IF STICK THEN G
  (PUSH) 100
80 IF STICKIN < 0 THEN IF STICK THEN G
  (PUSH) 100
```

The symbol < means is less than and > means is greater than. So line 70 will now update A2 only if the stick is pointing right AND if the character has not yet reached the right-hand border. Similarly line 80 will update A2 only if the stick is pointing left and the character has not reached the left border.

Once you understand how this program works you're ready for Program 8 — our first game. It's called Spider Attack and uses most of the techniques you've learned so far. If, when you type it in, there's anything you

don't understand, go back and re-read the earlier parts of this series — all the information is there for you.

The scenario involves a young lady who is frightened of spiders and must hurl methballs at them to deter their inexorable advance. The heroine is represented by a boat — CHASBO — at the top of the screen — yes, I know it's weird, but I couldn't find a macho symbol in the character set. The methball missiles are represented by the ball character — CHASBO. The spiders are asterisks — a mutant variety with six legs.

As the game starts our heroine is at the top center of the screen and the line of spiders is near the bottom. Use the joystick to move from side to side and the fire button to hurl a methball. If the missile hits a spider it will obliterate it, but after every shot the abominable arachnids will advance one line up the screen. Your task is to eliminate as many as possible before they reach the top line.

Right, how does it work? Line 30 turns off the cursor so that it doesn't interfere with the action. Unless you do this the little white square will be slipping around all over the screen with every POSITION command. It's still there of course, but the HOME command makes it invisible.

Line 35 sets up the variables which will be used to control horizontal movement and to keep track of the number of shots. Line 40 prints a row of nineteen asterisks near the bottom of the screen, and line 50 prints the heroine's boat character at top center.

Lines 60 to 100 read the joystick and move the heroine one space left or right using the technique we explained in Program 1. Line 60 checks to see if the fire button is pressed and, if it is, control passes straight to line 100 which handles the methball movement.

Since the methballs have to move vertically down the screen, the horizontal co-ordinate remains constant and the vertical co-ordinate increases according to the FOR...NEXT loop which starts at line 100.

As before, each move prints a blank space at the character's current location, then re-prints the character at its new position.

Line 108 keeps track of the number of methballs thrown and ends the game when it reaches 25. The command END does precisely what you'd expect it to — it terminates pro-

```
10 REM Program 8: Spider Attack game
20 HOME: POS=PRINT CHR$(11):HOME: Hide
  cursor location and status screen
30 AT=0: SHOTS=0: HOME
40 FOR STICK=0 TO 30 STEP 1: POSITION AT
  AT: POS=PRINT CHR$(11): HOME: Print 11
  to 0 spiders
50 POSITION AT: AT=HOME: CHASBO=BOAT: our
  girl's boat character
60 IF STICK=0 THEN GOTO 100
70 IF STICK=1 THEN STICK=0
80 IF STICK=0 THEN STICK=1: STICK THEN GOTO
  100: STICK=0
90 IF STICK=1 THEN STICK=0: STICK THEN GOTO
  100: STICK=1
100 POSITION AT: AT=HOME: CHASBO=BOAT
110 GOTO 60
120 POSITION AT: AT=HOME: CHASBO=BOAT
130 GOTO 60
140 REM Moving to throw methball
150 FOR MISS=0 TO 10
160 POSITION AT: AT=HOME: CHASBO=BOAT
170 REM Hit to throw?
180 POSITION AT: AT=HOME: CHASBO=BOAT
190 GOTO 60
200 REM Hit?
210 REM Hit?
220 REM Hit?
230 REM Hit?
240 REM Hit?
250 REM Hit?
260 REM Hit?
270 REM Hit?
280 REM Hit?
290 REM Hit?
300 REM Hit?
310 REM Hit?
320 REM Hit?
330 REM Hit?
340 REM Hit?
350 REM Hit?
360 REM Hit?
370 REM Hit?
380 REM Hit?
390 REM Hit?
400 REM Hit?
410 REM Hit?
420 REM Hit?
430 REM Hit?
440 REM Hit?
450 REM Hit?
460 REM Hit?
470 REM Hit?
480 REM Hit?
490 REM Hit?
500 REM Hit?
510 REM Hit?
520 REM Hit?
530 REM Hit?
540 REM Hit?
550 REM Hit?
560 REM Hit?
570 REM Hit?
580 REM Hit?
590 REM Hit?
600 REM Hit?
610 REM Hit?
620 REM Hit?
630 REM Hit?
640 REM Hit?
650 REM Hit?
660 REM Hit?
670 REM Hit?
680 REM Hit?
690 REM Hit?
700 REM Hit?
710 REM Hit?
720 REM Hit?
730 REM Hit?
740 REM Hit?
750 REM Hit?
760 REM Hit?
770 REM Hit?
780 REM Hit?
790 REM Hit?
800 REM Hit?
810 REM Hit?
820 REM Hit?
830 REM Hit?
840 REM Hit?
850 REM Hit?
860 REM Hit?
870 REM Hit?
880 REM Hit?
890 REM Hit?
900 REM Hit?
910 REM Hit?
920 REM Hit?
930 REM Hit?
940 REM Hit?
950 REM Hit?
960 REM Hit?
970 REM Hit?
980 REM Hit?
990 REM Hit?
1000 REM Hit?
```

Program 8: Spider attack game

gram execution and retains control to you with a READY message.

The clever bit is at line 210: This controls the spider's movement up screen using a command to PRINT nothing. It works because the invisible cursor must inevitably be on the bottom line after tracking a reptilian all the way down screen. So any PRINT statement will now make the whole screenful of characters scroll upwards by one line.

This means that the heroine ascends into oblivion, of course, but the final jump to line 50 immediately restores her to her rightful position.

You might like to improve the game by adding sound to it. Try linking the pitch of a SOUND statement to one or more of the existing variables – for example:

```
55 SOUND 1,444,10,1
```

or, for greater variation, make the pitch 10 times the value of ACW/as in:

```
100 SOUND 1,444*10,10,1
```

And don't forget to switch the sound off when you've finished with it.

```
111 SOUND 0,0,0,0
```

So much for two-dimensional joystick movement. Now take a look at Program B1, but don't bother typing it in. This one uses familiar techniques but allows you to move a character in any direction under joystick control.

It has to be a lot more complex, since instead of just two directions there are now eight to worry about – up, down, right, left and four diagonals. And there must be a boundary check for each direction.

This leads to an annoying amount of repetition in the program, and each diagonal direction needs two separate lines of IF...THEN statements – one for the horizontal and the other for the vertical component. You'd be right in thinking that there must be a better way, and in fact there are several, but the one we'll look at just now is the subroutine.

This is a sort of mini-program-within-a-program. It usually handles a clearly defined and self-contained task, especially if that task has to be executed more than once during the main program. It can be called at any point using the command GOSUB followed by the line number at which

```
10 REM PROGRAM B1: Subroutine written to
  1: 2-dimensional joystick control.
  2: 3: 4: 5: 6: 7: 8: 9: 10: 11: 12: 13: 14: 15: 16: 17: 18: 19: 20: 21: 22: 23: 24: 25: 26: 27: 28: 29: 30: 31: 32: 33: 34: 35: 36: 37: 38: 39: 40: 41: 42: 43: 44: 45: 46: 47: 48: 49: 50: 51: 52: 53: 54: 55: 56: 57: 58: 59: 60: 61: 62: 63: 64: 65: 66: 67: 68: 69: 70: 71: 72: 73: 74: 75: 76: 77: 78: 79: 80: 81: 82: 83: 84: 85: 86: 87: 88: 89: 90: 91: 92: 93: 94: 95: 96: 97: 98: 99: 100: 101: 102: 103: 104: 105: 106: 107: 108: 109: 110: 111: 112: 113: 114: 115: 116: 117: 118: 119: 120: 121: 122: 123: 124: 125: 126: 127: 128: 129: 130: 131: 132: 133: 134: 135: 136: 137: 138: 139: 140: 141: 142: 143: 144: 145: 146: 147: 148: 149: 150: 151: 152: 153: 154: 155: 156: 157: 158: 159: 160: 161: 162: 163: 164: 165: 166: 167: 168: 169: 170: 171: 172: 173: 174: 175: 176: 177: 178: 179: 180: 181: 182: 183: 184: 185: 186: 187: 188: 189: 190: 191: 192: 193: 194: 195: 196: 197: 198: 199: 200: 201: 202: 203: 204: 205: 206: 207: 208: 209: 210: 211: 212: 213: 214: 215: 216: 217: 218: 219: 220: 221: 222: 223: 224: 225: 226: 227: 228: 229: 230: 231: 232: 233: 234: 235: 236: 237: 238: 239: 240: 241: 242: 243: 244: 245: 246: 247: 248: 249: 250: 251: 252: 253: 254: 255: 256: 257: 258: 259: 260: 261: 262: 263: 264: 265: 266: 267: 268: 269: 270: 271: 272: 273: 274: 275: 276: 277: 278: 279: 280: 281: 282: 283: 284: 285: 286: 287: 288: 289: 290: 291: 292: 293: 294: 295: 296: 297: 298: 299: 300: 301: 302: 303: 304: 305: 306: 307: 308: 309: 310: 311: 312: 313: 314: 315: 316: 317: 318: 319: 320: 321: 322: 323: 324: 325: 326: 327: 328: 329: 330: 331: 332: 333: 334: 335: 336: 337: 338: 339: 340: 341: 342: 343: 344: 345: 346: 347: 348: 349: 350: 351: 352: 353: 354: 355: 356: 357: 358: 359: 360: 361: 362: 363: 364: 365: 366: 367: 368: 369: 370: 371: 372: 373: 374: 375: 376: 377: 378: 379: 380: 381: 382: 383: 384: 385: 386: 387: 388: 389: 390: 391: 392: 393: 394: 395: 396: 397: 398: 399: 400: 401: 402: 403: 404: 405: 406: 407: 408: 409: 410: 411: 412: 413: 414: 415: 416: 417: 418: 419: 420: 421: 422: 423: 424: 425: 426: 427: 428: 429: 430: 431: 432: 433: 434: 435: 436: 437: 438: 439: 440: 441: 442: 443: 444: 445: 446: 447: 448: 449: 450: 451: 452: 453: 454: 455: 456: 457: 458: 459: 460: 461: 462: 463: 464: 465: 466: 467: 468: 469: 470: 471: 472: 473: 474: 475: 476: 477: 478: 479: 480: 481: 482: 483: 484: 485: 486: 487: 488: 489: 490: 491: 492: 493: 494: 495: 496: 497: 498: 499: 500: 501: 502: 503: 504: 505: 506: 507: 508: 509: 510: 511: 512: 513: 514: 515: 516: 517: 518: 519: 520: 521: 522: 523: 524: 525: 526: 527: 528: 529: 530: 531: 532: 533: 534: 535: 536: 537: 538: 539: 540: 541: 542: 543: 544: 545: 546: 547: 548: 549: 550: 551: 552: 553: 554: 555: 556: 557: 558: 559: 560: 561: 562: 563: 564: 565: 566: 567: 568: 569: 570: 571: 572: 573: 574: 575: 576: 577: 578: 579: 580: 581: 582: 583: 584: 585: 586: 587: 588: 589: 590: 591: 592: 593: 594: 595: 596: 597: 598: 599: 600: 601: 602: 603: 604: 605: 606: 607: 608: 609: 610: 611: 612: 613: 614: 615: 616: 617: 618: 619: 620: 621: 622: 623: 624: 625: 626: 627: 628: 629: 630: 631: 632: 633: 634: 635: 636: 637: 638: 639: 640: 641: 642: 643: 644: 645: 646: 647: 648: 649: 650: 651: 652: 653: 654: 655: 656: 657: 658: 659: 660: 661: 662: 663: 664: 665: 666: 667: 668: 669: 670: 671: 672: 673: 674: 675: 676: 677: 678: 679: 680: 681: 682: 683: 684: 685: 686: 687: 688: 689: 690: 691: 692: 693: 694: 695: 696: 697: 698: 699: 700: 701: 702: 703: 704: 705: 706: 707: 708: 709: 710: 711: 712: 713: 714: 715: 716: 717: 718: 719: 720: 721: 722: 723: 724: 725: 726: 727: 728: 729: 730: 731: 732: 733: 734: 735: 736: 737: 738: 739: 740: 741: 742: 743: 744: 745: 746: 747: 748: 749: 750: 751: 752: 753: 754: 755: 756: 757: 758: 759: 760: 761: 762: 763: 764: 765: 766: 767: 768: 769: 770: 771: 772: 773: 774: 775: 776: 777: 778: 779: 780: 781: 782: 783: 784: 785: 786: 787: 788: 789: 790: 791: 792: 793: 794: 795: 796: 797: 798: 799: 800: 801: 802: 803: 804: 805: 806: 807: 808: 809: 810: 811: 812: 813: 814: 815: 816: 817: 818: 819: 820: 821: 822: 823: 824: 825: 826: 827: 828: 829: 830: 831: 832: 833: 834: 835: 836: 837: 838: 839: 840: 841: 842: 843: 844: 845: 846: 847: 848: 849: 850: 851: 852: 853: 854: 855: 856: 857: 858: 859: 860: 861: 862: 863: 864: 865: 866: 867: 868: 869: 870: 871: 872: 873: 874: 875: 876: 877: 878: 879: 880: 881: 882: 883: 884: 885: 886: 887: 888: 889: 890: 891: 892: 893: 894: 895: 896: 897: 898: 899: 900: 901: 902: 903: 904: 905: 906: 907: 908: 909: 910: 911: 912: 913: 914: 915: 916: 917: 918: 919: 920: 921: 922: 923: 924: 925: 926: 927: 928: 929: 930: 931: 932: 933: 934: 935: 936: 937: 938: 939: 940: 941: 942: 943: 944: 945: 946: 947: 948: 949: 950: 951: 952: 953: 954: 955: 956: 957: 958: 959: 960: 961: 962: 963: 964: 965: 966: 967: 968: 969: 970: 971: 972: 973: 974: 975: 976: 977: 978: 979: 980: 981: 982: 983: 984: 985: 986: 987: 988: 989: 990: 991: 992: 993: 994: 995: 996: 997: 998: 999: 1000: 1001: 1002: 1003: 1004: 1005: 1006: 1007: 1008: 1009: 1010: 1011: 1012: 1013: 1014: 1015: 1016: 1017: 1018: 1019: 1020: 1021: 1022: 1023: 1024: 1025: 1026: 1027: 1028: 1029: 1030: 1031: 1032: 1033: 1034: 1035: 1036: 1037: 1038: 1039: 1040: 1041: 1042: 1043: 1044: 1045: 1046: 1047: 1048: 1049: 1050: 1051: 1052: 1053: 1054: 1055: 1056: 1057: 1058: 1059: 1060: 1061: 1062: 1063: 1064: 1065: 1066: 1067: 1068: 1069: 1070: 1071: 1072: 1073: 1074: 1075: 1076: 1077: 1078: 1079: 1080: 1081: 1082: 1083: 1084: 1085: 1086: 1087: 1088: 1089: 1090: 1091: 1092: 1093: 1094: 1095: 1096: 1097: 1098: 1099: 1100: 1101: 1102: 1103: 1104: 1105: 1106: 1107: 1108: 1109: 1110: 1111: 1112: 1113: 1114: 1115: 1116: 1117: 1118: 1119: 1120: 1121: 1122: 1123: 1124: 1125: 1126: 1127: 1128: 1129: 1130: 1131: 1132: 1133: 1134: 1135: 1136: 1137: 1138: 1139: 1140: 1141: 1142: 1143: 1144: 1145: 1146: 1147: 1148: 1149: 1150: 1151: 1152: 1153: 1154: 1155: 1156: 1157: 1158: 1159: 1160: 1161: 1162: 1163: 1164: 1165: 1166: 1167: 1168: 1169: 1170: 1171: 1172: 1173: 1174: 1175: 1176: 1177: 1178: 1179: 1180: 1181: 1182: 1183: 1184: 1185: 1186: 1187: 1188: 1189: 1190: 1191: 1192: 1193: 1194: 1195: 1196: 1197: 1198: 1199: 1200: 1201: 1202: 1203: 1204: 1205: 1206: 1207: 1208: 1209: 1210: 1211: 1212: 1213: 1214: 1215: 1216: 1217: 1218: 1219: 1220: 1221: 1222: 1223: 1224: 1225: 1226: 1227: 1228: 1229: 1230: 1231: 1232: 1233: 1234: 1235: 1236: 1237: 1238: 1239: 1240: 1241: 1242: 1243: 1244: 1245: 1246: 1247: 1248: 1249: 1250: 1251: 1252: 1253: 1254: 1255: 1256: 1257: 1258: 1259: 1260: 1261: 1262: 1263: 1264: 1265: 1266: 1267: 1268: 1269: 1270: 1271: 1272: 1273: 1274: 1275: 1276: 1277: 1278: 1279: 1280: 1281: 1282: 1283: 1284: 1285: 1286: 1287: 1288: 1289: 1290: 1291: 1292: 1293: 1294: 1295: 1296: 1297: 1298: 1299: 1300: 1301: 1302: 1303: 1304: 1305: 1306: 1307: 1308: 1309: 1310: 1311: 1312: 1313: 1314: 1315: 1316: 1317: 1318: 1319: 1320: 1321: 1322: 1323: 1324: 1325: 1326: 1327: 1328: 1329: 1330: 1331: 1332: 1333: 1334: 1335: 1336: 1337: 1338: 1339: 1340: 1341: 1342: 1343: 1344: 1345: 1346: 1347: 1348: 1349: 1350: 1351: 1352: 1353: 1354: 1355: 1356: 1357: 1358: 1359: 1360: 1361: 1362: 1363: 1364: 1365: 1366: 1367: 1368: 1369: 1370: 1371: 1372: 1373: 1374: 1375: 1376: 1377: 1378: 1379: 1380: 1381: 1382: 1383: 1384: 1385: 1386: 1387: 1388: 1389: 1390: 1391: 1392: 1393: 1394: 1395: 1396: 1397: 1398: 1399: 1400: 1401: 1402: 1403: 1404: 1405: 1406: 1407: 1408: 1409: 1410: 1411: 1412: 1413: 1414: 1415: 1416: 1417: 1418: 1419: 1420: 1421: 1422: 1423: 1424: 1425: 1426: 1427: 1428: 1429: 1430: 1431: 1432: 1433: 1434: 1435: 1436: 1437: 1438: 1439: 1440: 1441: 1442: 1443: 1444: 1445: 1446: 1447: 1448: 1449: 1450: 1451: 1452: 1453: 1454: 1455: 1456: 1457: 1458: 1459: 1460: 1461: 1462: 1463: 1464: 1465: 1466: 1467: 1468: 1469: 1470: 1471: 1472: 1473: 1474: 1475: 1476: 1477: 1478: 1479: 1480: 1481: 1482: 1483: 1484: 1485: 1486: 1487: 1488: 1489: 1490: 1491: 1492: 1493: 1494: 1495: 1496: 1497: 1498: 1499: 1500: 1501: 1502: 1503: 1504: 1505: 1506: 1507: 1508: 1509: 1510: 1511: 1512: 1513: 1514: 1515: 1516: 1517: 1518: 1519: 1520: 1521: 1522: 1523: 1524: 1525: 1526: 1527: 1528: 1529: 1530: 1531: 1532: 1533: 1534: 1535: 1536: 1537: 1538: 1539: 1540: 1541: 1542: 1543: 1544: 1545: 1546: 1547: 1548: 1549: 1550: 1551: 1552: 1553: 1554: 1555: 1556: 1557: 1558: 1559: 1560: 1561: 1562: 1563: 1564: 1565: 1566: 1567: 1568: 1569: 1570: 1571: 1572: 1573: 1574: 1575: 1576: 1577: 1578: 1579: 1580: 1581: 1582: 1583: 1584: 1585: 1586: 1587: 1588: 1589: 1590: 1591: 1592: 1593: 1594: 1595: 1596: 1597: 1598: 1599: 1600: 1601: 1602: 1603: 1604: 1605: 1606: 1607: 1608: 1609: 1610: 1611: 1612: 1613: 1614: 1615: 1616: 1617: 1618: 1619: 1620: 1621: 1622: 1623: 1624: 1625: 1626: 1627: 1628: 1629: 1630: 1631: 1632: 1633: 1634: 1635: 1636: 1637: 1638: 1639: 1640: 1641: 1642: 1643: 1644: 1645: 1646: 1647: 1648: 1649: 1650: 1651: 1652: 1653: 1654: 1655: 1656: 1657: 1658: 1659: 1660: 1661: 1662: 1663: 1664: 1665: 1666: 1667: 1668: 1669: 1670: 1671: 1672: 1673: 1674: 1675: 1676: 1677: 1678: 1679: 1680: 1681: 1682: 1683: 1684: 1685: 1686: 1687: 1688: 1689: 1690: 1691: 1692: 1693: 1694: 1695: 1696: 1697: 1698: 1699: 1700: 1701: 1702: 1703: 1704: 1705: 1706: 1707: 1708: 1709: 1710: 1711: 1712: 1713: 1714: 1715: 1716: 1717: 1718: 1719: 1720: 1721: 1722: 1723: 1724: 1725: 1726: 1727: 1728: 1729: 1730: 1731: 1732: 1733: 1734: 1735: 1736: 1737: 1738: 1739: 1740: 1741: 1742: 1743: 1744: 1745: 1746: 1747: 1748: 1749: 1750: 1751: 1752: 1753: 1754: 1755: 1756: 1757: 1758: 1759: 1760: 1761: 1762: 1763: 1764: 1765: 1766: 1767: 1768: 1769: 1770: 1771: 1772: 1773: 1774: 1775: 1776: 1777: 1778: 1779: 1780: 1781: 1782: 1783: 1784: 1785: 1786: 1787: 1788: 1789: 1790: 1791: 1792: 1793: 1794: 1795: 1796: 1797: 1798: 1799: 1800: 1801: 1802: 1803: 1804: 1805: 1806: 1807: 1808: 1809: 1810: 1811: 1812: 1813: 1814: 1815: 1816: 1817: 1818: 1819: 1820: 1821: 1822: 1823: 1824: 1825: 1826: 1827: 1828: 1829: 1830: 1831: 1832: 1833: 1834: 1835: 1836: 1837: 1838: 1839: 1840: 1841: 1842: 1843: 1844: 1845: 1846: 1847: 1848: 1849: 1850: 1851: 1852: 1853: 1854: 1855: 1856: 1857: 1858: 1859: 1860: 1861: 1862: 1863: 1864: 1865: 1866: 1867: 1868: 1869: 1870: 1871: 1872: 1873: 1874: 1875: 1876: 1877: 1878: 1879: 1880: 1881: 1882: 1883: 1884: 1885: 1886: 1887: 1888: 1889: 1890: 1891: 1892: 1893: 1894: 1895: 1896: 1897: 1898: 1899: 1900: 1901: 1902: 1903: 1904: 1905: 1906: 1907: 1908: 1909: 1910: 1911: 1912: 1913: 1914: 1915: 1916: 1917: 1918: 1919: 1920: 1921: 1922: 1923: 1924: 1925: 1926: 1927: 1928: 1929: 1930: 1931: 1932: 1933: 1934: 1935: 1936: 1937: 1938: 1939: 1940: 1941: 1942: 1943: 1944: 1945: 1946: 1947: 1948: 1949: 1950: 1951: 1952: 1953: 1954: 1955: 1956: 1957: 1958: 1959: 1960: 1961: 1962: 1963: 1964: 1965: 1966: 1967: 1968: 1969: 1970: 1971: 1972: 1973: 1974: 1975: 1976: 1977: 1978: 1979: 1980: 1981: 1982: 1983: 1984: 1985: 1986: 1987: 1988: 1989: 1990: 1991: 1992: 1993: 1994: 1995: 1996: 1997: 1998: 1999: 2000: 2001: 2002: 2003: 2004: 2005: 2006: 2007: 2008: 2009: 2010: 2011: 2012: 2013: 2014: 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```

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After the first call (line 12), Basic will automatically go to line 20. After the second call (line 20) it will return to line 30. GOSUB is obviously a lot more versatile than GOTO, which can only ever jump to a single, fixed point in your program.

If there are any further statements on the line containing your GOSUB command, Basic will return to the next statement after GOSUB - unlike IF...THEN, it doesn't need to skip to the next line.

Note the GOTO 10 at line 30. Without this Basic would crash through into the subroutine again and, when it encountered the RETURN command, it wouldn't know where to go. You'd then get ERROR 16 indicating RETURN without a corresponding GOSUB.

Program 19 shows how you can use subroutines to avoid much of the repetitive typing in Program 18. There are four subroutines controlling movement up, down, right and left respectively, and each contains its own boundary check. If vertical upward movement is required we

instruct the computer to GOSUB 220. To go left it's GOSUB 260, and to move diagonally up/left we simply call both routines one after the other - GOSUB 220 GOSUB 260. Using this technique it's easy to move a character in any of the eight possible directions.

The code for our joystick control routine is now shorter and much easier to understand - compare lines 20-30 to 100 in Program 18 with lines 80 to 200 in Program 19.

Because the subroutines can be called more than once - from different places in the program - there's very little repetitive typing to do. You can write subroutines to handle any repetitive chores of this kind, and they make the program structure more elegant.

■ Next month we'll demonstrate how you can move characters in eight directions without disturbing a background picture, and start to look at the use of colour in Graphics Mode 3 and 4.

Send them try these routines and write some of your own. Remember, practice makes perfect.

```
10 REM PROGRAM 19: More elegant joystick control, using subroutines
20 STATE=0:Y=0:YMAX=20:YMIN=0:YMAX=20:YMIN=0:YMAX=20:YMIN=0
30 GOTO 100:REM Now horizontal and vertical coordinates
40 REM Horizontal coordinates
50 REM Vertical coordinates
60 REM Diagonal coordinates
70 REM Diagonal coordinates
80 REM Diagonal coordinates
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Program 19: Elegant joystick movement

# Put in the boot when all else fails

JUST before Christmas I bought a 8800 system. My first attempts with the micro have been quite frustrating. In fact, the best, and I have several questions.

Firstly, I have been experiencing great difficulty loading some of the games I got with the computer. It appears that it is not sufficient to just simply type CLDAD. What else do I have to do?

Is it possible to expand the micro's memory, and what is the best disc drive to use with it? Finally, will old games like *Don and Conan the Barbarian* run on my computer? — **A. White, Barnsley, South Yorkshire.**

Most of the tapes you got with your computer contain machine code programs. You can't load these direct from Basic — so you must 8800 them. You do this by holding the Start and Option keys down as you switch the micro on.

You will hear a beep, and at this point insert the tape and press Return. Then just wait a while and the program will load.

It is possible to upgrade the memory of your 8800, but the 64k of memory it has is enough to run any software currently available.

Any of the Atari disc drives will work with it although, at the moment, there is a slight problem obtaining one. Atari plans to release a new disc drive

which should be available soon.

Most games written for the old style micros — Atari 400 and 800 — will work on your 88 system. However, some differences in operating systems between the new and old machines mean certain software will not work — but this is only a minority.

*Don* and *Conan the Barbarian* will work perfectly.

## Display width poke

I HAVE just bought a book for my Atari called *Software for the XL*. There's a program in it called *Chromaplay*, and every time I try to type in the listing I get an error at line 805.

When I do this line the end is always missing, and my *at* key I can't get it to go in. Can you please tell me how to enter this line? — **Derek Spring, Leeds.**

Before you attempt to enter the listing type POKE 82,0 followed by Return. This will increase the width of the display and allow you

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Addington  
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to enter more characters per program line.

Also use all possible abbreviations for commands — for example: G for GOTO — and enter the line without any spaces, as Basic will automatically insert them for you.

## Saving with paint

COULD you please tell me if it is possible to save or print pictures from the Paint only package? I have an Atari 1300X, 1300 disc drive and 1300 printer.

I have drawn some quite good pictures and it is most annoying to just switch off the system and lose them. — **Michael Simons, Crawborough, East Sussex.**

You can save pictures created using Paint by opening the disc menu from the main menu and selecting Save File. Enter

the filename when prompted, but make sure you have a Dos disk in the drive.

In the January 1988 issue of *Atari User* there was a program to convert Paint picture files to a 50 sector uncompressed file, and in the same issue there was also a utility to print the newly-converted picture on an Atari 1300 printer.

## Cartridge gadget

I OWN an Atari 1300X and 1300 disc drive and I am very happy with it except for one small problem concerning the cartridge socket.

The way the system is located on my desk makes it very difficult to plug and unplug cartridges without having to move the computer.

Apart from the annoyance at moving it I'm also worried about the wear and tear on the socket. Would it be possible for your gadget's expert Len Gidding to design something to overcome my problems? — **Robbie James, Warrington.**

Although it would be possible for Len to design such a gadget it could work out to be rather expensive, and if any mistakes were made in its construction it could damage your computer quite badly. So regrettably, it's a non-starter.

## Recipe for success

IN the October 1987 issue of *Atari User* there was a letter from John Upon asking for information about astrology.

Turn to Page 68 in

## Boost for Atari comms

I FOUND the article on modems in the January issue very interesting. It doesn't seem that long ago that it was almost impossible to buy a modem for an Atari.

However, despite this improvement, we Atari owners for a long time were still lacking in communications software that would allow the use of teletext mode and support split baud rates.

Part of the trouble was the Atari 850 interface box that

was for a long time the only way of connecting anything to an Atari.

Now *Micro Technology* brought out its interface and cable and *Multiusercom* software which allows the use of split baud rates and the teletext mode.

Now Atari users are not restricted to 300/300 baudline boards and *MicroLink* Teletext Gold and can now access Prestel and 1300/130 baudline boards to their heart's content. — **Peter Boulter via MicroLink.**

#### 4 From Page 87

and history programs for the 8 Bit Atari.

A piece of a couple of programs available on astrology, are from The Catalog, 644 Second Street, San Francisco, CA U.S.A. and one from Astrologic, 67 Manscroft Road, Hamel, Minnesota, MN 55031.

A good costbookkeeping program is available from New Horizons, P.O. Box 780253, Austin, TX 78718 U.S.A. It is called The Computer Account and is very useful and informative. — B. Lussier, Burnaby, Canada.

## Sub hunting for errors

COULD you please tell me if there is anything missing from the listing of Submarine Hunter that appeared in the January 1988 issue of Atari User?

I am convinced I have entered it correctly, but when I play it I find that no score appears at the bottom of the screen. — M. Fitzgerald, Darlington, West Midlands.

● The listing was published as complete and works perfectly. Check the lines of data very carefully, as a mistake there may not crash the game but could cause the wrong information or none at all to be displayed.

### ETD LETTER

## The Melody lingers on

What a marvellous program Melody Maker by Bruce Murrehead is (February 1988). I typed it in and have thoroughly enjoyed playing tunes on it ever since.

However, as it stands it is not suitable for playing guitar music, which needs a greater range of notes and a larger memory store — the chord movement of Baroque's Ca Caracal needs 4128 bytes to store including its repeats.

Also tunes are stored in

files whose size is set by the variable CAP, so a little juggle occupies the same size as a symphony.

The following changes to the program will remedy these slight discrepancies:

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with a question: Every month *Galtop* provides you with information of games sales which enable you to compile a chart of the top 20 selling Atari games. Could you please tell me which shops are polled by *Galtop*?

I live in London and yet in such a vast expanse of commercial retailing I still have problems finding Atari software.

I have been informed by an advert that *Julius Shop* is the UK's No. 1 Atari specialist. But although it may have been, since its Tottenham Court Road branch started to sell other brands of computer games its supply of 8 bit Atari software and hardware has dwindled dramatically.

It does appear that even though software houses are producing games for the Atari there are no shops willing to retail them.

With this poor attitude how shops and certain soft-

ware houses Atari computers are fighting an uphill battle. It would be a crying shame if the popularity of the machine was marred because of ignorance. — **Peter Christie, London.**

■ The *Galtop* chart is compiled from sales figures taken from various shops around the country. It may be that when the charts are compiled the shop that you mentioned was not polled.

A FRIEND told me that there are a lot of good Atari software titles in America that have not been released in England. Is this true, and why aren't they available to people in the UK? — **Glen Williams, North Preston, Lancashire.**

■ There are a lot of games and business programs available in America that haven't been released in the UK. Unfortunately, a lot of US software distributors believe that the market for 8 bit Atari software is dead,

which is a mistake on their part.

We receive an incredible number of letters about this subject and we can see a long life for Atari 8 bit computers in the UK.

In November I went to the Atari User Show at the Novotel in London. It was the best show that I have been to and I was pleased to see the amount of interest in Atari products.

Unfortunately there was a lack of new software for the 8 bit Atari and this was a great shame. There were a lot of people there looking for new games for their trusty 8 bit and it was a shame that they had to go away unhappy.

On a lighter theme, I was very pleased to see that Atari is supporting the new All systems and I send my thanks to *Rich Davidson* who has done a great job since he arrived at Atari.

I do hope that it will now

release its old cartridge games again at a budget price as I find that they will sell very well.

At the show I saw the new Atari light gun for the 800 games system. Will it work on my 1300XT computer? — **Jackie O'Malley, Harrogate, North Yorkshire.**

■ The new light gun will work on your 1300XT, but the only game currently available for it is *Bug Hunt* on coin cartridges.

In the February 1988 issue of *Atari User* we published a game written to work with the gun, and this listing should show you the techniques needed to incorporate the gun into your own programs.

There are just a few of the letters waiting to be highlighted for the next edition of *Atari User*. Perhaps if we choose a few and long enough somebody will do something about it.

## ARE YOU BORED TO PLAY THE SAME GAME?...



**TIKI GANGSTERS' VILLE**  
PLAYABLE WITH ATARI LIGHT GUN  
INCLUDED ALSO A BOARD GAME



**TRANS ROBOTS ON THE SHELL PLANET**  
LAST BATTLE  
(play it with joy stick)  
DISK £ 9  
(English instructions)

**NEW!**

ORDER DIRECTLY (the cheapest) TO: LINDASOFT  
VIA PIERMONTA 15 - 20122 MONZA (MI) ITALY

**TRANSFER GAMES** FUN TO OWN! Thought I was computer-wise but many computer games can indeed be transferred to other computers! We had **ALCHEMIST** tape to disk transfer system. The utility converts any hardware to any format, makes new and saves game cartridge tape.

**RECOVER DISK BACKUP** The **DISK TO DISK PLUS** offers disk backup, including disks that use **CRQ** and **RAM-BUFFER** for protected features also include **Tapes to Disk Transfer** - **Disk to Tape Transfer** - and a **Tapes to Tape Transfer**.

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**RECOVER TAPES** **LOADING TIMES** As well as automatic backup, automatic games, **TRANSFER** **LOADING TIMES** will save when an additional feature - **TRANSFER** The utility will transfer any tape to an internal disk, external disk, or hard disk (up to 10MB) **TRANSFER** (MS-DOS) **TRANSFER** (MS-DOS) **TRANSFER** (MS-DOS) **TRANSFER** (MS-DOS)

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## Two discs crammed with the most popular programs from your favourite magazine!

These two exciting compilations bring together some of the very best listings from the pages of Atari User.

Whether you like games or prefer more serious pursuits there's something here for you – and you can also learn a great deal from examining and modifying the Basic listings.

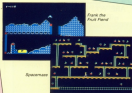
### Ten of the Best Games

- Chopper Rescue** – Take command of a helicopter to rescue lost soldiers.
- Des Bells** – Rescue Enriesta by negotiating the dangerous obstacles.
- Spacemaze** – Fly your spaceship through the deadly unknown below the lunar surface.
- Mazemunch** – Guide your munch monster around the maze, avoiding its deadly inhabitants.
- Minerlode** – Gooble up all the money but beware of the angry spooks!
- Frank the Punk Planet** – Help Frank eat his favourite food in this platform game.
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