AMATEUR COMPUTER CLUB NEWSLETTER

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16 BITS FOR £15!

Readers of the April issue of 'Practical Electronics' may have noticed that Marshalls were offering a new microprocessor chip, the 8900D, for £15. This is,in fact, a brand new 16 bit chip from National Semiconductor Corp.that is claimed to outperform most present 8 bit designs.

From the information available to date the 8900 is a true 16 bit machine, having full 16 bit wide data & address paths (multiplexed onto a common chip bus to fit it into a 40 pin package), although it can also handle 8 bit data words.

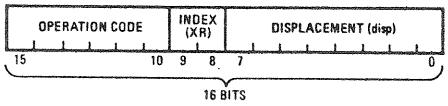
Features include a single phase clock input, four general purpose accumulators and a 10 word stack on the chip, and a PACE compatible instruction set.

PACE is the generic name given by NSC to a software compatible family of microprocessors they have developed in recent years, the 8900 being the latest member of this family. The PACE instruction set is reminiscent of a cleaned-up 16 bit PDP-8.

The four accumulators (AC0-AC3) are not equal, in that AC0 is the only one which can be used with some instructions (particularly Skip and many of the memory reference instructions), while AC2 and AC3 can be used as Index registers as well as general purpose registers.

Memory addressing is in terms of 16 bit words, thus PACE can handle 64k words, or 128k bytes of memory. Memory mapped I/O is assumed.Although advertised as being able to handle 8 bit data, in practice one would have to write the software to pack and unpack pairs of bytes to conform to the 16 bit word used. Not an arduous task, as the Shift and Rotate instructions can move the data by any number of bit positions with one instruction.

Each instruction is always one word, and memory reference instructions, Jump & Jump to Subroutine, all consist of 8 op-code bits plus 8 address bits.



XR FIELD	ADDRESSING MODE	EFFECTIVE ADDRESS
00	Base page	EA = disp
01	Program-counter relative	EA = disp + (PC)
10	AC2 relative (indexed)	EA = disp + (AC2)
11	AC3 relative (indexed)	EA = disp + (AC3)

The on-chip stack is used for storing the old Program Counter during subroutine calls, and the contents of AC0-AC3 may also be pushed onto the stack and pulled from it. Program flow is controlled by a limited number of 'Skip' instructions, which cause the next instruction (which may be a Jump) to be skipped if the specified condition is met. Two of these Skip instructions allow one to increment or decrement a memory location, then skip the next instruction if the result of the increment (or decrement) was zero. Useful for loop control. A Branch Relative instruction is also provided, which can test for one of 16 conditions, including the state of three flag inputs to the chip. A Status and Control Flag word contains the usual Carry, Overflow & Interrupt Enables, and also controls the state of four flag outputs from the chip. Thus simple I/O can be performed without the need for external special I/O chips.

All in all, the 45 basic instructions of PACE are straightforward and should be easy to remember and use, although not as sophisticated as the instruction sets of more advanced (and expensive) 16 bit processors such as the 9900 and PDP-11.

LATE NEWS

My apologies to all ACC members for the lateness of this issue, which is due to an overload caused by the volume of membership renewals.

Mike Lord

IN THIS ISSUE

D.I.Y. AGAIN

Following the sell-out success of the 1977 D.I.Y. Computer Show, Online are now organising a mammoth event for 1978. Three days of exhibition, conference, side show & seminars. Despite some grumbles about the high costs involved, nearly all U.K. firms with a stake in the personal computing market are expected to attend, which will make a visit worthwhile even without attending the conference or seminars.

And the ACC will be there ! (somehow - volunteers needed to man the stand). Members who plan to come to the show are advised;

- To make a note of the date (June 22,23,24) and place (West Centre Hotel, Lillie Rd,London SW6) and keep it safe in your diary or wallet.
- Miss the first day (when the exhibitors will be getting the bugs out of their systems) and the Saturday (which will be crowded).
- Bring a large lightweight bag, to carry away piles of free information.
- Online have kindly agreed that all ACC members are eligible for the Group Discount rate for the personal computing seminar tickets - even though they may apply for their tickets individually - so you need only pay £8 per day instead of the full £14. Just make sure when applying for your ticket that you state that you are a member of the ACC, and quote your ACC membership number.
- If you plan to attend the exhibition only, then FREE tickets will be issued provided that you apply for them before 16th June, and enclose a SAE for their return. Otherwise it will cost £2.

FORMATS & FILES

R.MUNT

DATA FORMATS FOR CASSETTE AND PAPER TAPE
And thoughts on a standard.

This outline limits itself to software data formats as it relates to microprocessors and paper tape/cassettes.

First of all we need to define data types, essentially these are as follows:

Plain text	This is straightforward english text such as an article for ACCN. It will use some standard code such as ASCII or BAUDOT.
Source text	This is similar to above but is in that multilated form of english used as i/p for an assembler/interpreter.
Object code	This is the code that an assembler produces. It may be binary or hex/octal.
Hex data	In this outline I use the term hex data to mean a subset of ASCII etc. being those numbers numbers & letters used for hex namely Ø-9,A-F. This can also apply to octal of course with just numerics Ø-7.
Binary data	This is where a single unit represents one bit i.e. for paper tape '0'=no hole '1'=hole. (In hex ASCII 'Ø'=7 holes 1000001)

The next thing to look at is error detection. When recording data or sending data from one place to another it helps to know that what you have recieved is correct. The amount of error detection incorporated depends primarily on two things: The likelyhood of the recording /transmission medium to introduce errors and the severity of the effect of an undetected error i.e. if a data bit will be used to trigger an atomic bomb you will want to be pretty damn certain that it is valid data and not noise.

For text, plain or source, and using ASCII code an eighth even parity bit is provided for each character. This is usually sufficient for text where error recovery can usually be made by observing the remaining correct text around the error. Even if an error is not detected the result will not usually upset the sense of the message unless a large amount of errors occur.

For errors in hex or binary data the result is usually more severe i.e. the program will not execute properly and may even scramble other good data.

With this type of data a checksum is usually employed. Checksum types vary in the amount of protection provided according to the method used. The more sophisticated types are called CRC (Cyclic Redundancy Check) according to several methods which is supposed to be virtually foolproof. However a CRC is relatively difficult to generate and for paper tape/cassette the error rate is not high enough to justify this level of error detection.

Two of the most common methods employed for data checksums are as follows:

Both methods initally start the checksum with a value of Ø. The first method which seems most common to microprocessors is to take the first data byte, perform an exlusive-or with it and the checksum value and then rotate the result left by one bit. This becomes the new checksum value to be used for the second data byte.

This process is repeated on each succesive data byte until after the last data byte the checksum itself is recorded.

The second method adds each byte in turn to the checksum value, ignoring carries, until after the last data byte the value of the checksum is complmented and then recorded.

During playback the same process is performed but includes the checksum byte. In both cases the result of the checksum computed after reading the checksum will be Ø again if no errors have occured.

It will be apparent from the preceeding that an error would not be detected until all data has been recieved also the amount of protection provided would be dependant upon the amount of data, a short file getting more protection than a long file. To hold the amount of protection provided to a constant value and to provide an earlier indication of error, data files are usually broken down into 'b-ocks'. Each block is a constant length except for the last block in order to get a file of the length required. Block lengths are decided according to the amount of protection required, they are usually some binary multiple in the range 32-256 bytes. The lower lengths are more common for paper tape/cassette, 64 data bytes being a good compromise.

The next requirment is for a block size indicator. This has to indicate to the loader routine the size of the block so that the loader 'knows' where the checksum is.

(The term 'loader' is mean't to describe a routine which must already be in memory, either by keying in from switches or in PROM. This routine accepts the data format used and puts the resultant data bytes in the correct place in memory. A 'dump' or 'punch' routine performs the exact opposite, it reads succesive memory locations and adds the extra bytes to produce the data format).

The block size value is usually a positive value for hex formats but is often negative in binary formats. The block size value will normally be 64 or the size of the block decided on but for the last data block may be anywhere between 1 and 64. A data block with a size of Ø has a special purpose, this is described later.

A further requirement is a block start address. This is needed because not all programs start from address Ø.

An optional extra is a block describer byte, more about this later.

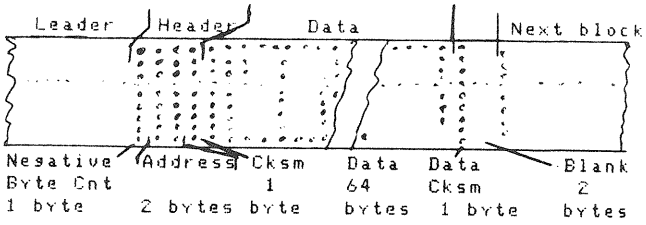
For a hex (or octal) format a sychronizer byte is required also sometimes used with binary.

So having now decided on the extra information required we can outline the actual format.

Paper tape will be described first because cassettes require everything that paper tape requires plus some extras.

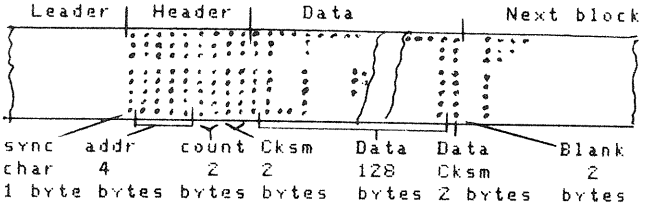
Paper tape differs from cassette in two major aspects. Firstly a single length of paper tape is usually a single program or text. It is usual to write on blank leader the name, date and type(source/binary). Secondarily with a bit of practice the header block for each section can be visually identified so that if a reading error occurs it is only required to return to the start of the block where an error was found rather than the start of the tape. To make the start of a block more easily recognisable it is usual, for binary paper tape, to start the header with either the sychronizer byte or with the negative byte count when a sychronizer byte is not used. This byte count whether negative or positive only relates to actual data bytes and does not include header data and checksums. The next bytes indicate the block start address. For hex formats this is usually reversed i.e. the header always starts with the sychronizing character followed by block address and then a positive byte count. In either case the next bytes are a header checksum. A checksum is preferred here, although some formats omit it, so that a reading error in either the byte count or block address is detected quickly before that block data is written. This prevents overwriting previous good data if a bad address is read. If this checksum were omitted and an error occured you would need to reload from the start, includins any previous tapes to ensure that all data is correct.

Following the header checksum the 64 bytes of data are recorded followed by another checksum. It is then usual to leave a small gap of blank tape, say 2 bytes before the next data block. In pictorial form a binary tape would look as follows:-



total = 71 bytes per 64 bytes data

A hex tape would look as follows:-



total = 141 bytes per 64 bytes data

Note that in hex format 2 hex characters(bytes) are required to define 1 memory byte. Checksums are always computed on memory bytes not hex bytes. The hex sync character is not included in any checksum.

At this point it might be well to indicate why both hex and binary formats are used. If you have seperate 8 hole punch & reader or a cassette binary format can be used, it causes no complications and will load/dump in half the time required for hex format. This is more significant on slower devices.

For people who have devices that expect parity, such as the ASR33 teletype it is better to use a hex format. The problem here is that while the punch on this device can punch binary it will cause the print mechanism to do daft things. On ASR33's with code activated punch & reader the binary codes will be liable to turn the punch & reader on and off. This can be got round by removing any tape from the reader and manually holding the punch on button down. However not all devices intended to work with parity can be frissed so easily. For people who have paper tape equipment for less than 8 holes (BAUDOT users) hex is the only way.

As mentioned previously a header block with a byte count of zero has a special use. This is used as an 'end of file' (EOF) block. It indicates to the loader routine that all data blocks have been read and loading should be stopped. Where the just loaded tape is a program this block can also be used to indicate to the loader the starting address of the routine so that it may be automatically started.

In this case what would normally be the block address becomes the routine start address. Since not all tapes loaded will be programs a means is required whereby it can be indicated to the loader that although it is the end of file the program execution cannot be started. Since the loader routine usually occupies high memory (and hence nothing else can be loaded there) a high value of 'start address', usually FFFF, is used to indicate 'don't start'and the loader halts instead. As also indicated previously some formats include a file/block describer byte.

This can be used to indicate to the loader routine the type of file/block that follows e.g. A certain value indicates that the data section is text, another value = hex program a third value = hex data etc.

Most microcomputers have the manufacturers editor/assembler routines desisned to work with ASR33 teletypes and hence most make use of hex format paper tape. The most common sychronising character for hex tapes would appear to be the ASCII colon.

For cassette tapes most of the preceeding still applies but there are a few extra requirments.

Firstly cassettes are not normally chopped up into lengths such that there is only one program or file per cassette. This produces the problem of selecting the right program/file from many.

Also cassettes require time to get to speed making the use of sychronising more important.

To get round the problem of finding the correct program/file on cassette the simplest means is to name it using ordinary text characters. The number of text characters used will depend on the number of different programs/files on all of the cassettes available assuming that a meaningful name is required rather than a code e.g. it is easier to remember 'ACCOUNTS' or 'STARTREK' rather than say 'AAC125'. Ten text characters is usually sufficient to define any given file in meaningful english. To ensure that the file name search routine starts comparison at the correct point it will need a sychronizing character not normally used elsewhere in text. The problem here is that everyone using cassettes seem to use a different character.

AN ACC DATA FORMAT STANDARD

In view of the definition of the E78 ACC bus standard in the last issue of ACCN perhaps now would be a good time to consider an ACC standard data format for cassette and paper tape.

I would recommend a hex format as the standard using ASCII/ISO7 for the code.

Although binary would be more compact, hex allows members with parity type devices to read and produce formats while members with 8 hole devices need only write suitable loader/dump routines. Although members may currently have a variety of equipment using various codes virtually every member who intends to have a VDU on their system will need to use ASCII/ISO7. Also ISO7 is the proper data exchange code for the UK (ISO7 is the same as ASCII except that # becomes £ , ↑ becomes ^ and ← becomes _). All other codes will eventually fall by the wayside.

So that a common data format can be used for paper tape and cassette (could also be used with modems via the telephone) the standard data format adopted should include at least the followings:-

1/ A sychronizing character to indicate that the file name follows. This must be a character not often used and in the range 2Ø - 5F to prevent difficulies for members with limited character sets. Suggest that % be used.

2/ A ten character file name in ISO7 characters.

3/ One character to be normally a numeric (Ø-9) to indicate the type of file.

- Ø = plain text
- 1 = source text (applies to both assembler and BASIC.
- 2 = assembler hex object - absolute
- 3 = " " " - relocatable
- 4 - 9 to be defined

If the file is type Ø or 1 even parity to be used terminated by an ETX code. A text file only has a file header consisting of 1 to 3 above followed by variable length text strings and ending in ETX, no byte counts/addresses or checksums are employed.

A type 2 or 3 file continues from 3/ above with the followings:-

4/ A colon block sychronizing character

5/ The block address in hex, 4 characters to provide an address range from ØØØØ - FFFF.

6/ Positive data block byte count, normally 64 except for the last block which may be 1 - 64. Requires 2 hex characters.

7/ A header checksum on items 5 & 6 using the exclusive-or and rotate left method. Requires 2 hex characters.

8/ The data, normally 64 memory data bytes will require 128 hex characters.

9/ The data checksum same method as 7 will require 2 hex characters.

4/ to 9/ repeats for each succesive block of data. The EOF block consists of 4/ to 7/ where 6/ has a value of Ø and 5/ becomes the entry address if in the range Ø to FFFE. The value FFFF stops the loader routine.

A type 3 file is provided mainly for future use as very few, if any, of the assemblers that actually run on micro's can currently provide relocatable object. (Relocatable code is used here in its wider sense, reqiring a

special loader routine, rather than in the limited sense of limiting oneself to relative type instructions. Relative type instruction reloctable still comes under type 2)
Type 3 reloctable object will require extra control words to be added to the data section. It may also have to be specific to each micro class.

I would welcome other members comment for a data format standard preferably direct to me (to reduce the incubation period):-
ROGER A MUNT, 51 BEECHWOOD DRIVE, FENISCOWLES, BLACKBURN, LANCS., BB2 5AT. Tel (0254)22341.

WANTED Case shift mechanism for a Friden Flexowriter. I have a Flexowriter model FPC8P which is single case which I would like to uprate to dual case. Can anyone supply the mechanism or perhaps details ?
ELBIT 100
I have available a complete set of documentation for the ELBIT 100 minicomputer including various program tapes, anyone interested ?
R. A. Munt, 51 Beechwood Drive, Feniscowles, Blackburn, Lancs, BB2 5AT. Tel (0254)22341

LETTERS

SWTPC - 6800

Martin Rowat

As a newcomer to home computing perhaps I can be forgiven for rushing into print so early. But those of you who have already had this bright idea can forgive me. I have a SWTPC-6800 with 20k bytes of RAM on five 4k boards, a Bill Marshall VDU in another slot and the last slot has the MPU in it. To make room for my further cards means using an SWTPC system expansion box or to buy 8k or 16k RAM boards just to release a couple of slots !

I plan instead to do the following, and this may have appeal to others;

1) Remove all cards and the mother board.
2) Cut and drill a piece of plain fibreglass PCB (i.e. no copper) to mount in place of the mother board.
3) Buy 3 strips of 0.15" VERO equal in length to the mother board and using MOLEX pins from Tim Moore make a mother board having 14 rows of pins. Mount all this on the PCB in (2).
4) Use an MSI Protaboard from Computer Workshop and install decoding on that board for 4 ports (2 PIA 2 ACIA). Reconfigure the MP-C and other ports on that board. (See Universal I/O, Kilobaud Oct '77 p 102-108).
5) Room now for 14 slots !
6) Remove power transformer; replace it with similar rated at 2 times amps.

Additionally the box can be stiffened by a couple of $\frac{3}{4}$ x $\frac{1}{4}$ aluminium angles and 14 pairs of card guides.

HELP WANTED

Your General Librarian, Frank Cato, being very much an amateur computer, more used to fighting lagging power factors than to eliminating leading zeroes, is going to need a lot of assistance putting his 7768 to work servicing the Borrowing function.

So, get to work on a suitable program, and send it to Mike Lord, or directly to Frank at 3 Rykneld Way Derby DE3 7AT.

Constraints

Refer to the Project as ACLIB (Amateur Computer Club Library).

Refer to the machine as FLIC (Frank's Last In-house Computer).

The program should answer the question 'Is (item) in stock, or is it on loan? To make it easier, take it that the only items of interest are the back numbers of ACCN, Vols 1 thru 5, three copies of each.

Other lovely questions would be 'If all the copies are out, who had the first one?' 'When?' 'How long has Who had his copy out ?'

Programs should be written in Hex, Frank being more numerate than literate.

FLIC comprises the 7768 original without enhancements and a tape punch and a tape reader. The latter can load FLIC through an electro-mechanical module rather reminiscent of 'Simple Simon' (remember?), more interforcing than interfacing...

END

CHIP STACKS

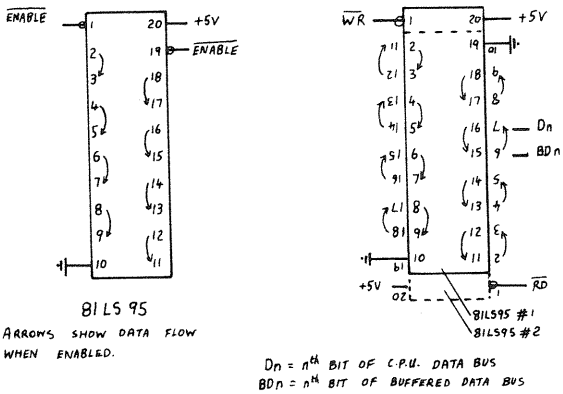
I'd like to pass on a couple of tips which, though not original, may perhaps be new to some readers;

The first tip is how to convert 81LS95's into 8bit bi-directional buffers. Using two 81LS95's, solder one IC on top of the other as shown. In order to obtain the desired data turnaround you must rotate the piggyback IC 180° in relation to its partner and offset by one pin, thus achieving a 22 pin package with 0.3" centres.

Since active-low enable pin 19 meets pin 10 (GND) of the partner, ground these together (two places) and use the remaining pin 1 of each IC for data direction selection. If you're using an RD, WR CPU like SC/MP or Z-80, each line goes to its own pin 1. If you're using a R/W CPU like 8080 or 6800 R/W goes to one pin 1 and its complement to the other.

Just tack the 18 pairs of pins together with solder and you're ready to install it as a single device. The only penalty is having to poke up a pair of wires through the board to meet the top chip pins 1 & 20. If you prefer the upper pin 20 could be jumpered over the top of the two chips to the other pin 20.

What are the properties of this piggyback pair ? 15nSec, one LSTTL load, sinking 16mA and power 30mA, not to mention the saving in board space. Also they are a reasonable price.



The second tip is similar, to save space when using 2102 RAM's stack 8 IC's one on top of the other and solder all commonly-numbered pins together (Towering Inferno ?) with the exception of 'Data In' and 'Data Out' (pins 11 & 12). These pins are cut short at the shoulder of the IC and thin wire flying leads attached to the stub of the pin. The data leads can then be connected to a DIL plug so that you have a 1k byte plug-in memory block. It looks a bit ungainly towering above the other IC's on the PCB but it saves a lot of board space and address wiring.

Mel Pearce

IBM MEETS SWTPC

I have successfully interfaced an IBM Selectric typewriter to my SWTPC 6800 system using a PIA. The software and the hardware are fairly simple. I also have a duplicate set of 1702's with program and look-up table addressed at 7E00 and 7100. For further details phone Hitchin 811851 or SAE to J A Correa, Box 1689, RAF Chicksands, Beds

Texas Instruments 9900 Microprocessor

The last couple of years has seen the advent of several 16 bit microprocessors. These do not seem to have hit the amateur market in a big way yet but are bound to as their price drops. One of these is the Texas Instruments 9900 and it must be close on one of the most powerful commercially available microprocessors on the market today.

It is, to say the least, unconventional from a software point of view but this is by no means to its detrement. The memory is organised in 8 bit bytes, two bytes constituting a word. This can be addressed in either byte or word format up to a maximum of 32k 16 bit words.

The CPU has no accumulators on board but instead uses 16 consecutive words of memory (known as a 'Workspace') which can be addressed relative to a 'Workspace Pointer' held in the CPU. This pointer can be changed at will by software and the only restriction on the amount of workspaces you may use is the size of your memory.

By doing this Texas have left more room on the chip for the instructions, which really are a programmer's dream to use. There are 69 of these in total including 16 bit multiply and divide.

Another beauty of the TMS9900 is the input/output system. This is done by three serial lines (in,out & clock) and the address bus. By using the address bus to access external latches a parallel I/O bus of up to 4096 lines can be made available ! Anything from 1 to 16 of these lines may be set up or read in one instruction.

Another feature of the 9900 is its extremely powerful interrupt system. There are 16 external and 16 software interrupts all separately vectored. One great advantage of the workspace system is the ease with which you can do a context switch. You could be half way through a routine when an interrupt arrives. The processor will load the new registers and store the old ones and Lo and Behold you are in a different routine, and all in about 10uS. What's more, in one instruction you can be back exactly where you were before the interrupt had occured and carry on as if nothing had happened.

Now for the bad news. The TMS9900 is also unconventional from the hardware point of view which is not so useful. To start with it has a 64 pin package. Next it needs + & - 5V and +12V to power it and its own 3MHz 4-phase clock generator to get things moving.

Unless you have a lot of confidence in your electronics (or a very large wallet) I would suggest the safest and easiest way to use this processor is to buy a 'Micro-99' board. This is a fully built mini-processor consisting of CPU, 256 words of RAM, 16 I/O lines decoded and a 20mA loop and RS232 interfaces along with the 1k 'Tibug' ROM operating system. The only drawback is that this little lot will set you back about £350.

For anyone still reading, further information on this processor can be obtained on loan from the TMS9900 User's Group (address below). Please send a large SAE with any request.
Simon Garth 67 De Parys Ave., Bedford.

WHAT I WANT IS ...

What I chiefly want out of membership of the Club is information. Back in 1974 I was only skimming through 'Wireless World' and knew nothing about calculators except a little bit of something about that small firm Advance. I got a whiff of news about the HP65 from a 'guardian' Special. Then I found out that 'ETI' was taking a typically lively interest in microprocessors and my knowledge about the whole field stems from that discovery.

My great interest is number crunching and that article you've just reprinted on calculators versus computers might have explained a lot to me about a year ago. It still seems pertinent to add that if number crunching is your only interest then the 4 bit bus is perfectly adequate, the unit of 'information' being one BCD digit. Greater complexity involves the ISO7 character set (or similar) and implies the 8 bit bus. Maybe someone will one day invent the CHISO 14 character set, for flogging to Chinese Mandarins and Ancient Phonecian Mariners to justify the 16 bit bus.

Having got through the Advance 162P, Sharp PC 1001, HP55 and HP97 in quick succession and finding myself still dissatisfied I realise that the calculator concept is about played out, the last straw being the arrival of cheap 8 bit uP combined with the VDU display using the CRT, and BASIC interactive programming. But for number chrunching BASIC (interpreting) is as yet inadequate - the speed tests reported in 'Kilobaud' recently show that the highly developed firmware for the equally highly multiplexed calculator chips like MOSTEK's MK50075 ALU could be just as fast if the interface problem was solved. That firmware is also stored on very cheap ROM's. It also seems to me that RAM is expensive, it ought to be being used by several uP at once.

The hardware buffs are going to have a lot of fun with that H.P. Instrument Bus. There are 8 data lines for bit parallel, byte serial data transfer, 3 handshake lines so that data can be transferred asynchronously, coping with wide variations in response times, and 5 lines for bus management.

The three handshake lines are called 'Data Valid', 'Not Ready For Data', 'Not Data Accepted'. Now I feel very pleased about this - I think I understand this part of it. There are Listeners, Talkers, and one Controller involved, and in any given transaction there is only one designated Talker.

If all the Listeners pull down the last two lines until they are ready (wire OR'd) the signal O.K. go ahead will only occur when the slowest Listener is ready , so on line 2 going inactive the Talker pulls active the Data Valid line and every designated Listener takes note of what's on the data bus. Then they all let the 'Not Data Accepted' line go free. But don't blame me if I got it wrong.

The five Bus management lines are called 'Interface Clear','Attention','Service Request','Remote Enable' & 'End or Identify'. When the Controller becomes aware that the latest Talker has finished, it pulls the 'Interface Clear' line active and that resets everything else to a set-up mode, in which everything connected to the bus checks what's on the data bus against its own built-in address. These addresses set up which instruments are to 'Listen' and which is to 'Talk' and which others are to ingnore everything happening during the next transaction.

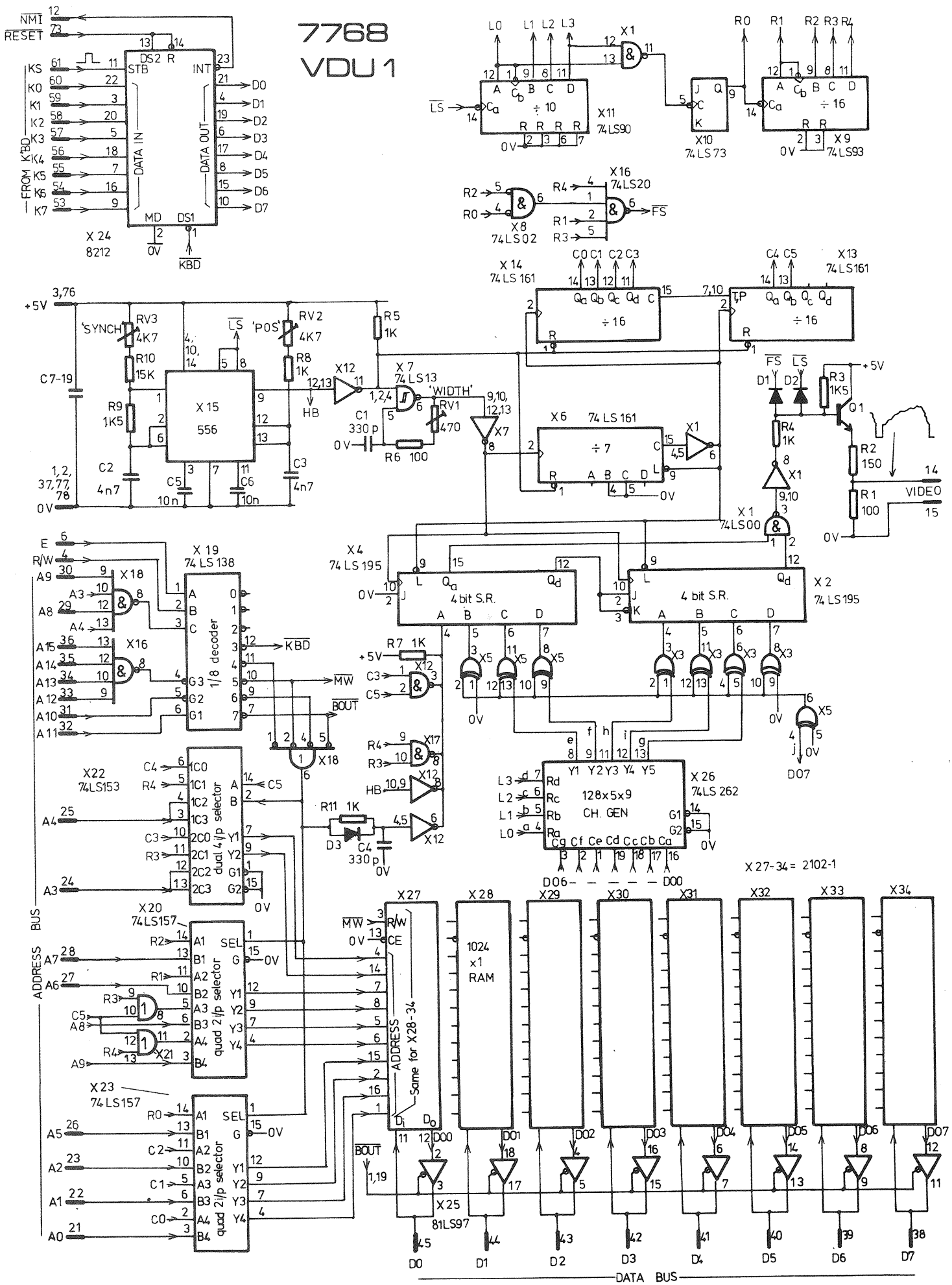
The 'Attention' line is used by the controller to indicate that a valid address is on the data bus. As everything except the controller is a listener when the attention line is low (active), and as the bus seems to be limited to 1 talker and 14 listeners the development insisted on by the International committee after it got out of HP's hands seems a bit inexplicable to me but I suppose it can all be done by buffering. There are 31 Talk and 31 Listen primary addresses which is how it left HP - their kind of answer to greater requirements is e.g. to fit 3 separate bus capabilities on one controller as they did on the 9825A desktop computer - but this International Committee (IEC) insisted on potential for secondary (2 byte) addresses up to 961 Talk and 961 Listen. After that it all gets too complicated for me.

USING MIKBUG

Frank Charles

I have a SWTPC 6800 + TTY. My first proper program was a structured logic experiment and took about 600 bytes of memory. I found that debugging that amount of code tedious with the necessity to reset the program counter after each breakpoint. I hit upon the idea of making the first instruction of the program LDS $A07F to relocate the stack in the spare area of MIKBUG's RAM. This meant that the program's start location in A048/49 was never changed and I could restart the program after a breakpoint SWI just by pressing RESET and typing G. It also had the advantage that I could search down the stack to see the path of the program through nested subroutines and the vital values pushed onto the stack, without debug overwriting the stack causing great confusion.
Perhaps this idea will be helpful to others. It would be interesting to know what strategies other people adopt to quickly debug programs in assembler code.

7768 VDU 1


NMI
RESET
FROM KBD
KS
K0
K1
K2
K3
K4
K5
K6
K7
DS2 R
STB
INT
DATA IN
DATA OUT
MD
DS1
X 24
8212
KBD
D0
D1
D2
D3
D4
D5
D6
D7
L0 L1 L2 L3
X1
LS
÷ 10
X11
74LS90
X10
74LS73
R0 R1 R2 R3 R4
÷ 16
X9
74LS93
X16
74LS20
X8
74LS02
FS
X14
74LS 161
X13
74LS161
÷ 16
+5V
'SYNCH'
RV3
4K7
'POS'
RV2
4K7
R5
1K
R10
15K
R9
1K5
R8
1K
X 15
556
C7-19
C2
4n7
C5
10n
C6
10n
C3
4n7
HB
X12
X 7
74 LS13
'WIDTH'
RV1
470
C1
330 p
R6 100
X7
X6 74 LS 161
÷ 7
X1
R3
1K5
Q1
R4
1K
R2
150
R1
100
VIDEO
X1
74LS00
X 19
74 LS 138
1/8 decoder
X18
X16
KBD
MW
BOUT
X4
74 LS 195
4 bit S.R.
X 2
74 LS 195
R7 1K
X17
R11 1K
D3
C4
330 p
X22
74LS153
dual 4 i/p selector
X20
74LS157
quad 2 i/p selector
X21
X23
74LS157
quad 2 i/p selector
ADDRESS BUS
X 26
74LS 262
128x5x9
CH. GEN
X 27-34 = 2102-1
X27
X28
X29
X30
X31
X32
X33
X34
1024
x1
RAM
Same for X28-34
X25
81LS97
DATA BUS

7768 VDU

The latest board in the 7768 range is this 'cooking' memory mapped VDU.

It provides a composite video output to drive a monitor or a normal TV set via a modulator with a display of 24 lines of 40 characters each (Teletext or Viewdata format). Each character cell consists of 10 lines of 7 dots, inside which can be displayed any one of 128 characters (ISO-7 set, similar to ASCII, upper & lower case plus 32 special 'control' characters) as either white-on-black or as black-on-white, controlled by bit 7 of the data word.

The on-board display refresh memory, X27-34, is normally controlled by the VDU timing circuits, but can also be written into and read from by the CPU as if it were normal memory (addresses in the range F800-FBBF - 960 bytes). This technique allows a very fast change to the screen's contents, and also allows any individual character position to be altered at random.

Also on the board is an interface for a parallel keyboard input (X24).Pulsing the KS (Keyboard Strobe) input high latches whatever was on the input lines KO-K7 and causes a Non Maskable Interrupt; allowing the system software to be written for a 'live keyboard'.The processor can then read what was latched by reading address FBFF, this read also clears the interrupt.

The TV synch signals are derived from a nominal 15 kHz free running oscillator (part of X15) which gives the line symch signal (LS) directly and drives the dividers X9,10,11 which generate the frame synch.

The second half of X15 provides a variable delay to the start of the display on each line.

The 'dot' timing is derived from the high frequency oscillator (X7) and is divided by 7 in X6, then further divided by X13,14 to determine the current character column. X6,13 &X14 are all connected as synchronous counters to reduce circuit delays in this high speed part of the system

The five 'dots' corresponding to the particular line of the character being displayed are fed from the character generator chip X26 to the shift register (X2,4) via exclusive-or gates X3,5 which invert the signals as required. The video blanking signal derived from open-collector gates X12,17 is actually latched in the first (A) stage of S-R X4 for the duration of each character position because the 'J' input of that particular stage is taken to '0' (X4 pin 2).

As usual, item numbers and pin connections shown refer to those on the PCB available from Newbear Computing Store, 7 Bone Lane, Newbury. This board also contains a small 'prototyping' area for those who don't like the '262 character generator, or who want to add more keyboard interface circuitry.

7768 VDU 1 IC's

X1	74LS 00	X15	556
X2,4	" 195	X16,18	74LS 20
X3,5	" 86	X19	" 138
X6,13,14	" 161	X20,23	" 157
X7	" 13	X21	" 32
X8	" 02	X22	" 153
X9	" 93	X24	8212
X10	" 73	X25	81LS97
X11	" 90	X26	74LS 262
X12,17	" 03	X27-34	2102-1

PAUL MAPP'S SYSTEM *Part 2*

All RAM, I/O and vector interrupt locations are selected by using a memory mapping technique. Address bits 14 & 15 are decoded to give 4 x 16k block selects. 0 - 16k is further decoded by a 74154 on address bits 10 - 13 to provide 16 x 1k page selects for 2102 RAM's, internal decoding requiring A0-9. I have a 4k x 12 core store which I also intend using at a later date. Addresses 16k to 32k are not used at present but the block select is available. 32k to 48k is decoded by a 74138 to give 8 peripheral select lines from A10 - A12, the VDU & keyboard being the only peripherals in use at present. The final block 48k to 64k is used for interrupt vector addressing and provides access to the address counter, in the program I/O, from the data bus for JUMP and SWI instructions. This mapping results in a very inefficient use of the available addressing range, but provides me with more than enough expansion possibilities at present. In any case it can very easily be modified if required at a later stage.

A small amount of RAM (16 bytes) is located at the top end of store for the other two interrupt vector addresses. To monitor program execution & processor conditions, two lamps are driven by the memory read/write line and BA (bus available) signals.

For bulk program storage I shall probably use a CUTS cassette tape system in preference to paper tape as I've enough room to add an edge loading tape mechanism within the VDU chassis, very convenient if I ever get around to it ! That will, however, probably be put off for a bit once I get 4k of core running as the necessity to reload programs after switching off will be removed, for small(ish) programs anyway.

The one good thing in having a direct Hex program I/O facility from the keyboard is that it makes testing much easier as the system is built and also allows one to play with the bits that are working (many hours have been spent doing that !). All of the necessary power is derived from the VDU power supply and there is plenty still available.

A final point to note, the memory mapping is partially undertaken by a 74139. This device must not be manufactured by I.T.T. as the I.T.T. 74139 is a quad buffer gate, and totally different from anyone elses 74139. As far as I know this is the only discrepancy in the whole of the 74 series.

My complete system is now working successfully, so its down to a bit of programming for a while, although there are still a few ideas for peripherals on the drawing board. Anyone got any ideas on telephone modems for computer to computer communication ?

PARTS LIST

Control switch i'face;

X1	74121
X2	7410
X3,4	7403
X5	7400

Processor;

X1	7400
X2,4	7402
X3	7428
X5	7414
X6	7474
X7	7473
X9	6800
X10-13	74126
X14-17	74125

Memory page '0' etc.;

X1-8	2102
X9,10	74125
X11,12	74S189
X13	74154
X14	7400
X15,16	7404
X17	74139
X18	74LS138

I/O data/addr buffers;

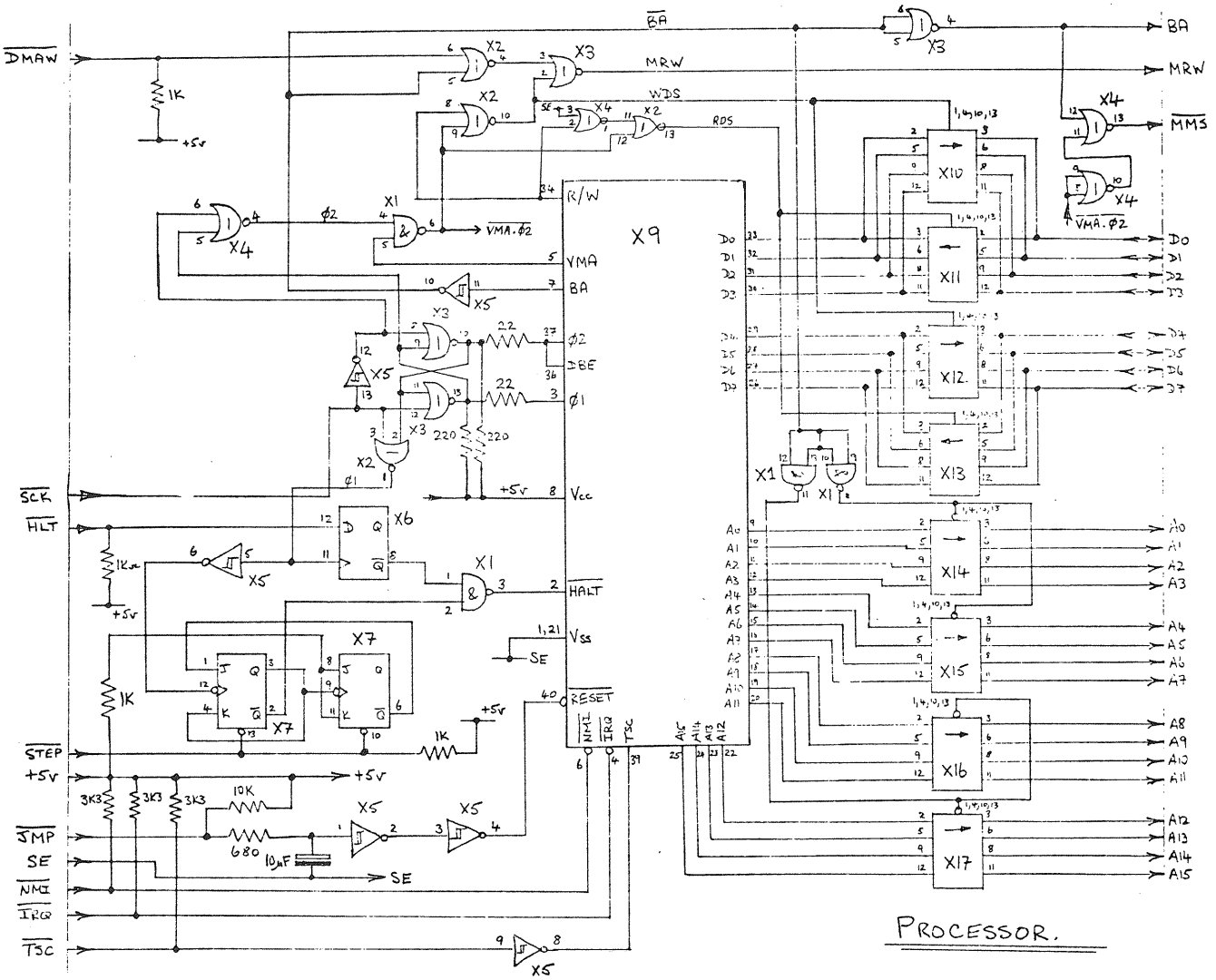
X1	7400
X2,3	7402
X4-7	74125
X8-11	74126
X12,13	74125
X14,15	7475
X16,17	74126
X18	74S140

Program input;

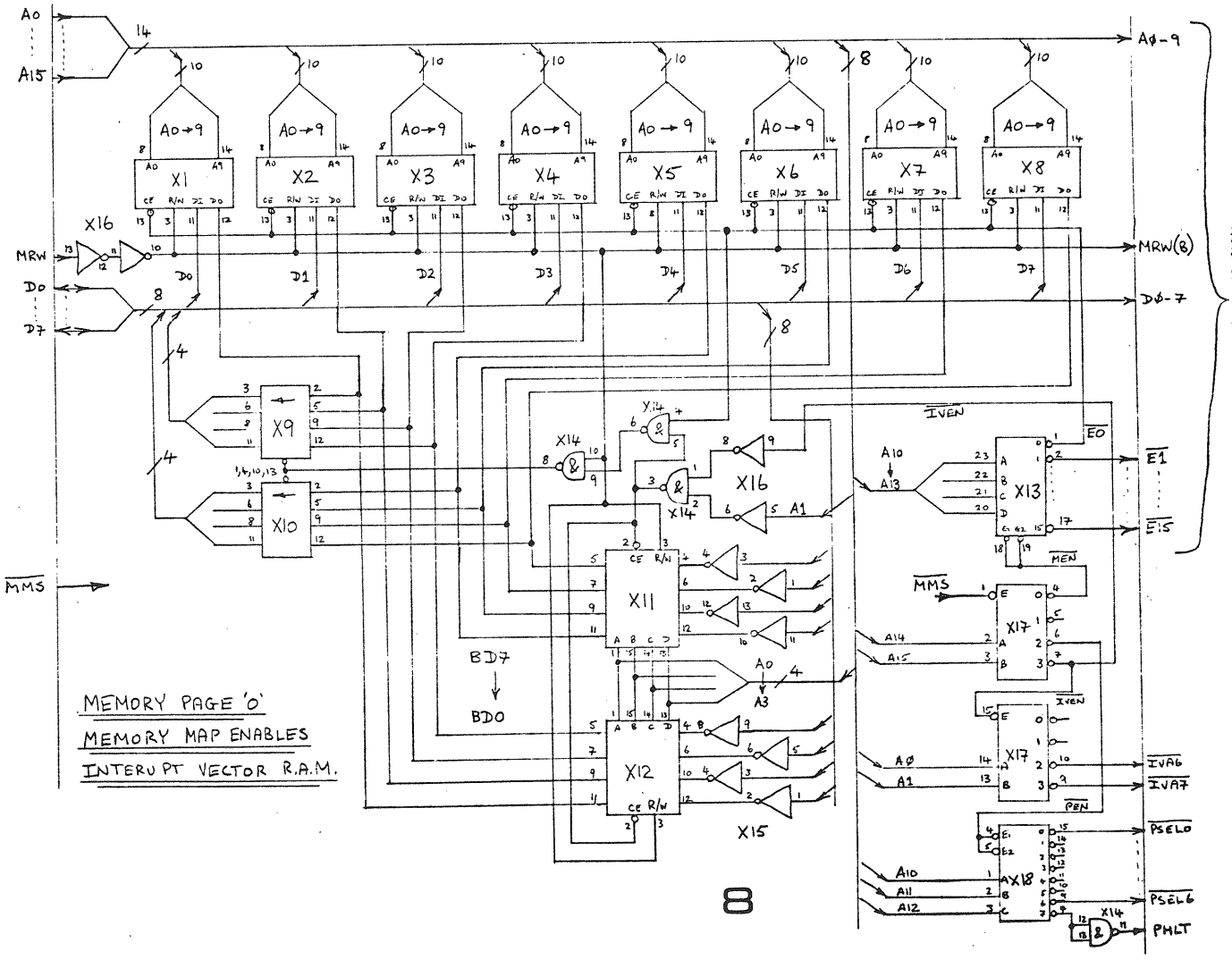
X1	7483
X2	7414
X3	7400
X4,5	7474
X6-9	74193
X10,11	74175
X12	7402

Display int'face;

X1-4	74150
X5	7400
X6	7447
X7	74145
X8	7490
X9	74154
X10	7402



PROCESSOR.

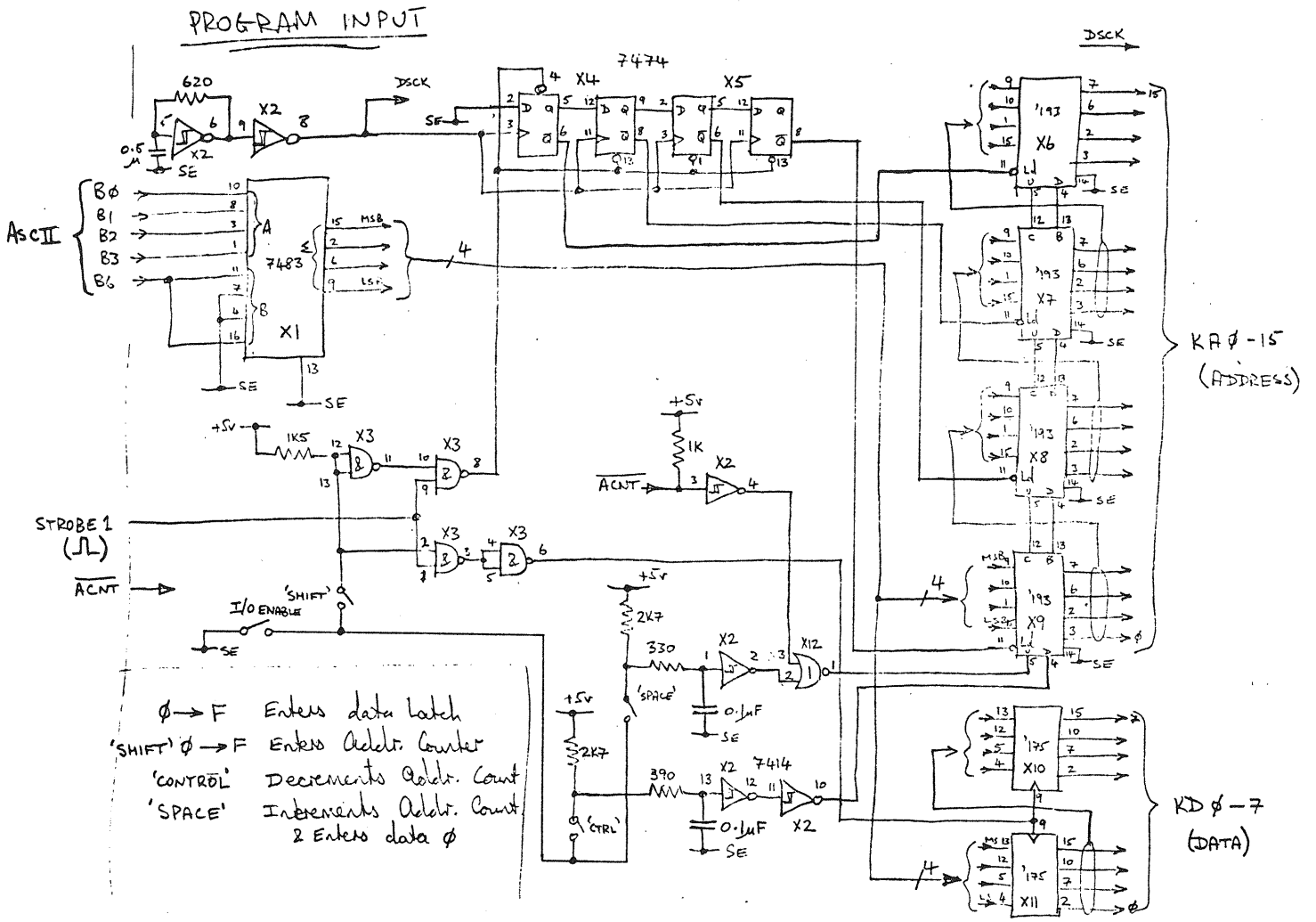


MEMORY PAGE '0'

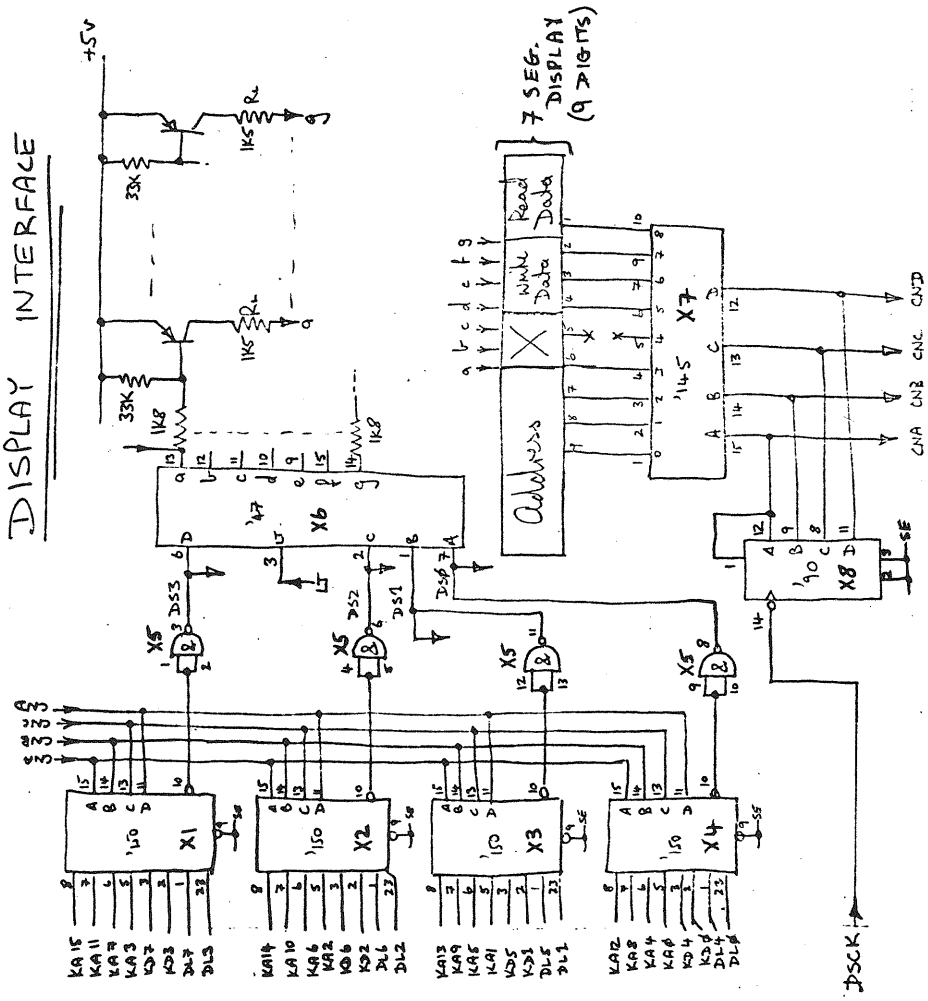
MEMORY MAP ENABLES

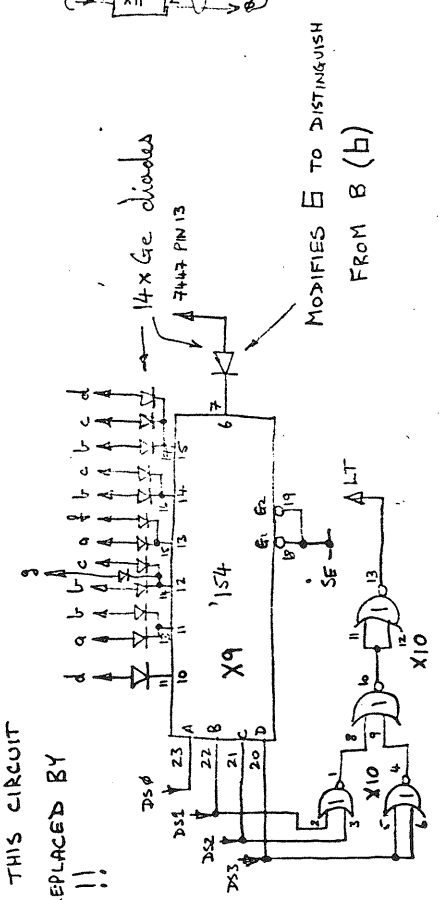
INTERUPT VECTOR R.A.M.

PROGRAM INPUT



DISPLAY INTERFACE





N.B MOST OF THIS CIRCUIT CAN BE REPLACED BY A 9368 !!

Z-80 BITS

Mike Blandford

Z-80 users may be interested to know of the following 'fiddle' for comparing the HL and DE register pairs;

```
100  A7      AND A       ; clears carry flag
101  ED 52   SBC HL,DE   ; compare HL & DE
103  19      ADD HL,DE   ; restore HL to original
```

If HL = DE then Z flag is set
HL > DE then carry flag is reset
HL < DE then carry flag is set

This method has the advantage that the Accumulator is not used in the comparison. With the Z-80 extra instructions ,over the 8080, quite frequently the HL pair can be used as a 16 bit accumulator and the actual accumulator used as a register.

Other Z-80 instructions may not appear to be of real use because of the prefix bytes making the instructions longer e.g.

```
ED 5B 00 00      LD DE,(0000)
```

achieves the same result of loading the DE register from 0000 H as;

```
2A 00 00      LD HL,(0000)
EB            EX HL,DE
```

but the second version corrupts the HL pair and requires an extra EX HL,DE to prevent this.

Finally when doing arithmetic on a Z-80 it is very advantageous, as far as speed of operation is concerned, to make full use of both sets of registers. Assuming the data is in the correct registers the Z-80 can perform a 32 bit add very quickly;

```
100  D9      EXX          ;switch to alternate set
101  19      ADD HL,DE    ;16 bit add
102  D9      EXX          ;switch back
103  ED 5A   ADC HL,DE    ;second 16 bit add with carry
```

I once reduced a long arithmetic program from about 10 days execution time to 8 hours by making full use of the on chip registers !

Z-80 USER GROUP - CHANGE OF ADDRESS

New address is; The Corner House, Birlingham,Near Pershore, Worcs. tel; Evesham 750251

Apologies to all who may have been trying to reach me and also to those awaiting a reply. My interrupts have been unmasked and my bus enabled so hopefully we're back to normal.

Roger Sinden.

PETS CORNER

In responce to the query about PET peripherals, the user manual states that the following will be available in the near future;

A Modem.

A second cassette player (not CUTS, it is CBM's own system).

An IEEE-488 interface is in the works for a terminal that can be connected to the PET.

A RS232/IEEE-488 interface for connection to a printer not made for PET (CBM).

Most H.P. instruments work on PET using an edge connector instead of the standard pin connector.

WARNING

It was stated in ETI that to get lower case letters type in the command

```
POKE 59500,72
```

This can jam the PET keyboard interrupts, the correct method is as follows;

```
POKE 59468,14   for lower case letters (you
                lose graphics)
```

And to return to graphics use;

```
POKE 59468,12
```

Use only masks 14 & 12 or you may disrupt the PET and have to switch it off to get it working again.

T Turnbull

PROM PROGRAMMER FOR LOAN

'Micro Peripherals' have donated one of their PROM programmers to the ACC for members' use.

The unit requires + & - 5V and +12 and +26V supplies, and is driven by the user's microcomputer system via a 8255, Z-80 PIO or 6800 PIA parallel port. Software is provided for 8080, Z-80 or 6800 processors. Both 2704 and 2708 PROMs can be programmed. Anyone wishing to borrow it get in touch with Mike Lord.

Micro Peripherals, by the way, make a number of items of interest to the amateur, including a 8085 based system built and tested for £188, and are developing a low cost VDU incorporating a professional keyboard. Their products are available from Haywood Electronics, 11 Station Approach,Northwood, Middlesex.

SWTPC S'WARE PATCHES

SOME PATCHES FOR SWTPC CORES V1.0 Martin Rowat

SWTPC Co-resident assembler seems to be a popular and relatively fast assembler editor package for 6800 machines. Implemented with MIKBUG primary I/O is via the interface on port 1. If this interface is configured at 300 baud and used with a VDU then cassette I/O can take place also via this port and this configuration is assumed by CORES.

To permit proper use of CORES with alternative configurations the subroutines for PUNCHON, PUNCHOFF,READERON and READEROFF can be used to jump to an external routine to configure an ACIA on port 0. I use RT-68 multitasking firmware as system monitor, it contains both ACIA and software UART (PIA) output/input routines which are transparent to the calling software.

It is therefore relatively easy to patch CORES to work with say a teletype on the control interface on port 1, and a cassette on an ACIA on port 0. Also in CORES is a subroutine located from (hex) 1A12 to 1A39, designed to pules unused pins of the PIA on the interface. If this subroutine is not required the ACIA initialisation routines can be placed there so that no additional space is taken up by the patches.

Using these patches permits proper functioning of SAVE,LOAD and 2P,2T commands with CORES. The fixes as outlined may need a little fine tuning for MIKBUG systems.

Additionally CORES itself needs a slight alteration so that the value of the X register is not lost when using these new routines;

	OLD		NEW
19B9	DE FE	19B9	BD 1A59
19BB	BD 1A59	19BC	DE FE

CORES	PATCHES	NEW CODE	
1A3A	BD 7061	PUNCHON:	JUMP TO ACIINZ ROUTINE
1A3D	86 12		PUNCH ON CODE
1A3F	BD 1A79		PRINT IT (CORES PRINT JUMP)
1A42	BD 0605		JUMP TO DELAY ROUTINE
1A45	39		RTS
1A46	01		NOP
1A47	01		NOP
1A48	86 14	PUNCHOFF:	PUNCH OFF CODE
1A4A	8D 2D		BSR PRINT IT
1A4C	86 34		RT-68 CODE TO RETURN TO
1A4E	B7 8007		THE PIA ON PORT 1
1A51	39		RTS
1A52	01		7 NOP's
1A59	BD 7061	READON	:JUMP TO ACIINZ ROUTINE
1A5C	86 11		READ ON CODE
1A5E	BD 1A79		PRINT IT
1A61	39		RTS
1A62	01		7 NOP's
1A69	8613	READOFF:	READ OFF CODE
1A6B	8D0C		BSR PRINT IT
1A6D	86 34		RT-68 CODE TO RETURN TO
1A6F	B7 8007		THE PIA ON PORT 1
1A72	39		RTS

Notes; Calls to 7061 could call an ACIAINZ routine user written and located at 1A12 to 1A39 to save space, otherwise 7061 is a user written ACIAINZ routine.

TTY 33/38/390

Tony Snaith

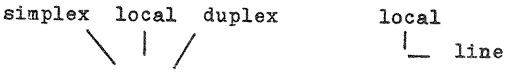
As Teletypes are now becoming a reasonably cheap way of complimenting your systems, I think it may be useful to bear a few points in mind.

First of all it could prove very costly to bring a badly worn TTY up to scratch, about two or three hundred pounds for parts alone.

Secondly, your chances of buying a dodgy TTY could be greatly reduced by making a few mechanical checks. These checks are by no means fool-proof as faults may not show immediately and an experienced eye is often needed.

When going to see a TTY the first thing is to get the dealer to plug it in and listen to see how noisy the machine is. Excessive noise is usually due to worn motor gears, but avoid grinding or screeching machines, unless the motor air deflector is rubbing on the fan inside, this can easily be bent over. As an extra point motor gears are not too expensive.

For the next test it is necessary to put the TTY in the local mode by turning the switch on the front of the line unit (right hand corner, front behind makers name plate if knob not fitted). Usual positions are;



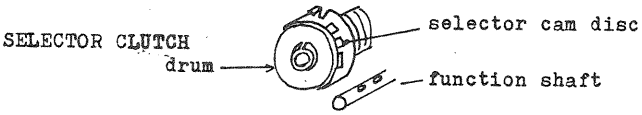
It is also possible to type in simplex but some corruption may be experienced. You should now be able to test, on a KSR machine by the keyboard and on an ASR machine by producing a tape ending in CR/LF and three deletes, feeding it through the reader allowing the tape to run from punch to reader for continuous test.

After managing some sort of test it is advisable to have a look inside. First of all switch off the TTY and remove the plug from the mains. Remove the cover by four screws at the front, under cover plate if fitted, three screws at the back and on ASR small screw in side of reader. Remove paper roll and tape and lift vertically. Don't lift too fast as sometimes wires are connected to cover, underneath.

Besides looking for general wear around the TTY and broken bearings on the carriage, there are two places where bad wear shows up; in the centre of the machine are two shafts running almost the full width of the machine. The one most easily seen, with all the clutches on, is the main shaft and the one below is the function shaft. Wear on both these shafts can result in an overhaul being necessary but the main shaft is of most importance.

TO CHECK

To the left of the main shaft is the selector clutch. By placing thumb and forefinger on the clutch cam disc, not the drum, move it to the front and rear, and up and down. If you are able to detect movement it does indicate bad wear, but be careful not to get a false reading due to end play in the shaft, which can be taken up by adjustment. To check the function shaft, hold the shaft and move in the same directions. Movement in both these shafts should be neglible, taking into account that after an overhaul there should be none.



Two more indications are the hour clock (not always reliable but a good reference point) and the range finder. Checking by the range finder requires the machine to be switched on with the cover off, so take care where you put your hands and only use one, and secure loose clothing and long hair. The range finder is used to check the machine margins and is located above the selector clutch;

TO CHECK

Slacken the range finder knob (not loosely) and while typinf an 'A' move the range finder lever from one end of the scale to the other noting at which point the 'A' corrupts. (If punch fitted run tape). The two readings taken give you a good idea as to the state of the machine. The further apart the better the condition. The operating position is the sum of the two numbers divided by two.

I.e. the ideal reading is 20 and 100 making the operating position 60. A good reading is also 0 and 80 or 40 and 120. A movement between 20 and 60 or equivalent is not very good, but sometimes margins can be improved by setting up the TTY correctly, this I shall cover in my next article.

BRA·SLIDE

Frank Cato

The typical amateur hobbyist has to check his own programs and it is easy to make the same mistake twice. The relative addressing used in the 6800's branching instructions can be quickly checked, using the BRA-SLIDE, a simple and very easily home-made do-it-yourself gadget, made from the strips used in Visible Index Systems. The cost is negligible, in fact zero if you can manage to liberate a pad of un-used strips from the stationery store.

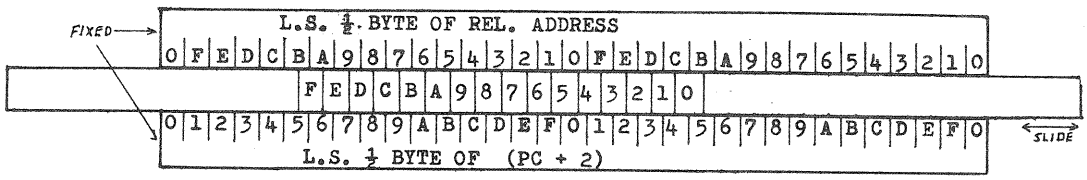
It is M.D.-proof, in as much as it doesn't mind which zero you index against, or which way you read the stock, owing , of course, to the endearing characteristics of two's complement binary. As you were so rightly about to point out, the M.D. would probably insert the slide upside-down, in which case it will solve close encounters of the third kind; I have an interesting proof of this which I have written out in the margin of my copy of Bachet's 'Diophantus'.

An example from the 'TUNER' program in the 7768 manual;

PC	INSTS	LABEL	OPS
....			
03	08	NUNOTE	INX
....			
19	27 E8		BEQ NUNOTE

To check using BRA-SLIDE, add 2 to the PC, making 1B. Scrub the 1. Your destination for the BEQ is 03. Scrub the 0. Enter B and 3 into BRA-SLIDE, and read off 8. This is of course the less significant half-byte of the address at PC 19, so we can all heave a sigh of relief.

Sure, it didn't check the E, but in our puny programs it's always either E or F, and you soon know which !. If you'd like to see a mock-up of BRA-SLIDE with a view to making a better one yourself, drop a line to Frank Cato at 3 Rykneld Way, Derby, but don't enclose any stamps at this stage.



AID FOR CHECKING 6800 BRANCHING INSTRUCTIONS.
WORK IN HEXADECIMAL USING THE LESS SIGNIFICANT HALF-BYTES.
INDEX '0' ON THE SLIDING DESTINATION STRIP AGAINST (PC+2).
READ OFF RELATIVE ADDRESS AGAINST DESTINATION.

LIBRARIES

The 6800 library has shown how a 'Special Interest Group' can assist many of the members of the ACC. I understand that the Z-80/8080 group is equally well organised and very active. May I ask that any 'SIG' contact the ACC committee & request funds to assist their endeavours. Cash gives a 'SIG' teeth to set itself up with printed indexes, leaflets etc, and a chance to buy & circulate very expensive textbooks. In this way considerable additional benefit can be gained from Club activities by its members (I am not suggesting that Club funds are spent on buying hardware for the chosen few !).

Tim Moore

SC/MP USER GROUP LIBRARY

After a quiet period, requests have started to rush in, and I should like to apologise for the delay in servicing some members' interrupts, due to the turn round time of the material of which there is generally only one copy. Please ensure, if you request, that you send SAE at least A4 size and generous postage (32p +) as some of the items are rather heavy, especially S004,S026,P001 for which extra may be necessary.

Additions;

S024 : SC/MP mates with cassette recorder.
S025 : Cassette interface (Elektor).
S026 : SC/MP Applications Handbook.
S027 : SC/MP Keyboard Kit Users Manual.
P002 : Sample programs to illustrate techniques. (replaces S007 which is temporarily withdrawn due to damage).

Special thanks to the members who contributed several large items above.

J.Roger Knight Dept of Meteorology,University of Reading, Earley Gate,Whiteknights,Reading RG6 2AU

ACC GENERAL LIBRARY

Run by Frank Cato, 3 Rykneld Way, Derby DE3 7AT tel; Derby (0332) 513769

Items currently available for loan to ACC members are;

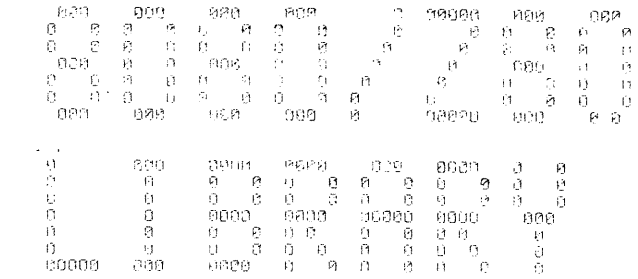
- ACC Newsletter Vols 1,2,3,4,5 (30p P&P per Vol)
- 'Kansas City' (CUTS) cassette interface circuit folder; 3 circuits ex Byte. (30p P&P)
- RS232C/V24 folder, contains RS232C, V1,V24 & V28 interface specifications. (30p P&P)
- 'Bear' reprint of Weeny-Bitter articles (40p P&P)
- '7768' CPU design manual (30p P&P)
- 'Guide to Baudot Machines' Byte 1977 articles describing 5 level code teletypewriters (30p P&P)
- MUBUS data file (30p P&P)
- Guide to SC/MP Programming ,Kemitron (40p P&P)
- How to Use Integrated Circuit Logic Elements, by Jack W Streater (1969 !) (30p P&P)
- IM6100 CMOS Family Sampler (20p P&P)

6800 LIBRARIES

Seem to be churning out supplements to their indexes every couple of weeks; for the latest send SAE +9p stamp to;

Hardware information ; Bob Forster, 18A The Barons, St. Margarets,Twickenham, Middx. 01 892 1873

Software,I/F & Memory; Roy Hall, 4 Hart Grove, Ealing Common,London W5 3NB 01 992 6017



IMPORTANT NOTICE:-

THE LIBRARY WILL BE MOVING FROM ITS PRESENT ADDRESS IN MID MAY AND ANY CORRESPONDENCE TO THIS ADDRESS AFTER THEN WILL ALMOST CERTAINLY GET LOST. PLEASE USE THE FOLLOWING TEMPORARY ADDRESS FROM MAY 19th UNTIL FURTHER NOTICE:-

ACC 8080/Z80 LIBRARY,
C/O 257 BUTTERMORTH ROAD,
NUNEATON
WARWICKSHIRE.

ACC 2650 LIBRARY

The library has been considerably expanded recently with the addition of hardware and software publications from Mullard Ltd.
The hardware sections include interfacing for paper tape punches and readers also keyboards and 7 segment displays etc. Software listings include driver routines for the hardware above and various other routines including BCD & binary floating point arithmetic for numbers between +0.99999999E+99 and 0.1E-99 etc.
The Signetics monitor routine 'Pipbug' is avaliable on punch tape as is also the 3 pass assembler 'Promethus'.
Various support chips are becoming avaliable. The 2651 multi baud rate sychronous/asychronous UART has been avaiable for some time. The 2655 parallel I/O-timer is available now and also the 2652 serial chip with CRC generation(useful for floppy discs etc but a bit expensive).
The uprated speed version of the 2650, the 2MHZ 2650A-1 is about to become available in the next few months. This version is equivalent in processing power to the 4MHZ Z80 while being easier to use and less demanding on fast memory requiring only 400 ns memory with no wait states.
Signetics in the states have recently brought out the 2610 video games chip for use with the 2650 but unfortunaly it is only for 525 line operation at present but perhaps they will produce an european version soon.
Kits and ready built cards using the 2650 are avaliable from Central Data in the states and from Epsilon in France.The Central Data version provides for use with the S100 bus. They also provide software such as monitor, text editor and 'basic'. In the U.K. Quarndon provide a modular system which can be based on the 2650 or 8080 and provides a monitor, assembler/ disassembler. Various add-on cards are available including static & dynamic RAM to 16K bytes/ card. EPROM and EPROM programming cards and cards for VDU, floppy disc and hardware arithmetic. Altogether they provide some 23 different assemblies. Quarndon systems are aimed mostly at the industrial and educational markets but the prices are in reach of the amatuer.
Requests for data on the 2650 family should incude a SAE and be addressed to:-
Roger A. Munt, ACC 2650 Library, 51,Beechwood Drive, Feniscowles, Blackburn, Lancs, BB2 5AT Tel (0254)22341

HELP !

Wanted; buy or borrow, any technical information on Olivetti p603 Office Micro-computer.
D.Butler 32 Warenne Rd.,Hove,Sussex

Information needed;
Processor (reputedly Compucorp) apparently MOS devices have logo Mi;
CPU board 0135871-B devices ACL03 to ACL07
(C1815 to C1819)
Data Memory 0126466-A " HTL04 to HTL06
HTL10 HTL18
Program mem 0115709-A " HTL02 HTL12
2KR520 to 2KR523
Lemp logic 0102434-C " HTL15 to HTL17
HTL00
Data Memory 0102236 " HTL04 to HTL06
HTL00 HTL10

Any information, particularly about Mi devices gratefully received & willingly paid for.
Arthur Bailey, The Gateways,Park Rd.,Bingley, West Yorkshire BD16 4EJ

Cossor 401-2A VDU, circuit diagram, manual or any relevant information wanted. Denis Bunker, 326 High St.,Berkhamsted ,Herts tel; Berkhamsted 4334

Would anyone who has any information about the PROCESSOR TECHNOLOGY VDM-1, such as curcuit diagram, specification, etc., and is willing to share it with another ACC member please contact Ian Roll at 16 Hill St., Hednesford,Staffs. (Hed 4363)

Can any member assist me with details of an interface for seven bit ASCII to SC/MP processor using a Sanders keyboard ?
R.Kugler Kays Electronics, 195 Sheffield Rd., Chesterfield,Derby. tel Chesterfield 31696

ACC AGM

AMATEUR COMPUTER CLUB ANNUAL GENERAL MEETING

Held at the Polytechnic of the South Bank,London on 13th April 1978. 47 members attended.
The agenda was as printed in Vol 5 Iss 6 of the Club newsletter.

a) Retiring Officers' Reports & Statement of Club Accounts

Bob Warren, Chairman, who also spoke for Mike Reeve (Secretary) in his absence, said that the past year had been very successful in all but one aspect. Membership had risen to nearly 1000 and the Club's good finances were in good order. Regional centres had been formed in various parts of the country & were encouragingly active. The main disappointment had been the rather sporadic nature of the Londom based activities. Perhaps a significamt improvement could be made in this area next year.

The ACC had exhibited at the Online D.I.Y. Computer Conference last June and had good response. This year the conference has been extended to 3 days and the ACC have again been alloted space.

Mike Lord, Treasurer & Newsletter Editor then gave the following statement of the Club's accounts;

STATEMENT OF CLUB ACCOUNTS

At 22nd March 1978

Membership ; 946

Balance c/f from 1976/7		£ 82.72
Receipts for year 1977/8;		
1977/8 membership fees;	£ 1887.00	
Other (mainly from sale of back issues);	220.28	
	£ 2107.28	2107.28
Expenses for year 1977/8;		
Printing;	£ 869.96	
Postage;	526.96	
Assistance to SIG's;	115.00	
Other (mainly stationery);	101.61	
	£ 1613.53	(1613.53)
Balance @ 22-3-1978;		£ 576.47

b) Election of Officers & Committee Members for 1978/9

After Proposition, Seconding & Unopposed voting, the following officers & committee were chosen;

Chairman; Jim Cunningham 7 Harrowden Court,Harrowden Rd.,Luton LU2 OSR

Secretary; Bob Warren 90 Tudor Rd,Hampton,Middx

Treasurer & Newsletter Editor; Mike Lord, 7 Dordells, Basildon, Essex.

Committee Members
Terry Young 2 Branksome Ave.,Hockley,Essex
Jim McDonald 19 Cowper Rd., London W7
Peter Birnie 4 Clarence Court,Clarence Rd., Bromley, Kent
Alan Secker 209 Albury Drive,Pinner,Middx.
Jaap Creutzberg 135 Thornton Rd.,London SW12

c) Discussion of Special Projects for 1978/9

The following were proposed as being possible for Club sponsorship;

1) A form of fast mass storage.

2) A tape cassette data storage system using CUTS/high speed CUTS and possibly Tarbell compatible.

3) An economical plotting device.

General discussion seemed to indicate that members felt that direct financial subsidy of projects was undesirable.

d) Visit & Lecture Program

The members probably wanted more 'social' events. The new secretary agreed to follow up this requirement. One of the main problems concerning organisation of meetings is the 'inertia' associated with advertising forthcoming events, especially if arranged at short notice. The Club newsletter appears once every two months & it financially & organisationally impossible to notify members by post.

e) Any Other Business

A proposal by Mike Lord (seconded by Jaap Creutzberg) to alter the Club Constitution as follows;

Paragraph 17 includes the sentence;

"Any assets of the Club remaining on dissolution shall be distributed among the current members, pro-rata according to their subscription for that year."

In view of the present size of the Club, I propose that this sentence be changed to read;

" Any assets of the Club remaining on dissolution shall be donated to the British Red Cross Society"

was passed by a large majority.

In prolonged discussion the members felt that the Club should expend additional money in order that the newsletter could be more conveniently & efficiently produced. Suggestions were;
- An electric Typwriter should be purchased for the Editor.
- Addressing should be computerised.

In closing the Chairman thanked all those who had attended, especially people who had travelled some distance.

Bob Warren

MEETING POINTS

THAMES VALLEY GROUP

A meeting is being planned for the end of May, probably at Reading University. Further details can be obtained by sending an s.a.e. to Bob Cottis, Pippins,Boulters Lane,Maidenhead SL6 8JT, or call Maidenhead 22445

CAMBRIDGE COMPUTING

The Cambridge University Processor Group is open to anyone in the area (not just members of the University), and especially anyone who would like to help with their next constructional project. Tim Hopkins, Cambridge University Processor Group, Magdalene College, Cambridge CB3 0AG

ANYONE FOR THE SOUTH-WEST ?

There seems to be no group as such working in the South West. If any two or three would care to foregather from time to time in the Exeter/Taunton area perhaps they would care to get in touch. G.V.Barbier, Palmers Mill,Calverleigh,Tiverton.

SOUTH WEST REGION

If anyone is interested in setting up or joining a local East Devon; Devon; or South West Region branch of the ACC, please contact Mr. D.Carne, 44 George St., Exmouth, Devon EX8 1LQ tel 039 52 74479

NORTHEAST PETS

As I have a PET 2001-8 computer, I would like to start a non profit making branch of the ACC in the North East for software, hardware information etc. I have a place for small meetings e.g. 10-20 people. T.Turnbull 49x9th row,Ashington,Northumberland.

BELFAST

I would like to contact other ACC members in the Belfast area.
John Peacocke 22 Wheatfield Gdns.,Belfast 14

MIDLAND MEETING SATURDAY 18th. MARCH.

Although we have now "cast off" the electronic organ constructors, and have our own meeting, the first item would be equally at home at either meeting. John Diamond demonstrated his latest offering in computer music. He has added 4K RAM to his 77/68 and has developed a program to play four part harmony, combined with variable waveform listing. As an example he played a very convincing rendering of "Eye Level" which was generally acclaimed as a vast improvement over his previous monophonic square wave offerings.

Nick Wright then took the floor,and with his 77/68 connected to an oscilloscope, demonstrated "serendipitous circles", a program out of "Byte" magazine which generates assorted groups of circles on the screen, somewhat similar to "Life".

I must congratulate these two members for the wide range of work they have covered on their very simple machines. This is particularly praiseworthy when you consider that they are both still at school!

Dave Goadby then showed us the latest additions to his monitor program. This is a single step and trace routine which runs a program step by step and displays the condition of all the registers after each step. A very powerful de-bugging tool.

The meeting then broke up for refreshments and general discussion, with Dave's system getting its usual pounding from members trying out his many games.

Next meeting Saturday May 20th. 2.30pm.

HARROW ENTHUSIASTS WANTED.

I am anxious to start a small working group in the Harrow area. My particular intention (unless I am persuaded otherwise) is to develop modules to A.C.C.'s own 78 spec - memory cards, I/O cards etc. on single eurocard size boards and ultimately a "front-end" powered by a Z80. Anybody interested please contact me as soon as possible.

ALAN SECKER 209 Albury Drive, Pinner, Middlesex HA5 3RH England. Telephone 01-428 0844

GILLINGHAM GROUP & PROGRAM LIBRARY

Being interested in;
- Z80, soon to be Z-8000
- Artificial Intelligence & simulation of behaviour.
- High level languages.
- Non-numeric applications of computers.
- Data base/Library/Computerised consultation.

I would like to start a local microprocessor group.

I would also be interested in forming a program/ algorithm library and wonder if there is anything already in existence that could be further publicised, or must this be started from scratch.

A.Aylward 194 Balmoral Road,Gillingham,Kent

HOW TO RUN A LOCAL GROUP MEETING.

I am writing this note on the same basis as the questionaire at the end of the first meeting of the London Group concerning the type of meeting. In other words I hope the criticism to follow will be acceptable rather than evoking the response 'What a nerve, complaining about other people's organisation and not making any contribution himself' etc. Because I do appreciate that it takes expertise and voluntary effort to run things.

What I am complaining about was the one day event held on February 18th at City University. I don't really mind about the preceeding difficulties such as not knowing until very late whether it was on or not, or the panic on the train trying to find the wrong street in the A-Z , or the confucing signs at the University. These minor mishaps are fairly tolerable. But I didn't like the way it was actually run once I had arrived.

It would have been nice to have known where the toilets were instead of having to go to the porter and then still finding them difficult to locate.

There was no mention beforehand about refreshments, nor during the event did I know whether the University had any snack bars open or whether there was a cafe or pub open nearby.

Above all, I would have preferred the actual 'business of the day' to be more rigidly done. Even standing to attention and listening to a lecture on each machine on a guided tour would have been better than being completely lost and not knowing what was going on where. From about 10 until 1, I spent the time in the downstairs bit at a loose end and rather bored and getting fed up. At about 1pm. it was apparent that everybody else had drifted away and I assumed that they had got fed up as well and gone home. I then discovered the upstairs bit and had a very pleasant afternoon playing games with some child on Neil Harrison's machine. So it wasn't a complete disaster after all. I see from the magazine that a PET 2001 was there. Really ? I didn't see it, or if I did, I didn't realise what I was looking at. A pity, I would have been interested in seeing it.

*** Ed's note; this was a private letter to me, but I think it will be of interest to all organisers of similar events, and therefore publish it in the spirit of the first paragraph ***

SHOP

FOR SALE

1702A EPROMS, new, unused £3.50 each.
Dave Cox 8 Widecombe Close,Bedford MK40 3BL
tel; (0234) 45828

HEATHKIT IS HERE

Heath (Gloucester) Ltd. are now selling th H8 and H11 computers. The H8 is built around the 8080A, with an intelligent front panel (octal data entry & display), the monitor allows program storage & re-loading. For £302, the kit includes a fully tested CPU board.

For £1100, the H11 uses DEC's LSI-11 with 4k memory, and built in power supply unit.

A 12" VDU terminal (£503 for the kit) and paper tape reader/punch (£310) are also available, and a floppy disc system will be available soon.

PERSONAL COMPUTERS AT THE ROUNDABOUT

Stuck in a traffic jam at Gants Hill roundabout, Ilford ? Then keep an eye open for a personal computing shop next to Barclay's bank. Due to open in mid May, it will be run by Vince Coen, of L.P. Enterprises fame.

FOR SALE

One Motorola 6800 DII Kit (assembled) complete with extra memory & buffers £175

One MIKBUG ROM (MC6830L7) New. £7

One Z80 CPU + PIO + CTC (Unused) £29

One MOSTEK Video Adaptor Board £130

All above items plus postage.
S Hawley 3 Elm Rd.,Hollins,Oldham OL8 3UQ

PROMS FOR SALE

1702AQ 256x8 UV erasable £5
5204AQ 512x8 UV erasable £7.50
2708Q 1024x8 UV eraseable £15
M.J.Pearce, 21 Hall Meadow,Wedges Mills,Cannock, Staffs WS11 1TB

NU VDU

The PETITVID is a single card VDU having composite video and RS232/V24 interfaces. Using the Thompson-CSF chip gives a 16 x 64 character display. Available as a complete kit or individual parts (e.g. 8" x 4" board) from Newbear.

COMPUTING IN THE RAIN

Manchester's first COMPUTER WORKSHOP is now open at 29 Hanging Ditch, Near Cannon Street bus station, Manchester M4 3ES (tel; 061 832 2269)

REAL COMPUTER SEEKS GOOD HOME

The machine is an E.A.I. (West Longbranch, N.J.) '640' G.P. digital computer, designed for process control & scientific computation. It is 16 bit parallel, 2's complement arithmetic, 1.65uS cycle, 62 instructions including hardware multiply,divide and square root. Multi level indirect addressing & multi level interrupt. Construction is I.C. (CTuL, Motorola), it has 8k core (max 32k), 300cps P.T.R., 150 cps P.T.P., no TTY (20mA current loop interface) and console. C.P.U. + memory is 24" x 30" x 60" wt. c. 600lbs (has wheels), P.T.R & P.T.P. and console are 'loose' as they were fixed to an enormous desk. I also have full hardware and software documentation,and software packages including Editor, Assembler, Debug, Diagnostics & FORTRAN II compiler (& Run-Time Library which can be called by Assembler or FORTRAN programs) - and several other misc. programs ! And a box full of spare cards. It will have to go by the end of June; I am looking for £400 for it, I might take a little less but otherwise will dismantle for the store and other useful parts.
C.Seton 'Greenway' Wantage Rd.,Rowstock,Oxon OX11 0JY tel; 0235 83 367

WANTED

DEC Introduction to Programming Book 2 'Programming Languages'. Also any information on PDP-8 4k BASIC and FOCAL. (Neither item is currently available from DEC).
Malcolm Connell 38 White Close, High Wycombe, Bucks HP13 5NG tel High Wycombe (0494) 31314

HIGH WYCOMBE SHOPS.

Garex Electronics of 7 Norvic Rd.,Marsworth,Tring Herts (tel; Cheddington 668684) have a quantity of Creed 7E teleprinters said to be in as new condition at about £20 or used condition at £5 upwards. They will probably take offers and haggle. They also do a lot of other new and surplus electronic equipment.

82S23 (equivalent to SN74188) 32 x 8 PROMS programmed as required (e.g. for 7768 MON 1) are available from C.P.Developments, 16 Hughenden Road, High Wycombe,Bucks tel (0494) 30043 (evenings) for £3.75) They also do CMOS and Schottky IC's and a very nice VDU.

Malcolm Connell

FOR SALE

Creed 7E Teleprinter with Punch/Reader (5 level of course) works fine. Buyer must collect. Offers ? Ring Sheffield (0742) 662230 after 6 or at weekends. Lindsay Reid.

Z-80 SYSTEM FOR SALE

Z-80 system, intelligent stand-alone VDU,keyboard possibly included, 2k Zapple monitor in ROM, serial interfaces to VDU and cassette, 1k static RAM, 4k dynamic (probably) fully buffered and has bus plane with sockets for further 12 boards. Expansion no problem, encased in snazzy boxes (!). Compared with Lynx it must be worth about £250 though prepared to haggle. Can be seen Worcester area weekdays and Croydon area most weekends. Telephone Evesham 750251 for more details. Roger Sinden.

PROMGRAMMING

I recently discovered how much it costs to program 2708's. Therefore since I do a lot of experimentation with a large number of them I have a programmer & eraser for 2708/2716. If any member wants a 2708/2716 programmed I will program their chips for £1 per 1k byte. Please supply Hex Listing as well as CUTS tape if poss. I will program a full spec Nat Semi 2708 supplied by me for £14 inclusive of P&P/programming etc. For details ring 0742 662230 evenings and weekends. Lindsay Reid.

NORWICH COMPUTER MART

A new company 'Computer Mart Ltd.' at 38 St.Faiths Lane, Norwich tel; 0603 615089, has been formed to import and retail small business and personal computers. Products they are handling include IMSAI & SOL systems, Shugart & Calcomp floppy discs.

FOR SALE

Keyboard, encoded (non-standard) on diode matrix, can be converted to ASCII by altering matrix. £15 plus postage.
Paper tape reader (similar to that offered by Electronic Brokers for £165) £60 + postage.
Dynamic RAM; MM5262 2kx1, £1 each post free.
D.H.Row 21A Shorelands Rd.,Barnstaple,Devon

FOR SALE

Ex VDU TV Monitors. All solid state time base, deflection circuits etc. 75 ohms video in, 240V mains supply, smart cases, 2 only. £40 each or thereabouts. Demonstration for seriously intending purchasers.
J.W Smith 80 Overstone Rd.,Harpenden, Herts
tel; Harpenden 67254 anytime.

IBM PERIPHERALS FOR SALE

J&M Computers of Malden, Essex have a number of ex-IBM 1053 printers, 2 - 5 years old, working, sold as seen, with remote keyboard £130 . Also paper tape readers. For details ring Mr. Goddard at Malden (0621) 892 333.

FOR SALE

SWTPC Floppy Disc System, full working order with software £800.
SWTPC 4k memory boards, built & tested with sockets £75.
Motorola D1 kit with full RAM. documentation etc£100
P.A.Gibson-Daw 479 Wellingborough Rd.,Northampton. tel; 714821

FOR SALE

IBM 1620 1964 model 20k core, 1311 disk drive with 2 disc packs. In-out typewriter, 1621 tape reader. Working when moved from local polytechnic. Lots of software, tapes and manuals. engineering drawings, listings. Known to have FORTRAN 4 among software and on disc. £250 o.n.o. buyer collects. Warning; about 10cwt of hardware so only suitable for someone who can put the car out and turn the garage into a computer room!

Elliott 803. Hardware for spares. Or could be made to run. Needs power pack. Software - about 200 tapes some listings, manuals. Engineering drawings etc. Creed 75 and transmitter to make ASR set-up. 5 bit code. Many other bits, modest offers on what you need or £135 for all.

Elliott 5 or 8 level paper tape station compricing large desk full of electronics with high speed peader and high speed punch. (The reader and punch look similar to those advertised by Electronic Brokers at £140 each) £120 for the complete station.

Michael Young Newgate Lane,Farehem,Hants PO14 1AN tel; 0329 28751

FOR SALE

Scopex 124D two beam scope. Good condition £95.

CT1024 VDU terminal fitted with professional Keytronic keyboard, externally switched baud rates from 110 - 1200, little used and as new £240.

K.R.Brooks tel Bristol (0272) 504359

Note; No charge is made for including items in the 'Shop' section of the ACC Newsletter, however, items will only be included if, in the opinion of the ACCN editor, they will be of interest to the general ACC members. Inclusion of an item does not imply any approval of the goods or services offered.

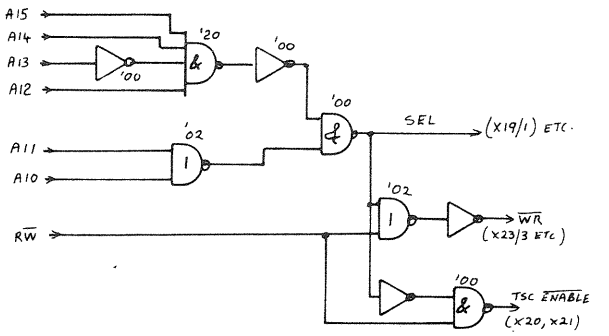
SS50 VDU

BILL MARSHALL'S VDU ON THE SS-50 BUS M.Rowat

This should be read in conjunction with Bill's diagram in the October '77 ACCN.

Thanks to Bill Marshall I now have a memory mapped VDU on my SWTPC-6800. I have used the circuit as distributed by Bill and mentioned in the December '77 ACCN. The only modifications to make it work on the SS-50 bus were to the address decoding and enabling circuits (X15,16) and to the 2102 read/write buffers since the SWTPC data bus is inverted.

The original decoding provides 3 control lines (X16/8) or VDU select; (X16/6) or WR and tri-state enable (X15/6). Bill suggested X15 and X16 be replaced with the following for the SWTPC-6800. My VDU lives at D000-D3FF



This needs ½ 7420, 1 7400, ¾ 7402 and an inverter ¼ 7402 or 1/6 7404. Only 3 or 4 chips here.

As the data bus is inverted Bill's circuit won't work as shown. As I also wanted to read memory for my VDU driver routines I used two quad tri-state transceivers (DM8835). These are connected as shown and replace the 74125'2 (X20,21)

For proper MPU read connect X21/2 to earth otherwise bit 7 will be read as high.

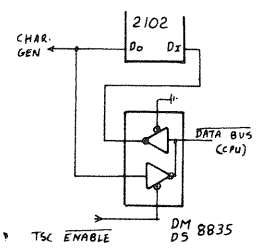
There are one or two connections omitted by Bill from his diagram. These are ground connections on the 7490 and 7493 counters (2 or 3 and 6 or 7).

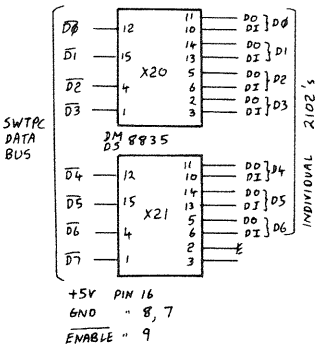
Lastly, though not strictly necessary, I used a pair of non-inverting tri-state buffers as the address lines A0 - A9 to avoid loading the bus. 74LS367 are ideal and cost only 51p each from Newbear.

At the moment I use a Computer Workshop modulator but this inverts the video; their re-inverter doesn't work !.

I have written a VDU driver for the 6800 for scroll mode, it is fully debugged and provides cursor on/off (any symbol) highlight on/off, scroll and line feed, EOL,EOF,backspace and processes the character for proper presentation. Copies are available from me (free but please send an SAE) at 44 Broadwheal Rd., Helpston, Peterborough.

The circuit as shown provides 32 lines of 32 characters. About 2 lines are lost at the head and foot of my TV set and I have shortened the line (by software) to 28 characters because I can't reduce the TV line drive sufficiently. My software allows a single byte to specify line length and two bytes for entry line start under scroll mode. I prefer page mode when the CPU is outputting to the VDU (as opposed to keyboard entry) and I have some un-debugged software for this.





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