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Volume 2, Issue 6

November 1st., 1985

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Oxon residents are offered a subsidised subscription at £1.56 p.a., payable either as 12 second class postage stamps or by cheque.

THIS OFFER APPLIES UNTIL MAY 1986 ONLY

TI-LINES is available on Associate subscription to Users resident outside Oxfordshire, for £10 p.a. Overseas subscriptions are by arrangement. Back issues are £2 including post and packing. New subscriptions begin with Issue 1 of the current volume, up to and including the current issue, regardless of the number of issues elapsed.

Contributions should be submitted either on diskette in TI-Writer compatible files, or in a form which is as legible as possible. Art work should fit within an A4 area and should not contain colour. Very high contrast line drawings are preferred, and these may be produced by arrangement with the publisher.

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From BRUCE CARON, Assorted And Miscellaneous Information, Including How To Add 8K RAM To The Editor/Assembler, And How To Access Disk Sectors From Assembly Language (A Useful Intro To Information From RICHARD BLANDEN)	

Scanning note: Sadly this copy of the magazine had a number of pages which could not be scanned, being copies of copies of copies etc. These pages are sadly not in this scan.

Notable article missing- an illustration of using Enhanced Basic where significant portions of the listings were cut off. No corrections were issued. Page numbers have been adjusted.

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IF YOU KNOW OF SOMEONE WHO DOESN'T HAVE A SUBSCRIPTION TO TI-LINES,
WHY NOT GET YOUR BETTER HALF TO GET THEIR BETTER HALF TO TAKE ONE OUT ?

E D I T O R I A L

BEEB RAINS OK ?

A short item in one of the micro mags recently revealed that the BBC micro is able to receive pictures from the weather satellites. It involves some extra hardware, naturally, and I'm just wondering if the same principle could be applied to our trusty 99s - well, those with bit-map mode anyway (i.e., not the early 99/4s). Any takers ?

~~~~~

TI POWERS TANDY  
-----

I gather from ALAN DAVEY that TI power supply units (which were designed to run the console) have been cropping up in TANDY RADIO SHACK outlets in Torquay for £5. GORDON PITT followed this up with a visit to TRS' central warehouse, which is not far from him, and came away with a circuit board without a transformer or even a casing, and with several more bits to buy before it could be classified as a former TI psu, for £4.95. I'm not sure therefore whether the two are the same, but I hope to have more news later. Such a psu could lower the cost of providing external drive systems and thus enable more of us to either expand our systems or begin to build a cheap one.

~~~~~

TI STILL IN THE RUNNING

When GORDON PITT went to buy a TI console from a branch of WIGFALLS in MANCHESTER, he came across an interesting fact. He wasn't able to buy a console because they had sold out: in fact, sold out of 5000 consoles in one weekend of a stock clearance sale! This has given him a greater incentive to put out an advert on several of his local radios (not just one), and we may see a small increase in OTIU numbers as a result. With any luck, Gordon should see a large increase in his members.

Incidentally, the consoles were selling for £39.95 each...

~~~~~

Q: WHEN DOES SAVE CS2 NOT SAVE CS2 ?  
-----

A: When TI try to cut costs by not implementing the CS2 hardware in later issues of the console. This fact came to light recently when I talked to ALAN DAVEY, and it has since been confirmed by other sources. Now, you might think that the lack of CS2 is not the end of the world, but some software does rely on it, and there is the little-known but useful facility whereby you can make two copies of a program on cassettes simultaneously by saving to CS1 or 2 and connecting BOTH leads to tape recorders (without remote leads, I assume). The signal is fed to both leads so both recorders can be used. Checking if necessary has to be done on an individual basis, obviously. I am indebted to NEIL LAWSON for that piece of information - yes folks, I'm STILL learning after five years of ownership!

I am told that if you write a nice letter to PHIL WINGROVE at Manton Lane and send him your offending console, he will arrange to have the CS2 facility re-instated free of charge. I would check on this just to make sure, though, before dropping yourself in it (and me too!).

You can easily check to see if CS2 is connected: just SAVE CS2 (with a program in memory, of course!) and then check to see if a signal appears on the cassette (you don't need to CHECK via the console, just listen to the tape!).

~~~~~  
PUZZLE NUMBER ONE

I recently put together two half-height double sided 40 track MPI drives for an owner, and before I sent it off with all its leads, I ran it on my system to see if it worked OK. It didn't. It took me over 24 hours solid to try and sort out the problem, which hinged on preventing the TI Disk Controller from powering up all drives in the system every time it wants to talk to just one - it's called MOTOR ON SELECT, and is easiest to apply to the half-heights rather than the full-heights. I did eventually manage to make it all work, after a lot of help from the engineer (and some interesting advice - see later), but in the process the Disk Manager 2 gave me an error code to set me thinking. The code, 38, is not supposed to be used by DM2 according to the manual: the two digits are to be interpreted separately, so 3 means an INPUT error was found, and 8 is not used. It may be that the insufficient power given out by my Peripheral Expansion Box could have caused unusual conditions to obtain (as they say), and I'd be the first to agree. However, what appears to be a slight alignment difference between my full-height drive and one of the half-height drives, which were operated singly (and therefore powered adequately), caused the same error message, 38, which puts me in the position of someone looking for a black cat in an unlit coal cellar after midnight. Ahem.

~~~~~  
DOs AND DON'Ts  
-----

As a result of talking to the MPI engineer about drives in general, several interesting facts have emerged. Firstly, how many of us insert our disks with the drive spindle still turning? I haven't done so, largely because it was frowned upon by the people who initiated me into some of the mysteries of drive operation. "Wait until the drive stops turning before either inserting or extracting a disk" they always said.

Not so, it seems. It is BETTER if you can insert or extract a disk while the spindle is still turning, says the engineer, as this helps to centre the disk correctly when going in and avoids incorrect clamping - a problem which cropped up just recently, in fact.

MPI drives have a superior, and less damaging (to the disk), clamping mechanism than those made by SHUGART (who didn't actually MAKE them anyway!). Full-height drives are to be preferred at ALL times, as the modifications made to their half-height cousins mean that the clamping mechanism is far less efficient. In addition, the MTBF (Mean Time Before Failure) for half-heights is much, much less than that for the full-heights. This applies to ALL drives, especially the new Japanese half- and third- heights. In spite of this, I receive more requests for half-height systems than for full-heights.



Written by GARY HARDING. Condensed for easy reading by RICHARD OWEN

PART 1. THE BASICS  
-----

WHAT?

What is an assembly language?

Well all microprocessors come with their own instruction sets with which they may be programmed - not quite "LET, GOTO, GOSUB, PRINT, etc.", but the principle is the same.

The CPU (central processing unit) only recognizes BINARY numbers. So what we need is a go-between (or translator). This must correspond exactly with the CPU's instruction set. This is (surprise!!!!) an assembly language.

Let's concentrate on our very own TMS 9900 microprocessor. It has a fairly comprehensive instruction set, consisting of 69 instructions (64 on the 99s). These 64 fall into 7 BROAD categories:-

1. Data transfer - moving data around in memory
2. Arithmetic - the basic four functions, plus a few others
3. Comparison - of data in memory with other data/constants
4. Logical - Boolean operations or setting/clearing of bits
5. Shift - moving bit-patterns rightwards and leftwards
6. Branch and jump - including subroutine linkage
7. CRU - forget about these for the time being

I, (with the help of Gary Harding's booklets (novels?)) shall be running through the instruction set in future editions of TI-LINES, but there is a fair bit to get through first, as there is a considerable difference between BASIC and ASSEMBLY language.

Here now is part of an assembly language program for single pixel plotting .... yet again from Gary Harding!!!!

What/con.?  
-----

Each instruction in an assembly language program corresponds directly with just one CPU operation, whereas the execution of a single instruction in TI-BASIC program causes, via the interpreter, a sequence of many such 9900 instructions to be executed.

The TI BASIC system relieves the programmer of the responsibility for allocating storage space in memory for variables. It automatically reserves 8 bytes, for each numeric variable, and allocates the requisite number of bytes (one for each character and one for the length), for each string, re-arranging memory as necessary.

When using assembly language, however, none of this convenient work is done for you. It is your responsibility to reserve space in memory within your program, in order to maintain variables. This is the main reason why assembly language programming takes a lot more effort than BASIC programming.

The Basic unit of storage as far as 9900 is concerned, is the BYTE, although it is more usual to use a pair of bytes, termed a WORD. The CPU may address 64K bytes of memory directly, numbered 0 to 65535 with words starting at even byte addresses, i.e. 0,2,4,6 etc. Many of the 9900 assembly language instructions come in two varieties to allow the same operation to be performed on word and byte operands. What you store in a particular word of memory, and how you interpret it is completely up to you, as there are no pre-determined data types such as the numeric and string types in TI-BASIC.

```

CLR          DEF  SETUP, PLOT, DRAW, CIRCLE

REF  NUMREF, XMLLNK, GPLLNK
REF  VWTR, VSWR, VSWB
REF  VDPWD

FIRST EQU 31+>60
LAST  EQU >FF
NROWS EQU 24
NCOLS EQU 32

FAC   EQU >834A
ARG   EQU >835C
STATUS EQU >837C

CFI   EQU >1200      XMLLNK
CIF   EQU >2300      XMLLNK
SQRT  EQU >0026      GPLLNK

EVEN
PXLWSP BSS 32
CODE   BSS 2
NEGX   BSS 2
NEGY   BSS 2
SWPXY  BSS 2

*      VDP  RAM BLOCK FILL

RPTWRT BLWP @VSWB      RO=VDP DESTINATION ADDRESS
        JMP  RPT2
RPT1   MOVB R1,@VDPWD  R1=SOURCE BYTE
RPT2   DEC  R2          R2=NUMBER OF BYTES
        JNE RPT1
        RT
PAGE

```

One little plea... Is there anybody out there reading this who could possibly donate a program to be published? Your name in print..... Helping OTIUsers... Think about it. At time of writing, I have aout 6 months worth of programs and ten '0' level exams to contend with!!!!

Any help or feedback is much appreciated. If there is any point I have raised that you are not sure about, tell me.

My address is Richard Owen, 17 Highfield Avenue, Litchard, Bridgend, Mid Glam, S. Wales, CF31 1QR. Thank you.



```

SET UP      MOV  R11, R3
           CLR  R0
           LI   R1, FIRST
           MOV  R11, @CODE
           SWPB R1
           LI   R2, NROWS*NCOLS
           BL   @RPWTWT
           LI   R1, 1
           BLWP @NUMREF          PARAM #1=FG COLOUR
           BLWP @XMLLNK
           DATA CFI
           MOV  @FAC, R2
           INC  R1
           BLWP @NUMREF          PARAM #2=BG COLOUR
           BLWP @XMLLNK
           DATA CFI
           MOV  @FAC, R0
           DEC  R0
           DEC  R2
           ANDI R0, )000F
           ANDI R2, )000F
           SLA  R2, 4
           SDC  R2, R0
           AI   R0, )0700
           BLWP @VWTR
           SLA  R0, 8
           MOV  R0, R1
           LI   R0, )030F
           LI   R2, 17
           BL   @RPWTWT
           B    *R3
           PAGE
PIXEL      DATA PXLWSP, PXPLOT
PXPLOT    MOV  *R13, R3          CALLERS R0=DOT-ROW [0, 191]
           JLT  PXL4
           CI   R3, NROWS*8-1
           JH   PXL4
           MOV  @2(R13), R4     CALLERS R1=DOT-COL [0, 255]
           MOV  R4, R4
           JNE  PXL4
           MOV  R3, R0
           SRL  R0, 3
           MOV  R0, R1
           SLA  R1, 3
           S    R1, R3
           MOV  R4, R2
           SRL  R2, 3
           MOV  R2, R1
           SLA  R1, 3
           S    R1, R4
           SLA  R0, 5
           A    R2, R0
           BLWP @VSB
           SRL  R1, 8
           CI   R1, FIRST
           JH   PXL2
           MOV  @CODE, R1
           CI   R1, LAST
           JEQ  PXL4
           INC  R1
           INC  @CODE

```

```

SWPB R1
MOV R0, R5
MOV R1, R6
MOV @CODE, R0
AI R0, -) 80
SLA R0, 3
AI R0, ) 400
CLR R1
LI R2, 8
BL @RPTWRT
MOV R6, R1
MOV R0, R6
MOV R5, R0
BLWP @VSBW
MOV R6, R0
JMP PXL3
PXL2 MOV R1, R0
AI R0, -) 80
SLA R0, 3
AI R0, ) 400
PXL3 A R3, R0
BLWP @VSBW
MOV R0, R3
MOV R4, R0
LI R2, ) 8000
SRC R2, 0
SOC R2, R1
MOV R3, R0
BLWP @VSBW
PXL4 RTWP
PAGE

```



**“I’ve been using the same computer since 1982.  
They can’t replace it without violating the  
company’s age discrimination policy.”**

From the newsletter of OTTAWA TI-99/4 USERS GROUP

June 1985

## ----- ADDING 8K RAM TO EDITOR/ASSEMBLER -----

The February newsletter of R/D COMPUTING (Ryte Data) contained an article on how to modify a game cartridge into an Editor/Assembler module with an extra 8K of RAM. This modification involves disassembling and removing the ICs from both the game and Ed/As modules. If you damage the ICs from the game module it's no problem as they will not be used again. However, if you damage the Ed/As IC then you're "---- out of luck" as they say.

Well instead of destroying your Ed/As cartridge, Andre Delisle ordered 25 new Ed/As ICs from TI and is selling them for 8 bucks a piece. The 8K of static RAM was ordered from the States by Mauro Tomietto and they are selling for 14 bucks. With an old game cartridge, such as Munch Man, and these two ICs you can make yourself one powerful cartridge. Texas Instruments missed the boat when they didn't think of this one. Instead of 32K of RAM you now have 40K at your disposal.

I bought the chips and decided to modify my old Munch Man cartridge. The instructions were very straight forward and easy to follow. The only problem that I can foresee is removing the old game ICs without damaging the printed circuit board. If you are not a practised solderer then I would suggest you find one who is. The only special tool required is a "SOLDAPULLT", a solder vacuum device, to remove the old ICs. You can purchase one around town or better yet drop into a VC/Stereo repair shop and ask a technician to remove the ICs for you. It only takes a few minutes with the right equipment.

After removing the old chips I installed two brand new IC sockets to plug my new ICs into. I followed the assembly instructions to a tee. Installed the ICs, wired them up, plugged the cartridge into the TI and fired it up. It tested just fine, and I was quite proud of myself at not damaging the 8K RAM chip (it is highly sensitive to static electricity). Unfortunately when I went to reassemble the case around the module it would not fit. The IC sockets were in the way. So I had to disassemble it all and start over without the sockets.

This time I damaged the printed circuit board while unsoldering the IC sockets, and I had to install an extra jumper wire to repair a damaged printed circuit run. Once I had reassembled the case, it fit, and the module worked.

A few tips.

- Have a technician remove the old ICs
- Don't use any IC sockets
- Follow assembly instructions carefully
- Handle the 8K RAM only by the case

If you follow these tips you should have little difficulty building this powerful module, and it should work when you are finished.

## ACCESSING A DISKETTE BY SECTOR

-----

{Our own RICHARD BLANDEN uncovered the additional subprograms resident on the TI Disk Controller card, and how to utilise them. I am still trying to find time to put all his information together, but in the meantime this excellent article will serve as a useful introduction to the eventual series. PB}

I have had quite a few requests lately on how to access a diskette by sector and also on how to initialize a diskette. The technique is quite similar to accessing a file on disk through assembly language program. I found out how to do this by studying a disassembled listing of the Disk Fixer module. The info on how to initialize a disk came from the source code for TI Forth, and the technique for doing different formats came from a well placed phone call to Craig Miller of Millers Graphics fame.

Set up a PAB 32 bytes long with the following information.

```
DATA >1000,>1000,>5000,>0000,>0001,>1000,>9800,>8C02
DATA >00E0,>000E,>0106,>00F5,>0A0D,>2020,>2A2A,>2A44
```

The SCRATCHPAD FAC is used as follows

```
FAC+2  1 byte  Drive number (1,2, or 3)
FAC+3  1 byte  I/O opcode  00=WRITE / 01=READ
FAC+4  1 word  VDP buffer address for 256 bytes
FAC+6  1 word  Sector number to READ or WRITE
FAC+10 points to byte 9 of the PAB
```

Then Branch to a DSRLNK subprogram with the following statement.

```
BLWP @DSRLNK
DATA 10
```

### Example 1. READ SECTOR 25 FROM DISK DRIVE # 2

```
DEF READ
REF VMBW,DSRLNK
PABBUF EQU >1000 VDP Buffer for sector
PAB EQU >0F80 VDP Buffer Peripheral Access Block
FAC EQU >834A Floating Point Accumulator

PDATA1 DATA >1000,>1000,>5000,>0000,>0001,>1000,>9800,>8C02
DATA >00E0,>000E,>0106,>00F5,>0A0D,>2020,>2A2A,>2A44

READ LI RO,>0200 drive #2
MOVB RO,@FAC+2

LI RO,>0100 I/O opcode= 01 READ
MOVB RO,#FAC+3

LI RO,PABBUF VDP Buffer for 256 bytes
MOV RO,@FAC+4

LI RO,25 Sector = 25
MOV RO,@FAC+6
```

```

LI   RO,PAB           Set up and load PAB
LI   R1,PDATA1       CPU address of PAB DATA
LI   R2,>0020        32 bytes of PAB DATA
BLWP @VMBW           write PAB to VDP ram

LI   RO,PAB+9        Pointer to name length
MOV  RO,@FAC+10

BLWP @DSRLNK        Get sector from disk
DATA 10

```

To WRITE to the disk just change the I/O opcode.

## INITIALIZING A DISKETTE

-----

This is quite similar to a READ/WRITE operation with the exception of a couple of bytes in the PAB. The technique is self explanatory, just follow the listing.

EXAMPLE 2: INITIALIZE A 40 TRACK DRIVE SSSD

```

DFMT DATA >0111      Default data for PAB (Initialize)

INIT LI   RO,PAB       Set up PAB
     LI   R1,PDATA1
     LI   R2,>0020
     BLWP @VMBW        Write PAB to VDP ram

     LI   RO,>0100      Drive#1
     MOVB RO,@FAC+2

     LI   RO,>2800      # of tracks (>28 = 40)
     MOVB RO,@FAC+3

     LI   RO,>PABBUF    VDP Buffer
     MOV  RO,@FAC+4

     LI   RO,>0100      Density 01=Single 02=Double
     MOVB RO,@FAC+6

     LI   RO,>0100      Sides 01=Single 02=Double
     MOVB RO,@FAC+7

     LI   RO,PAB+9     Pointer to name length
     MOV  RO,@FAC+10

     LI   R1,DFMT      Set PAB for initialization
     LI   R2,2         2 Bytes
     BLWP @VMBW

BLWP @DSRLNK        Initialize disk
DATA 10

```

The example is quite lengthy simply to illustrate all the steps necessary to initialize a disk. Once the disk is initialized you still have to build a Disk Header and Bit Map on Sector 0, and clear Sector 1 for the Link Map pointers. Also whenever you initialize a diskette the contents of VDP RAM will get corrupted.

STEPHEN SHAW'S SOFTWARE COLLECTION

DISK BASED SOFTWARE LIBRARY

Available to Members Only

The following are available from:

Stephen Shaw, 10 Alstone Road, STOCKPORT,  
Cheshire, SK4 5AH

Prices: £3.00 per disk plus £1.00 p&p per order

OR you send blank disks and pay only £1.00 per disk + £1.00 p&p per order.

DM1000...(Version 2.0).Disk based disk manager. Single or double sided or density. Does not operate on 35 track systems. Object code & documentation on one disk, source code (small bit missing) on two disks.

BEAXS...Editor. Assembler to load from Extended Basic. Why change modules?

Will ONLY work with TI Disk Controller Cards...not Myard or CorComp.

FUNLWRITER (Vn.2.1) from the Hunter Valley group in Australia. The amended TI Writer files plus an XB loader, which is better than the module! Show Directory is supported, and indicates fractured disk files, and which PROGRAM format files have BASIC headers. Amend printer name or screen colours easily by adjusting Extended Basic LOAD program. Super program.

LOGO...from the YPLA, EIGHT disks of assorted Logo material of all grades.

Order as LOGO1, LOGO2, LOGO3 etc etc

FORTH...from Milwaukee, SEVEN disks of FORTH material, order as FORTH1, FORTH2 etc to FORTH6, then FORTH DOODLES. Also available is TI Forth Vn.4.6 to load from the module of your choice! (XB, Ed/As, MiniMem: indicate which!).

NEATLISTER...a machine code utility to LIST ExBas programs... quickly list the names of the variables used... with the line numbers they occur in if you wish. List your program NEATly!- with each XBas statement on a separate line!

Lots of other public domain material available!! For a full list, please send a disk & return p&p or send an SAE for a printout (donations of funds welcome!).

Donations of ANY programs or utilities (non-copyright!) are welcome in any language or format. Do you need a program and can't find it? Let me know and we'll try to find the program, or a programmer to write it!

S.A.E. with any enquiries please!

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BULLETIN BOARD  
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FOR SALE FOR SALE FOR SALE FOR SALE FOR SALE FOR SALE FOR SALE FOR SALE FOR SALE

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RICHARD OWEN is selling a SPEECH EDITOR and a SPEECH SYNTHESIZER for £42 for the pair. Contact him on 0656 4972.

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VINCENT COHEN has a few items for sale:

|                                                   |                    |
|---------------------------------------------------|--------------------|
| RB232 Standalone (not often you see one of those) | £70                |
| Console                                           | £35                |
| BBC Mouse (unused: one for the hardware buffs)    | £60 (cost £90 new) |
| Acoustic Coupler                                  | £35                |

Contact him on 01 249 6028

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I have a few things left over from the Show which weren't sold:

|                                    |     |                                  |     |
|------------------------------------|-----|----------------------------------|-----|
| "Gunshot" single joystick          | £ 4 | Prog. Aids III Disk              | £ 5 |
| Double Sided 40T Half Height drive | £75 | TI-Writer module with manual     | £40 |
| 2 DSDD 40T Full Height drives each | £65 | Joystick with 3 handles+adaptor  | £12 |
| Extended BASIC V110 * 2 each       | £40 | 2 * Parsec each                  | £ 8 |
| Console                            | £35 | Early Learning Fun module        | £ 4 |
| Music Maker module                 | £12 | TI Invaders                      | £ 6 |
| 33 Programs For 4A (Compute!) * 2  | £ 6 | Get More From The 4A * 2         | £ 4 |
| Dynamic Games For Your 4A * 2      | £ 3 | Getting Started With 4A * 2      | £ 4 |
| Learning To Use 4A                 | £ 3 | 4A User's Handbook               | £ 7 |
| TI Disk Controller card            | £70 | Single Sided Full Height Drive   | £50 |
| 32K Ram Expansion Card (TI)        | £65 | TI Thermal Printer+3 rolls paper | £60 |

Contact me on the usual number (see front page!)

oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo

It will be possible for OTIU to supply a number of new modules at reasonable prices shortly, thanks to MUKUND RAJPARA. There is a full range of EDUCATIONAL modules (not Plato, unfortunately), and the games/utilities look like this:

|                           |     |                         |     |          |     |          |     |        |     |
|---------------------------|-----|-------------------------|-----|----------|-----|----------|-----|--------|-----|
| CHESS                     | £10 | PARSEC                  | £ 8 | INVADERS | £ 6 | MUNCHMAN | £ 6 | ESPIAL | £ 9 |
| PERSONAL REPORT GENERATOR | £10 | PERSONAL RECORD KEEPING | £10 |          |     |          |     |        |     |

Contact me for further information and for availability.

~~~~~

S O R T I N G A N D S E A R C H I N G

P e t e r B r o o k s

N o v e m b e r 1 9 8 5

Here is a small program which contains the two missing elements mentioned last time. There is an INPUT section where you can type in entries at the keyboard, and a PRINTOUT section which shows the sorted list:

100 CALL CLEAR	Clear the screen
110 CALL SCREEN(8)	I'm a black on cyan buff
120 FOR P=0 TO 9	I like short variable names
130 INPUT "ENTRY NUMBER "&STR\$(P)&":":A\$(P)	I like numbered prompts
140 NEXT P	Make no mistakes, there's no retry
150 F=0	I really like short variable names
160 FOR P=9 TO 1 STEP -1	I like to re-use variables
170 IF A\$(P)=A\$(P-1) THEN 220	Own up. Who's out of place ?
180 G#=A\$(P)	I am. Sorry...
190 A\$(P)=A\$(P-1)	I'll just change places...
200 A\$(P-1)=G#	With the one above me...
210 F=1	Commemorate the occasion
220 NEXT P	Who's next ?
230 IF F=1 THEN 150	Better luck next time
240 CALL CLEAR	I'm an uncluttered screen buff
250 FOR P=0 TO 9	Back to looping the loop
260 PRINT P,A\$(P)	Let's see your number and your entry
270 NEXT P	All of you...

T H I N G S T O T H I N K A B O U T

If the list was already completely sorted, the Bubble sort would still have to make one complete pass in order to find out.

If, at the end of a pass in which at least one swap had occurred, the list was fully sorted, the Bubble sort would still need to make another complete pass in order to realise this.

If the list was completely "unsorted" - that is, every entry was as far away as possible from its final position, the routine could make close to N*N passes in order to sort the list. (N is the total number of entries in the list).

For small-sized lists the Bubble sort is adequate, even ideal. For very large lists - of 10,000 items for example - the Bubble sort is very far from ideal, and many other sorting methods have been devised which are many times faster.

The next topic is Bubble Tag Sorts - or do I mean Tag Bubble Sorts ? Later we will look at STRAIGHT INSERTION, SELECTION, QUICKSORT, SHELL or SHELL-METZNER, D-SORT, SEGMENT SORTING, and then the BINARY CHOP and other forms of Search.

INPUT VALIDATION, OR MUG TRAPPING

Peter Brooks

Originally written for HOME COMPUTING WEEKLY

Input validation, mug trapping - call it what you will, if you want your programs to be idiot-proof you need to check any data given to the machine by someone using it. They may accidentally (or wilfully) press the wrong key or type in something unexpected; how your program copes with this is a reflection upon your skill as a programmer.

There are two approaches to validating any input: silent and unresponsive (unless the user does things right), or responsive - maybe reproving - and friendly. I tend to prefer the first approach for single key input (as scanned by CALL KEY()) and the second for multiple key entry (i.e. INPUT).

If you offer a series of choices (a 'menu') from which a selection must be made, try to arrange it so that it is reduced to a single key in each case - for example:

PRESS:	FOR:
1	Cassette
2	Disk
3	Mini-Memory
4	Other

Your selection ?

This can be scanned very simply as a 'range' of valid keys; anything less than 1 or greater than 4 is invalid, which in ASCII terms is between 49 and 52 inclusive.

Your program should therefore branch back to the keyboard scan if the ASCII code of the key pressed is less than 49 or greater than 52 thus:

```
First Line: CALL KEY(O,K,S)
Second Line: IF (K<49)+(K>52) THEN First Line
```

Should it be the case that the valid keys do not fall into a convenient range - perhaps when using the 'direction' keys: W, E, R, S, D, Z, X, and C - then you can make use of POS() thus:

```
First Line: CALL KEY(O,K,S)
Second Line: IF K = -1 THEN First Line
Third Line: ON 1 + POS("WERSDZXC",CHR$(K),1) GOTD First Line, etc.,
etc., etc., etc.
```

Here, if an invalid key is pressed its character will not appear in the list of valid keys within the quotes (you could use a string variable), and so POS() will return a value of zero.

Add 1 to this and make the first line number in the following line number list the same as First Line, and the routine will branch back to the keyboard scan, while for any other valid keypress it will branch to the relevant routine (indicated by the 'etc.'s).

Using this method you could also restrict the valid keyrange by altering the start position for the search to begin (i.e., change the value '1' in the POS() function).

You could prevent upward directional control by using a value of 4 - thus effectively 'disabling' the keys W, E, and R - perhaps in a Space Invader type game as a result of a glancing blow to your defending ship. It's just a thought.

Under these circumstances, beware of using ON...GOSUB... as this will build up a potential error, for any invalid keypress will cause a GOSUB to the keyboard scan, which in turn will eventually come back to the ON...GOSUB... resulting in wasted memory (being filled with un-RETURNED GOSUBS) and possible later malfunctions of the program.

As far as INPUT is concerned, don't waste its power by using it in cases where a simple YES/NO response is required. Use CALL KEY() and test for Y or N - and don't forget to notify the user that only Y or N are valid. Too many programs using INPUT ask for a response from a user and expect him/her to be psychic and 'know' that either YES or NO should be typed in full - a waste of time and a possible problem for those not familiar with computers, especially if the ENTER key is involved; few 'computer-naive' people are aware that they need to press ENTER in order to proceed.

When it comes to using INPUT and validating it, try and be as friendly as you can - don't call the user a fool or swear at him/her (don't laugh: many of the American programs I have reviewed call the user a 'jerk' or even an 'asshole' if he does something wrong. You don't gain many friends and you do computing a disservice by this) - and 'echo' his/her mistake when giving the reproof. That is, if the data entered included an invalid character (perhaps a non-hexadecimal digit if requesting hexadecimal definition strings) then tell the user which character it was; don't expect them to always know what they entered, and users unfamiliar with a system are likely to make many mistakes.

The best test of your program is to take it to someone who enjoys showing computers up; if there are any weak points, they'll soon be spotted!

C O N T A C T S

ANDREW HOPKINSON 16 Linden Walk, North Baddesley, Southampton
Tel: 0703 [REDACTED] between 7pm and 11pm
MultiPlan, TI-Writer, Games

NIGEL CLEMONS 34 Montalt Road, Cheylesmore, Coventry, W. Midlands CV3 5L
Tel: 0203 [REDACTED]

MAURICE RYMILL 231 Bournville Lane, Bournville, Birmingham B30 1RA
Tel: 021 458 [REDACTED]

TONY BOWDEN 1 Little Heath, Hatfield Heath, Bishops Stortford, Herts
Tel: 0279 730594 Home, 0279 26862 X7185 Work CM22 7
Hardware

PETER WALKER 24 Bacons Drive, Cuffley, Herts EN6 4DU
Tel: 0707 [REDACTED] Home, 01 936 [REDACTED] Work

F O R T H B U G S

From 99 HOCUS, Newsletter of the MILWAUKEE AREA 99/4 USERS GROUP

99 HOCUS presented a compilation of bugs found to date (May 1985) which may help some of you to overcome a few hurdles:

JEFF STANFORD:

```
Scr # 22 Line 5  BASE->R HEX ( 3800 ' SATR ! )
Scr # 23 Line 2  : CINIT 3800 DUP ' SPDTAB ! 800 / 6 VWTR 3800 ' SATR !
Scr # 28 Line 1  : EDT VDPMD @ 5 = 0= IF SPLIT ENDIF CINIT !CUR R/C
                  CGOTOXY
                  Line 11 OF OF 5 0 SPRPAT CLS SCRNO DROP 300 ' SATR ! QUIT ENDOF
```

TOM FREEMAN:

```
Scr # 53, # 54, # 55:
Line 1  VDPSET2 should be SETVDP2
Scr # 58 Switch lines 9 and 10 and change line 9:
                  VDPMD @ 4 < IF SMTN 80 0 VFILL 300 ' SATR ! ENDIF
Scr # 59 Line 9  Between )R and SP put 8 SLA SWAP OOF@ AND OR
```

EVERYBODY AND HIS BROTHER (AND EVEN ME!):

```
Scr # 72 Line 5  PAB_ADDR should be PAB-ADDR
```

JIM VINCENT:

```
Manual: Chapter 6 Page 10 Line 1  HEX 3800 ' SATR !
          Chapter 10 Page 3  Line 20 : DOWN -100 ALLOT DROP ;
```

If any other Forth bugs have some corrections to add to the list above, please contact me and I will publish them. Remember that Forth was released before the software had been fully checked, and every little piece of information helps!

Pete Brooks

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S H O W   R E P O R T  
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The October Meeting In Birmingham Organised By TI Exchange

FRIDAY OCTOBER 25th  
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11.00 am

Learned from last experience. Took Friday off, so plenty of time for brain to adjust to non-sleep situation. Small construction in middle of room composed of boxes of gear packed ready for Show. Is size of small mountain (not seen any goats, though).

4.00 pm

RICHARD SIERAKOWSKI arrives in favourite vehicle called FOUR WHEEL DRIVE OFF-ROAD MASSAGE PARLOUR. Richard stares at small mountain in disbelief. We manage to pack mountain into back of Massage Parlour, even room for goat.

5.15 pm

Richard switches Massage Parlour on, big cloud black smoke from diesel engine, hope landlady not stood behind Massage Parlour, not best way to keep rent down.

Set off, but soon obvious conspiracy afoot. Anti-TI-Users all get in cars and clog roads for miles. Council anti-TI-Users make special effort and dig up all roads between Oxford and Bloxwich. Take 3 hours to do 88 miles, must be longest message on record.

Just thought, average reader not know why Mobile Massage Parlour called Mobile Massage Parlour. Fact is, weighs over 2 tons, park for half an hour and all tyres get flat dent in them, each one gradually work round to different position on wheel, result: massage for 20 miles until tyres warm up and dents pop out.

8.15 pm

Arrive rendezvous with GORDON PITT, shaken not stirred. Gordon foolhardy enough to offer Richard and self overnight quarters, whips up special nutritional item, looks like worms playing football in cooking pot, yum, yum, not had footballing worms before.

10.00 pm

Aargh! Gordon realises need special disk, self not brought my version, quick ring round see if Uncle Clive got one, nope, panic, MicroNet demo hinge on this disk. Number One Racing Driver TREVOR DAVIES offers to chauffeur self back to Oxford, so Warp Factor 99 Mr Spock, back in Oxford in hour and a quarter. Brain beginning to regret taking Friday off, still, could have been worse. Support brain, pick up disk, refuel with caffeine, Warp Factor 98 Mr Spock, back in Bloxwich by 2 am. Brain now retreated to back of cave, so hit sack by 3 am, leaving stalwart trusty comrades still slogging over TI. Brain dreams of lost art of sleeping more than 3 hours a night.

SATURDAY OCTOBER 26th

---

6.30 am

Urgh! Not again! Still, no motorcycle welly for tongue to crawl around in, oops, spoke too soon, tongue hiding in yesterday's sock, eyeballs adopt policy of non-co-operation with brain, mouth in desperate need of services of Rentokil. Thinks: don't smoke, don't drink (don't get chance, too busy commuting between Oxford and Bloxwich!) so if this is healthy wake-up what must it be like for puffing dipsomaniacs? Gordon relieves Mafeking (?), brings hot cuppa char, cor, luvverly.

7.30 am

Finished usual palaver with bristles, teeth, and bald patch, regular readers know the form by now, hmm, just thought, no All Bran to stick on hairless bits, no doubt fellow travellers heave huge sigh of relief 'cos self not likely to heave huge sighs of relief in confined space. All pile into various vehicles, pick up ANDREW STEVENS, his job to savage Light-Fingered Mob, can't afford to lose any equipment.

9.25 am

Held up in traffic, get to Digbeth Civic Centre late

Oops. Only enough room for one van in access lane to Centre, so rediscover ability to hold in Pot Belly and carry boxes through six inch gap between Parco van and wall. Suddenly realise that unloading is a tactical nightmare, one person stay with vehicle, maul passing pilferers, one person stay with gear in Centre, poor old pilferers, get mauled left, right, and civic centre.

Argh! Where tables? Gordon asked for eight, all gone! Uncle Clive and Auntie Audrey to rescue, discover at least six knocking around other stands, grab 'em back, make a fortress, and suddenly discover lack of Plans For Layout. Self is Twit Of Year. Consequence is, still setting up as TI-ers begin filing in, one entire system spends day under piano, grand old NTSC 99/4 never sees light of day (was going to frighten newcomers by showing 'em how hard life was in the Old Days, people don't know they're born these days, etc., etc....).

Andrew and Trevor doing magnificent job, even making first sales of OTIUsers equipment. Chap from MicroNet arrives ready to do demo, panic, HOWARD GREENBERG not yet arrived, Howard kindly agreed to lend modem to Gordon for dazzling Bulletin Board access, phew, sigh of relief (comrades back away warily), Howard arrives, now rushed off feet, not even aware of Trevor and Andrew doing sterling work on sales front while Gordon and Richard wrestling with modem and software.

MicroNet Man not happy, can't access anything at all, wrong chips or something, ALAN DAVEY says our modem not making right noises, must be up creek, so even demo of 4ABC goes up Swanee. Even rope in BERRY HARMSEN to translate commands of Dutch Prestel-type program, nothing doing, whole demo kaput. MicroNet Man mollified by one new subscriber to MicroNet, but failed demo must have cost his firm hundreds of greasy oncers (or clinky oncers, these days).

Self not aware of all this until after Show, too busy chasing self up own exhaust pipe, every so often meet face or name I know - some lost over two years ago, hallo Nigel, nice to meet up again - don't really even get chance to stand back (well back) and enjoy Auction, have to conduct conversations multiplexed with IVAN NIBUR urging reluctant TI Users to part with clinking stuff, should have made some bids myself, prices extremely low in some cases.

Where everyone gone ? What did I say ? Self been off the All Bran and beans for at least two days, ahah!, I know what it is, it is End Of Show, what happen to seven hours in between, gone, phut!, never enough time to do everything.

Couldn't have managed at all without massive help from crew, take a bow lads, and are you free for next year ?

Have to wait turn to load all gear into mobile Massage Parlour, say ta-ta and rush off, still got things to do, pick up another system to sell, also reckon up clinky oncers, pay costs, etc., put aside cash for OTIUsers' gear sold, also treat half of crew to Oriental nosh (other half of crew either tucked up in bed or out on town), leap into mobile Massage Parlour, back in Oxford by 11.30 pm.

Mountain re-appears in middle of room, say cheerio to Richard, he still got 40 miles massage to go, then set to dispersing mountain to four corners of room.

Reckon up profit for day, comes to £37.40, part of that payment of bills, urgh..

Three days later, still dispersing mountain, answering phone, answering letters, trying to write stuff for TI-LINES...

TEN DAYS LATER...

Finally found time to write this, perched on sink on Doctor's Office, get funny looks from passers-by, nothing new, always get funny looks from passers-by...

Now, when can we do it again ? Somebody said "Scotland" in Birmingham, not a word Brummies use often, wonder how self would survive 12 hours massage, what are you doing next year, Richard...?

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A DOZEN HELLOS

As a consequence of the Birmingham Show (and thanks to Clive and Audrey) we say a warm Hello to ANDREW HOPKINSON (see below), NIGEL CLEMONS, MAURICE RYMILL, TONY BOWDEN, PETER WALKER, JAN LORIE, BERRY HARMSEN, RAYMOND BOWKER, BOB LUCKIN, T. SOUTHWELL, A. FRANCESCHI, PHILIP TROTTER, F. HARTLAND, and NEVILLE BOSWORTH. Some of these names you will find on the Contacts page together with, in some cases, the subjects in which they have a particular interest.

XB PLUS AND STRIVING FOR DRIVES

ANDREW HOPKINSON has passed a couple of items of information to me, one of which would benefit from some feedback from OTIUsers: Andrew has the opportunity of bringing over a German product, Extended BASIC Plus, a module which has 40 extra graphics commands and 20 additional programming commands, among which is a resident screen-dump routine operating on one key (Epson compatible) and which would cost £100 or less if sufficient orders can be placed. If you are keen, give Andrew a ring on 0703 [REDACTED] between 7 and 11 in the evening. There should be some more detailed bumph along shortly which will help you decide whether to buy.

In addition, Andrew can supply CANON disk drives at a very reasonable price. The "internal" type, DSDD 40T, 2/3 height, are £75, and the 1/3 height are £85. External "standalones" with psu and case are £115 for the 2/3 height, and £135 for the 1/3 height, which incidentally is supplied with a case and psu suitable for expansion with another 1/3 height should you wish to do so. All drives are supplied with a full 12 months manufacturer's warranty. TI-EXCHANGE is now running two 2/3 height drives I understand, so you could check with Clive if you have any queries.

CHRISTMAS IS A-CUMMIN'...

I will probably be away for a while over Christmas, which means that January's TI-LINES will be late. Now there's a novelty... If I can get the work done, December's will be out before Christmas sets in, although overseas subscribers may be subject to some delay - I hope not. I am still struggling to get the new catalogue for the anorexic TIHOME SOFTWARE COLLECTION out, and the way things are shaping up at the moment it would not take a crystal ball to predict that it will probably now appear in the New Year. Note that I don't say WHEN in the New Year...!

I just thought I'd give you advance warning; at least that will be published early!

Good Programming

Peter Brooks

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