6809 Preview

6800 fans should be well pleased by Motorola's new 6809 MPU since, while being a major impr- ovement over the original 6800 (Motorola claim that a 1MHz 6809 system will typically use 30% fewer instruction bytes and run almost three times as fast as a 6800),it is sufficiently similar that a user can change from one MPU to the other without trauma.

From a hardware point of view the 6809 is com- patible with the 6800 bus and supporting devices, with the addition of ACK (Interrupt Acknowledge) and BUSY (for multi-processor systems) outputs. A third Fast Interrupt Request input is provided and of course the 6809 has an on-chip oscillator requiring only an external crystal to provide the system clock.

```
┌─ 8 bits ─┐  A  Accumulator
│          │  B  Accumulator
│          │  CC Condition Code Register
│          │  DP Direct Page Register
├─16 bits ─┤  X  Index Register
│          │  Y  Index Register
│          │  U  Index Reg/User Stack Ptr.
│          │  S  Index Reg/Hardware Stack Ptr.
│          │  PC Program Counter
└─ A ──── B ┘ D  Double Accumulator
```

M6809 Programming Model

A second 16 bit Index Register has been added, curing one of the weaknesses of the 6800 design, and a second Stack Pointer (U) allows the prog- rammer to set up a separate data stack, although the Autoincrement and Autodecrement addressing modes let you use the X & Y Index Registers as stack pointers as well.

A new 8 bit register (DP) specifies the upper 8 address bits when using Direct mode addressing; one can envisage a time-shared system allocating a page of directly accessible variables to each user. The two 8 bit accumulators A & B can be treated as a single 16 bit accumulator for double byte arithmetic.

Mode	Description
,R	Indexed with zero offset
(0,R)	Indexed with zero offset indirect
,R+	Auto increment by 1
,R++	Auto increment by 2
(,R++)	Auto increment by 2 indirect
,-R	Auto decrement by 1
,--R	Auto decrement by 2
(,--R)	Auto decrement by 2 indirect
N,R	Indexed with signed N as offset
(N,R)	Indexed with signed N as offset indirect
A,R	Indexed with signed accumulator A as offset
(A,R)	Indexed with signed accumulator A as offset indirect
B,R	Indexed with signed accumulator B as offset
(B,R)	Indexed with signed accumulator B as offset indirect
D,R	Indexed with accumulator D as offset
(D,R)	Indexed with accumulator D as offset indirect
	R = X,Y,U or S register N = 5,8 or 16 bits

6809 Index Addressing Modes

The instruction set has been improved from that of the 6800 principally in ways which will help the writer of modular programs. Notably, a great variety of Indexed addressing modes have been

IN THIS ISSUE
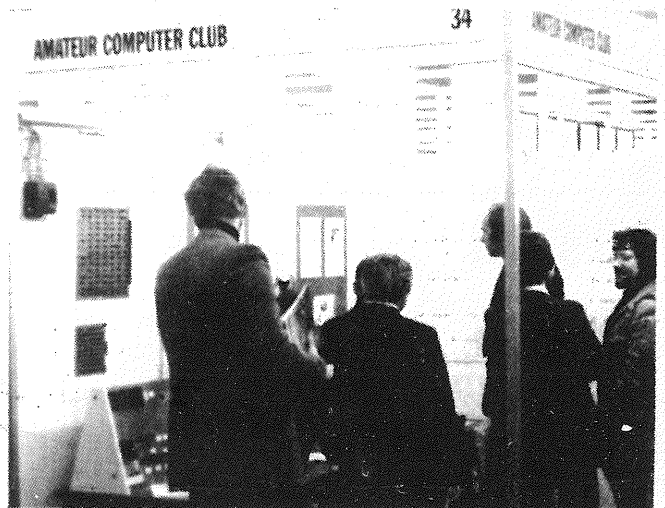
ACC at the June DIY Computing event, photo by Bob Warren. We'll be at September's PCW Show, and look forward to meeting more members.

London Phoenix

As members resident in the London area will know, Club activities in the Capital City have been spasmodic to say the least over the last year or so. This has been very regrettable and was larg- ely caused by the absence of a formally organised London Group. To overcome this problem the main Club committee have decided to organise a regular pattern of events for London Members during the coming year.

The venue in most cases will be the Polytechnic of the South Bank, Boroough Rd.,near the Elephant and Castle.

Events will initially be at fortnightly intervals although later may become more frequent if the membership requires this.

The first two meetings will be;

28th September. A 77/68 evening, speakers to inc- lude Mike Lord & Tim Moore.

12th October. Apple computers will bring along their products, describe the des- ign philosophy etc. Then you can play with the goodies.

After that we have NASCOM, Commodore, PET, TRS80, Texas Instruments, and 'Whither Busses ?' lined up as topics for the Thursday evenings up to Christmas. Details to be announced later.

Bob Warren

provided, including Indirect and Program Counter Relative types as well as Autoincrement and Auto-decrement modes. Long Relative branches are also available, and offsets may be specified as 5,8 or 16 bit values.New instructions include a 8x8 multiply and the ability to push or pull a selectable set of the MPU registers.

A 'Load Effective Address' set of instructions allow a programmer to add immediate values or an accumulator to an index register,which is useful in extracting data from tables, especially when using the PC relative mode of addressing. A full set of transfer and exchange instructions allow data to be moved between similarly sized registers.

Two major benefits of the instruction set are that parameters can easily be passed between routines on the stack, and that truly position independant code can be generated; Motorola hope that this will lead to the development of ROM 'firmware' which could be located in any spare address space in a system.

At the time of writing it is thought that 6809's will start to become available during September/ October, though in limited quantities at first. Already one begins to think of an upgrade to the 77-68 ...

Ed's Bit

No, I haven't got a new typewriter - yet. Just borrowed an IBM golfball with a carbon ribbon to see what it looks like when printed.

On a serious note, is there anyone out there who has a working ETI System 68 and who would be willing to help those less fortunate than himself ? The problem being, of course, that even if you implement all the published modifications, it appears that you have to be lucky, or else a knowledgeable enthusiast with access to some decent test gear, to get it going satisfactorily. So, as the ETI articles attracted a lot of interest, there are many people about who have spent a lot of money and still haven't got a working system. (Alternatively, has anyone designed a system using basically the same components ?).I've been getting calls from people who say that ETI have advised them to get help from the ACC; but my time is limited and I can only really help those living locally, so we need some expert trouble-shooters please.

Rumour has it, by the way, that ETI are now working on a new DIY computer design.

I had hoped to include an up to date membership list with this issue, but have not done so as;
  - Typing and checking 1400 names and addresses is not my idea of the best way to spend the summer evenings.
  - Plans are under way for the ACC membership & subscription function to be computerised - and once this happens we'll be able to produce membership lists at the touch of a key.
So, please bear with us and be assured that a list will be published as soon as practical.

Talking about the weather, by the time you get this newsletter the skies will have clouded over, those happy hours spent in airport lounges will merely be expensive memories, and the evenings will be drawing in. An ideal time of the year for writing articles for your favourite newsletter !

                                              Mike Lord

Quick Cuts

A HIGH SPEED CUTS CASSETTE INTERFACE

This circuit has been developed with three main objectives;
1. It should be capable of reading and writing CUTS.
2. It should have the minimum of adjustments.
3. It should be capable of operating reasonably fast.

CUTS involves recording eight cycles of 2400Hz for a one, and four cycles of 1200Hz for a zero. This interface records and reads tapes in this way, but is also capable of using fewer cycles at each frequency, down to one cycle of 2400Hz or half a cycle of 1200Hz, giving a data rate of 2400 bits per second. By increasing the master clock frequency it is possible to operate even faster, and prototypes have run at 5000 bits per second.

The operation of the transmitter circuit should be fairly obvious, but the receiver is a bit more complex. The recorder output is amplified (change R6 to adjust the gain) and squared by

IC10a, which is wired as a schmitt trigger. IC10b & c serve to generate a negative going pulse on each zero crossing of the input signal. IC9a operates as a digital monostable, which times out when a 1200Hz input signal is being received. IC7a & b serve to latch the time-out signal, and to give equal length 0s and 1s. The zero crossing pulses are combined with the eight to twelve counts of the monostable to give a steady 4800Hz (nominal), which is used as the input signal for the phase-locked loop IC8. The appropriate UART 16 times clock frequency is selected from the feedback divider IC9b by the multiplexer IC2b.

The only adjustment required is the setting of the master oscillator frequency to 76.8kHz, or this can be derived from a crystal oscillator.

The circuit seems to be very reliable, even at 2400 baud, though good quality tape is important. Newbear should have a printed circuit board available by the time this goes to press, and a more detailed description will appear in PCW.

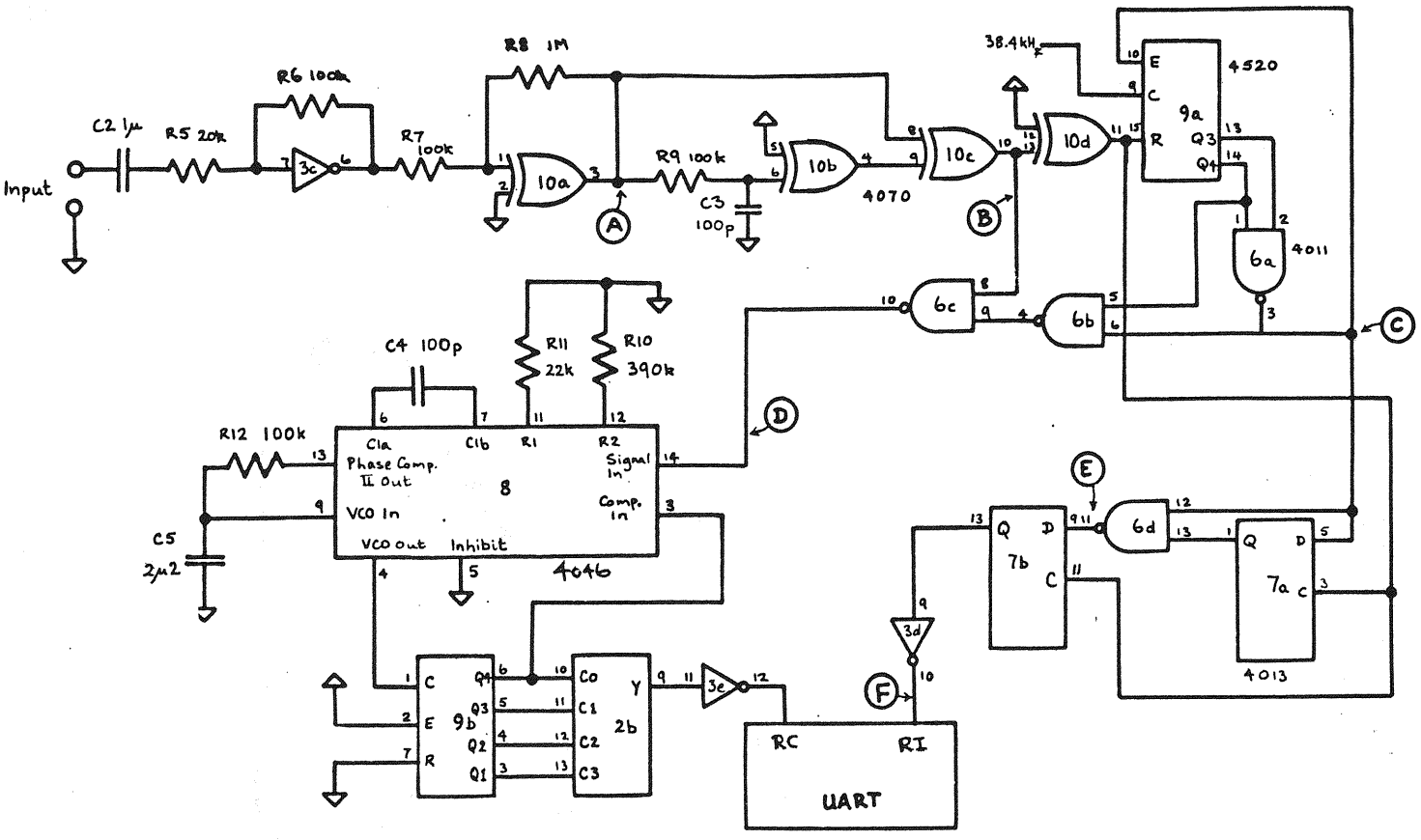Bob Cottis and Mike Blandford.

Hardnews

Some more news about Intel's new 8086 16 bit MPU; it should be available in the next month, and an evaluation kit, the MCS 86, will cost £235. The chip itself is priced at £74 for the 5MHz version in 100 up quantities, and £61 for the 4 MHz item.

Heath E&M; who advertised a low cost printer terminal - the DTS 78 - for £125, seem to be having problems. One ACC member who sent a deposit for a machine on 20 April 1978 has recently received a reply which says; "we feel it is our duty to inform you that an unexpected technical fault developed during manufacture. The fault being of a complex nature and effecting the specifications caused extensive redesign. Both the expense and delays thus caused have resulted in an impossible financial position. Although negotiations are in hand, which we feel may provide a solution we are unfortunate in having to await developments."

6800 part prices have been slashed by up to 50% by Fairchild with their F6800 series.One off prices are now £6.77 for the F6800P CPU and £3.69 for the F6821P PIA.

Commodore have announced extensions for their KIM 1 single board microcomputer.A video board at £150 allows a domestic TV set to be used as a display, while a memory board provides an extra 8k bytes of RAM for £199.

Texas Instruments plan to introduce a 256k bit magnetic bubble memory package during the last quarter of 1978.
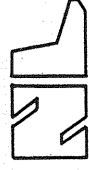
Receiver Circuit
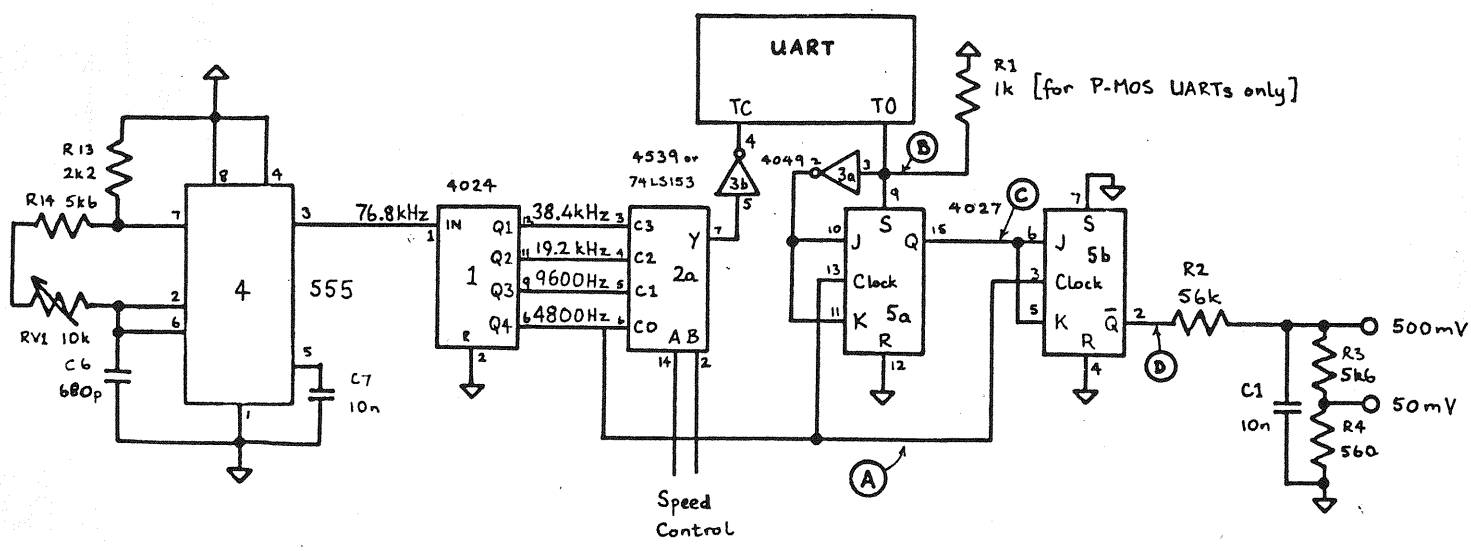
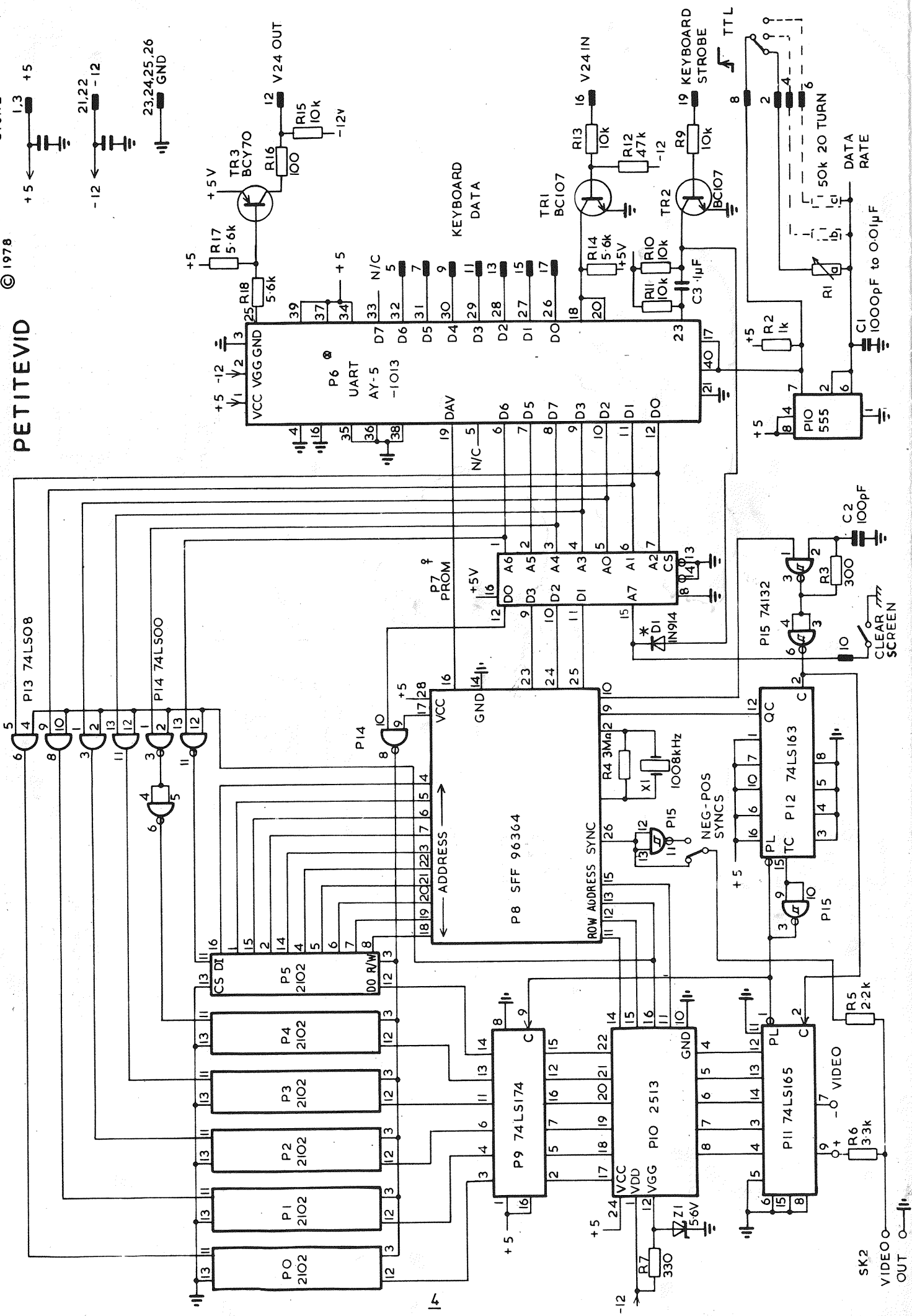Transmitter Circuit

© Bob Cottis and
Mike Blandford
1978

3

CD 41200

PETITEVID

NEW BEAR COMPUTING STORE
© 1978

NOTES ♀ THIS IC HAS A WHITE SPOT ON IT & ITS No. e.g. 82S129 IS NOT SIGNIFICANT
* THIS DIODE REPLACES R8
⊗ IF 6402 UART SUPPLIED PIN 2 MUST BE ISOLATED FROM -12v

Petitevid Offer

INSTANT VDU

The Thompson super chip has solved many problems for the home constructor. It has also created a few of its own! It is now possible to have a 64 ch x 16 line scrolling 'glass teletype' for the effort of a few evenings soldering. The snag is that a small (256 x 4 bit) ROM is required to decode the control characters. Well, most people don't have a suitable PROM programmer, so the super chip suddenly becomes useless. Not all is lost, however, because of the "Bear's" Petitevid which is a low cost implementation of the Thompson design. The kit however is still expensive compared to the cost of the raw super chip plus a deep junk box.

FOR ACC MEMBERS ONLY, the Bear is prepared to sell half a Petitevid e.g. The Superchip, PCB, ROM and documentation for £28.80 (this might increase slightly when a Mk II PCB is released) plus 8% VAT & 30p P&P subject to availability of the PCB (occaisionally we experience supply problems). Please quote your ACC membership number when ordering from Newbear Computing Store, 7 Bone Lane, Newbury, Berks.

The Midlands Group is prepared to offer advice and support for those constructing this VDU. Contact John or Roy Diamond, 27 Loweswater Rd., Coventry tel 0203 454061

Brief spec; 64 characters x 16 lines scrolling. Control characters are Cursor Left, Right, Up, Down, Clear Screen, Home, Line Feed and Carriage Return. V24 o/p, i/p 110 to 1200 baud. 1V composite video output.

Hope that this will assist in keeping the computer in the home where it belongs.

Tim Moore

Meeting Points

HANDS ON AT THE POLY

The Inaugural meeting of the North London Hobby Computer Club will be held at 6.30pm on Wednesday October 5th in room 47 of the Polytechnic Old Building, Holloway Rd.,London N7,opposite Holloway Road underground station.All are invited.

Robin Bradbeer, senior lecturer, is acting club secretary, and hopes that the club will grow so that by the new year they will be having short courses on programming, talks by manufacturers, and a homebrew section using the department's facilities (they have two PETs, four 6800's with floppy disks and VDUs, as well as some KIMs and Motorola systems.

WEST MIDLANDS

I would like to start a local group in the West Midlands area, and if members who are interested could phone or drop a line I would appreciate it. John Tracey 100 Booth Close,Crestwood Park, Kingswinford,West Midlands DY6 8SP (0384)70097

LIVERPOOL COMPUTER LOVERS UNITE

I am the secretary for an as yet unnamed group of people interested in computers generally,with a special interest, generated mainly by their low cost,in microprocessors and microcomputers.

Some of the groups members come from the educational sector, some from industry and business and some, like myself, from the 'professional' computer world. We want to establish a group which is not a professional organisation, but which will allow anybody interested in computers to meet other people with similar interests.

Our next full meeting is on 15th September at 7 pm. The place has yet to be fixed but will probably be in one of the University of Liverpool's lecture halls. Further details can be obtained from STEM, 19 Abercromby Square,Liverpool 7.   J.S.Stout

BROMLEY BIT BASHERS

I would like to start an ACC group in the Bromley/Orpington area.No definate plans at the moment, but I hope to get a few different micro systems together in one place & time to talk about/play with.
Phil Wheeler G8LSC 1 Irene Rd.,Orpington,Kent 01 300 3333 x 590 (work),Orpington 23800 (Home).

KENTISH COMPUTERS

J.M.Baron, of 27 Wises Lane, Borden,Sittingbourne invites anyone in the area interested in joining a new local group to write to him or phone Sittingbourne 70160.

BRISTOL BIT BASHERS ?

Would members in the Bristol area interested in forming a local group please contact me. If you write and require a written reply, a SAE would be much appreciated. Suggestions for a meeting place would be particularly welcome.

I will be at University during October and November and subsequent terms. In order to expedite the establishment of the group, then, it would be useful if someone could assist by dealing with correspondance and calls during these times. My family would forward letters (please mark envelopes 'Local Group') and inform telephone callers of my absence.

Let's hope the group soon gets off the ground. Rex Godby 16 Williamson Rd.,Ashley Down, Bristol BS7 9BH tel;Bristol 46981

NORTH STAFFS

If any enthusiasts in the Stoke-on-Trent/North Staffs area would like to write to me at 11 Beech Drive, Kidsgrove,Stoke-on-Trent ST7 1BA (tel; 07816 4387) including an SAE, I would be glad to make a list of the manes and addresses of those who write, and return a copy of the list to each person. This would be useful as regards exchange of information, advice, programs etc.

M J Brough

MIDLANDS MEETING OF 8th JULY

The TRS 80 which failed to materialise at the last meeting made its appearance at this meeting by kind permission of the Coventry branch of the Tandy Corp. This is a very attractive package which members enjoyed using, although in its 4k basic version it was considered to be rather limited, particularly as it could not be operated in machine code. The graphic system was very versatile as it could be set spot by spot. A very interesting system, and we look forward to seeing the upgraded 8k Basic system which will be much more versatile.

Nick Wright brought along his 77-68 system which grows a little at each meeting. He now has 4k BASIC running, controlled from a very stylish home made QWERTY keyboard.

Laurence Wickins then introduced us to the MK14, this is a simple minimum system based on the SC/MP with a hex keyboard & LED display. Whilst this is a rather limited system, it is nevertheless the cheapest complete system (less power unit) at present on the market. Its main weakness lies in the difficulty of expanding it to a full system.

Dave Smith from the Manchester Group paid us a visit and told us about his NASCOM system, let-

ting us know of problems he had met, not the least of which was obtaining the kit in the first place ! However it is now up & running and he is very pleased with it.

Big news ! We now have provisional agreement to hold our meetings at the Coventry (Lanchester) Ploytechnic. Details are yet to be finalised, but it is hoped that our next meeting on Sep 16 will be at the Poly. Members are advised to ring John or Roy Diamond at Coventry 454061 to confirm arrangements.

CORBY TECHNICAL COLLEGE

We have started a computer club based on the college which has 3 Research Machines' 380Z microcomputers. Members are interested in both the hardware and software sides, and it is hoped that we will hold meetings with speakers from September, also hold workshops and courses will be offered at the college in Z80 machine code programming and BASIC programming.
Diane Hayes

BRISTOL-CARDIFF

If any member is interested in a Bristol and/or Cardiff group, would they ring Pete Hesketh on Shire Newton 596 evenings or weekends, or Newport (0633) 73366 x 4573 during office hours.

SOUTHAMPTON ACC

SACC, the sister club of the Soton. University ACC, will be holding its first informal meeting at Southampton University Arts A - next to the Nuffield Theatre - at 7.30pm on Friday 13th. of October, and we welcome prospective new members from the Southampton area.(we hope you are not superstitious!).
There is the possibility of members' micros being on display, and a short talk on some aspect of computing, in addition to an introductory talk on the club and its aims.
P.D.Maddison 13 Westridge Rd.,Portswood,Southampton. tel; 0703 558557

ACC LINCS ?

M Alexander, 5 Brattelby Cresc.,Lincoln,LN2 2EB would like to start a micro-club in his area. Write to the above address or 'phone him on Lincoln 23084.

A PUG ISN'T A PET

Pet User Group should note that the abbreviation PUG is already in use, by the Pascal User Group!
C J Marshall

THAMES VALLEY GROUP

A change of employment is taking Bob Cottis to the land of ACC NorthWest, and the running of the rapidly growing Thames Valley Group is being taken over by Dave Howland, 4 Kent Lodge,Courtlands, Shoppenhanger Rd.,Maidenhead tel; Maidenhead 36976

BRADFORD ; IS THERE ANYBODY THERE ?

Barry Waite, 315 Toller Lane, Heaton, Bradford 9 tel; 498 750 would like to get in touch with local computer hobbyists.

NORTH WEST GROUP

The North West Group of the ACC is still growing, having reached about 110 members, and are considering alternative accommodation and fortnightly meetings. For more details contact Ken Horton 50 Lymefield Drive,Worsley,Manchester M28 4WA

HELP !

DO THE 6800 SHUFFLE

I would be very pleased to hear from someone who could lend me a copy of the SWTPC 6800 system manual, as I wish to re-arrange my system so that SWTPC software can be run without any mods.
Also if anyone locally would like to get in touch with me for a chat and a 'go' on my system,please give me a ring.
Terry Cassell 65 Alphington Ave.,Frimley,Camberley, Surrey tel;Camberley 29781 (evenings & w/end)

DOCUMENTATION NEEDED

I recently acquired two ICL 8 track paper tape peripherals.They are a solenoid driven punch and a photo-electric reader with a stepping motor drive, made in 1975, type No's P 1598 & P 1599. They were mounted in two blue drawers in a desk.Would like to buy or borrow any documentation on these.
Soren Poulsen, Gronnehoj 7,DK-2720 Vanlose, Denmark.

DATA TRANSFER WANTED

I am eager to correspond with members of the ACC, I am a Guyanese studying Electrical Engineering in Valencia at the University of Carabobo. I am a second year student and would like to exchange ideas and topics in Electronic and Computer systems.
Clarence Liverpool c/o Prof. Anateresa Garcia, Centro Internacional De Estudios, Urb. La Ceiba,Callejon 145, 98-10 Valencia, Carabobo, Venezuela.

HELP

Has anyone a Technical Manual and circuit for a Viatron 21 processor,cassette and reel-to-reel tape ? To buy, beg or borrow.
D.Holman 4 Larchfields,Saughall,Chester.
         (0244) 50593

TRAIN DRIVERS WANTED

A demonstration of the control ability of our system would create a lot of interest at exhibitions and displays. One possibility would be a series of shunting problem on a short piece of model railway layout, involving point switching etc. If any member has worked on a similar programme, or has nay other ideas for practical demonstrations, then I would like to hear from them.

Naturally, the Company would pay for any material used, but I would ask that any contact be by letter only please.
B.Lumb Marketing Manager, The Micronics Company, 1 Station Rd.,Twickenham, Middx.

LECTURER WANTED

We are a very active Amateur Radio Club. However, some of our members have become very interested in computing and especially the application of micro-computers in amateur radio. I am writing, therefore, to ask if any member of the Amateur Computer Club, within a reasonable distance of Dunstable, would be prepared to give us a short talk/lecture/demonstration on computing, possibly in its widest sense.

The speaker can be assured of an attentive audience and reimbursement of all travelling expenses involved. He would, of course, be quite free to hand out publicity literature for the ACC.

The date we have in mind is Friday 24th November, and if anyone could accommodate us in any way we would be most grateful.

L.J.Smith 9 Kinsbourne Close,Kinsbourne Green, Harpenden, Herts AL5 3PB

Real Time D2

MOTOROLA M6800 D2 KIT ENHANCEMENTS

The D2 kit in its basic form is ideal for evaluating the M6800 microprocessor and for testing small programs and routines, but it lacks the facilities for testing interrupt routines and real time programs. Finding I needed these facilities, I made a few additions to my D2 kit to enable NMI and IRQ signals to be manually produced, and also a crystal controlled timebase generator (derived from the CPU clock) for real time applications. Two points should be noted. Firstly, no changes (e.g. cutting copper traces on the circuit board) are made to the existing kit. Secondly, it should be obvious to hardware buffs that these circuits are not the best way of going about things; however, I am a software man, and develop my hardware by 'trial and error'.

The first addition is an LED lamp driver circuit connected to the Bus Available (BA) commector on the CPU board (top of Fig 1). This will light when a WAI instruction is executed, and can be used to indicate a CPU wait-state. (The numbers in brackets refer to the PC board connectors, and are given in the D2 manual). The other two gates in the CD4001 IC can be used if required (as shown in the bottom half of Fig 1) to show Transmitted and/or Received data from the Cassette Recorder. This gives an impressive flashing display and also enables the user to coun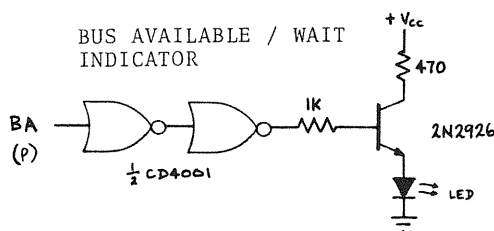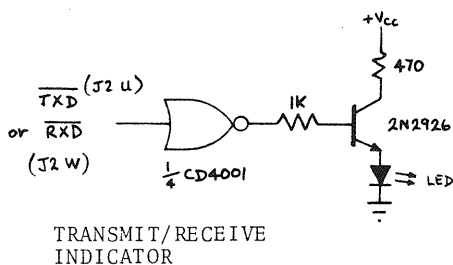t the number of blocks being written or read. It also gives the user something to look at during those exasperating 40 seconds or so when reading or writing is occurring !

The second circuit (Fig 2) deals with the interrupt circuitry. The 4800Hz input to the timebase generator is derived from the Cassette Recorder clock, which is in turn derived from the 614.4 kHz CPU clock. The selector switch interrupt frequencies of 2400Hz,1200Hz,etc. to be selected. The 75Hz rate is particularly useful. I have used it to 'program' a digital clock running in both universal and sidereal time (very useful if you're an amateur astronomer like me).

When SW2 is in the upper position, manual interupts are enabled. When SW1 (double pole,double throw, centre off) is moved to its upper position an NMI interrupt occurs, while the lower positiot produces an IRQ request. The switch (SW1) must be returned to its central position before another interrupt can be produced.

When SW2 is in the lower position, and the interrupt switch SW1 is in the central position.no interrupts occur. When SW1 is moved to its upper position, NMI interrupts are produced at a rate depending on the selector switch. IRQ requests are similarly produced with the switch SW1 in the lower position.

For examples of Real Time clock interrupt drivers and programs, see Byte; November 1977.
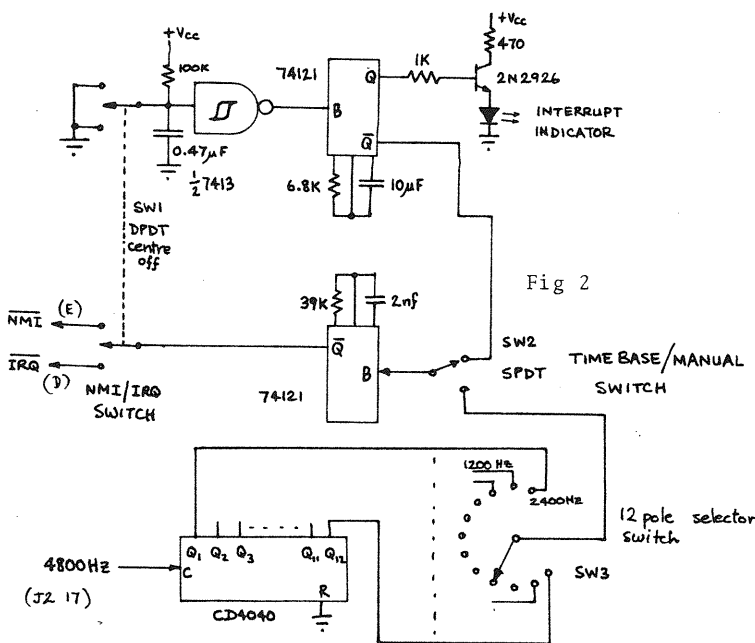
Paul Rodman

BUS AVAILABLE / WAIT INDICATOR

Fig 1

TRANSMIT/RECEIVE INDICATOR

Fig 2

LIBRARIES

SC/MP USER GROUP LIBRARY ADDITIONS

SO28 : Science of Cambridge MK14 kit details.
SO29 : SC/MP with scanned keyboard input.
SO3O : SC/MP with 20 key encoder.
SO31 : SC/MP with 90 key encoder.
SO32 : SC/MP with Burrough Selfscan display.
SO33 : SC/MP multiprocessor system.
SO34 : MK14 home computer (PCW review).
SO35 : SC/MP Instruction Guide/Summary.
SO36 : SC/MP Interrupt system.
SO37 : SC/MP as A/D converter (New Electronics).
SO38 : Address assignments & decoding.

POO3 : Maths Routines.

In preparation; SC/MP Cross Assembler and Disassembler to run on SWTPC 6800, a Monitor for parallel I/O (Elektor type) systems, Block search/move.
As you can see, Hardware outnumbers Software considerably in the Library, as might be expected with a controller type micro, but any contributions will be very welcome.

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

6800 SOFTWARE LIBRARY MOVES

Roy Hall, who organises the 6800 Software Library, has now moved to 89 Hicks Ave, Greenford, Middx. tel; 01 578 9136.

TRS8OUG

Anyone interested in joining a TRS-80 User Group should contact Leon Heller, 8 Morris Walk, Newport Pagnell, Bucks MK16 8QD, or ring him during the week at Loughborough 212041

Shop

FOR SALE

ICL VDU's, consisting of 9" monitor with circuit,
needs 12V, VDU controller board, needs 5V, with
MOS memory, mains PSU for above. No keyboard or
case. £100 each.

Mag tape units; modern, small rack mounted with
standard V23 interface connector. Use standard
½" computer tape. With data on circuit to use as
replacement for paper tape reader/punch. £100

Power supply; mains to 5V 4A regulated. £7

Olivetti TE 300 ASR teletype; almost new, direct
TTY replacement, serial ASCII into 20mA or RS232
Upper and lower case, n-key rollover keyboard.
Reliable tape punch & reader. £300

ICL 7020 terminal, with 250ch/sec paper tape
reader and 100 ch/sec punch. RS232 in/out. £200

Honywell Keytape unit; working with core store,
keyboard, all electronics. £100

ICL Key Edit VDU; TV monitor in attractive metal
case on stand. £60.

Ring Nigel Dunn   049 47 4483 evenings.

WHAT'S WRONG WITH MY RO35 ASCII TTY ?

Nothing as far as I know, but nobody has bought
it yet, even at the ridiculous price of £150.
But I must sell it, I need the space, so why
not negotiate ? I've also got a couple of
PTR 661A paper tape readers left @ £16 plus £2
p&p each.   Mike Lord

FOR SALE

Owing to the untimely death of Bill Ingle, the
following items are for sale;
SWTPC MP68 Computer System with 12k £275 o.n.o.
SWTPC CT1024 Visual Display Terminal. 2 Pages
of 16 lines of 32 characters   £125 o.n.o.
SWTPC AC30 Audio Cassette Interface £40 o.n.o.
All above with complete notes for construction,
plus System Notebook.
Sony cassette recorder TC92   £40 o.n.o.
Software; SWTPC Library;
           Vol 2 3k BASIC
           Vol 3 4k BASIC
           Vol 4 8k BASIC
           Vol 5 Space Voyage
           Manuals and original cassettes plus
           various extra programs on spare tape.
           Offers please.
Books;   Computer Science - Basic Programming.
           Computer Science - a first course.
           Offers please.
Byte magazine from August 1976; £1 per copy or
offers.
Reply to Mrs.J.Ingle, 30 Head St.,Goldhanger,
Maldon, Essex.

BOOKS FOR SALE

Interface Age (July '77 to June '78)   £14
Personal Computing (No's 1 to 8)   £ 8
Creative Computing (last 7 issues)   £ 7
6800 Applications Manual & Programming
Manual   £10
Byte (May/June/July 1977)   £ 4.50
All as new.
D.Holman 4 Larchfields,Saughall,Chester.
(0244) 50593

FOR SALE

Creed 7E teleprinter with silence cover and 5
level paper tape punch. Very good condition. 30
hours use since serviced by Post Office. With
Z80 software to drive it £40.
ASCII keyboard encoder board (no switches),
diode encoding £5.
Vero plug in board wired for 2k x 8 2102's,
with sockets but no chips. Offers ?
Phil Wheeler 01 300 3333 x 590 (work), Orping-
ton 23800 (Home).

MEMORY FOR SALE

2 off Godbout 8k memory boards £90. These are
S-100, 450nsec. static boards used four months.
I am replacing them with a 24k board.
R.J.Subler 88 Lexham Gardens,London W8 5JB

LIVERPOOL SHOP

Microdigital has opened a shop at 25 Brunswick
St.,Liverpool 2. They stock NASCOM,PET,APPLE
ets as well as a wide range of books and mag-
azines.

SOME THINGS YOU HAVE TO PAY FOR, OTHERS ARE FREE

8 track paper tape reader, 13 ch/sec. FREE.

5 track paper tape punch, 35 ch/sec, good condit-
ion. £5

Plessey core store, 4k x 18 bits, 4uSec £5

ICL alpha-numeric keyboard, came off a verifier,
£3

I also have a reel of 5 track PT for an Elliot
803 marked FORTRAN COMPILER!?? Its either an
Algol type interpreter, or a loadable 8k machine
code version; I suspect it is the latter. Huwev-
er, any 803 owner is welcome to try his luck.

James Beard 13 Mayesford Rd.,Chadwell Heath,
Romford, Essex

CHEAP 4K RAMs

Brian Day 7 Heather Mount,Harmans Water,Brack-
nell,Berks tel; 0344 50263, has National 5270
4096 x 1 dynamic RAM (18 pin) for sale at £1
each (large orders preferred).

FOR SALE

6800 chip, new, £10

Numerous copies WW/PW/PE 1972-77, 30p each post
paid; SAE for list of issues or write requirem-
ents.

Model 35 RO teletype printer as advertised by
Chiltmead last year; £55, buyer collects.

Guy Burkill Rake Holt,Rake,Liss,Hants GU33 7PF
tel; 073 082 3311

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of electricity and paper. By being able to offer
low cost computing on a personal level, Galdor
attracts schools, students and researchers pur-
suing their own projects, and anyone is welcome
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ted in using any of Galdor's services, or in
helping write programs, repair machines, or
talk to customers.

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tel 01 399 1300