MICROTAN WORLD

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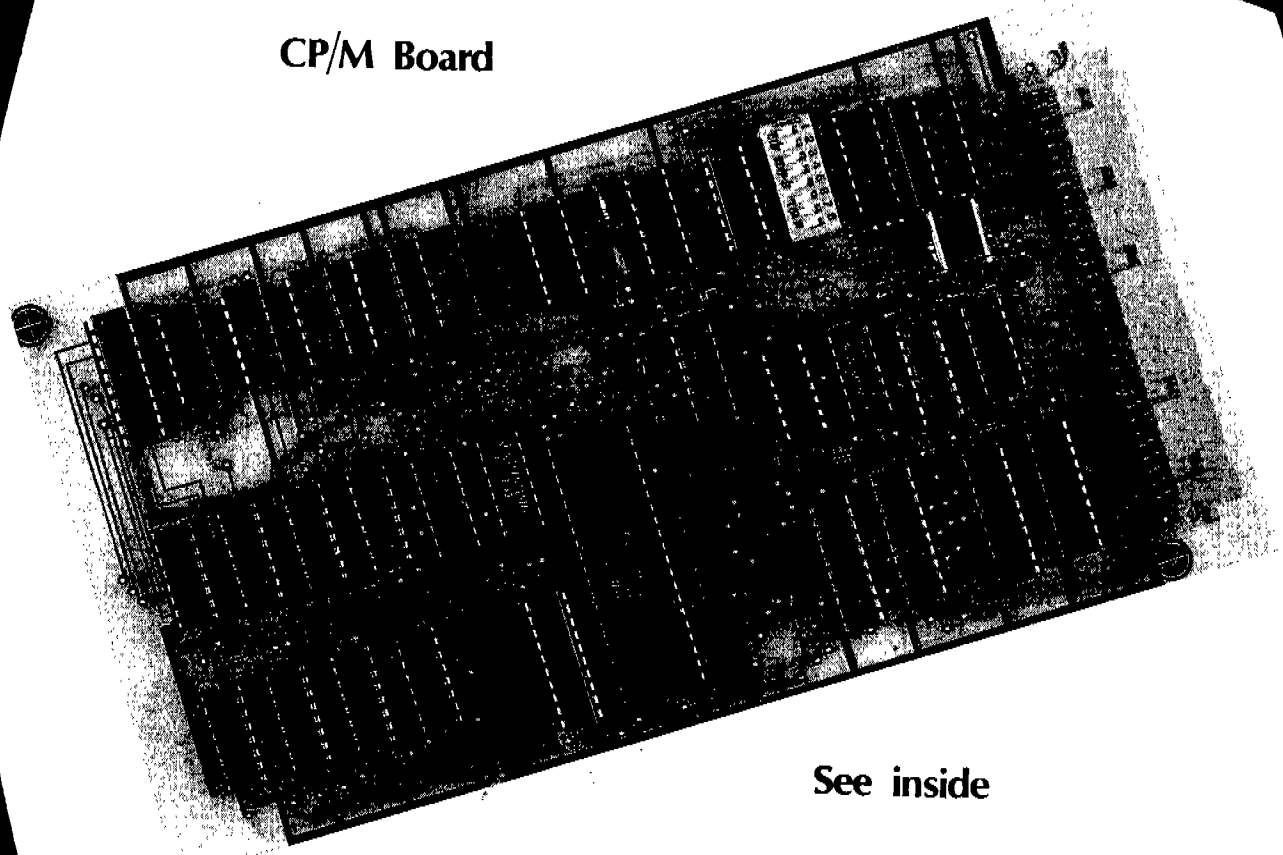
Programs · Reviews · Your Letters



CP/M Board

See inside

CP/M AVAILABLE MARCH

PUBLISHERS

MICROTANIC COMPUTER SYSTEMS LIMITED

102 LORDSHIP LANE, DULWICH, LONDON SE22. 01 299 1419

CP/M - Z80 CARD FOR THE MICROTAN SYSTEM

Technical Specifications

CPU	Z80A running at 4 MHz
Memory	64k dynamic RAM + 2 k bootstrap EPROM on board.
Bus Usage	Plugs into any additional slot of Microtan bus and uses only 2 locations in the I/O map
Software	CP/M industry standard operating system is supported.

Hardware Details

The Z80 card is a self contained slave processor card for the Microtan 65 system. The CPU is a Z80A running at 4 MHz offering a great speed improvement over the Microtan CPU running at 750 kHz. The board has 64k of dynamic RAM on board arranged as 8 off 64k x 1 chips plus a 2k EPROM containing cold start firmware. The board slots into any additional slot of the Microtan bus and occupies only 2 locations in the 1k of I/O space, selectable on any 4 byte boundary. When used in the system the Microtan 6502 becomes an I/O processor for the Z80.

System Requirements

To operate the Z80 card the system requirements are dictated by the needs of the CP/M operating system and are as follows:

a) Microtan 65 card,
   Minimum configuration card required

b) Tanex card,
   Tanex with 3k RAM (400H – FFFH) minimum required. Second 6522 and/or 6551 required only if a printer is needed.

c) Disk controller card,
   Disk controller with RAM and EPROM firmware for TANDOS required but not TANDOS disk based O/S

d) TUG 80 column VDU card,
   The software supports the TUG 80/82 video card in its 80 column form. Software drivers are supplied for this card to run word processing packages etc.

Software

The Z80 utilises the industry standard 8 bit operating system CP/M. All the I/O functions are performed by the Microtan 6502 under programmed service requests from the Z80. Using this method provides an unusually large amount of memory on the Z80 card, typically 59k, for user programs under CP/M

80/82 Video card

An 'intelligent' video terminal (EX–TUG) for use on the Microtan giving :–

40 or 80 columns text
256 x 256 or 512 x 256 bit mapped graphics display
8K on board video RAM (4x6116)
for 40 column or 256 x 256 graphics
16K on board video RAM (8 x 6116)
for 80 column or 512 x 256 graphics
+2K operating system.

Includes a scrolling window and a 2K RAM for zero page and stack operations. The operating system is totally independant of the host computer.

The full standard 96 ASCII Character set is produced on a 5 x 7 matrax pixels and include interline and inter character spacing.

Ideal for word processing printer and editing operation, graphics and general use. Excellent as a terminal for both the CP/M card and the 6809 single board controller.

Kit Less RAM	£79:95
Ready Built	£89:95
Bare PCB plus Firmware Eprom & Manual.	£39:00

Operation

The system software comes on 2 5.25" single sided 40 track disks. The first disk, the boot disk, contains the 6502 support software for the CP/M operating system and loads under TANDOS. This disk is used to cold start the system. The CP/M system is supplied on the second disk. A full range of utilities is provided on the CP/M disk.

£240 includes
- **Z80 card**
- **two disks Boot & CPM**
- **manual**

Available March 1985

ALL PRICES INCLUDE V.A.T. BUT PLEASE ADD 00.60p FOR POST AND PACKING

MICROTANIC COMPUTER SYSTEMS LTD.

Computer Manufacturer
Software · Hardware · Books

Registration No: 1668843 V.A.T. No. 237794718

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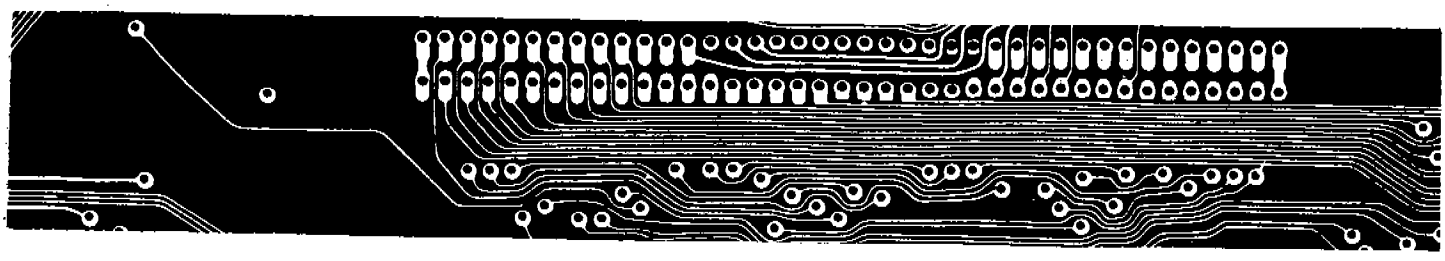

WHO'S WHO AND WHAT'S WHAT

THE COMPANY.

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Microtan World

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Repairs & Technical Andy Parnell.

THE MICROTAN SYSTEM.

1K Computer in Machine Code.

Microtan 65 + Keypad
+u/l case + Graphics

8K Computer Expansion

As above + Tanex + Mini Motherboard
+ Power Supply + Full ASCII Keyboard
+ Basic

48K Computer Expansion

As 8K + Tanram + MPS2 Power Supply
+ System Motherboard

Additional Expansion

HI RES Board
Sound Board
DOS Board
MASS Storage Eprom Board
80/82 VDU Board
CP/M Board
64K RAM Card
Combo Card

Operating Systems

Tanbug
Tvbug
C/PM
Flex
Tugbug

Languages

Basic, Forth, Pilot,
Assembler, Pascal.

Also Available

Modems
Microtutor
Single Board Controller
EP4 EPROM Programmer

The Inside Story

by David Northway

This issue of Microtan World completes the end of the 2nd year of successful trading with the Microtan 65 System. Let me take this opportunity of thanking all of you, the 'Microtan Owners' who have supported us in keeping the Microtan alive.

During these two years we have added 10 extra boards to the system and even today the computer magazines are still giving us good reviews but we are now at another crossroads and it is up to you the readers to let us know which way you would like us to go in supporting the 65 system.

During January and February we experienced severe difficulties with the postal system. About 8 or 9 users have had to chase their orders which we had already posted but they had not received. Until we locate the reason for these delays we will be sending most orders by recorded delivery, so if this will give you any problems because of the need for the postman to get a signature, please let us know when you place your order.

By the time you read this CP/M should be fully available, that is by the end of March. We have had a lot of problems in getting to this stage and I apologise for all the delay. One of our biggest problems has been getting the P.C. Boards manufactured in a satisfactory way and in one case we had to change the supplier in mid stream. Hopefully all that is now behind us.

As we go into year three we can look forward to a period of consolidation with the system organised and with the strength of both FLEX and CP/M to support us.

David Northway

ED'S Page

Here we are with Volume 2 Issue 6 which means that two years have simply flown by. In trying to judge the success of the Microtan or otherwise, we can at least say . . . we are still here . . . . we are still strong . . . and we are still going forward. In the world of home computers that must be only just short of a miracle. It must be said that the success of the Microtan has to be due to Microtanic who rescued it . . . you the dedicated owners who would not let it die . . . and the versatility of the Microtan itself. This may well be an over simplification as there are many other factors too numerous to mention, but it all adds up to an unusual success story . . . long may it continue.

We can not and must not, however, become complacent in any way and as far as Microtan World is concerned I appeal to you all to keep writing to me, whether its a letter, tip, hint, article or whatever. The important thing is that the content must be up to date and reflect your views entirely. It is your magazine in the most real sense of the word, if you stop the magazine stops.

At this point may gently remind you that we will not publish full addresses or telephone numbers unless you specifically tell us to. In computer terms the default mode is town or county only. So if you do wish us to publish the full address, please say so each time you write.

In this issue is an article/advertisement on the Psion Organiser. This highly acclaimed hand held computer is, by itself, a most versatile tool as the article clearly shows. If it is then interfaced with a desk computer it can become even more useful. I would like to hear from any readers who have an Organiser, particularly if you have interfaced it with the Microtan and or any other computer.

Finally for this issue, may I comment on the letter which refers to the publication date of our magazine. In an ideal situation we would publish in the first week or two of the first cover month, ie February for this issue and post out by the end of the same month. However, as you are no doubt aware from comments in previous issues, our magazine is not a profit making venture and only exists through the continuing support of Microtanic. Because of this we rely on the work and co-operation of a lot of people. Let me assure you, however, that we will always do our best to meet deadlines and ask for your tolerance when we do not.

Together we go forward to year three !!!!!

Deryck M Sutton

VIEWPOINT

Glenn Jarvis
Peterborough

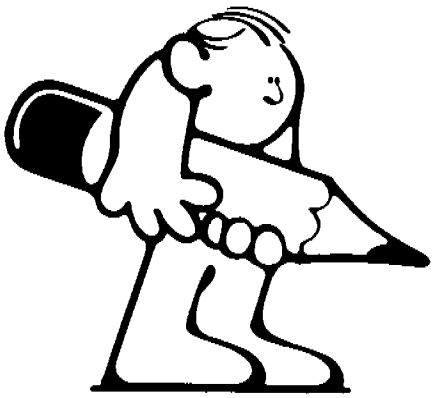
Please find enclosed a program called "Calender" with a brief explanation on its operation.

Keep up the good work with Microtan World'.

Andy Michael

Please find enclosed an article for the Microtan World about Flex. It seemed to me that there wasn't very much in the magazine about what Flex was actually like, so I thought that an article was in order. It might also boost sales of Flex a bit. I will be happy to write some more Flex articles if you want them.

Always interested in 'All' articles so keep up the good work ..... Ed



J D Westoby
Islington

Having eagerly received Vol 2 Iss 5, reading therein, what do I find?

In Modifications to Tanram it is suggested that we alter SYS to read 60Kb to allow loading above BBFF.

Argh!!!!. You try entering Basic with that on your head. (It says you've got that much free but strings get stored up there until Basic falls over).

The best way to allow loading above is to alter the DOS, very simple;

```
$B3CA    BCS   $B3E7
         NOP
         NOP
         NOP
         NOP
```

(Although this does allow loading to the I/O space as well).

Also further to the Basic Mods section the Getsys routine can also be altered to be:

```
$B66c    NOP
         NOP
         NOP
         LDA   #$0
```

either works but this is more explicit so its to be favoured.

It's good to see these insights into the M/C OP system .....Ed

Brian Stephens
Nottingham NG16 2AG

Please keep up the good work with Microtan World. The only comment in this direction I would make is that it always appears to be at the end of the two monthly period when I receive my copy, compared to the usual implication in editorial comments that it is the first month it is produced, enough of that.

In reply to Bill Hind's letter in V2 issue 5. I have just installed a disc board which had a fault on it which resulted in two areas of RAM overlaid on top of each other. Simple memory tests i.e. writing then reading all locations produced no errors.

The more complex test of writing to one location then checking ALL memory was required before the fault showed up. So yes Dont use test patterns are still needed.

I would also suggest that if he has not already had a copy of Microtans book 'Good Companion' he should obtain a copy if it is still available.

Re. comment on publication date - see Ed's Page.

Adventure Game donated by 3M UK plc

This game (see Pg 13 last issue) has been won by N Ireland 'CONGRATULATIONS'

Articles

FLEX~WHAT'S THAT?

Well, its arrived - the little Compusense binder with the magic words "Flex operating system editor and assembler". So what does it all mean, and why all the fuss?

Perhaps the most confusing thing to the Microtan newcomer is that Flex represents a change not only in operating system, but also in the processor using it. Not only do you have to learn a new set of system commands, but a whole new micro as well.

I have an unfair advantage here, as I have used the 6809 before, so that part was not new to me. To those familiar with the 6502, the 6809 is not vastly different, except that it has two accumulators, and the X and Y registers are 16 bits long, not 8 bits. It also has a direct page register, which means that what would be the zero page in a 6502 can be anywhere in the memory map for a 6809. (Yes, all you 6809 users smirking out there, I know that this is a very simple view, but it will suffice for now). Most assembler mnemonics are similar to those of a 6502, with differences due mainly to the extra registers of the 6809. If all your programming is done in Basic, these features probably won't interest you too much, but if you use assembler, then after a while you will begin to wonder how on earth you got on with that dreadful old 6502. Suffice to say that Motorola call the 6809 an 8/16 bit processor, and many people consider it to be the best 8 bit micro in existence. In fact, in some applications it is faster than the 68008. (You weren't really going to buy a QL were you?).

Apart from the 6809 itself, the other aspect of "going Flex" is the operating system. I know that there are a lot of people out there who have not got discs on their 6502 systems, so it will be more awkward to explain to you the difference that Flex makes. To those of you who have discs, I ask you to remember the effect Tandos had on your system. It isn't just a matter of the speed with which programs can be loaded or saved - somehow the Microtan stops being a toy and becomes a "real" computer. Those of you who have experienced this will know what I mean. For the remainder, it is a treat still in store. Replacing Tandos with Flex gives about the same improvement again. To be fair to Tandos, it didn't really stand a chance as an operating system - by the time I bought it Tangerine had given up with it, so it didn't offer a lot of facilities that it should have done, and the documentation wasn't really very helpful - even when it was correct. Flex is different - it has been around for over five years in one form or another, and is still supported by its authors.

Just a glance at the Flex manual is enough to show that this is an operating system that has been thought through from the very beginning. Unlike Tandos, Flex falls over itself to be helpful to the serious programmer. Useful parameters are stored in ram or accessed by vectors where they can be changed to suit requirements. Full information is available on inbuilt routines, so that if you wish say, to print an Ascii string in a program, you can call a Flex routine to do it for you. Indeed, a lot of useful routines that you require can be made up by simply calling various Flex inbuilt routines - assuming that Flex doesn't already have the command that you want, since there are over twenty commands as standard on the Flex distribution disc.

The Flex disc also contains the editor and the assembler. In Flex, all assembler or Basic files are just stored as text files. All of these use the Flex editor, so it doesn't matter whether you are programming in assembler, Basic, C, Pascal or anything else - you use the same editor. No more learning different commands for different editors. Oh, and the assembler makes the EPA look really sick in terms of facilities. It also accepts macros, so you can assemble 8085, 6800 or even 6502 programs if you buy the appropriate macro set.

By now, you will have gathered that I quite like Flex, so it seems about time to declare that no, I have not got any shares in it - more's the pity. I just think that it is the best thing to happen to the Microtan since it was invented. Clear?

Flex has another great advantage - campatibility. If Flex programs are written correctly, they then can be run on any computer running Flex, regardless of the hardware in use. This brings me neatly on to the next point - what hardware do you need to run Flex?

Firstly, you need a 6809. This may sound obvious, but things now get complicated, because there are two possible ways of running a 6809 on the Microtan. The first is to use the 6809 card, designed by Ralph Allen Engineering and available from MCS. The second is the single board controller, designed by Tangerine (who ?), also available from MCS. The easiest way is to use the 6809 card, as this simply replaces Microtan 65 in the rack, and is available in versions to interface with either the Mousepacket VDU card, or the 80/82. One problem is that Flex requires ram from SC000 to SDFFF in order to function - right where the eproms are on Tanex. There is a 14k ram card available to replace these eproms with 6116 ram. A lot of people already have 6116 conversions done on Tanex, courtesy of TUG, but beware - some of these have been found not to work with the 6809 due to timing problems. Since the 6809 card produces all the Tanbus signals, Tanram will run quite happily. A Tandos disc card is required, but the original eprom and ram are not needed. This means that Flex with the 6809 card is a truly "plug-in" modification.

All right, so why mention the single board controller? Mainly because that is what I'm using. I bought an SBC some time ago, and thought that I ought to use it. The main problem with this card is sorting out a video display. The MCS monitor for the SBC, TVBUG, assumes the use of the Mousepacket VDU card. A pity, because I had an 80/82. The 80/82 will not work with the SBC due to the lack of Tanbus sync signals, although I gather that MCS are working on this problem. TVBUG will, however, work with a serial terminal (shades of Tanbug and teletypes, I suspect), so I bought an Intelgraph card from Frank Kups, and put my 80/82 card components on it to form a serial terminal running at 9600 baud. Great - how I could talk to it, but what about Flex? Flex needs to be "configured" for its hardware environment (this is what makes it software compatible between machines) and there was no Flex available for the SBC. Armed with knowledge of the 6809, and a friend who had a working Flex system, I bought Flex from Ralph Allen and converted it - not recommended for the faint hearted.

I understand that MCS can now offer a configured Flex for the SBC, to save anyone else the trouble.

With the SBC, Tanex is no longer required, as all this memory is contained on board in the form of 6116s. I therefore took a saw to my motherboard and removed the left-hand end three slots, leaving a nine slot parallel motherboard. Tanram will run, with some slight modifications (thanks, MOUG). If your Tanram will run at 1.5 MHz with the 6502, then it probably will with the 6809, but mine will only run at 1MHz. BUT - when the prices of 6264s become more reasonable, then I can put them on the SBC, throw Tanram away and run the 6809 at 2MHz. That is the advantage of the SBC - fast, low power memory. I don't know about the 64k ram card, as I've not tried it with a 6809, but I think that it has timing problems at higher speeds anyway, and I don't see any point in a replacement for Tanram that won't run at 2MHz. I have tried the Trevor Henshaw 40k ram card, which doesn't work at all with the SBC, although it is perhaps possible to modify it in the same way as Tanram.

So there you are - the choice is yours. The 6809 card definitely has the edge when it comes to ease of changeover, and it still allows you to put the 6502 back when you want to. Personally, after using the 6809, I have no wish to go back.

After all this free advertising for Flex, there must be a catch somewhere, and of course there is - the price. Buying a 6809 and Flex does not come cheap, although it rather depends on how you wish to look at it. If you see the Microtan as a cassette based machine for playing games and programming in Basic, then going Flex may seem very expensive, and it is doubtful that you could justify the expense. On the other hand, if you like programming in assembler or a high level language other than Basic, a 6809 Microtan is a pretty cheap machine - try asking one of the companies producing 6809 development systems for their prices and you will see what I mean. Flex is increasing in popularity, and I am sure that this will result in the production of cheaper software, although I doubt that we will ever see a Flex word processor for the £5 that I paid for Columbia. In the end, it's up to you to say whether or not the cost is justified, but if you can force the bank manager back into his cupboard, I don't think that you will be disappointed.

I hope that these deranged wanderings will have helped others to understand more about Flex and what it means. I will leave with one parting shot. It has been said that Flex is only useable if you have two disc drives. I've only got one, and most of the time this causes no inconvencience. I will explain later in an article, but as a clue for the impatient, you night look at page 16 of the Flex advanced programmers guide .....

Andy Michael

Another excellent article on one of the new Plug In systems..... Ed.

FLEX DISK OPERATING SYSTEM

FLEX's features are dynamic filespace allocation, random and sequential file accessing, batch job type program entry, user startup facility, automatic drive searching, file dating, space compression, complete user environment control. English error messages and over 20 commands for normal disc operations.

SUMMARY OF FLEX COMMANDS

APPEND	Is used to append or concatenate two or more files to an output file
ASN	Is used to assign the system drive and the work drive.
BUILD	Is provided to create small text files.
CAT	Is used to display the disk file names in the directory on a disk
COPY	Is used for making copies of files on disk.
DATE	Is used to display or change the internal FLEX date register.
DELETE	Is used to delete a file from the disk.
EXEC	Is used to process a text file as a list of commands.
I	Is used to redirect the input stream to a disk file so that data is accepted from a disk file instead of the keyboard.
JUMP	Is used to start execution of a program in memory.
LINK	Is used to tell the bootstrap loader where the DOS file resides.
LIST	Is used to display the contents of a text file on the terminal.
NEWDISK	Is used to format a new disk.
O	Is used to redirect the output stream to a disk file (spool files).
P	Is used to redirect the output stream to the system printer.
PRINT	Is used in conjunction with an interrupt timer to provide printer spooling. (Not available for DRAGON version).
PROT	Enables the user to write or delete protect a specified file.
QCHECK	Is used to examine the print queue (see PRINT)
RENAME	Is used to change the name of a file
SAVE	Is used to save a section of memory on disk.
STARTUP	Is an text file which is always executed, if present, on powerup.
TTYSET	Is used to control and vary environmental parameters such as the Backspace key, length of line, length of page etc.
VERSION	Is used to display the version number of a utility command.
XOUT	Is used to delete all files which have the extension. OUT.

These are most of the principal commands, and usually there is a specific selection of additional utilities supplied for a specific computer.

6809 & FLEX on the Microtan

We now have available from stock a full implemented FLEX 6809 CPU board that will plug straight into a standard MICROTAN rack system and allow all your original MICROTAN boards to function as before, simply remove the 65 board and replace it with our 6809 board and you are ready to run FLEX.

FLEX for the uninitiated is a disc and system hardware controller programme like CP/M, any programmes written for FLEX will run on any computer that is FLEX based, this opens up your MICROTAN system to a whole host of professional software available off the shelf, including 3 word processors, RMS data base management, Dynacalc an electronic spread sheet, Editors, Assemblers, Cross compilers, 19K Xbasic, Abasic, Pascal, Cobol, Fortran, C, Eforth, Forth+, Disc diagnostics, Disc utilities, etc, etc, FLEX alone has about 40 utility commands at its call, any Flex disc for any other Flex computer ie BBC, Windrush, Cubic, Dennis etc can be read by the MICROTAN, this is not true of CP/M where discs are not interchangeable between machines, there are now 12 licensed Flex dealers in the U.K. and we now have a license to supply you with an operating system and any Flex programmes imported into the U.K. by Compusence the U.K. importers. As the power of Flex is realised in the next year or two there will be an abundance of cheap software and it will ALL run on any Flex computer.

NOW AVAILABLE

6809 BARE BRD + 4 EPROMS	£58 + VAT
6809 BUILT AND TESTED	£94.75 + VAT
FLEX O/S WITH EDITOR AND ASSEMBLER	£85.00 + VAT
14K RAM BARE BRD	£24.50 inc
14K RAM BUILT (LESS RAM)	£46 + VAT

P/P £1.50

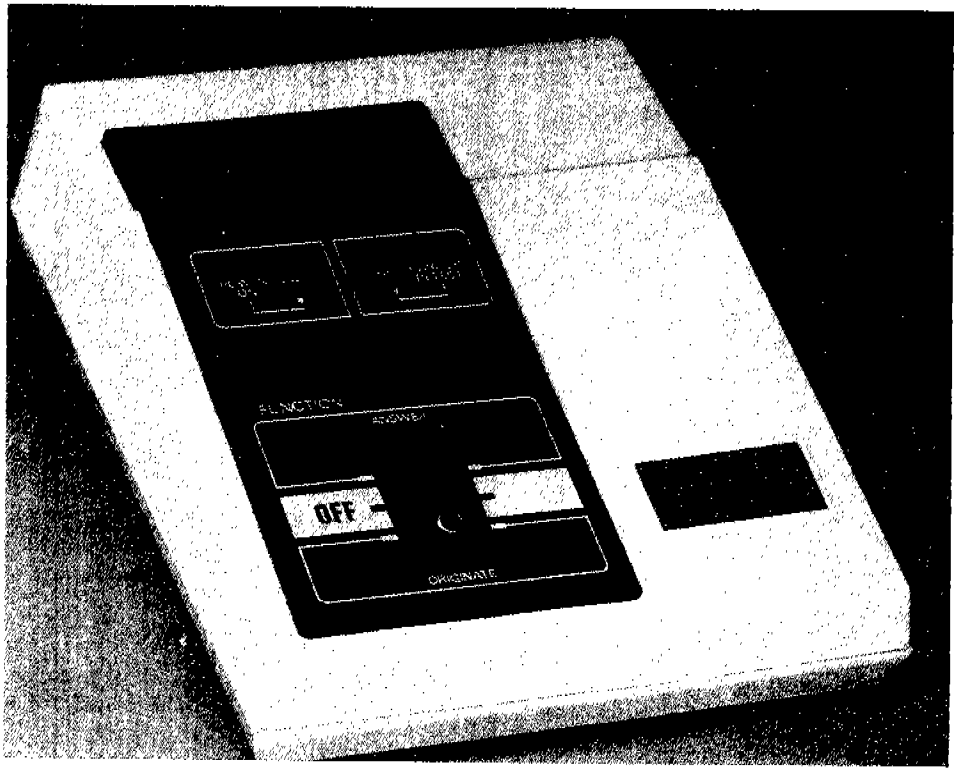
SPECIAL OFFER

MODEMS... MODEMS... MODEMS...

MODEM MM 100/UK PLUS TANCOM SOFTWARE

Modems are now in stock. These Modems by 'ANSWERCALL' are PO approved and have a RRP of £75. 00

To introduce these we are offering them complete with operating software at a special price of £65 + 1.50 pp



(Extras if Needed) ... Leads (Modem to Tanex) £19.95

(Extras if Needed) ... Serial option for Tanex £17.50

TANCOM SOFTWARE (If bought separately) ... £19.95

MODEM MM 100/UK (If bought separately) £65.00

PSION Organiser available from MCS

A Unique New Invention that will change the way you work

If you've ever thought how much more convenient and simple your life could be with a full-feature micro-computer – but have always been deterred by the size, complexity and cost of conventional systems, then it's time you discovered the PSION ORGANISER: the world's first practical pocket computer!

The PSION ORGANISER is a versatile and innovative personal computing resource incorporating hybrid microprocessor technology more advanced than that found in systems twenty times the price. **And the entire system – Including screen, keyboard, mass storage and software is compact enough to hold in the palm of your hand and carry around in your pocket. The photograph on the front cover of this brochure is actual size.**

Packed with exclusive features:
Built in database system allows instant access to programs and information.
Off-the-shelf software library provides a mass of powerful programs and data.
Simple operating procedures make the ORGANISER incredibly easy to use.
The purpose designed POPL programming language enables you to write and save your own programs.
Communicate with other computers, modems, printers and peripherals through the industry standard RS232 interface.

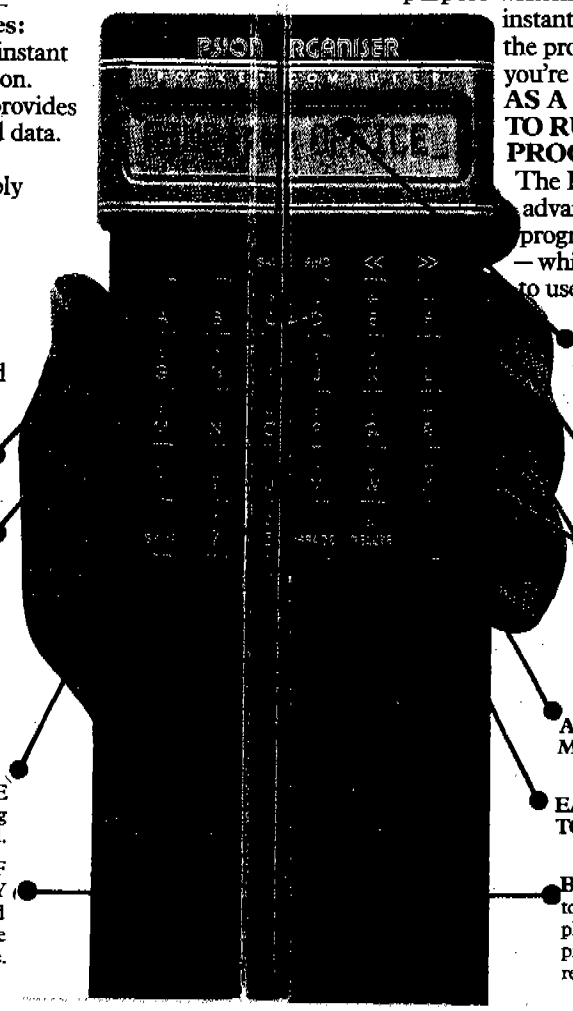
FORMATTING SERVICE
AN OPEN ENDED COMPUTER SYSTEM
COMMUNICATIONS
PERSONAL PROGRAMMING
SOFTWARE LIBRARY
A PERSONAL DATABASE

THREE WAYS TO PRACTICAL POCKET-COMPUTING!

AS YOUR OWN PRIVATE DATABASE...
Use the PSION ORGANISER to store information at will and retrieve it instantly – keeping vital day-to-day records safely and securely.

WITH READY-TO-RUN SOFTWARE...
The PSION ORGANISER offers you a comprehensive – and constantly-expanding – library of purpose-written software packages for instant problem solving. Just plug in the program pack of your choice and you're ready to go.

AS A CUSTOMISED SYSTEM TO RUN YOUR OWN PROGRAMS...
The PSION ORGANISER is so advanced it even has its own programming language – POPL – which is as easy to learn as it is to use.



TIME AND DATE Automatically displayed when you switch on.

EDITABLE CALCULATOR function allows you to carry out complex calculations involving up to 200 characters with two levels of brackets. You can also re-edit both data and formulae after completing a calculation to carry out "what/if" analyses. A special utility pack extends the power of the calculator even further with an extensive range of additional maths and science functions.

PERMANENT SAFE STORAGE of information in removable datapaks using the "SAVE" command.

ORGANISER RUNS OFF STANDARD PP3 9V BATTERY Auto switch off after five minutes and low power CMOS components give up to six months life in normal use.

16 CHARACTER ALPHA-NUMERIC DISPLAY with full scrolling over each record up to 200 characters long.

ADJUSTABLE CONTRAST CONTROL.

UNIQUE TWIN 'SOLID STATE DRIVES' Allow open ended use of plug-in software and data. The range of information, program and peripheral packs that can be slotted into the drives is enormous.

ACCESS INFORMATION IN MILLISECONDS.

EASY TO USE, POSITIVE TOUCH KEYBOARD.

BRITISH DESIGNED and built to the highest standards with gold plated contact points and a tough protective sliding case for rugged reliable use.

PERSONAL PROGRAMMING

POPL – A POWERFUL AID TO PERSONAL POCKET COMPUTING

POPL – (PSION ORGANISER Programming Language) has been purpose designed for the organiser, and enables you to write, store and run your own programs.

With POPL you can customise the PSION ORGANISER to exactly match your own requirements – whether you simply need to store basic and repetitive calculations for day to day application or need to create a sophisticated program for later use.

Contained within the Finance, Maths and Science packs, POPL is built around a set of simple commands such as IN, OUT and GOTO and has a versatile line Editor.

POPL is a modular programming language, based on procedures which can be combined and cross referenced. Even the most complex and ambitious tasks can be split down into a series of discrete and manageable elements. This approach is highly flexible and enables you to write complex programs easily and quickly.

CREATE PROGRAMS AS INDIVIDUAL AS YOUR PROBLEMS.

When any of the three program packs is plugged into the ORGANISER the MODE key provides options additional to those found in the base machine:

CAT Lists all programs and procedures held in the program pack and datapak, if there is one plugged into the other 'Solid-state drive'.
RUN Either a ready written program or one of your own stored in a datapak.
PROG Programming language.
COPY Transfer information from one datapak to another.

When the Programming Language option is selected a further range of facilities specific to POPL are available.

EDIT: For writing and editing procedures.
INSRT: Inserts a program line.
QUIT: Discards your current procedure.
EXIT: Takes you out of PROG and carries the procedure into RUN.
SAVE: Copies an edited procedure into datapak for permanent retention and access.
ERASE: Erases a procedure from a datapak.

The comprehensive manual included with each program pack contains an extensive description of POPL and advice on its use. Sections include: Variables: INput, OUTput and Assignment. GOTO, Branching and Labels. Conditions: IF, AND, OR and NOT. Looping and Iteration. Globals and Arrays, STORE and RECALL. Calling procedures. Parameters and Error messages.

A PERSONAL DATABASE

Imagine the convenience of having a filing system and secretary in your pocket. With the PSION ORGANISER you can forget about diaries, notebooks and the backs of old envelopes. All you have to do is type in your information in ANY order or sequence and file it away at the touch of a button. For instant retrieval use the FIND command, type in a few characters which match ANY part of your original entry and all the information will be displayed.

Editing and amending a record is just as simple and you can scroll through an entire entry up to 200 characters long using the cursor keys. Even if the battery is accidently disconnencted, your database stays intact because it's *permanently* stored in a choice of 8k or 16k datapaks.

The 8k datapak holds 11,000 characters and the 16k 22,000. So with two 16k datapaks you can store information equivalent to 1,000 names and addresses and recall them with a few keystrokes. As both datapaks can be removed and replaced at will, you can build an infinitely large personal database which you can access in a few seconds.

You can use the ORGANISER to store all the vital day-to-day information you need:

Names and Addresses
Important dates
Restaurants
Customer and supplier records
Exchange rates
Personal Reminders
Price Lists
Schedules
Expense details
Timetables
Survey information
Statistics
Experimental data

and there are dozens of other examples. The potential for the ORGANISER is as wide as your imagination!

Although datapaks permanently and securely store information, it is possible to clear and re-use an entire datapak using a process called formatting, a service which is available by post or through using a PSION FORMATTER.

Further details are provided on the ORDER FORM.

AN OPEN ENDED COMPUTER SYSTEM

Psion is dedicated to the continuous development of the ORGANISER as a practical, innovative and versatile computing resource for the personal and professional user.

Over the next few months we will be introducing a number of new software and peripheral packs designed for a wide variety of applications including database management, data logging and analysis and an expanding range of customised data bases.

In addition to the creation of further software packs to increase the usefulness of the ORGANISER for the general user, a special PSION development team undertakes in-depth analyses to investigate the requirements of particular user groups. Specialist packs are currently planned for such widely differing markets as hospital doctors, general practitioners, pharmacists, farmers, teachers, meter readers, warehouse staff, stockbrokers and pilots.

Combined with the facility to interface with a wide range of other computers and peripherals through the LINK-UP Communications pack the opportunities for using the ORGANISER become almost limitless.

If you have any particular expertise or requirements which you believe could be addressed by the ORGANISER, we would be very pleased to hear from you. For further information please write to PSION SUPPORT, 22 Dorset Square, London NW1 6QG.

COMMUNICATIONS

The PSION ORGANISER can be linked to a wide range of printers and other computers with the simple to use industry standard LINK-UP pack. It enables the ORGANISER to:

- Send records and files stored in datapaks to other computers.
- Print out records and programs from datapaks.
- Receive and store information from other computers in datapaks.

The benefits are enormous and greatly extend the power of the ORGANISER as a versatile and portable database. Two way communication with other computers enables the ORGANISER to act as a remote terminal and data collection device for a central database, and to receive and use such

information with speed and versatility.

The LINK-UP pack is fully integrated with the database system of the ORGANISER and allows automatic selection of records for transmission to computer or printer.

Connected to a printer, programs and information stored on datapaks can be listed, checked and changed using the ORGANISER's compact alphanumeric keyboard.

The LINK-UP pack consists of two units, the connector pack, which looks like a datapak and has a multicoloured ribbon lead emerging from it, and the software pack.

The software pack contains the programs which control the flow of information to and from the ORGANISER. Once the programs have been set, the software pack is replaced by a datapak to transmit or receive information through the connector pack.

The LINK-UP pack conforms to the widely used RS232 and RS423 standards, found in almost all home and desk top micros and serial printers.

The manual explains in detail how to use the software pack to set the ORGANISER to communicate with compatible machines including the Sinclair QL, BBC Model B, IBM PC and ACT Apricot computers and the EPSOM FX80 with serial interface card.

The two metre ribbon cable terminates in a standard 25 pin D type socket which can be plugged directly into an IBM PC. Other computers and printers may require an additional adaptor which if you do not already have one, can be purchased from your computer dealer. Full details are provided in the manual.

TECHNICAL INFORMATION

Inserting the SOFTWARE PACK and CONNECTOR PACK in the solid state drives provides two new MODE commands: SETUP and RESET.

SETUP provides the following communication parameters and default settings using the ↑ and ↓ keys:

BAUD	9600	EOL	CRLF
PARITY	NONE	EOF	1A
BITS	8	TRAN A	NONE
STOP (BITS)	1	TRAN B	NONE
HAND (SHAKING)	NONE	EXIT	NO SAVE

and are arranged in a continuous loop. Using the « and » keys, new parameters can be set, depending on the requirements of the 'target' computer or printer.

BAUD:	150, 300, 600, 1200, 2400, 4800, 9600
PARITY:	ODD, EVEN, MARK, SPACE, NONE
BITS:	7, 8
STOP BITS:	1, 2
HAND SHAKING:	RTS/CTS, XON/XOFF, NONE
EOL:	CR, LF, FF, or user defined
EOF:	CR, LF, FF or user defined
TRAN A:	CR, LF, FF or user defined
TRAN B:	character substitution.
EXIT:	NO SAVE, SAVE

SEND AND RECEIVE COMMANDS

SEND L	Send Line	REC L	Receive Line
SEND F	Send File	REC F	Receive File
SEND P	Send Program		

SOFTWARE LIBRARY

However simple or complex your computing requirements – the PSION ORGANISER can meet them – at work or in the home – with a range of ready-written software that you just plug in and run. Each program pack also contains an extended range of mathematical and scientific functions and POPL – the PSION ORGANISER Programming Language. Three packages are already available and more are on the way soon:

FINANCE

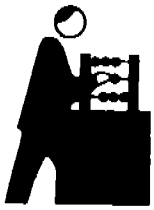
MORTGAGE: Monthly repayments
CASH FLOW: Net present value
Internal rate of return
INVESTMENT: Bond redemption yield
Equity price to earnings ratio estimates
COMPOUND INTEREST: Mortgage
Payment
Value
Capital
Duration
DEPRECIATION: Straight Line
Reducing Balance
Lifetime Estimate
BONDS AND EQUITIES: Bond redemption yield P/E estimate: Whitbeck-Kisor model.

SCIENCE

A suite of science programs suitable for a wide variety of applications.

Physical Constants – Planck, electron mass, electron charge, Rydberg, Gravitation, Avogadro, speed of light, sound. Gas constant, permeability, permittivity, earth radius, Bohr radius, Astronomic unit, etc.
Conversion Factors – UK to MKS etc.
Formulae – LC circuit, Lenses, Bohr energy levels, Larmor, plasma, etc.
Integration Under a Curve
Least Square Fit
Solution of Polynomial Equations

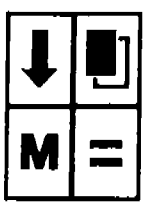
SOFTWARE LIBRARY



MATHEMATICS

Valuable for the mathematician, the student and scientist – with a comprehensive range of facilities:

Bessel – functions
Polynomials – solutions to equations
Matrices – solution to matrix equations
Eigenvalues
Integration – under a curve
Curve-fitting – least squares
Statistics – mean
standard deviation
Chi-squared



UTILITY PACK

Further increases the power of the PSION ORGANISER'S calculator functions with a powerful range of additional mathematical and scientific functions.

LOG, ALOG, LN, SQRT, EXP, SIN, COS, TAN, ATN, ABS, INT, DEG, RAD, MOD, MIN, MAX, FAC, SGN, ROUND, MEAN, STDEV, PI, RND, RAND, ENG, FIX, POWER FUNCTION AND COPY.

TECHNICAL INFORMATION

ORGANISER

Dimensions (with protective case closed)
Length 142.0 mm
Width 78.0 mm
Depth 29.3 mm
Weight (without battery) 225 grams
Power Consumption (Milliwatts at 9V)
Organiser Off 0.2: On 40.0
Datapak access (during 'SAVE' or 'FIND')
One datapak 500.0: Two 800.0
Display Sixteen character alpha-numeric (dot-matrix) liquid crystal.
Keyboard 36 keys comprising:
Control: ON/CLEAR; MODE/HOME; FIND; SAVE; EXECUTE
Editing: SHIFT; DELETE; SPACE; «and».
Character: A to Z; 0 to 9; arithmetical symbols and punctuation.
Significance selected with SHIFT.
Microprocessor HD6301X eight-bit CMOS microprocessor chip with 0.9216 MHz clock. (3.6864 MHz crystal frequency source), 2 Timers, serial interface, 53 I/O lines, 80 pin LSI.
Memory Total 14k with one datapak
Rom 4k (internal to microprocessor)
RAM 2k
EPROM 8k (datapak)
Clock CMOS real time clock with 32768 Hz crystal frequency source.

DATAPAKS

	8k	16k	
Capacity	10,900	21,800	Characters of packed data
'FIND' times			
Average (sec)	2.5	5	(with full datapak)
Maximum (sec)	5	10	

'SAVE' time 4-8 characters per second, according to battery age
Data Retention 50 years at temperatures up to 100°C (MTTF)
Storage Medium EPROM (Erasable programmable read only memory)
Formatting 30 minutes in PSION FORMATTER prepares datapak for re-use
Life Can be formatted up to 100 times
Dimensions Length 53 mm
Width 26 mm
Depth 13 mm
Weight 20 grams

PROGRAM PACKS

Contents 16k of facts, formulae and procedures for specialist applications.
Programming language.
Storage Medium ROM
Dimension and Weight As for datapaks

FORMATTER

Operation Formatts 1 or 2 datapaks in 30 mins. (auto-timer control)
Dimensions Length 190 mm
Width 95 mm
Depth 65 mm
Weight 975 grams
Voltage 220-240 ac
Power Consumption 6 watts

PSION has a policy of continuous product development and improvement. Small modifications arising from this are not necessarily included in this technical information.

FORMATTING SERVICE

Although datapaks permanently and securely store information it is possible to clear and re-use an entire datapak using a machine called the PSION FORMATTER (£44.95).

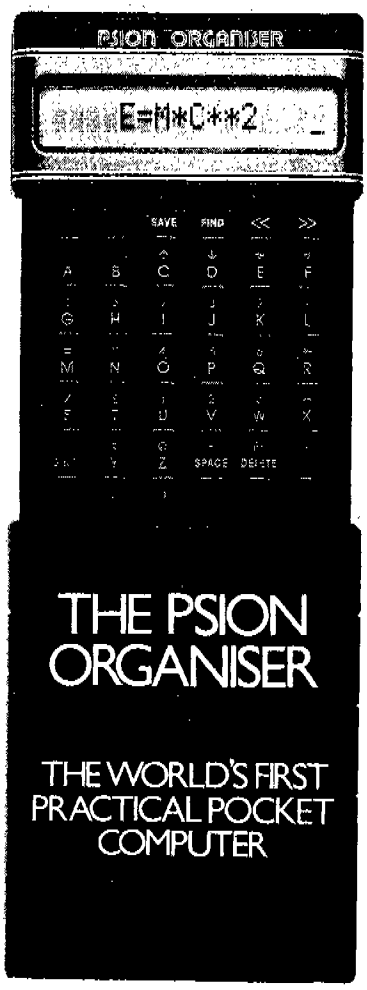
This facility is also available by post at £3.50 (incl. P&P) for each datapak, whether 8k or 16k. Your datapak will be dispatched by Recorded Delivery within 48 hours of receipt, with a guaranteed capacity of either 8k or 16k, for the storage and retrieval of new information.

Before using this service, please ensure that all the information you wish to retain is transferred to another datapak.

PRICE LIST

PSION ORGANISER

PSION ORGANISER WITH 8k DATAPAK	£99.95
SCIENCE PACK	£29.95
MATHS PACK	£29.95
FINANCE PACK	£29.95
LINK-UP COMMUNICATIONS PACK	£39.95
16k DATAPAK	£19.95
8k DATAPAK	£12.95
FORMATTER	£44.95
SPARE DATAPAK LABELS (30)	£2.40
FORMATTING SERVICE	see other side for details



A 6502/6809 Single Board Computer

Despite the increasingly large number of home computers on the market there are still surprisingly few which could be described as a computer for the electronics enthusiast. Most machines are entirely suitable for game playing and BASIC programming having such facilities as medium resolution colour graphics and sound effects but do not lend themselves to learning about the hardware or machine code programming. One product which has successfully occupied the nitch of the "hardware man's machine" for a number of years is the Microtan 65, a number of hardware add-ons for which have been featured in ETI. One drawback of the Microtan 65 is that the design is now somewhat dated, the single board having very little memory and utilises the 6502 processor. Out of the same stables has now come the Single Board Controller which is now marketed by Microtanic Computer Systems Ltd. This board has the advantage of using the same bus specification as the Microtan 65 hence obviating all interfacing problems with previous Tangerine peripheral boards yet may be configured to use either the 6502 or the 6809, regarded by many as the most powerful 8 bit processor. Other processors which may be used are the 6802 and the 6808 which are versions of the 6800 with on chip clock and RAM. In this article, however, the discussion will be restricted to the 6502 and 6809. The controller can also take up to 56K of memory on the one board. In addition it is available either as a complete board, as a kit of ports or as a bare PCB, monitor EPROMs being available separately if this latter option is chosen. As such, the controller forms the basis of an attractive system for the more serious home computing enthusiast and especially those with a hardware bias. Unfortunately this product has, as yet, received little in the way of publicity outside the realm of existing Tangerine users. The purpose of this article is to introduce the 6502/6809 controller both as the basis of a sophisticated computer system and also as a true controller, the board being presented as a constructional project.

A 6502/6809 COMPUTER SYSTEM

Since the single board controller has been artworked in such a way that it may take either a 6502 or 6809 processor, the types of system which may be built around it fall into two categories. A 6502 based system will be similar in many ways to a system built around the original Microtan 65 although the clock frequency may be selected to 1.5MHz, twice the speed of Microtan. For such a system, the CBUG monitor will be used and will give all the usual facilities of display/modify memory, setting breakpoints etc plus a line assembler and disasembler. This sytem will also allow BASIC resident in EPROM to be added. A 6809 based system, on the other hand, may be run at 1MHz or 2MHz and will use a system monitor called TVBUG. Monitor facilities are similar to those in CBUG except that the line assembler/disassembler is not included but routines for booting from disc and writing MIKBUG compatible records via the serial port are included. It should be noted that the single board does not include any video circuitry and accordingly a minimum system must either include the VDU card marketted by MCS Ltd or alternatively some sort of computer terminal should be interfaced via the RS232 port. From these minimal systems which will allow 6502 or 6809 machine code programming and may well be adequate for those whose main interest is computer hardware, many upgrade paths are available. Hundreds of K of RAM or EPROM may be added in a paged memory configuation. The addition of a disc controller and disc drives allows the FLEX or OS/9 operating systems to be run on the 6809 board or TANDOS on the 6502 controller. Alternatively a Z80 card is available and allows the industry standard CP/M disc operating system to be run on systems with either processor. Other options include high resolution colour graphics, sound effects, serial and parallel I/O, EPROM programmers, real time clocks etc. Table 1 and Table 2 list the commands available under CBUG and TVBUG respectively.

THE 6502 / 6809 BOARD AS A CONTROLLER

Some months ago, the author made a start on the design of a minimum configuration 6809 card to control the ETI Universal EPROM programmer in a stand-alone situation. It soon became obvious that this was a "re-inventing the wheel" type exercise as a board which would do this task at a reasonable cost was already available to the home user. Admittedly the 6502/6809 single board controller was not designed with this type of application in mind and it could be argued that it is a waste to use a board of this complexity for a pure control function. Whereas this would be true if the board was only available fully built, the fact that a bare board can be obtained and populated only to the point required by the particular application makes it quite suitable as a controller. In addition the cost for control applications can be further reduced by some slight circuit modifications which obviate the need for some of the more expensive components which are not really needed in this type of application. For logic designs of reasonable complexity, the cost of a minimum configuration single board controller will be less than the component cost of a design using discrete TTL devices without even considering the time and expense of PCB artwork and manufacture.

THE CIRCUIT

The object of this section, "How it works" and the constructional details is to open the board up to the electronics enthusiast, the documentation currently provided by MCS Ltd not really doing justice to the product, a circuit diagram having only just been released, the one presented here which is more comprehensive than the MCS version being the result of many hours tracing the circuit from a bare PCB.

The following outlines the constituent parts of the circuit :

a) The processor which may be either a 6502 or 6809 running at a variety of clock frequencies.

b) 9 sockets which may take any standard JEDEC packages allowing 2K, 4K or 8K RAMS or EPROMs to be used depending on link selection.

c) One 6551 configured to provide TTL serial, 20mA current loop or RS232 I/O at various baud rates.

d) Two 6522 VIAs giving 40 bits of parallel I/O, 2 counter/timers and 2 shift registers, one of which controls a cassette interface. When used in a computer system these VIAs provide interfacing for a parallel keyboard and Centronics printer. When used as a controller, a slight circuit modifications allows the 6522s to be replaced by the less expensive 6821 PIAs.

e) A bipolar PROM controlling the memory mapping of the board.

f) Signal buffering and implementation of various TANBUS signals to allow the board to be used as a part of a larger system by use of a system motherboard.

HOW IT WORKS

The heart of the circuit is either D2, the 6809 processor or D3, a 6502 (6802 or 6808) processor, these two being slightly offset sockets. On the circuit diagram (Figure 1) the two possible processors are shown as one block, the pin numbers and functions for the 6502 option being shown in brackets (where different to the corresponding 6809 functions) next to the 6809 pin numbers and functions. LK1 is used for enabling or disabling on chip RAM if the 6802/6808 is in use and LK9 allows a battery supply to be used with this same processor for power down data retention. The processor clock is provided by the circuitry around C1, a binary counter and its associated crystal oscillator. LK7 selects either the on-board crystal oscillator or an off-board master clock, LK3, LK4, LK5 and LK6 select the processor frequency and LK2 alters the clock configuration depending on the type of processor in use. The power-on reset circuit is the portion including 1/6 C2, D2 and capacitors C5 and C15. Buffering of the address bus is provided for on-board and external use by E2 and E3 whereas N2 buffers the data bus for off board peripherals only. E1, F1, F2, H1, H2, K1, K2, L1 and L2 are sockets for JEDEC memory devices, the specific type of device in use being specified by links LK14, LK15, LK16, LK17, LK18 and LK19, some of which control a single socket and some of which affect a pair of memory sockets. The chip select decoding of these memories comes from M3, a 3 to 8 line decoder which is used in conjunction with N3, a bipolar PROM which controls the memory mapping of the complete board. LK24 allows a 2 page memory configuration to be implemented on board, the page selection being controlled from B1, a 6522 VIA. The circuitry around J3 allows on board memory to be enabled or disabled via the external BE (block enable) signal which is generated on the system mother board and allows a paged memory configuration greater than 64K to be achieved. LK21 and LK22 allows this facility to be disabled for on-board EPROM or RAM respectively. The same circuitry is sensitive to the Tanbus generate under various circumstances to disable portions of on-board memory. B1 and B2 are the 6522 VIAs, connection to the outside world being made via the DIL sockets A1, A2, A4 and A5. Socket B2 can take a 6526 in place of the 6522, this device having time of day registers and requires a 50Hz clock which may be connected via LK25. The cassette interface is driven from B1 and the circuitry round C3, a LM358N op-amp. D1 is the 6551 UART, access to which is provided via DIL socket A3 and the circuitry around D4, Tr3 and Tr1 providing RS232 (transmitted and received data only - not modem control lines) and 20mA current loop signal levels. The address decoding for the I/O devices is provided by F3, links LK10, LK11, LK12, LK12 and LK13 allowing 4 optional addresses for the on-board portion of the I/O area. The I/O area select signal is also made available to off-board devices via the edge connector. Provision is made for DMA, the circuitry comprising G3 and H3 taking DMA request and generating DMA granted.

CONSTRUCTION

It is not the intention of this article to duplicate information supplied by MCS Ltd and accordingly the section on construction will mainly cover those points not covered by the instructions which accompany the PCB or kit. This being the case, except to say that it should cause no problems to anyone familiar with the fundamentals of electronic construction, no comments will be made about construction and link selection. Instead, this section will cover the programming of the address decoding PROM and the ways in which the board may be modified slightly to reduce the cost of a minimum configuration system for control applications.

MCS Ltd supply a number of memory mapping PROMs for various applications but do not give instructions on how to work out the programming required to achieve a specific mapping configuration. The 74S288 PROM has a capacity of 32 bytes and, in this application, each of these bytes controls the memory configuration of a 2K block of addressing space within the 64K map. In other words, the lst byte affects 0-2K (0000-07FF), the 2nd byte 2K-4K (0800-0FFF) etc. Table 3 shows the significance of each bit within these bytes, bit 0 in this illustration being the least significant and bit 7 the most significant. As an example, Table 4 shows the programming of the standard memory map PROM for a 6502 CBUG system. Looking at the bit 7 column it is clear that the sockets 1-8 are enabled for addresses 0000-2000 and C000-EFFF, these blocks being the only ones where an 0 is programmed. The columns for bits 4,5 and 6 indicate that sockets 1,2,3,4,7 and 8 are configured for 2K devices as each of these sockets is addressed for 2 blocks each and are therefore 4K devices. It can be seen that 0000-07FF addresses socket 1, 0800-0FFF - socket 2, 1000-17FF - socket 3 up to E800-EFFF - socket 8. By looking at the bit 1 and 2 columns we can see that of these 8 sockets, the lst 4 have a 1 for bit 1 and are therefore EPROMS. The last 2 2K blocks have a 0 in bit 3 therefore selecting socket 0, the monitor EPROM which is obviously a 4K device and to complete the map, a 1 in bit 0 for the block B800-BFFF indicates that the I/O area is in the top half of this block ie BC00-BFFF.

From the foregoing information it is quite clear that virtually any memory map in 2K steps can be specified by the programming of the PROM. However, for a minimal configuration as used for control applications, a cost reduction can be made by replacing this component with a number of wire links and a simple TTL device which could be soldered onto a DIL header and inserted into the PROM socket. Figure 2 shows the circuit diagram of such an arrangement which gives a crude but effective memory map for many control applications. In this map the I/O area repeats 16 times in 2K steps starting at 0400-07FF, socket 5 is addressed at 8000-9FFF, socket 6 : A000- BFFF, socket 7 : C000-DFFF and socket 8 : E000-FFF. Obviously if 4K devices are used in these sockets they will repeat twice within the 8K block and 2K devices will repeat 4 times. It should be noted that this configuration does not give RAM at address 0 and accordingly will be more practical for a 6809 application that for the 6502 since this latter processor generally requires zero page memory at this address.

The memory mapping PROM does not dictate the mapping of the various I/O devices within the I/O area. This is partially fixed by the hardware and partially a function of LK10, LK11, LK12 and LK13, only one of which will be fitted. Table 5 shows the I/O memory map.

Although when used as the basis of a computer system, the 6522 VIAs will be required as their facilities are made use of by the system software, in many control applications all that is required is the parallel I/O capability and as such the devices could be replaced by the less expensive 6821 PIAs. Unfortunately the pinouts of the two devices are not identical which means that a few tracks need cutting and a few wire links require adding to the back of the board. Figure 3 shows the details of this modification. The 6821 only occupies an addressing space of 4 compared to the 16 bytes of the 6522 which means that once the modification has been carried out the 6821 registers will be spaced at intervals of 4 bytes. This need present no problem so long as it is not overlooked when writing the firmware.

As far as further cost reductions for control applications is concerned it is merely a case of omitting those components which are not required for the particular application in question. I RAM and 1 EPROM will obviously be required as will at least one of the 6522 VIAs (or 6821 PIAs). If no RS232 facility is required then D1, D4, Tr1, Tr3, X2 and their associated passive components may be left out. If the cassette interface is not to be used the C3 and Tr2 together with

their passive components can be omitted. As a final cost reducing exercise, assuming that no other boards are to be connected to the bus then the address and data bus buffers may be omitted. N2, the data bus buffer may be simply left out but E2 and E3 the address bus buffers will require linking across as they supply on-board as well as off-board[devices. This linking is done by omitting the chips in question and linking each input to its corresponding output as may be seen from the circuit diagram ie pins 13 to 7, 17 to 3 etc.

TABLE 1 – COMMANDS AVAILABLE UNDER CBUG (6502)

M	MEMORY MODIFY / EXAMINE
L	LISTMEMORY
G	GO (EXECUTE PROGRAM)
R	REGISTER MODIFY / EXAMINE
S	SINGLE STEP MODE
N	NORMAL (NON SINGLE STEP) MODE
P	PROCEED (IN SINGLE STEP MODE)
B	SET / CLEAR BREAKPOINTS
O	OFFSETT CALCULATION
C	COPY MEMORY BLOCK
BAS	BASIC COLD START
WAR	BASIC WARM START
D	DUMP TO CASSETTE TAPE
E	EXAMINE CASSETTE TAPE
F	FETCH FROM CASSETTE TAPE
T	TRANSLATE (SINGLE LINE ASSEMBLER)
I	DIS-ASSEMBLER

TABLE 2 – COMMANDS AVAILABLE UNDER TVBUG (6809)

*	BOOT 5 INCH DISC OPERATING SYSTEM BOOT 8 INCH DISC OPERATING SYSTEM USER FUNCTION
/	OPEN LAST ACCESSED MEMORY ADDRESS
B	DISPLAY / MODIFY BREAKPOINTS
C	COPY MEMORY BLOCK
D	DISPLAY MEMORY BLOCK
F	FILL MEMORY BLOCK
G	GO (EXECUTE PROGRAM)
J	JUMP TO SUBROUTINE
M	MODIFY MEMORY
N	SET NULL PAD COUNT
P	TOGGLE PRINTER OUTPUT
R	DISPLAY / MODIFY REGISTER
S	DISPLAY STACK CONTENTS
V	COMPARE MEMORY BLOCK
W	WARM START FLEX OPERATING SYSTEM
X	REMOVE BREAKPOINTS
b	BUILD S1-S9 TAPE BLOCK
l	LOAD TAPE
s	SAVE MEMORY AS TAPE FILE
v	VERIFY TAPE

TABLE 4 – MEMORY MAPPING PROM FOR 6502 CBUG CONFIGURATION

ADDRESS BLOCK	EPROM ADDRESS	DATA BITS 7	6	5	4	3	2	1	0	=HEX
0000-07FF	00	0	0	0	0	1	1	0	0	OC
0800-0FFF	01	0	0	0	1	1	1	0	0	1C
1000-17FF	02	0	0	1	0	1	1	0	0	2C
1800-1FFF	03	0	0	1	1	1	1	0	0	3C
2000-27FF	04	1	0	0	0	1	0	0	0	88
2800-2FFF	05	1	0	0	0	1	0	0	0	88
3000-37FF	06	1	0	0	0	1	0	0	0	88
3800-3FFF	07	1	0	0	0	2	0	0	0	88
4000-47FF	08	1	0	0	0	1	0	0	0	88
4800-4FFF	09	1	0	0	0	1	0	0	0	88
5000-57FF	0A	1	0	0	0	1	0	0	0	88
5800-5FFF	0B	1	0	0	0	1	0	0	0	88
6000-67FF	0C	1	0	0	0	1	0	0	0	88
6800-6FFF	0D	1	0	0	0	1	0	0	0	88
7000-77FF	0E	1	0	0	0	1	0	0	0	88
7800-7FFF	0F	1	0	0	0	1	0	0	0	88
8000-87FF	10	1	0	0	0	1	0	0	0	88
8800-8FFF	11	1	0	0	0	1	0	0	0	88
9000-97FF	12	1	0	0	0	1	0	0	0	88
9800-9FFF	13	1	0	0	0	1	0	0	0	88
A000-A7FF	14	1	0	0	0	1	0	0	0	88
A800-AFFF	15	1	0	0	0	1	0	0	0	88
B000-B7FF	16	1	0	0	0	1	0	0	0	88
B800-BFFF	17	1	0	0	0	1	0	0	0	89
C000-C7FF	18	0	1	0	0	1	0	1	0	4A
C800-CFFF	19	0	1	0	0	1	0	1	0	4A
D000-D7FF	1A	0	1	0	1	1	0	1	0	5A
D800-DFFF	1B	0	1	0	1	1	0	1	0	5A
E000-E7FF	1C	0	1	1	0	1	0	1	0	6A
E800-EFFF	1D	0	1	1	1	1	0	1	0	7A
F000-F7FF	1E	1	0	0	0	0	0	1	0	82
F800-FFFF	1F	1	0	0	0	0	0	1	0	82

TABLE 5 · MEMORY MAP OF I/O AREA

LINK FITTED	START ADDRESS 6551 D1	6522 B2	6522 B1
LK10	I/O+00H+00H	I/O+00H+10H	I/O+00H+20H
LK11	I/O+40H+00H	I/O+40H+10H	I/O+40H+20H
LK12	I/O+80H+00H	I/O+80H+10H	I/O+80H+20H
LK13	I/O+COH+00H	I/O+COH+1OH	I/O+COH+20H

COMPONENT	VALUE/TYPE	COMMENT
RESISTORS		
R1	220R	ONLY FOR 20mA C/L
R2	220R	ONLY FOR RS232
R3	4K7	ONLY FOR RS232
R4	1K0	ONLY FOR RS232
R5	4K7	
R6	120K	ONLY FOR CASSETTE INTERFACE
R7	10K	ONLY FOR CASSETTE INTERFACE
R8	10K	ONLY FOR CASSETTE INTERFACE
R9	470R	ONLY FOR CASSETTE INTERFACE
R10	10K	ONLY FOR 20mA C/L
R11	4K7	
R12	4K7	
R13	470R	
R14	4K7	
PR1	4K7 SIL PACK	(7 COMMONNED)
RP2	I KO SIL PACK	(7 COMMONNED)
RP3	10K SIL PACK	(4 SEPERATE RESISTORS)
PR4	1KO SIL PACK	(4 SEPERATE RESISTORS)
CAPACITORS		
C1	100n	
C2	10n	
C3	n10	
C4	47n	ONLY FOR CASSETTE INTERFACE
C5	100uF	
C6	47n	ONLY FOR CASSETTE INTERFACE
C7-C14	100n	
C15	10n	

DISCRETE SEMICONDUCTORS

TR1	*BC184	ONLY FOR RS232
TR2	*BC184	ONLY FOR CASSETTE INTERFACE
TR3	*BC184	ONLY FOR RS232

* NOTE BC184 HAS DIFFERENT PIN OUT TO BC184L

D1	1N4001	ONLY FOR SERIAL I/O
D2	1N4001	
D3	1N4001	
XTAL 1	8.0 / 6.0MHz	8.0MHz FOR 1 OR 2MHz OPERATION 6.0MHz FOR 0.75 OR 1.5MHz
XTAL 2	1.8432 MHz	ONLY FOR SERIAL I/O

BUYLINES

Unlike the majority of ETI projects, the PCB is not available from the standard ETI PCB Service. Instead, it may be obtained from Microtanic Computer Systems Ltd at 102 Lordship Lane, Dulwich, London SE22 (Tel : 01–299–1419).

MCS Ltd also supply complete kits of parts for various 6502 and 6809 configurations, ready built boards and pre-programmed memory mapping PROMs and monitor EPROMS.

For those just obtaining the PCB from Microtanic Computer Systems Ltd., there should be few problems in obtaining the necessary components from standard sources.

INTEGRATED CIRCUITS

B1	6522	ALWAYS FITTED FOR USE IN COMPUTER
B2	6522	FOR CONTROL APPLICATIONS 1 OR 2 6522s MAY BE FITTED DEPENDING ON APPLICATION. MAY BE REPLACED BY 6821s AS DESCRIBED IN TEXT. FOR FREQUENCY 1MHz USE 6522A/68B21
C1	74LS393	
C2	74LSO4	
C3	LM358N	ONLY FOR CASSETTE INTERFACE
D1	6551	ONLY FOR SERIAL I/O. FOR FREQUENCY 1 MHz USE 6551A
D2	6809	EITHER D2 OR D3 SHOULD BE SELECTED
D3	6502	FOR FREQUENCY 1MHz USE 68B09/6502A
D4	75150	ONLY REQUIRED FOR RS232
E2	74LS244	MAY BE REPLACED BY WIRE LINKS FOR
E3	74LS244	SINGLE BOARD CONTROL APPLICATION (SEE TEXT).
F3	74LS139	
G3	74LS00	
H3	74LS266	
J3	74LS12	
K3	74LS10	
L3	74LSO8	
M3	74LS138	
N2	74LS245	NOT REQUIRED FOR SINGLE BOARD APPLICATIONS
N3	74S288	MEMORY MAPPING PROM. MUST BE PROGRAMMED AS DESCRIBED IN TEXT OR OBTAINED FROM MCS. ALTERNATIVE FOR SIMPLE CONTROL APPLICATION (SEE TEXT)
E1,F1,F2,H1,H2		MEMORY FITTED AS REQUIRED
K1,K2,L1,L2	FO	FOR 6502 COMPUTER SYSTEM MINIMUM CONFIG = CBUG(2732) in E1, 6116 in F2. FOR 6809 COMPUTER SYSTEM MINIMUM CONFIG = TVBUG(2732) in E1, 6116 in L1.

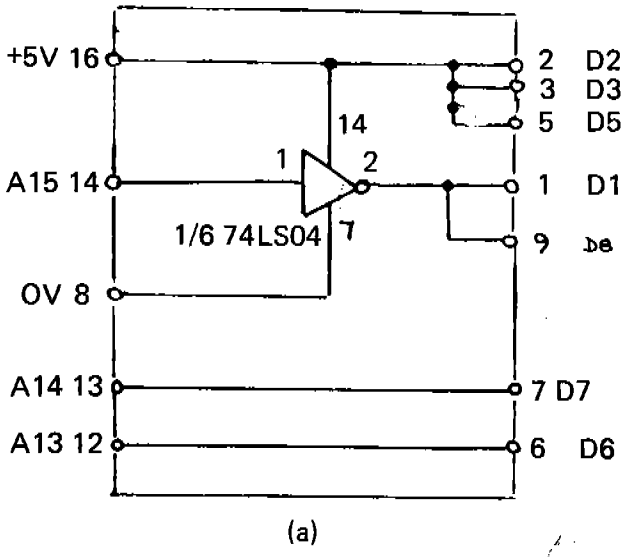
MISCELLANEOUS

PCB
EDGE CONNECTOR 2X32 WAY A+B DIN EURO–CONNECTOR
IC SOCKETS AS REQUIRED

REPRINTED COURTESY OF ELECTRONICS TODAY INTERNATIONAL (E.T.I.)

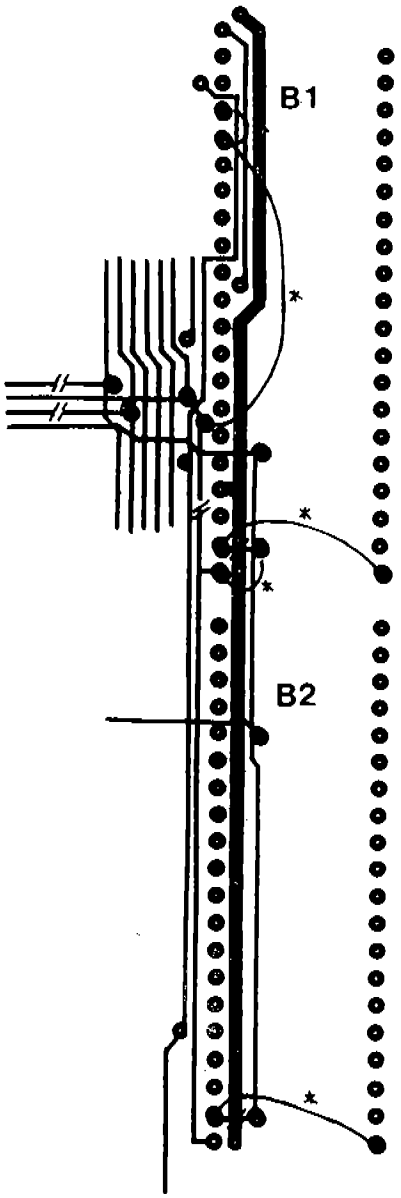
74S288 Pin No.	9	7	6	5	4	3	2	1
74S288 Bit No.	7	6	5	4	3	2	1	0
Function	A 0 in this bit enables memory sockets 1—8. This is further decoded by bits 4,5 & 6.	Wherever A 0 occurs in bit 7 A 3 bit binary number should be written to these bits to indicate which of the eight sockets is to be addressed. The socket number = 1 + the three bit number. eg 000 addresses socket No. I			A 0 in this bit enables memory socket No. 0 this is a special socket unaffected by block enable etc and is used for the monitor EPROM	Wherever a 0 occurs in bit 7 one of these two bits should be set to indicate whether the memory socket specified by bits 4,5 & 6 is to be considered as RAM or EPROM for block enabling and memory inhibiting purposes. Bit 2 = 1 for RAM Bit 1 = 1 for EPROM		A 1 in this bit enables the top half of the 2K block to be the I/O area

Table 3. Memory mapping prom bit designations



(a)

Figure 2 Memory map replacement circuit. Built on 16 pin DIL header

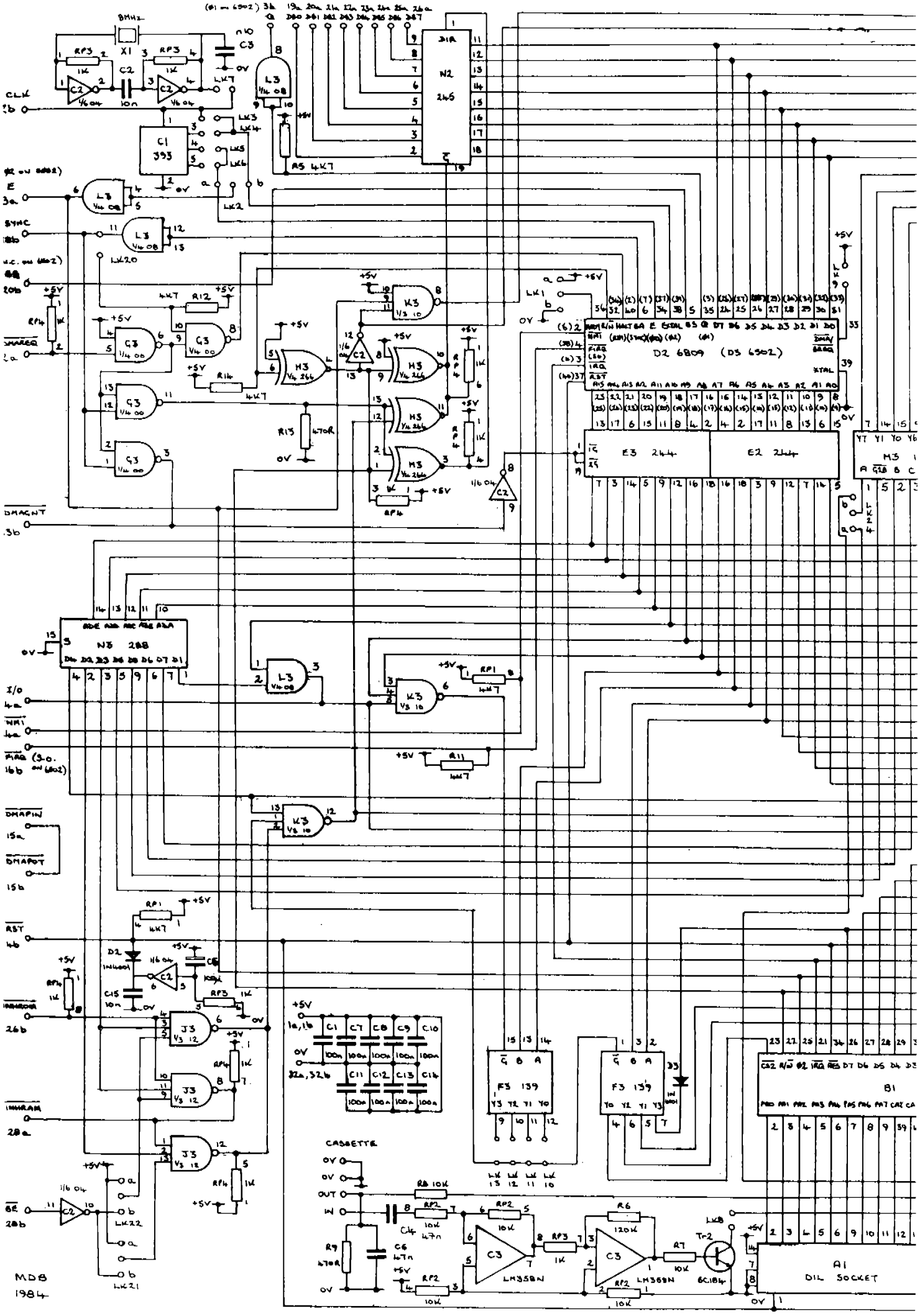


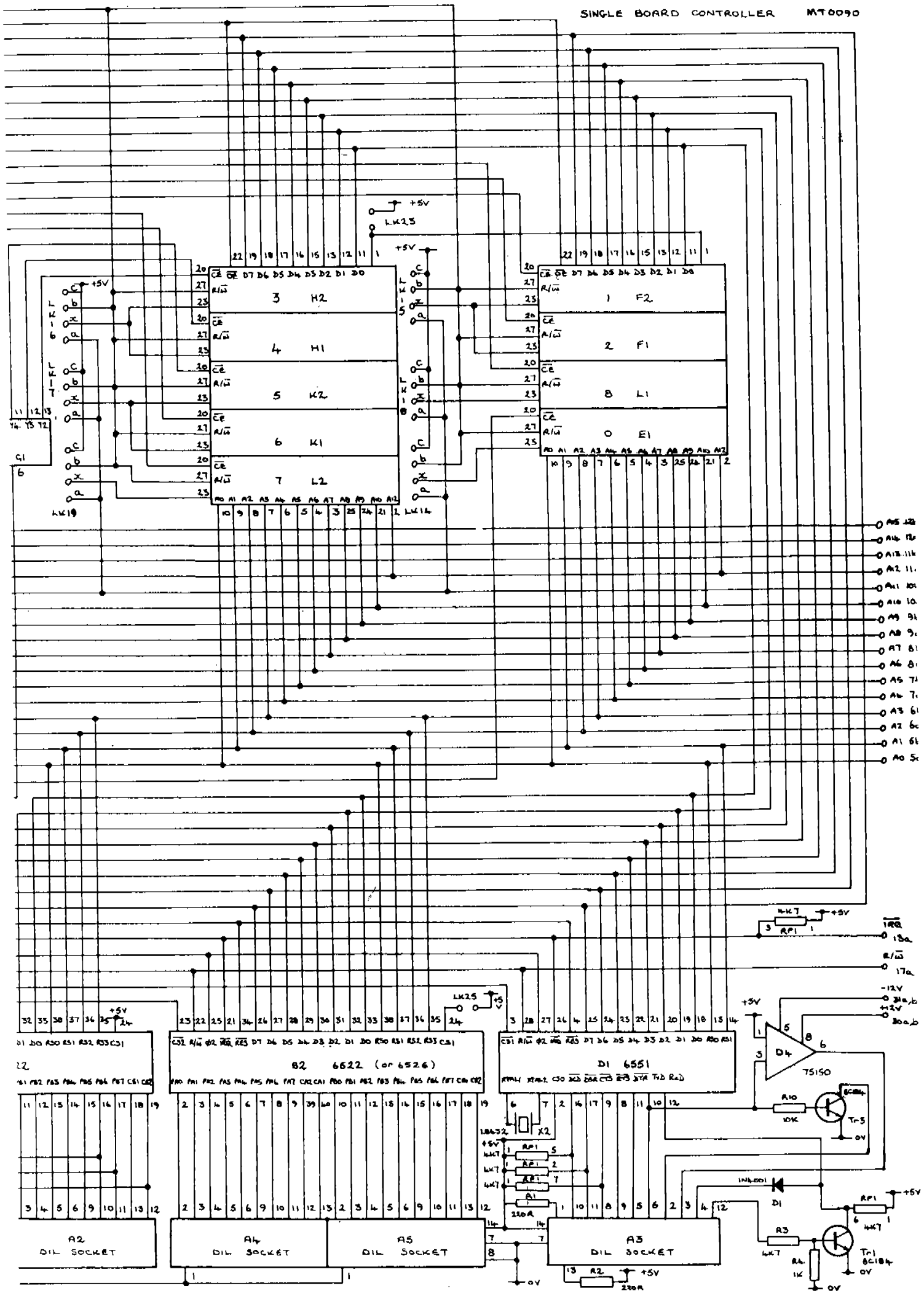
On the final version of this diagram the non-component side tracks will be printed in grey to improve clarity.

1) Add 5 wire links marked ✳ to back of board.
2) Make 5 cuts to tracks marked //. (Both sides of board). PCB modification to allow replacement of 6522s by 6821s. View from non-component side with edge - connector on L.H.S.

Figure 3

PCB Modification to allow 6821s to be fitted in place of 6522s


D2 6809 (D3 6502)
N2 245
N3 288
E3 244
E2 244
M3
F3 139
F3 139
B1
A1
DIL SOCKET
CASSETTE
LM358N
LM358N
6C184
MDB
1984


SINGLE BOARD CONTROLLER MT0090
3 H2
4 H1
5 K2
6 K1
7 L2
1 F2
2 F1
8 L1
0 E1
LK25
LK16
LK19
+5V
A2 DIL SOCKET
A4 DIL SOCKET
A5 DIL SOCKET
A3 DIL SOCKET
82 6522 (or 6526)
D1 6551
D4 75150
Tr1 BC184
Tr3 BC184
X2 1.8432
D1 IN4001
R3 4K7
R10 10K
R4 1K
R2 220R
0V

The 6502 SBC

Read about the SBC, like the idea?

How do you go about it!

Wellh

Well here is a simple way to illustrate "SBC and how she is done".

The 6502 SBC doesn't have a keyboard or a video display. So first things first, get your Video 80/82 card and get this up and running.

Now the only monitor that knows about the Video 80/82 is (believe it or not) TUGBUG so you need this or put in a little subroutine somewhere in TANBUG.

(The monitor needs to be altered anyway, see later).

Now pull out the Microtan 65, Tanex and the 244 on the motherboard and - - - GARBAGE.

Even without using the UHF modulator and using direct Video from the board it still needs a 6MHz CLK, FB and HB from Microtan to work. (Did you know that?)

So to supply these a reduced Microtan is needed.

Whats the reduced Microtan? Easy, rip out all chips on the Microtan except B3, C2-C3, D10D3, E1, E3, F1, G1 and H1 these give the necessary signals. (Why not buy the board and these chips, it only about £30?)

Put the 244 back in the motherboard with pins 12, 16 and 18 out of the socket, this just generates the CLK (at 6MHz).

Important, the SBC must now run from external clock so, link 7 is **broken**; of course better is just to run the Video 80/82 board by linking these across directly, the SBC can then run at any speed. Now put in the SBC, reduced Microtan and Video 80/82 with TUGBUG in the SBC socket 0 and RAM in socket 1, switch on and -

Ta-ra, monitor comes up on the display.

I seem to hear a scream - "Wheres the keyboard go?"

Patience, patience.

You are now (I hope) working on TUGBUG (if not go directly to joil do not collect £200). If you are using TANBUG you'll have to work out where to put the following routines yourself.

In line with the 6809 SBC the keyboard is connected to socket A1 on the 6502 SBC, this corresponds to socket A1 on Tanex.

The pin allocations are:

p1	RESET
p2-p6	D0-D4
p7-p8	GND
p9-p11	D5-D7 (D7 is unused)
p12	BUZZER (CA2)
p13	NEGATIVE STROBE (CA1)
p14	+5V

Note that on Tanex p1 is +5V as well so if using the keyboard on Tanex A1 pressing reset connects +V to GND which is not healthy.

(As an aside I connect these by a 15 way D Connector with pins as follows:

p1	RESET
p2-p6	D0-D4
p7,p15	GND
p14-p12	D5-D7
p11	BUZZER (not connected)
p10	CA1 (Negative strobe)
p9	not connected

This makes the cable connections very easy and neat).

Got that? Good.

Here is the software to run it (it also works with the keyboard attached to Tanex A1 naturally).

It overwrites the memory management routines but the SBC doesn't need them anyway. (I never used them either).

TUGBUG Changes for SBC Use

In the initialisation

```
$F89A   STA $BFF0
        JSR $FE70
        JMP $FB42 goto VIAINIT
        $FF
        $FF
```

The latter part of KBINT

```
$FB22   LDA $BFCD
        BPL $FB21
        AND #$2
        BEQ $FB21
        LDA $BFC1
        ORA #$80
        PHP
        PHA
        LDA $0
        LSR A
        BCC $FB1F
        LDA #$0
        STA $0
        LDA #$8B
        STA $BFD2
        BNE $FB1F
$FB42   LDX #$1     VIAINIT
        STX $BFCB   Latch on strobe
        LDX #$82
        STX $BFCE   Enable interrupt
        LDX #$E
        JMP $FA71   Back to print
                            message
```

From here to $FB61 just $FF out.

```
$FB62   PLA
        TAY
        PLA
        RTS
        and finally
$FB71   JMP $FB62
```

Also, if you are interested, altering the monitor message to be $C TUGBUG $0 clears the screen on start up.

To recap, to get the 6502 SBC up and running you need -

Reduced Microtan
244 on motherboard with pins 12, 16, and 18 out.
Modified TUGBUG
and SBC on external CLK with keyboard in A1.

Now, after all that.

Why should you want it?

Firstly the SBC now does not run as a terminal but uses a keyboard directly and talks to the Video 80/82. You can now easily run Microtan programs on the SBC (that don't use the VIA dirtily) and to change to the 6809 pull it out and plug in the 6809. Instant upgrade by just altering the display in the 6809 monitor to use the video board.

Also the SBC can run as a 56K monitor plus 8K RAM board putting it into slot zero, a user program can reclaim it by 'moving' to the 64K board in another slot (after copying across a minimum monitor) beforehand and can replace the monitor by just writing to some reserved location back in slot zero.

J.D. Westoby

CALENDER

MW2601

Calender is, as the name implies, a program that will print a calender on an Epson or compatible printer. The program is very simple in its operation.

Lines 10-30 set the arrays M$ and M with the names of the months and the number of days in them.
Line 40 sets array D$ with the names of the days.
Lines 50-60 asks whether a leap year and if yes adjusts February's number of days.
Line 70 gets first day of year.

With this information the program can continually sequence through the days of the week printing the day and date until the running tally of the date equals the number of days in that month. A form feed is then given, the name of the next month is printed and the process repeats.

For those without an Epson printer:-

Line 80 'PRINTCHR$(27)"E" is the emphasised mode setting.
Line 100 'PRINT CHR$(14)' is the enlarged mode setting
Lines 135-137 sets underline mode, prints 50 spaces and cancels underline mode. This produces a thin line. If you do not have this facility print full stops.

Glen Jarvis
Peterborough

```
 5 DIMM$(12),M(12)
 10 FORN=1TO12
 20 READM$(N),M(N)
 30 NEXT
 40 FORN=1TO7:READD$(N):NEXT
 50 INPUT"IS IT A LEAP YEAR";A$
 60 IFLEFT$(A$,1)="Y"THENM(2)=29
 70 INPUT"WHAT DAY IS JÁNUARY 1st          (MON=1.....SUN=7)";D
 80 PRINTCHR$(17)CHR$(2)CHR$(17)CHR$(5)CHR$(27)"E"
 90 FORM=1TO12
 100 PRINTCHR$(14)TAB(14)M$(M)
 110 FORN=1TO70:PRINT"*";:NEXT:PRINT:PRINT:PRINT
 120 FORN=1TOM(M)
 130 PRINT"  "D$(D)N;:IFN<10THENPRINT" ";
 135 PRINTCHR$(27)"-"CHR$(1);
 136 PRINT"
 137 PRINTCHR$(27)"-"CHR$(0)
 140 D=D+1:IFD=8THEND=1
 150 NEXT
 155 PRINTCHR$(12)
 160 NEXT
 170 PRINTCHR$(17)CHR$(3)CHR$(17)CHR$(4)
 180 DATA"JANUARY",31,"FEBRUARY",28,"MARCH",31
 181 DATA"APRIL",30,"MAY",31,"JUNE",30
 182 DATA"JULY",31,"AUGUST",31,"SEPTEMBER",30
 183 DATA"OCTOBER",31,"NOVEMBER",30,"DECEMBER",31
 184 DATA"MON","TUE","WED","THU","FRI","SAT","SUN"
OK
```

KEYBOARD INTERRUPT HANDLER

Enclosed is a short routine that your readers may find useful and/or interesting. Please publish my name and address since I would be glad to hear from any Microtan owners in the local area.

There are various routines that I have written for my system that I wanted to run without affecting the current BASIC or M/C program (for example, routines to display the time, initialise the printer, dump the screen to the printer etc). The easiest way to do this was to use control codes entered from the keyboard (so CNTRL T displays the time, CNTRL P dumps the page to the printer etc). The versatile routine enclosed fits into 128 bytes (including its look-up table), and can deal with all 31 control codes, directing control to the required service routine without otherwise affecting the current program or the usual keyboard operation.

The routine operates as follows: INTFS1 and 2 are set to direct control to SE900. The accumulator is saved and the keyboard interrupt flag is read. If it is not set, the interrupt was not from the keyboard, and control is passed back to TANBUG in the usual way. Next the value of the ASCII code is examined to determine if this is a 'control' code, If not, the accumulator is restored and control passed back to TANBUG for the usual processing of a keyboard interrupt. If the Keyboard input is a control code, X and Y are saved and a vector is extracted from a look-up table (using 2x ASCII code as a pointer). If the vector is 0000, X, Y & A are restored and control is passed back to TANBUG (this will be the case for control codes used by BASIC). If not, the service routine is called by a 'JSR' pointing at at an indirect 'JMP'. On return X,Y and A are restored and the routine exits via TANBUG. If the service routine has reset the keyboard interrupt flag (by STA SBFFO), TANBUG will return from the interrupt with no further action.

To use the handler, insert the address of the required routine in the table at (Start of table plus 2 X ASCII code), low byte first. Then set up INTSF1,2 to point at the start of the routine. Any pressing of the relevant control key will now call the service routine. Note that CENTRL C,D,E,I,K,L,R & U are all used by BASIC, and CNTRL M,L & J are Carriage Return, Escape and Line Feed respectively. These, and all unused, vectors must be set to 0000.

Keep up the good work with your excellent magazine.

Richard Ellis
52 Rowner Road
GOSPORT
PO13 9UF

Not only a very useful routine but also very well presented ..... Ed

```
KBDH.1                    MW2602
******

 A routine to handle control
code interrupts from the key-
board, and run associated
routines, without affecting the
current Program.
 Interrupt vectors are stored in
a look-up table at E940-E97F.
Each vector is stored,low byte
first, at (E940+2* ASCII code).
If the vector is 0000, control
will be returned to TANBUG

E900 48      PHA
E901 ADF3BF  LDA $BFF3
E904 1006    BPL $E90C
E906 297F    AND #$007F
E908 C920    CMP #$0020
E90A 9004    BCC $E910
E90C 68      PLA
E90D 4CC3FE  JMP $FEC3
E910 8A      TXA
E911 48      PHA
E912 98      TYA
E913 48      PHA
E914 ADF3BF  LDA $BFF3
E917 0A      ASL A
E918 AA      TAX
E919 BD40E9  LDA $E940,X
E91C 8D3EE9  STA $E93E
E91F E8      INX
E920 BD40E9  LDA $E940,X
E923 8D3FE9  STA $E93F
E926 D00C    BNE $E934
E928 AD3EE9  LDA $E93E
E92B D007    BNE $E934
E92D 68      PLA
E92E A8      TAY
E92F 68      PLA
E930 AA      TAX
E931 18      CLC
E932 90D8    BCC $E90C
E934 203BE9  JSR $E93B
E937 18      CLC
E938 90F3    BCC $E92D
E93A 00      BRK
E93B 6C3EE9  JMP ($E93E)
E93E 00      BRK
E93F 00      BRK
```

```
Look-uP Table
*************
E940 00 00 00 00 00 EA 00 00
E948 00 00 00 00 B8 E9 00 00
E950 00 00 00 00 00 00 00 00
E958 00 00 00 00 00 00 00 00
E960 DE E9 00 00 00 00 00 00
E968 EE E9 00 00 00 00 00 00
E970 D1 E9 00 00 00 00 00 00
E978 00 00 00 00 00 00 10 EA
```

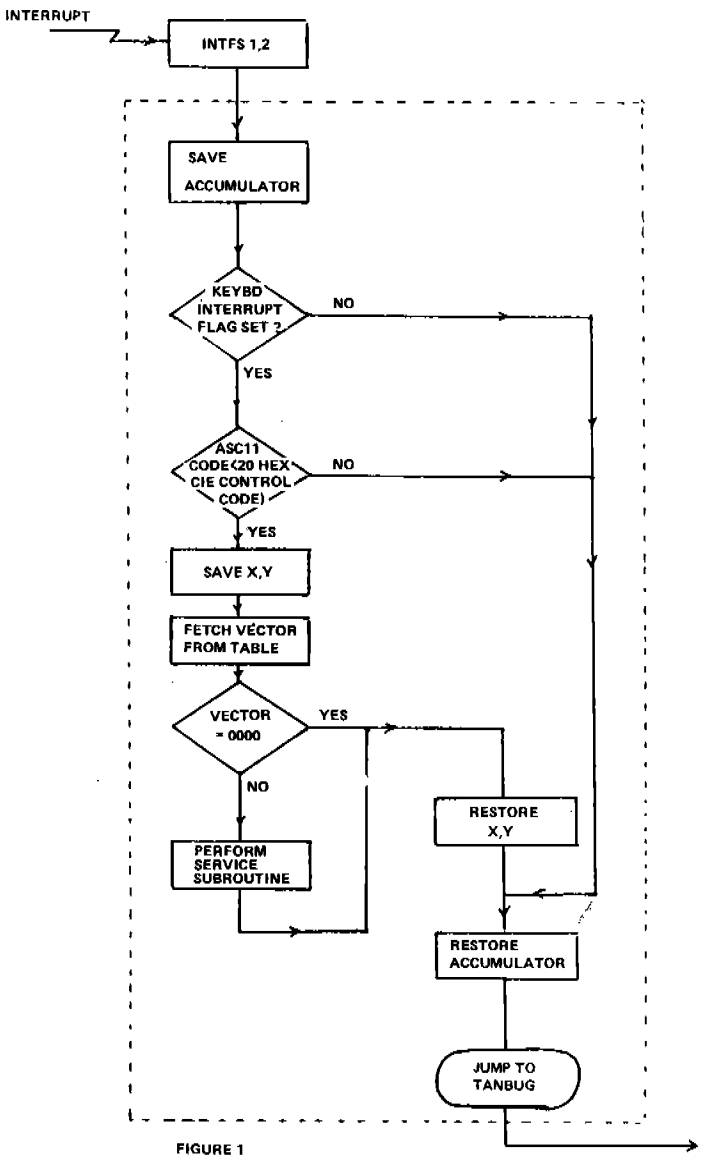


FIGURE 1

Tim Mimpriss
Bangor

I enquired about serial printer routines for Azimov, but you had no information on this matter.

I am now using Azimov with a serial printer without problems, so I enclose a copy of the relevant routines. I use 2400 Baud, and the printer CTS (inverted) halts the 6551 when the buffer is full. I have modified the TANBUG serial print routine because it times out when the 6551 is halted.

If you do not want to set a Baud Rate, byte C1F7h should be RTS (60h).

Thank you Tim a most useful routine ..... Ed

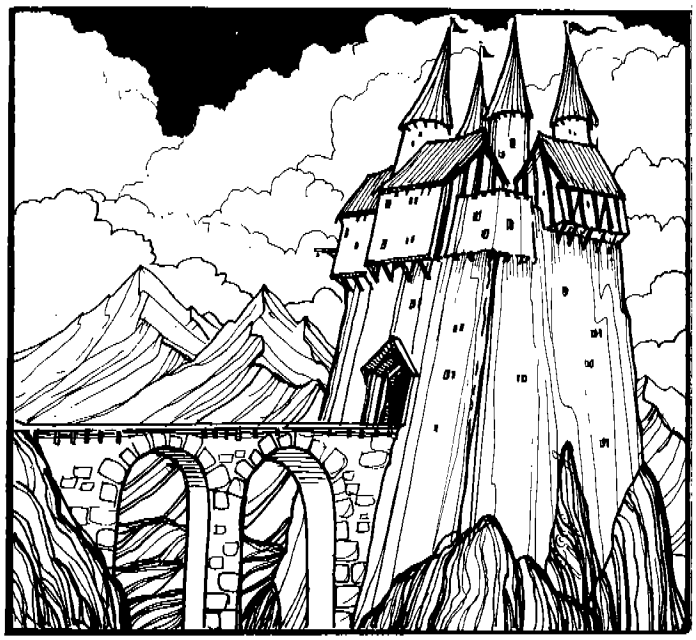
FOR SALE: Microtan 65 with TANBUG VI and TUGBUG, TANEX, VDU 80/82 with VBUG V6.PTL, ASCII keyboard, Tandos eprom and disc, BASIC, EPA, Columbia, Multi-purpose records and other assorted software. All with original manuals. **Offers for all or part to Andy Michael, 061-747-3459 (evenings).**

FOR SALE: Microtanic 4K Eprom manually switched extension board £10 **Glen Jarvis 0733 75160**

Doppel-Ganger
Dodworth
Barnsley
Yorks.

Seeing as it's the Microtan's fifth birthday this year I decided to supply the cake, in the form of this program. It uses V6 and the Toolkit. Besides drawing a cake it also contains a snippet of Sixdem, my demo for V6.

The next article on adventure games will be in the next issue ..... Ed.



Life at Doppy Towers

Hi there Microtanies, Doppel-Ganger here with some more stuff from the depths of my Ganderbag. Firstly a question. After delving deeply into my collection of Magazines going back 5 years, for information on CP/M, I gather that you can't just get any old disk, like you can with Flex, but you have to get the disks in the correct format. This leaves a question. How easy is it to buy CP/M software to run on the Microtan CP/M system? Could I just go out (or in my case ring for details then write to) somewhere and get me a disk which I could then stick in the ol' drives and run? With a bit of luck, by the end of this year I'll have disks, and be contemplating CP/M. Just how easy is it to obtain software which will run on the Microtan CP/M system? By the time this gets to press hopefully some of you out there will be able to pass on some info.
How nice it was to see Microtan getting a review in Personal Computing Today's April issue. It's about time some of these 'zines stopped concentrating on toy computers and looked at the real thing now and again!

Revolutionaries Corner...
With all this talk of a Standard system, I would like to propose an Advanced standard. If new growth is to flourish, you have to do a bit of pruning now and again. I think it is about time we got rid of the Microtan and Tanex cards, and while we're at it we could do without Tanram and the 64K ram card. 'Heresy!' I hear you cry, well maybe. In this day and age a 32 x 16 screen is an anachronism, and it's really about time we got rid of it. (Ok, so you lose your old software which uses the Microtan screen, but that's no great hardship, and of course you lose the old games, but then again if all you wanted to do was play Space games you wouldn't have a Microtan would you!)
Suggestion No.1 :-
To replace this lot we could use the System controller card, running a 65C02 at (if possible) 3Mhz, if that should be impossible or too unreliable then 1M5 would still be a

big improvement over the snail-like 750Khz of the Microtan. It would also have a modified Tugbug/Xbug (Xbug to maintain 300/2400 Cassette speeds & handle 65C02 Mmemonics) combination in a 2732, and a full complement of Ram, using the 8K Static ram chips. (6264's aren't they?). Basic or whatever can be loaded from Tape, Disk or Combo card as you like. But what about Output? You say, Intelgraph, I reply. For those (if any) who don't know, Intelgraph is basically the VDU 80/82 card, with serial and parallel interfaces, plus its own sync, video and RF output.
Provided that the toolkit, and the new word processor DV word communicate with the VDU card via the routine in Tugbug, by a slight modification to the Tugbug routine to make it talk to Intelgraph instead, your Video card software remains compatible. You might have to modify a few things here and there but then we had to do that for the toolkit, and the V6 toolkit, so in the long run all your software using the Video card could be made to use Intelgraph. This gives you your screen. So you've gone from four, to two boards, all of which use Cmos Ram, so uses very little Power. This combination of Controller and Intelgraph we could then call (for the sake of argument and easy reference) 'Microtan +'. With the added speed Tandos could be modified to allow the use of Double Density disk drives, vastly increasing storage capacity.
Suggestion No.2 :-
Suppose for the moment that the 64K ram card is redesigned to allow running at 1M5 without practically hacking it apart, then you could use one of those, instead of all those pricey 6264's on the system controller. With a small switch fitted to Tandos, to disable the DOS Eprom when required, all you would have to do is to keep two Controller cards, one with a 65C02, as I suggested, and a second with a 6809, then by simply switching the Dos Eprom on or off, and swapping over the Controller cards, one minute you could be running a Microtan +, the next exploring the wide (and wonderful, so I've been told) world of Flex. This is having your cake AND eating it. Not only do you then retain the best of your Microtan software, all those programs you've slaved over, but you also open the gateway to a new world of Flex software. I'm no hardware expert, so this is pure theory. It's probably high time some of the dead wood was pruned away. This Microtan +, as I call it, would offer more speed and power than the standard, and of course you'd still be able to add on stuff like the Eprom Programmer, Sound board, I/O boards etc. If using 6264's on the Controller then you have a Two board system, or three if using Disks, which offers the power of four (or five if Disk) existing boards. The enterprising owner could probably put a cassette based system into a small case and possibly run it off Ni-cads as a Portable system, and if you have a straight 64 way motherboard (having no further use for the Microtan and Tanex sockets) you could hold more equipment in the same space. I'd like to see other people's comments on this 'Microtan +' suggestion, and if such a thing was made available by MCS, then I for one would buy.

It's been most interesting lately reading in Microtan World of all the uses Microtan is finding outside the Home. The revelation that Microtans are used in BBC studios responsible for the making of Doctor Who leads me to this question. When exactly is the TanTardis module coming out? Seriously though it is a well known fact that all computers contain components which can exude a Slo-time envelope. How many times have you thought you'd just be another five minutes using the computer, only to find the next time you look at the clock that five minutes has turned into half an hour, or more.
M.O.U.G. members on recieving the March newssheet may have been surprised on reading of Cardfile, What exactly, you may be thinking, is someone like me, more usually known for the writing of Adventure games, articles, and neat little graphic demos, doing writing a serious Filing program? Well, the reason is purely selfish. I wanted to store information on a varying range of subjects, a screenful of information at a glance, without any restrictions of format, and to be able to sort this data, and search through it. The program I had, TUG's Multi Purpose Records, couldn't fulfil my requirements. I didn't want to risk buying a program which might not fit the bill, and I did want to use the larger screen size given by the VDU 80/82 card. First I modified M.P.R. to use the VDU card, but this was still not satisfactory, so I started on my own program, keeping the cassette routines developed by Colin Nowell, but writing the rest of the program myself. The first version used the full 80 columns, but I rapidly realised that this was just too much and you'd never fill that much space with information, so I fixed on a 40 x 23 card, leaving the top and bottom lines of the screen for system prompts etc. I then added a few finishing touches to this program, improving the cassette routines, still packing segments to as near 80 characters as possible, but first sending out to tape the number of the current segment preceded by two symbols, then the segment itself, so that if garbage collection held up the computer so long that it missed a segment, it could tell the user to rewind the tape, and then wait for the correct segment being found.

With the advent of Vbug V6 I reasoned that a system of windows could be used in this program to provide pop-up menus, from which options could be simply selected, and then the windows wiped off revealing the data behind them. It took me a little while to work all this out, but in the end I did it. In Cardfile, all options are selected using the Space and Return keys. One of the options is highlighted in Reverse Video, on pressing Space, the next option is highlighted, wrapping around to the first after highlighting the last on the list. Pressing Return then selects the option currently highlighted. On running the program you only have two options to choose from, either typing in a cardfile, or loading a file from tape, or if you implement the option provided, disk. (all the details are provided for the user wishing to add disk routines.) Once the cardfile is in, you go on to the View file mode. Using comma and full stop keys flips back and forth through the file, wrapping around at either end. On pressing space, the prompt line at the bottom changes, and out pops a menu, holding all the other system options. Space and return are used to select an option, and Escape takes you back to the card. On selecting options, other windows pop out, the Search option, for instance, has a secondary menu, where you select the type of search, and depending on which type you use you can have four windows displayed on the screen, so you can see at all times what you're doing, and also the name of the file, card number, and quite a lot of the current card, including the Index line. Some options only bring up one window, sometimes just to tell you they're working away.Once the option has finished, or if you press Escape, the card is reprinted, without clearing the screen, giving the impression of the windows being peeled off. At no time is the screen blanked, except for when you add a new card. The program really uses windows as they ought to be used. It is in Basic, which has a few disadvantages, firstly the program occupies some 20 K, and secondly, as it stands the Input routine is a little slow, it can be easily out-typed. This is due to the exceedingly good care it takes of you, disallowing the use of control codes which might mess up the screen format, and also replacing the comma, colon and double quotes with CHR$ 128, 129 and 130 respectively, which have been defined to resemble the comma, colon and double quotes, this allows you to type in these characters and display them on the screen, without crashing the cassette routines. Previous versions had to replace these with Spaces, which didn't help the layout much. I have been working on ways to speed up the input, but so far this has led to more problems. I'd rather have a slow, but foolproof input, than a rapid routine which is easily crashable. Cardfile is very secure in this respect. With Intelgraph, using the serial link, it might be possible to make even better use of windows by being able to store the screen information where you want the window to go, put up your window, and then recall the original screen information as before, but at the Moment Cardfile really takes the windows to extremes. You'll like it, I know I do..

Finally, news of a new addition here at Doppy Towers, I've just gotten me a printer, a Centronics 739. Nice printer, good graphics facilities, beautiful text output. Had a little trouble getting it going with Columbia though, but now everything is hunky-dory. That's all for this time. Hi ho Eddie, awayyyyy!

Dopple Ganger

Nice one "DP" I certainly agree about the great article in April's Computing Today ..... Ed

MW2603

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 0 REMEMBER *DOP WARNING* Use Hash instead of £ sign throughout !
 10  REM HAPPY BIRTHDAY MICROTAN 65 - 5 YEARS OLD & STILL GOING STRONG
 20  REM A SHORT PROG BY THE DOPPEL-GANGER FOR MICROTAN WORLD MAGAZINE
 30 REM INCLUDING A SHORT TASTE OF 'SIXDEM' MY DEMO PROG FOR V6 (PTL)
 40  £OFF:£CLG:£SIZE1:£MOVE255,127:£TILT90:£INC8
 50  FORX=110TO0STEP-2:£ARC0,X,360,3:NEXT
 60  FORY=127TO70STEP-1.2:£MOVE255,Y:£ARC0,110,180,3:NEXT
 80  FORY=127TO157:£MOVE117,Y:£ARC0,5,360,10:NEXT:£DRAW117,162
 85  £INC120:£TILT0:£ARC0,5,360,10:£TILT90:£INC8
 90  FORY=127TO157:£MOVE400,Y:£ARC0,5,360,10:NEXT:£DRAW400,162
 95  £INC120:£TILT0:£ARC0,5,360,10:£TILT90:£INC8
100  FORY=140TO170:£MOVE255,Y:£ARC0,5,360,10:NEXT:£DRAW255,175
105  £INC120:£TILT0:£ARC0,5,360,10:£TILT90:£INC8
110  FORY=135TO165:£MOVE170,Y:£ARC0,5,360,10:NEXT:£DRAW170,170
115  £INC120:£TILT0:£ARC0,5,360,10:£TILT90:£INC8
120  FORY=135TO165:£MOVE335,Y:£ARC0,5,360,10:NEXT:£DRAW335,170
125  £INC120:£TILT0:£ARC0,5,360,10:£TILT90:£INC8
130  £MOVE213,132:£SWAP:£RVS:PRINT"HAPPY BIRTHDAY"
140  £MOVE240,122:£SWAP::£SIZE5:PRINT"5":£SIZE1:
150  £MOVE222,112:£SWAP::PRINT"MICROTAN 65":£RVS
160  £h:£SIZE3:PRINT" ";:£LU:PRINT" Microtan's Birthday Cake ":£LU:£SIZE2
165  PRINT"  Press any key to blow the candles out"
170  POKE1,0:WAIT1,255
180  £INC120:£TILT0:£Mo117,162:£UNa0,5,360,10:£Dr117,157
190  £Mo400,162:£UNa0,5,360,10:£Dr400,157
200  £Mo255,175:£UNa0,5,360,10:£Dr255,170
210  £Mo170,170:£UNa0,5,360,10:£Dr170,165
220  £Mo335,170:£UNa0,5,360,10:£Dr335,165
230  POKE1,0:FORDE=1TO10000:IFPEEK(1)<>0THENDE=10000
240  NEXTDE
250  £CLG:£INC8:£TILT0
260  £SIZE4:£HOME:PRINT" A Taste of 'SIXDEM'":£SIZE2
270  £CURS23,0:PRINT" A Penny (Farthing?) for your thoughts?":£SIZE1:£HOME
280  £MOVE200,90:£ARC0,70,360,16:£ARC0,69,360,16:£ARC0,71,360,16
290  £INC180:FORX=0TO180STEP10:£TILTX:£ARC0,70,180,16:NEXT:£TILT0
300  £INC8:£MOVE360,50:£ARC0,30,360,16:£ARC0,29,360,16
310  £INC180:FORX=0TO180STEP10:£TILTX:£ARC0,30,180,16:NEXT:£TILT0:£INC8
320  £MOVE170,50:£ARC270,118,355,17:£ARC270,119,355,17
330  £TILT5:FORX=1TO5STEP1.5:£MOVE160,100:£ARC300,110-X,355,29
340  £MOVE200,210-X:£DRAW175,209-X:£DRAW160,208-X:NEXTX
350  FORX=197TO203:£MOVE200,90:£DRAWX,175:NEXT
360  £INC120:£TILT180:£MOVE204,195:£ARC0,22,360,12
370  £MOVE199,195:£ARC0,22,360,12
380  £MOVE370,155:£TILT145:£ARC0,50,360,3
390  £TILT90:£MOVE290,155:FORX=20TO1STEP-1:£ARC0,X,360,3:NEXT
400  £MOVE270,150:£DRAW300,150:£DRAW290,155
410  FORX=1TO2:£MOVE200,172:£DRAW230,172+X:£MOVE200,170:£DRAW230,168+X:NEXT
420  £MOVE200,90:£SIZE2:£SWAP:PRINT"6":£HOME:£SIZE1
430  PRINT:PRINT"      Well Microtan Fans, That's all for now - Be Seeing You"
440  PRINT", Doppel-Ganger..":
OK
```

TANDOS 65

Tandos is a complete disc operating system which greatly expands the processing power of the Microtan. The version you are supplied with only requires a Microtan and an expanded Tanex to run, you then tell it how much memory you have on your Tanram and it will then make use of it. The advantage of having a Tanram is that Tandos will have more 'leg room' to move files and data about and so cuts down on the number of disc accesses required for any particular operation. Tandos will cope with up to four drives which can be of mixed types but will work quite happily with only one. For complete flexibility and efficient operation we recommend that two drives should be used.

Commands

There are a number of Tandos commands which effectively cover most requirements of an operating system.

These are:

(n:) DIR	(n:FILNAM.EXT)
(n:)DEL	(n:FILNAM.EXT)
(n:)REN	FILNAN.EXT FILNUM.EXT (P)
(n:)SYS	(n:)
(n:)INIT	
(n:)DLOAD	(n:FILNAM.EXT) (ABC)
(n:)DSAVE	(n:FILNAM.EXT THHHH P)
(n:)COPY	(n:)DESTN.EXT (M:)SOURCE.EXT

where - 'n:' is an optional drive number (if not drive Ø) FILNAME.EXT is a six character filename with a three character extension e.g. INVADE.BAS or EDITOR.TXT and 'ABC' is an optional parameter list. 'P' refers to memory page number. Note that brackets are not part of the commands, they just show which parts are optional.

DIR prints a directory of the files contained on a disc or information on a specific file(s). A powerful mechanism for use with DIR and some of the other commands is the use of 'wildcards'. This term, dating back to the early days when computers used punched cards, allows a character to be replaced by '?' and a string of characters to be replaced by '*', thus specifying a 'don't care' character to Tandos. For instance if you wish to list all programs on your disc which end in 'BAS' you could specify: DIR *.BAS. You could also do such things as DEL XYZ???.* - delete all filenames that start with XYZ or DIR ??5???.123 - obtain a directory listing of all files have the character '5' in the third position of the name and an extension of '123'.

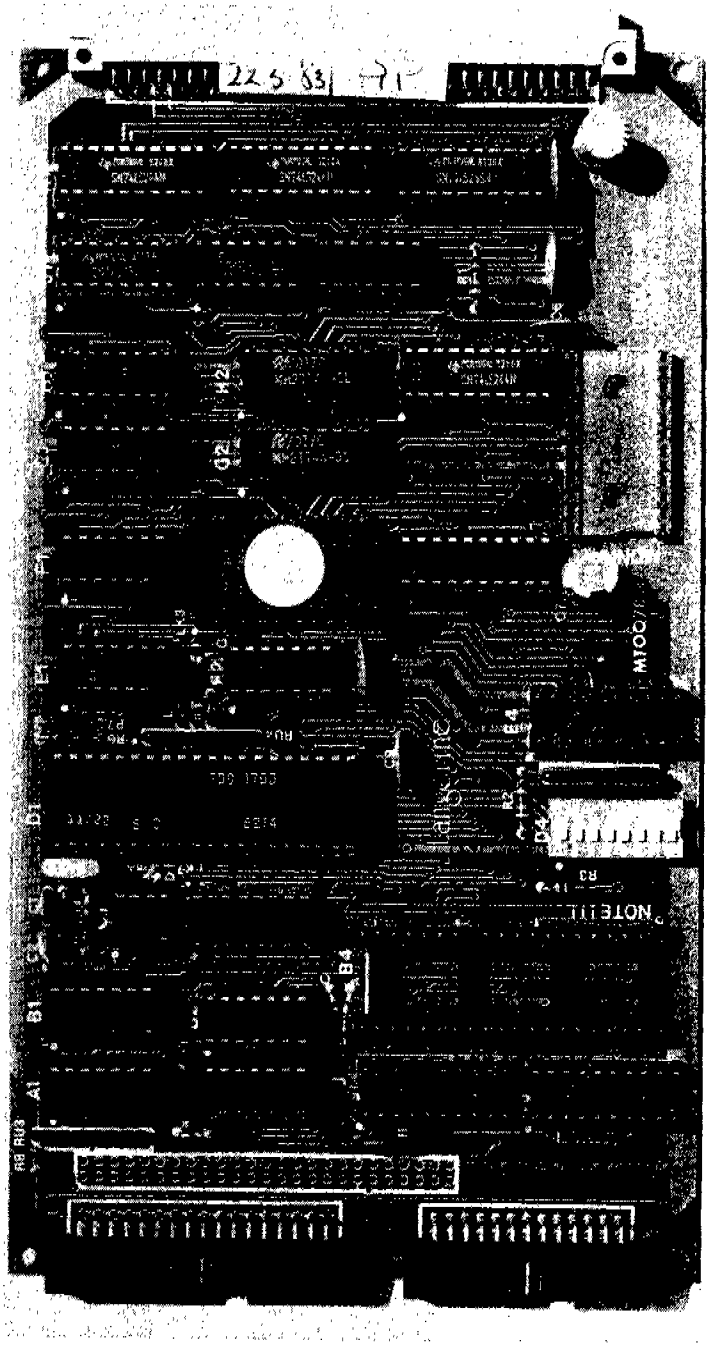
DEL deletes specified files from a disc allowing the space to be freed for subsequent use. DEL will not delete write - protected files - another useful Tandos facility.

REN renames a specified file without changing its contents and allows the adding of the write-protect indicator.

SYS runs the system definition utility and INIT initialises a disc.

DLOAD and DSAVE bring files into memory and save them back onto disc respectively. There are optional parameters which allow a program to 'Load and go', that is load into memory from disc and automatically begin execution, to specify which memory page the program is to be loaded or saved from and to print the execution address as a file is being loaded. There is also the facility to just type the name of a file without the 'DLOAD' command and have it automatically load and execute.

COPY allows files to be moved around from disc to disc, delete old versions of files (superceded) while copying, merge two or more files together and change the write-protection indicator. The wildcard facility also operates here.



Also included with Tandos 65 is a disc formatting utility.

BASIC Usage

At the time of writing only preliminary details of the BASIC interface were available but it is known that these commands are available: DOPEN,DCLOSE, DLOAD, DSAVE, DINPUT AND DPRINT their meaning is obvious and allow standard Microtan BASIC to work entirely with Disc I/O in a manner similar to the cassette system although a great deal faster.

Finally

It can be seen, then, that Tandos 65 is a powerful extension to the Microtan system and allows the user complete control of his disc system with a great deal of flexibility. The purchaser is supplied with the Tandos disc and a comprehensive user manual which includes a beginners guide, a description of each command, a guide to using the BASIC commands and an advanced users section. Also included is a great deal of technical information on how Tandos works and ways of configuring it to specific user requirements.

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NEXT ISSUE

A lot of the content of the next issue will depend on you the readers.

We are particularly interested in articles for single board owners, useful routines, hints and tips you may have found, etc. etc.

Don't forget to let us have your letters telling us what you think about this issue and of course any comments on the system or any matter of general interest.

If you know anyone with a Microtan Computer who is not yet subscribing to Microtan World why not let him have the subscription form and see if you can persuade him to join us. The more subscribers we can get the better we can make the magazine.

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