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PREMIER MICROSYSTEMS 208 CROYDON RD

ANERLEY LONDON SE20 7YX 01-659-7131



Here at last is our UK101/OHIO newsletter. It seems to have been delayed in every way possible - firstly by the PCW show, secondly by an overwhelming response to our DRAGON 32, then by the discovery that our normal printing firm had ceased printing, forcing us to invest in our own equipment! We offer our apologies to customers who have been waiting for documentation - the above explains why!

Many of our customers have asked if we are dropping the UK101/OHIO support now that we are DRAGON 32 and BBC dealers - the answer is emphatically NO. While people are still buying our UK101 products we will keep supplying and developing them. Witness our forthcoming Sprite board, Vortex and Microdrives releases. The demise of the UK101 as a current product does mean that there will be no more new ones sold, but the secondhand market in these machines seems to be very lively.

#### QUICK GOSSIP I

PREMIER PUBLICATIONS will soon be known as PREMIER MICROSYSTEMS LTD in order to more accurately describe what we do. Our Word Processing side of the business has been PREMIER BUSINESS SYSTEMS for some time.....Welcome to our latest major company recruit, John King. Like Charles Butcher, John has been a PREMIER customer (and UK101 owner) for several years and has helped us with kit-building and at exhibitions and weekends for a long time - now we've got to pay him to do it!! He is also the only person I know who can build a UK101 in THREE HOURS from a standing start - the ones he built for us recently all worked perfectly first time!.....PREMIER will be on the move again soon to even larger premises, probably about two miles from our current location, in Beckenham. We'll keep you posted.....Our forthcoming Microdrives should bring disks within the reach of almost every enthusiast - if you want one book NOW as our first shipment is over half-booked already.....Apologies to the customers who got early versions of the VORTEX booklet. Due to an internal error (ie. I blundered by printing an uncorrected file!), the central part of the manual contains several vital errors - if you have one of these manuals please return it for a corrected one.....The latest OSI User Group newsletter should arrive to club members about now.....Nice to see so many of our loyal customers at the Barbican this year for the PCW show.....A merry Xmas and prosperous New Year to you all.....

#### PRODUCT NEWS

We regret that the High Resolution Graphics board has been cancelled - It simply would not work with all formats of our Screen Enhancement Kit and since we have sold many hundred SEK's, we saw little point in releasing a board that would not work properly with it. We have also cancelled the Programmable Character Generator (even though it works perfectly), but for a different reason - disappointed readers read on!

#### SPRITE GRAPHICS BOARD

#### SPRITE GRAPHICS BOARD

PREMIER are currently developing a SPRITE GRAPHICS board for all UK101/SUPERBOARD machines, no matter what screen format they may have. Not only will this board provide 256 x 192 resolution, but it will also give up to 768 programmable graphics AND 32 independent, fully mixable screen display 'layers' AND 16 colours. All these display layers can be displayed AT THE SAME TIME to give a fabulous 3D effect.

Each 'layer' can be smoothly (and we mean SMOOTHLY!!) moved without disturbing the others whatsoever. Imagine a forest with a person walking through the trees. As he passes in front of a tree, part of it disappears; as he goes behind another tree, he disappears - the Sprite board gives this effect. The board will also give a sixteen colour output and features a backdrop colour plane, a border plane and many more exciting graphics goodies!!

The Sprite Graphics board requires only 2 locations in the UK101 memory map - its 16K RAM is addressed by the main display chip itself. This add-on will upgrade the UK101/OHIO to a level where it will compete with all the newer generation machines such as the DRAGON 32. For owners who have been wondering whether to sell their UK101, but who have hesitated because of their investment already made, the SPRITE board will certainly come as a very welcome addition! (If it doesn't, buy one of our DRAGONS!!!!)

At the time of writing this column (early Nov), no price was available for the Sprite Board (about £95 seems likely) - look in the Stop Press (if there is one!). Release will be as soon as humanly possible! The board will contain space for the addition of supportive EPROM software.

Our MICRODRIVES have generated enormous interest (see elsewhere in this issue for details). PREMIER have been in on the design of this unit for several months - the likely release date for these drives looks like being during December. We have two DOS's ready for the microdrives - MicroDos and MicroVortex - plus several attractive 'package' deals. Please do not confuse these drives with floppy TAPE drives - our drives use a proper, random access disk and run at the same access speed as 5.25in drives!

The price of standard 5.25in floppy units is falling. We can now offer two-thirds height single and double-sided drives at very attractive prices (from under £200.00 inc). These drives are made by Canon and are the best engineered we have ever seen. For really ambitious owners we can also supply 5MB CANON hard disk units for around £1200 - quite cheap really when you consider what you get! Fifty times the storage for six times the cost can't be a bad deal! The hard disks run amazingly quickly, at around 'memory' speed. We have loaded a 37K text file from hard disk in UNDER ONE SECOND!!



# OSI DEALER - for a few weeks!!

We were very pleased when we became OSI dealers because we thought that we could then get hold of all the OSI disk software that you wanted - some hope! After waiting many months and being told our goods were stuck in customs, we finally discovered that the main distributors were talking with their friendly local receiver with a view to ceasing trading! We zoomed down to their premises and bought their entire stock of OSI books. Unfortunately they had no 65D 3.3 in stock, and there is now NO hope of getting any since a little bird has told us that OSI America is none too healthy either. We apologise to all customers who have waited extremely patiently for 3.3 and hope that the superior Premier VORTEX is to their liking. Many thanks to Justin who worked tirelessly to accelerate the development of VORTEX when it became clear that 3.3 wasn't going to arrive.

We have a good selection of OSI books at present (see list in this issue), but as stocks decline they cannot be replenished so 'he who hesitates is lost'! (permanently!)

Several of our less reputable customers have come very unstuck when ordering from us lately - quoting BASIC 5 when you have pirated it and not bought it from us doesn't amuse either us or our computer - both refuse to serve you! To the customers who have genuinely bought their machines secondhand and have been asked to supply intricate code numbers we apologise; however we now have a short but interesting list of customers who seem to have sold the same machine to four or five people at once! Action will be taken against these pirates.

Contrary to earlier rumours, we can now supply SARGON 2 Chess for the following disk or cassette based machines - UK101 - 16x48, 32x48, 32x64: CIE, CIU (53248), CIT (53260), C2, CAP. Please state clearly which version you want when ordering. Thanks to Clive for all the conversion work.

P.S. We've just been informed that the SARGON suppliers for this country have ceased importing it, so we will now have to order directly from the States - please allow 60 days for delivery from about Xmas onwards when we expect our current stocks to run out.



# DRAGON 32

As stated elsewhere in this issue, Premier are now main DRAGON 32 retail and servicing agents. This superb computer attracted us from the moment of its announcement and its performance has more than justified our initial interest in it.

The DRAGON comes as standard with - 32K RAM, nine colour display, sound, good keyboard, 256x192 graphics, 6809 processor (very nice too!), a cartridge interface for games and utilities, parallel printer output and a very reliable 1500 baud rate cassette transfer rate. The standard of construction of the PCB is excellent.

The BASIC supplied (in ROM) is 16K extended Microsoft Colour BASIC - one of the best we have used. As well as virtually all the UK101 BASIC words, commands such as CIRCLE, DRAW, PLAY, LINE, PAINT and PMODE give an extremely powerful graphics capability. PUT and GET allow you to place a graphics display in a standard BASIC array ( A\$(x) ) and recall it later anywhere to screen.

PRINT USING and full file cassette handling are also available. The DRAGON runs at about the same speed as a standard UK101 (and twice as fast if you know where to POKE!!) - its graphics commands are many times faster than those of other machines; circles and rectangles appear instantly.

A special feature of the DRAGON which sets it well apart from the competition is the SAM chip installed. This memory management chip ensures that even in 256x192 format, you still have 24800 bytes left for programming - compare this to some machines which only leave 6K in hi-res mode!

The DRAGON is internally expandable to 64K, externally to a 128K - useful for disk owners but largely academic to the cassette user!

For programmers the DRAGON is a very attractive proposition. As well as having the 6809 processor and Extended Colour Microsoft BASIC, the DRAGON is also interesting because most of its commands are vectored, making alterations and additions to the operation of the machine a very simple matter. Like the UK101, not much is known about the internals at present, but since the DRAGON does not use a ULA chip, ferreting out information is a very interesting and rewarding pastime! For customers who were attracted to the UK101 by its 'get-at-ability' the DRAGON 32 will hold the same fascination.

## SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER

If you are thinking of buying a DRAGON 32 before Xmas, PREMIER will supply it to you for £195.00, this price to include VAT, P&P (English Mainland only), a cassette interface lead and a software cassette to start you off. Premier are supporting the DRAGON 32 fully - we already have it running disks and are interfacing the SPRITE board to it - the results should be sensational!

This offer closes last post 31/12/82 and applies to Great Britain only. To claim a DRAGON at the above price, the enclosed DRAGON special offer coupon MUST be returned with your cheque. Offer is subject to stock levels. As the machine is extremely popular, we would advise interested customers to act without delay. (If you want to pay by phone credit card, do so then send in the voucher!)



## WAIT

One BASIC word that UK101/OHIO owners find hard to follow is the WAIT command. The definition given by OSI is as follows:-

'WAIT halts the program execution until a particular bit is set or reset'

They then go on to explain in simple terms that there are two forms:-

- 1/ WAIT I,J
- 2/ WAIT I,J,K

where I is a memory location between 0 and 65535 and J and K are integers between 0 and 255.

Form 1 above reads location 'I', then ANDs the result with 'J' until a non-zero result is obtained.

Form 2 reads location 'I', exclusive ORs the value with 'K' and then ANDs the result with 'J' until a non zero result is obtained.

But, I hear you say, what does all this mean?

Firstly, we must examine the logical operators AND, OR and NOT, plus an extension of these called 'Exclusive OR'.

Consider the following truth table:-

AND		OR		NOT	
Bits	Result	Bits	Result	Bits	Result
0 AND 0	0	0 OR 0	0	0	1
0 AND 1	0	0 OR 1	1	1	0
1 AND 0	0	1 OR 0	1		
1 AND 1	1	1 OR 1	1		

Using the above table the following can be worked out.

Say X= 170 AND Y = 195

in HEX X=\$AA AND Y = \$C3

in Binary X = 10101010 AND Y = 11000011

The BASIC line

10 Z = X AND Y

is evaluated by taking each bit of X in turn and AND it with the corresponding bit of Y. I.E.

X	Y	Z
1	1	1
0	1	0
1	0	0
0	0	0
1	0	0
0	0	0
1	1	1
0	1	0

The above result for Z (10000010 or 235 decimal) is achieved by comparing columns X and Y against the truth table for AND and putting the result in column Z. To prove the result, run line 10 above on your computer. Try other examples using the other tables (NOT and OR).

The Exclusive OR function has a truth table as follows:-

Bits	Result
0 EXOR 0	0
0 EXOR 1	1
1 EXOR 0	1
1 EXOR 1	0

which after a lot of juggling can be got out of the three logical operators like this:-

$Z = X \text{ EXOR } Y = (X \text{ AND } (\text{NOT } Y)) \text{ OR } (Y \text{ AND } (\text{NOT } X))$

We are now in a position to understand how WAIT works! Form 1 can be written as the following subroutine:-

```

10 Z = PEEK (I)
30 X = Z AND J
40 IF X = 0 THEN 10
50 RETURN

```

while Form 2 can be the same as above with the following additions.

20 Z = Z EXOR K

or in BASIC

20 Z = (Z AND (NOT K)) OR (K AND (NOT Z))

Now, after all the above explanation, what good is WAIT to you? Well, you could use it to run add-ons through a VIA board using PEEK, POKE and WAITS or you could use it instead of the familiar X=USR(X) to read the keyboard.

Here is a program to read the keyboard, but I leave it to you to work out how it does it!

```

10 REM BASIC WAIT DEMO
20 REM <C>1982 PREMIER/PURDY
30 RESTORE
40 I=57088
50 PRINT"THE WAIT COMMAND"

```



```

60 PRINT"WAIT UNTIL (U) OR"
70 PRINT"WAIT IF (I)"
80 INPUT Q$
90 INPUT"KEY TO DETECT";K$
100 FOR Y=1 TO 8
110 FOR X=1 TO 8
120 READ K1$:IF K1$=K$ THEN J=2*(X-1):R=2*(Y-1):X=8:Y=8
130 NEXT X,Y
140 IF J=0 THEN PRINT"NOT FOUND":FOR D=0 TO 1000:NEXT D:RUN
150 POKE 530,1:POKE 1,256-R
160 K$=PEEK(1):IF LEFT$(Q$,1)="I" THEN 200
170 PRINT"PRESS"K$ "TO CONTINUE"
180 WAIT I,J,K
190 POKE 530,0:RUN
200 FOR D=0 TO 200:PRINT"PRESS"K$"TO HOLD LOOP"200-D
210 WAIT I,J,K-J
220 NEXT
230 POKE 530,0:RUN
240 DATA S,R,S,L,S,N,O,N,O,E,S,C,C,T,R,L,R,E,P,T
250 DATA N,O,P,A,S,P,A,C,E,Z,A,Q
260 DATA N,O,C,M,N,B,V,C,X
270 DATA N,O,K,S,H,G,F,D,S
280 DATA N,O,I,U,Y,T,R,E,W
290 DATA N,O,N,O,R,E,T,U,R,N,L,F,O,L,>
300 DATA N,O,R,U,B,O,U,T,-,* ,0,9,8
310 DATA N,O,7,6,5,4,3,2,1
320 END

```

GOOD LUCK !

SJP

## MUSIC NOTE GENERATOR

Below is a BASIC X program that should be of interest to musicians!

```

10 PRINT CHR$(26): PRINT : MODE"200":VOL1,15
20 PRINT"MUSIC NOTE CALCULATOR FOR ALL AY-3-8910 or"
30 PRINT"AY-3-8912 P.S.G's OPERATING ON A 1Mhz clock"
50 PRINT"For other clock frequencies change line 100"
60 PRINT"i.e. for a 2Mhz clock, CL=2E+6
70 PRINT"Only sharps '#' and naturals are accepted."
80 PRINT"For flats use normal calculation - flat = previous sharp
90 PRINT"see DATA":GOTO 140
100 CL=1E+6:TP=(CL/16)/FT
110 PRINT"12 BIT BINARY TONE PERIOD ="TP" DECIMAL
120 TC=INT(TP/256):TF=INT(TP-(TC*256)+.5)
130 PRINT"FINE TUNE ="TF" approx. COARSE TUNE ="TC"approx
135 PRINT"AND HERE'S WHAT IT SOUNDS
LIKE":MODE"200":CHAN1,TC,TF
140 FOR J=1 TO 750:NEXT:MODE"000":PRINT:Z=1.059463:S=32.703
150 INPUT"ENTER NOTE (EG C F#)";N$:INPUT"ENTER OCTAVE (1-8)";OC
160 IF OC<1 OR OC>8 THEN PRINT"OCTAVE":GOTO 230
170 OC=OC-1:RESTORE:N=99:FOR I=1 TO 12:READ A$:IFA$=N$ THEN N=I-1
180 NEXT I:IF N=99 THEN PRINT"NOTE":GOTO 230
190 Q=N+(OC*12):FOR I=1 TO Q:S=S*Z:NEXT:FT=S
200 PRINT"SUITABLE FREQUENCY FOR ";N$ "OCTAVE";OC+1" = "S
210 GOTO 100
220 DATA C#,D#,E,F#,G#,A#,B
230 PRINT"ERROR ON DATA INPUT ";N$:OC=1:GOTO 140

```

CB



## INITIALISING BASIC X FROM PROGRAM

Lots of people have phoned in to ask if there is any way of rewriting BASIC 4 and/or BASIC 5 to automatically initialise BASIC X in the same way as the new BASIC 4 initialises BASIC 5. Having the new B4 myself and using the function LOAD"xxx" to load and autorun a named program, I found myself getting continually frustrated by the occurrence of the dreaded SYNTAX ERROR IN xx caused by the computer finding an unrecognised word, then having to initialise BASIC X and run again.

A simple auto-initialise routine for those people using BASIC X commands within their programs would be to &GO\$8800 or &GO\$9800 from BASIC 5 or CALL -XXXXX from the new BASIC 1 or for the less fortunate POKE 11,XX: POKE 12,YY:X=USR(X). However, for those who tried this you will have been disappointed to see the start up prompt appear and the computer return to command mode instead of carrying on! If you now substitute \$8CFC or \$9CFC into the previous samples you will find that the computer goes away, initialises BASIC X without the start-up message and continues with program execution

Great - I hear you all shout - but life isn't quite as simple as that. If you type RUN again, you will find that all of your BASIC EPROMS have been clobbered so you are now worse off than when you started! So we finally get to the point of this article (about time too - Ed) and onto the program that will make everything work happily.....

10 IF PEEK(1)<>XXX AND PEEK(2) <>YYY THEN:(INITIALISE) where the following figures apply:-

TYPE	PEEK(1)	PEEK(2)	ENTRY POINT
8800	157	137	\$8CFC
9800	157	153	\$9CFC

and to initialise you use whatever method you have to jump to the entry point specified.

## LETTERS and DESPATCH

Please do NOT include complicated enquiries with your order as this invariably delays despatch of your goods. If you require an answer to a query, please either write separately (enclosing an SAE) or preferably use our Monday 7-9pm customer phone session. We apologise to customers who have had a lengthy wait for a reply but the quantity of enquiries makes it very difficult to keep up - the record for one day is over a HUNDRED letters! JMH.

## 32K DYNAMIC RAM CARDS

We are still selling every DRC we can lay our hands on. At present the delay in supply has dropped to around two weeks but due to a shortage of the memory control chip, this delay will go back to 4 weeks shortly - so if you want one for Xmas ORDER NOW!!

## CEGMON UPDATE

Our sales of CEGMON have increased of late, mainly due to customers who are upgrading to disk/microdisk and require a reliable disk bootstrap. Below are some points to note when using CEGMON:-

- 1/ The keyboard commands for clear screen (CTRL Z), clear window (CTRL L/SHIFT N), and home cursor without clearing screen (CTRL L) are only available if you have new BASIC 1 fitted. This is because new BASIC 1 unmask the keyboard and allows these codes to be passed to CEGMON. If you type in the BASIC unmask program in the CEGMON manual, the above facilities become available.
- 2/ Up arrow (raise to the power) is now obtained through pressing SHIFT N and not via the key with the arrow on it! This key is now used in the monitor for line-feeding.
- 3/ Single key BASIC entry (see previous newsletters) is available only if new BASIC 1 is fitted (see point 1)
- 4/ Contrary to some rumours, CEGMON does not gobble up all the free space in page two -all locations from 565 (dec) onwards are available.
- 5/ The only point of significant incompatibility with MON02 is that the CTRL C vector has been put back where it should be! This is documented in the CEGMON manual. This will only cause problems with m/c programs which are written specifically for MON02.
- 6/ When using the superb CEGMON screen editor, the easiest way to call it to a certain line is to 'home' it first with CTRL E then run up or down the screen to the appropriate line. This is a lot faster than driving the cursor round from the middle of nowhere to its new pickup point!



# SCREEN FLIP PROGRAM FOR SEK USERS

With the number of screens provided by the Screen Enhancement Kit, one problem was created: remembering the values to poke into CEGMON for each screen format required! One of our customers, Roger Derry, solved this problem ingeniously by working out how the SEK screen latch decoded its values, then writing a 143 byte routine to interface to the ROM BASICS USR(X) function. An assembler listing is given below or a tape - SEKLINKER - is available for £4.95 inc VAT & P&P.

(see next page for listing)

From machine code load the ACC with a ( legal ) value of screen and JSR SCNMOD ( \$025D ). If you are intending to access the routine from machine code then only the code from \$025D onwards is required. E.g.:-

```
LDA $8A
JSR $025D
```

rest of your program.

will give you the inverted 16 x 48 UK101 screen.

From BASIC POKE11,64:POKE12,2 then X=USR(138) will give you the inverted 16 x 48 UK101 screen. X=USR(X) is error trapped for illegal SEK codes and will produce an FC ERROR.

The program is ( almost ) location independent : one change is required in the Basic access section if the code is relocated. Locations \$0257 and \$0258 contain the destination address of the JSR SCNMOD and will need to be changed if the routine is moved.

The SCNMOD routine itself is completely location independent and can be located anywhere in the memory map provided the usual precautions are observed.

```
10 *$0244
20 : RODGER DERRY'S S.E.K. ROUTINE FOR ROM BASIC/ENCODER
30 :HOME=$FF01
40 :HIPI=$FF9C
50 :EROM=$AE38
60 :INVR=$AE45
70 PHA
80 TXA
90 PHA
100 JSR :HIPI
110 JSR :INVR
120 LDA $AF
130 TAX
140 AND $0F
150 CMP $0C
160 BMI :OKV1
170 JMP :EROR
180 :OKV1 TXA
190 JSR :$MOD
200 PLA
210 TAX
220 PLA
230 RTS
240 :$MOD PHA
250 AND $0F
260 TAX
270 CMP $0C
280 BMI :OKV2
290 PLA
300 RTS
310 :OKV2 CMP $04
320 BMI :FSCR
330 AND $01
340 BNE :BSCR
350 LDA $D0
360 STA $0224
370 LDA $D3
380 BNE :$ROT
390 :FSCR LDA $D0
400 SFA $0224
410 RNE :STD7
420 :BSCR LDA $D4
430 STA $0224
440 :STD7 LDA $D7
450 :$ROT STA $0226
460 :$IDE TXA
470 AND $0000110
480 CMP $02
490 BEQ :LD47
500 CMP $04
510 BEQ :LD31
520 CMP $06
530 BEQ :LD23
540 LDA $3F
550 $2C
560 :LD47 LDA $2F
570 $2C
580 :LD31 LDA $1F
590 $2C
600 :LD23 LDA $17
610 STA $0222
620 TXA
630 AND $02
640 BEQ :FLIN
650 TXA
660 AND $0000110
670 CMP $06
680 BEQ :IN5
690 LDA $0B
700 RNE :$TOR
710 :IN5 LDA $05
720 RNE :$TOR
730 :FLIN LDA $00
740 :$TOR STA $0223
750 ORA $C0
760 STA $0225
770 JSR :HOME
780 STX $0200
790 PLA
800 STA :$DE30
810 RTS
820 $END
```

*Thanks -  
Can we afford  
a new ribbon!!!*



## SIMPLE A/D and D/A using 6522 VIA.

Simple analogue to digital and digital to analogue conversion can be achieved cheaply by utilising the facilities of the 6522 VIA ( Versatile Interface Adaptor ).

The method outlined below will allow 6 bit resolution of voltage and in practice gives voltages between +0.25 and +4.75 and an input range of 0 to 63 decimal. Higher resolution can be achieved by extending the theory involved.

The component count involved in this project is low ( 1 x LM339 comparator, 1 x 4050 CMOS buffer, 12 resistors and one capacitor ). Two joysticks can be used by the addition of a MC14529 Data selector.

The principle of D/A conversion is illustrated in diagram 1. The outputs PA0 to PA5 of the VIA are buffered by the 4050 and are then fed into a resistor network. This resistor network forms a selectable potential divider. If a logic 1 (+5v) is applied the appropriate resistor is paralleled with any other resistor tied to 5 volts. The same applies to any resistors held to 0 volts by the output of a logic 0 (0v).

In diagram 1 the value 45 decimal is output by the VIA (101101) via the buffer into the resistor network. This results in R1,R2,R4,R5 and R7 being paralleled to 5v and R3,R6, and R8 being paralleled to 0v which according to Ohms law gives a potential divider consisting of 6650 ohms between the centre tap and +5 volts and 15112 ohms between the centre tap and 0 volts giving at the centre tap an output of 3.47 volts. This simple circuit together with software gives an effective and low cost D/A converter.

By the introduction of an LM339 comparator together with appropriate software, the circuit can be used for A/D. The voltage to be digitised is presented to the +ve input of the comparator and the output of the D/A is presented to the -ve input of the comparator ( diagram 2 ). The output of the comparator is connected to an input of the VIA so that its status can be tested. If a voltage ( between 5 volts and 0 volts ) is applied to the input of the comparator its output will indicate whether the voltage being sampled is greater (+5v) or less than (0v) the D/A output. The first value to be output by the D/A during a test is 32 decimal (100000) If the comparator output is logic 1 ( indicating that the sampled voltage is greater than the D/A output ) then half the remaining range is added to the D/A output and the result tested again. If this loop is repeated 6 times the last value output by the D/A will be within 1/64ths of the sampled voltage.

The algorithm used is a binary search and the voltage is found by successive approximation.

Diagram 3 shows a method by which 4 inputs can be selected and the A/D used to convert the voltage to its corresponding digital value.

Diagram 4 illustrates a suitable joystick circuit for use with this A/D. Happy experimentation !!

(With acknowledgements to BYTE magazine for the idea. M.B.)

## A/D - D/A Software

### ADDRESSES AND PORTS USED

INPUT	store input no. for A/D convert (0-3)
UL	upper limit of converted value
LL	lower limit of converted number
TEMP	try value/output value
PORT	Port in use (BASE addr of VIA +1)
PORTDD	Port direction register (BASE + 3)
VIA CR	VIA control register (BASE + C)

INIT	PHA ; initialise port (called once)	
	LDA #3F	
	STA PORTDD	
	LDA #5C	
	STA VIACR ; set up CA2/CR2 to 0	
	LDA #0	
	STA PORT	
	PLA	
	RTS	
OUTPUT	PHA	
	LDA TEMP	
	STA PORT	
	PLA	
	RTS	
CONVERT	PHA	
	TXA	
	PHA	
	JSR INSEL	
	LDA #63	
	STA UL	PLA
	LDA #0	RTS
	STA LL	
	STA PORT	
		INSEL LDA INPUT
		AND #53
LOOP	SEC	STA TEMP
	LDA UL	ASL A
	SBC LL	ASL A
	LSR A	ASL A
	BEQ DONE	ASL A
	STA PORT	ASL TEMP
	TAX	ORA TEMP
	LDA PORT	AND #52
	BMI HI	ORA VIACR
	STX UL	STA VIACR
	BPL LOOP	RTS
	STX LL	
HI	BMI LOOP	
	STX TEMP	
DONE	PLA	
	TAX	



# COMPETITION RESULTS - some interesting 6502 codes

Here at last we have the results of the competition. Considering the subject matter, we had a very good response - a number of replies came quite close to the true answer.

For those of you who are still wondering, here is the assembler source code of the competition routine.

```

10      1000 * = $1000          ; completely relocatable
20
30      ;
40      ;m/c competition corner
50      1000 A900      LDA#$0
60      1002 AB53      OAL#$53      ;LDA and X with DATA AND #EE
70      1004 4BFF      ALR #FFF      ;AND #DATA THEN LSR A
80      1006 4BFF      ALR #FFF
90      1008 4BFF      ALR #FFF
100     100A 4BFF      ALR #FFF
110     100C 5C        SKW4          ;skip word following - option 4
120     100D 8D 00     .WORD $008D
130     100F 49 30     EOR #$30
140     1011 48        PHA
150     1012 E2        SKB4          ;skip byte following - option 4
160     1013 A9        .BYTE $A9
170     1014 8A        TXA
180     1015 54        SKB9
190     1016 56        .BYTE $56
200     1017 29 0F     AND#$0F
210     1019 3C        SKW3
220     101A CD 00     .WORD $00CD
230     101C 49 30     EOR #$30
240     101E AA        TAX
250     101F 68        PLA
260     1020 FC        SKW7
270     1021 BD AE     .WORD $AEBD
280     1023 8D E8 D1  STA $D1E8
290     1026 D4        SKBC
300     1027 69        .BYTE $69
310     1028 8E E9 D1  STX $D1E9
320     102B 44        SKB8
330     102C A5        .BYTE $A5
340     102D 20 40 FE  JSR $FE40
350     1030 4C 7E F9  JMP F97E
360     1033 00        BRK
370     1034 00        BRK

```

As you can see from the above, we have made use of the little-known fact that the 6502, like the Z80, supports some unspecified opcodes (see table below). From the replies we found that while the SKW and SKB instructions worked well, OAL and ALR only worked in 50% of cases - as witness our eventual winner who spotted everything except the OAL because he had the wrong answer (42 was correct; if you had an 'old' 6502 you should have got 00).

## UNUSED 6502 OPCODES

	ABS	ABS,X	ABS,Y	(,X)	(,Y)	Op	Op,X	Op,Y
ASO	0F	1F	1B	03	13	07	17	
RLA	2F	3F	3B	23	33	27	37	
LSE	4F	5F	5B	43	53	47	57	
RRA	6F	7F	7B	63	73	67	77	
AXS	8F			83		87		97
AXA			9F		93			
LAX	AF		BF	A3	B3	A7		B7
DCM	CF	DF	DB	C3	D3	C7	D7	
INS	EF	FF	FB	E3	F3	E7	F7	
XAS			9B					
KAX			BB					
SYA		9C						

with immediate addressing only:-

ALR	AAR	XAA	OAL	SAX
4B	6B	8B	AB	CB

with implied addressing only:-

	1	2	3	4	5	6	7	8	9	A	B	C	D
SKBn	80	82	C2	E2	04	14	34	44	54	64	74	D4	F4
SKWn	0C	1C	3C	5C	7C	DC	FC						
NOPn	1A	3A	5A	7A	DA	FA							

## DEFINITIONS OF THE CODES

ASO	ASL then OR the result with the ACC
RRA	ROR then ADC the result with the ACC
DCM	DEC then CMP the result with the ACC
LAX	LDA and LDX
RLA	ROL then AND the result with the ACC
LSE	LSR then EOR the result with the ACC
INS	INC then SBC the result with the ACC
AXS	Store the result of the ACC AND X
AXA	Store bit 0 of ACC AND X
XAS	Store the result of ACC AND X the stack pointer and BIT 0 in memory
KAX	Stores the result of Stack pointer AND memory in ACC and X
SYA	Store BIT 0 of Y
ALR	Perform ACC AND Data then LSR the result
ARR	Perform ACC AND Data then ROR the result
XAA	Store X AND ACC in ACC
OAL	Perform ACC OR #SEE then ACC AND Data then TAX
SAX	Set carry and perform ACC AND X then SBC #Data storing the result in X
SKB	skip next byte
SKW	skip next WORD (2 bytes)
NOP	NOP !

Flags are set as though each individual instruction had been executed.

We think that you will agree that this has been a most interesting



competition. Our adjudged winner is J ARROWSMITH of the software voucher.

Our thanks to all who entered the competition and acknowledgements to IPUG and B D Grainer for their work in ferreting out the codes. P.R. & S.P.

# NEW COMPETITION

Now that you know all those new codes, we want you to write a program (in no more than 128 bytes), making the most imaginative use possible of the codes. Closing date for entries is 31/2/83. All entries MUST be on a separate piece of paper, NOT on a letter containing an order (as this will be filed!).

## INVADERS LIVELY LISSAJOUS LIFE CODEKIT

Our licences on these superb games and simulations run out in January, so we are offering last minute 'special offers' to our regular customers. Please note that the CODEKIT supplied is on tape ONLY. For EPROM purchasers we would strongly recommend ENCODER as an alternative.

Any one of the above	£7.50
Any two	£11.50
Any three	£14.50
All four	£17.50

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UK101/SUPERBOARD SOFTWARE UK101/SUPERBOARD SOFTWARE

SNAKE SNAKE SNAKE SNAKE SNAKE

This machine code game will test your co-ordination to the limit. Can you prevent the snake from crossing itself or a border?

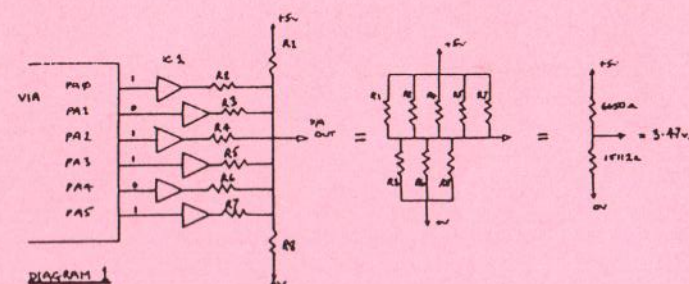


DIAGRAM 1

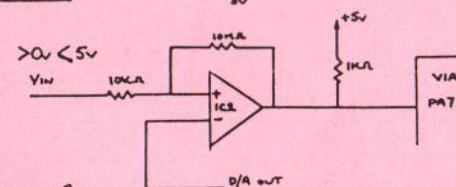


DIAGRAM 2

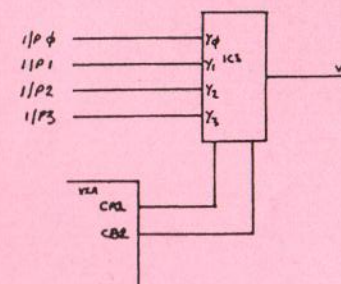


DIAGRAM 3

R1 - 100K  
R2 - 33K  
R3 - 16K  
R4 - 20K  
R5 - 40K  
R6 - 20K  
R7 - 10K  
R8 - 100K  
IC1 - 4050  
IC2 - LM339  
IC3 - MC14529  
VIA - 6522

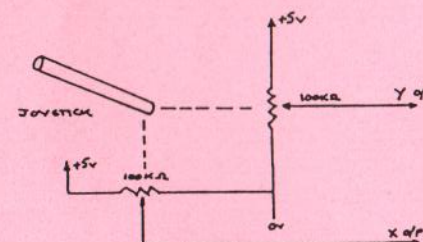


DIAGRAM 4