AMATEUR COMPUTER CLUB NEWSLETTER

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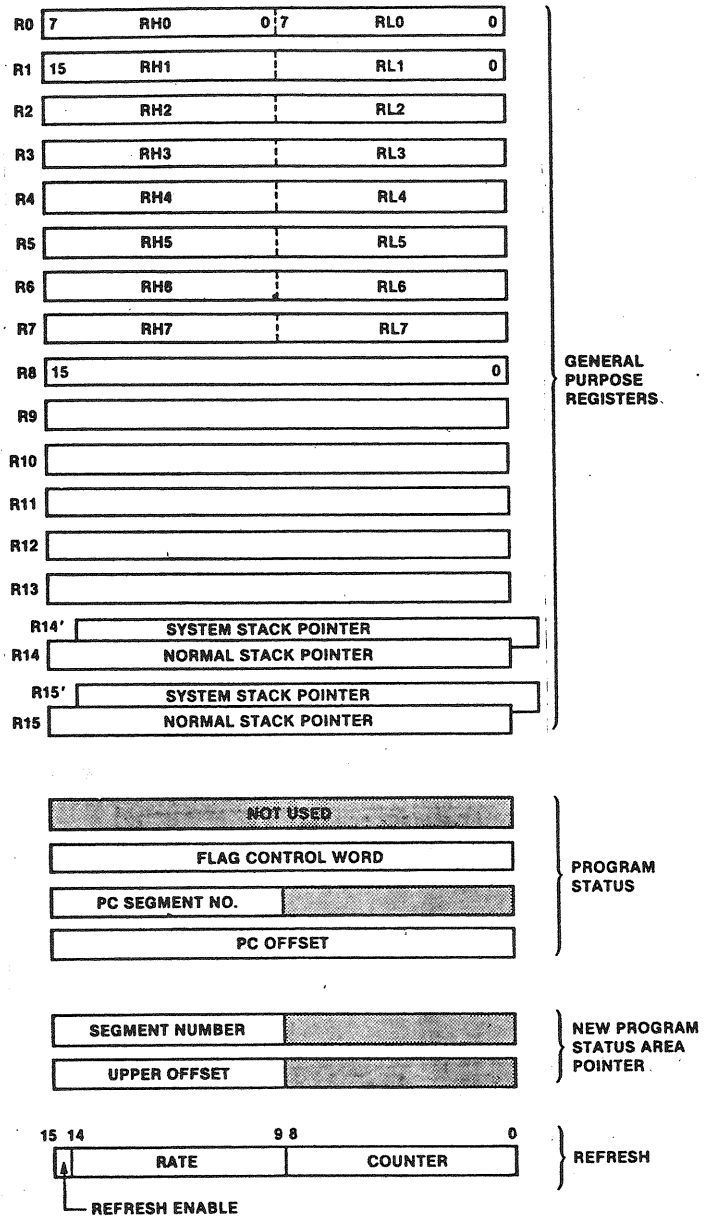
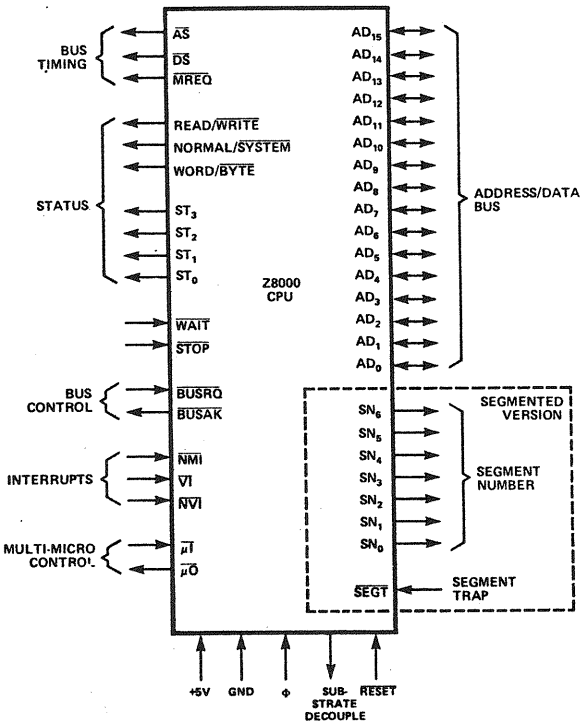
Z 8000 Preview

IN THIS ISSUE



CPU Registers (Segmented Version)



Z8000 Pin Functions

The Z8000 is basically a 16 bit processor, although memory is addressed in 8 bit bytes, but has instructions to operate on bits, BCD digits (4 bits),bytes, words (16 bits), long words (32 bits), byte strings and word strings.

All 16 registers R0-R15 can be used as accumulators, and R1-R15 may be used as index registers. Pairs of 16 bit registers are combined when operating on 32 bit (long word) data, and quadruple registers provide 64 bit data fields for instructions such as Multiply & Divide.

The instruction set provides the usual set of arithmetic and logical instructions, most of which can operate on bytes, 16 bit words, or 32 bit long words. Unusual instructions include Load Address (the address of the 'operand' is calculated in the normal manner but is then loaded into one of the registers instead of being used to access memory),Move multiple registers to/from memory, and a variety of block transfer and string manipulation instructions. Signed multiply and divide instructions can use 16 or 32 bit operands.

Eight addressing modes are provided; Register (R), Indirect Register (IR), Direct (DA), Indexed (X), Immediate (IM), Base Address (BA), Base Indexed (BX) and Relative (RA). One or two word addresses can usually be specified, and some instructions provide autoincrement or autodecrement.

The processor can run in Normal or System mode (hence the two stack pointers) and supports a sophisticated interrupt and trap structure. Two versions are planned; the simplest,in a 40 pin package, has 16 address lines and can therefore basically handle 64k bytes of memory. The 'Segmented' version comes in a 48 pin pack and provides 23 address lines, giving a basic addressing range of 8M bytes. However chip status signals can be used to define separate address spaces for code, data and stack for both the normal and system modes, extending the theoretical addressing ranges to 384k bytes for the non-segmented chip and 48M bytes for the 48 pin version. A memory management chip will be provided for use with the segmented version to provide segment relocation (logical to physical address translation) and memory protection using address space segments of up to 64k bytes each.

7768 ROM-A

This addition to the 77-68 range allows the user to add EPROM in the form of 2708's or Intel 2716's to his system.

There are two blocks of four EPROMs each (X1-4 and X10-13), each block may be set up to take either four 1k x 8 2708's or alternatively four 2k x 8 2716's (the Intel 5V versions).

S1a - S1d select which of the 16 4k memory address segments X1-4 will respond to if 2708s are fitted. If X1-4 are to be 2716s, then S1d is not used, and S1a-S1c select a particular 8k segment from the 77-68's 64k address range. Within the selected segment X1 corresponds to the lowest 1 (or 2) k bytes, and X4 to the highest. The switches S1e - S1f should be closed if an EPROM is fitted in the corresponding socket, but open otherwise so that the data output buffer X14 is not enabled ;allowing other system devices to use that address block.

The other block of EPROMs (X10 - X13) are similarly controlled by switches S2a - S2f

To set up the card for the first block of EPROM (X1-4);

For 2708's strap; a-c,d-e,g-i,j-l,m-o,p-r,s-u,t-v, x-y
leave b,f,h,k,n,q,w open

For 2716's strap; a-b,d-f,g-h,j-k,m-n,p-q,s-v,t-w
leave c,e,i,l,o,r,u,x,y open

The second block of EPROM (X10-13) are set up similarly but with a´,b´,c´etc. instead of a,b,c

COMPONENTS

2 off	74LS136	1 off	74LS139
1	74LS00	3	DM81LS97
1	74LS30	1	LM320T-5 or LM320MP -5V reg

2708 and/or 2716 (5V) EPROM as required

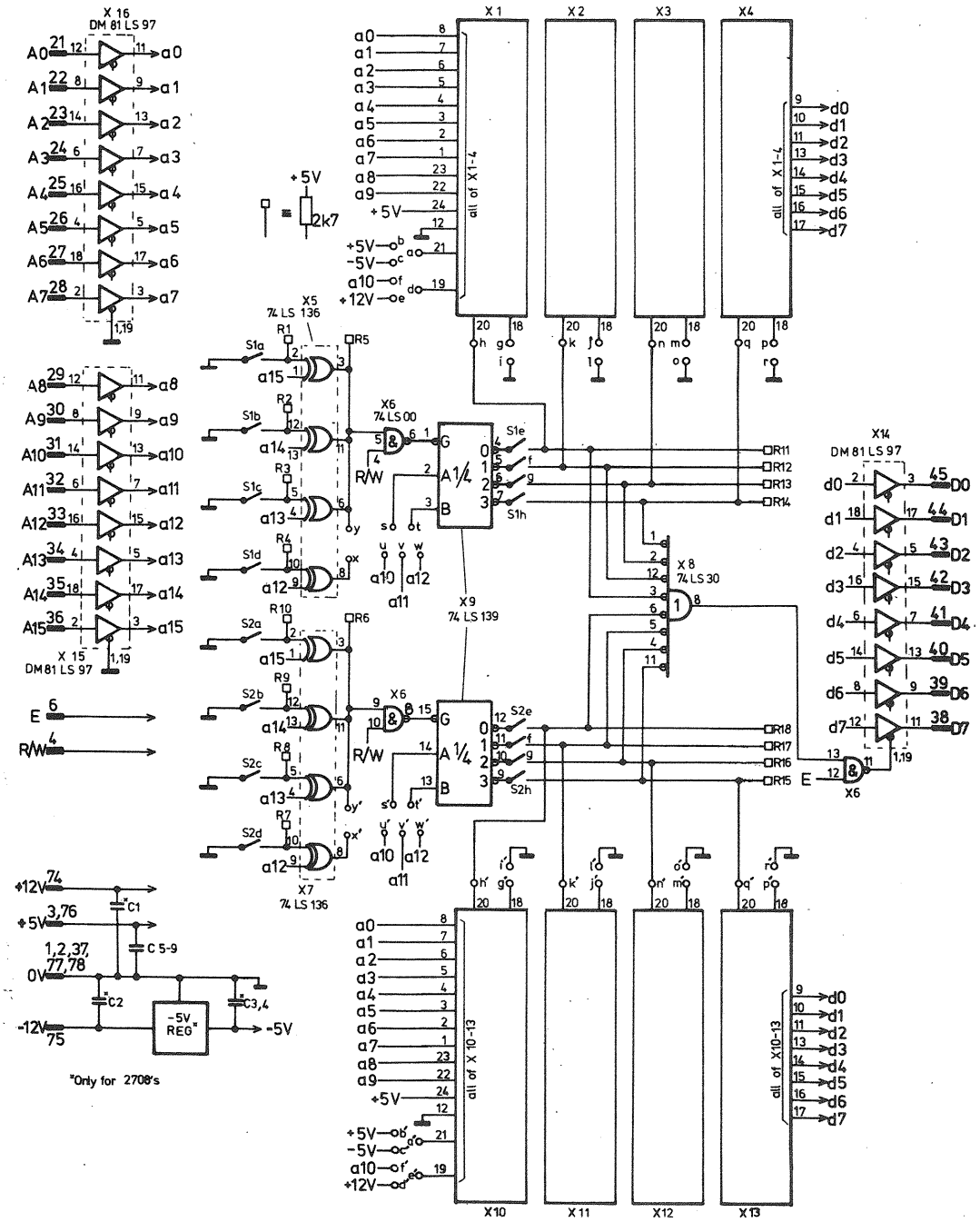
18 2k7 miniature resistors
8 4u7 16V tantalum bead capacitors
1 0ul ceramic capacitor

2 off 8 pole single throw on-off DIL switches

DIL sockets; at least 8 off 24 pin for X1-4,10-13 plus, if desired, 3 off 20 pin, 1 off 16 pin, 4 off 14 pin.

Small heat sink for -5V regulator

PCB (NewBear)



SW55 3-1 KBD MODS

Fig(1). SW55 3-1 output codes.

KEY pressed shift	KEY pressed straight	OUTPUT CODE (edge conn. P1 nos) 1	8	7	6	5	4	3	2	OCTAL NO PARITY
	DEL	X	X	X	X	X	X	X	X	177
	CAR RET	X	X	X		X	X		X	155
	LINE FEED	X	X		X	X	X		X	135
	BACK SPACE	X	X	X		X	X	X		156
	space	X	X							100
)	0	X	X			X		X		112
=	1		X						X	101
	2		X					X		102
;	3	X	X					X	X	103
:	4		X				X			104
%	5	X	X				X		X	105
'	6	X	X				X	X		106
"	7		X				X	X	X	107
*	8		X			X				110
(	9	X	X			X			X	111
	A		X	X	X				X	161
	B		X	X	X			X		162
	C	X	X	X	X			X	X	163
	D		X	X	X		X			164
	E	X	X	X	X		X		X	165
	F	X	X	X	X		X	X		166
	G		X	X	X		X	X	X	167
	H		X	X	X	X				170
	I	X	X	X	X	X			X	171
	J	X	X	X					X	141
	K	X	X	X				X		142
	L		X	X				X	X	143
	M	X	X	X			X			144
	N		X	X			X		X	145
	O		X	X			X	X		146
	P	X	X	X			X	X	X	147
	Q	X	X	X		X				150
	R		X	X		X			X	151
	S	X	X		X			X		122
	T		X		X			X	X	123
	U	X	X		X		X			124
	V		X		X		X		X	125
	W		X		X		X	X		126
	X	X	X		X		X	X	X	127
	Y	X	X		X	X				130
	Z		X		X	X			X	131
_	-		X	X						140
+	&	X	X	X		X				160
	@		X		X					120
!	$	X	X	X		X		X	X	153
±	£		X			X		X	X	113
	.		X	X	X	X		X	X	173
	,	X	X		X	X		X	X	133
?	/	X	X		X				X	121
	SHIFT (pressed)		X			X	X	X		116
	SHIFT (released)		X	X	X	X	X	X		176

N.B. There is no code change with shift.

USING THE SW55 3-1 KEYBOARD — Ian Roll

When I bought my keyboard I then had to interface it to my system. After some thought I decided to make a 'stand alone' (i.e. portable) unit which would give serial ASCII at 300 baud, seven bits + parity, with start & stop bits.

The SW55 3-1 is coded in Extended Binary Coded Decimal, so I used a 1702A to code convert to ASCII. Also, the keyboard gives no code change when shift is pressed, but does give two codes (PRESSED and RELEASED) and an accompanying strobe pulse for each. Therefore I used a code recognising circuitand a SET/RESET flipflop to give the required code changes. Finally, the keyboard has no CONTROL key, so I used the ATTN key instead.

The circuit diagram is fairly straightforward. IC1A,1B,3A recognise 'SHIFT'. IC3B recognises 'ON' and IC2A recognises 'OFF'. C1, 560pF, is used to delay the change over. R1 (10k) and C2 (1uF) are used to force 'SHIFT OFF' at power up; the flipflop is formed by IC1D and IC2B.

Monostable IC4A is used to generate a 'DATA READY' pulse when the 'STROBE' output from the keyboard goes low. This is the trailing edge of this pulse. A 'DATA READY' pulse is not required when a 'SHIFT' code is generated. Therefore the delayed 'ON' and 'OFF' lines are OR-ed together at 1C2C and IC3C to inhibit the monostable when shift is pressed or released.

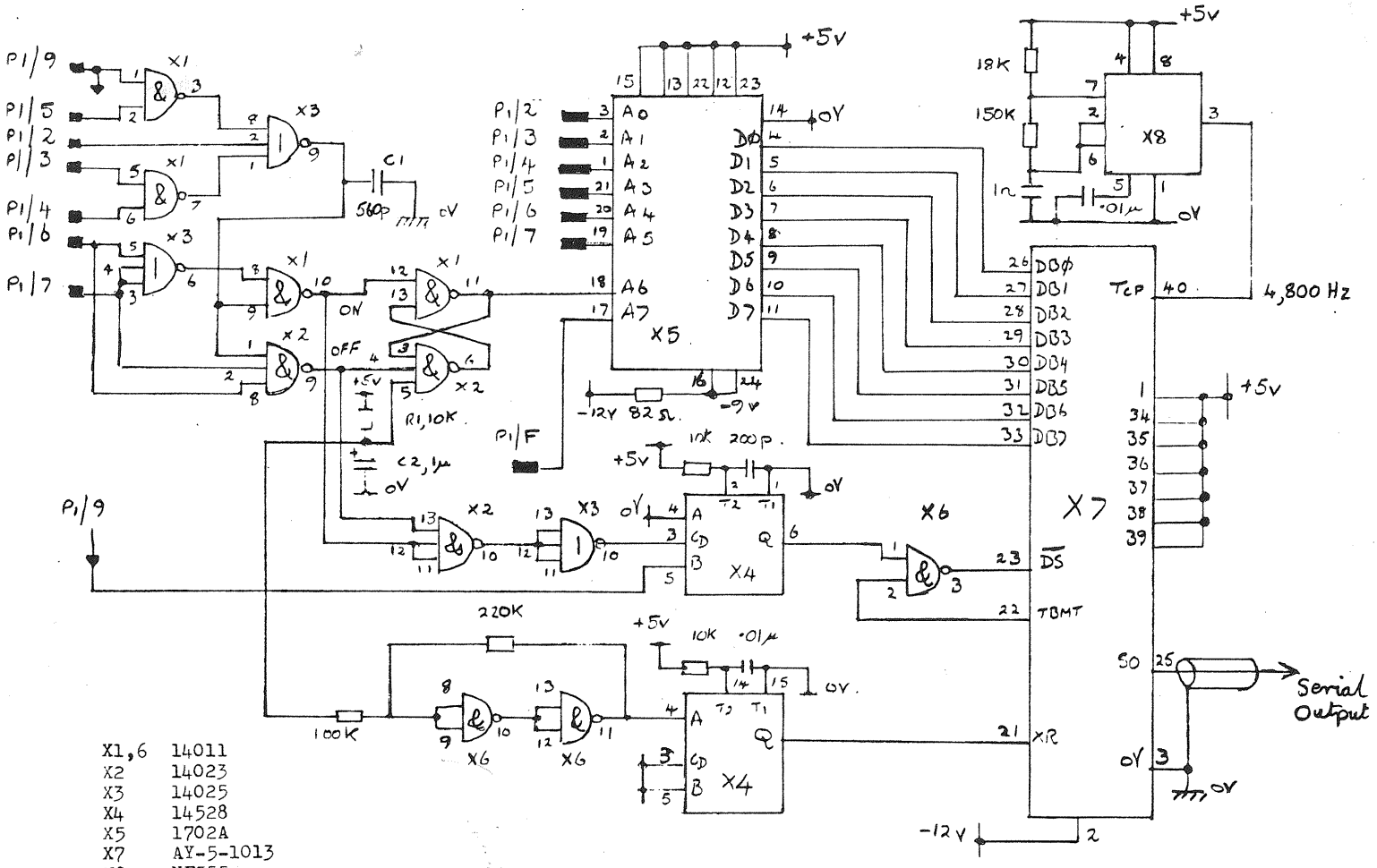
IC6C and 6D form a Schmitt trigger from the power on RC network. This sharp edge is used to generate a power-on reset pulse (IC4B) for the UART, IC7. IC6A is used to prevent over-run of the UART transmitter by inhibiting 'DATA STROBE' pulses when the UART transmitter buffer is not empty.

For ease of wiring the UART, the transmission format of one start bit, eight data bits, no parity bit, and two stop bits was chosen. The eight data bits may be considered as seven data bits + parity if necessary, because the EPROM output code is configured with even parity on the most significant bit.

Fig 1 shows the original keyboard output codes, and Fig 2 shows the coding for the EPROM. Locations 0-77 are accessed when the control key is pressed, locations 100-177 are accessed when control and shift are both pressed, locations 200-277 when neither are pressed, and locations 300-377 are accessed when the shift key only is pressed.

OTHER CONNECTIONS.

Edge conn. P1 no.	USE	
9	Strobe output	Active high
10	(Paper advance)	Active low
A	Transmit lamp (blue)	Active low
B	Local lamp (yel.)	Active low
C	Alarm lamp (red)	Active low
D	(On line)	Active low
E	N / C	
F	(Attn) or (Control)	Active low
G	Receive lamp (grn.)	Active low
H	-12 volts @ 30mA + 60mA per lamp	
I	+5. volts @ 250mA	
J	0. volts (Ground)	



X1,6	14011
X2	14023
X3	14025
X4	14528
X5	1702A
X7	AY-5-1013
X8	NF555

KEYBOARD INTERFACE UNIT - CIRCUIT DIAGRAM

LISTING OF THE DECODE EPROM. USED WITH THE SW55 3-1 KEYBOARD.

000	-240	-261	-262	-063	-264	-065	-066	-267
010	-270	-071	-072	-243	-377	-377	-377	-377
020	-000	-257	-223	-024	-225	-226	-027	-230
030	-031	-032	-377	-254	-377	-012	-377	-377
040	-055	-012	-213	-014	-215	-216	-017	-220
050	-021	-022	-377	-044	-377	-215	-210	-377
060	-377	-201	-202	-003	-204	-005	-006	-207
070	-210	-011	-377	-056	-377	-377	-377	-377
100	-240	-261	-262	-063	-264	-065	-066	-267
110	-270	-071	-072	-243	-377	-377	-377	-377
120	-000	-257	-223	-024	-225	-226	-027	-230
130	-031	-032	-377	-254	-377	-012	-377	-377
140	-055	-012	-213	-014	-215	-216	-017	-220
150	-021	-022	-377	-044	-377	-215	-210	-377
160	-377	-201	-202	-003	-204	-005	-006	-207
170	-210	-011	-377	-056	-377	-377	-377	-377
200	-240	-261	-262	-063	-264	-065	-066	-267
210	-270	-071	-072	-243	-377	-377	-377	-377
220	-300	-257	-123	-324	-125	-126	-327	-330
230	-131	-132	-377	-254	-377	-012	-377	-377
240	-055	-312	-113	-314	-115	-116	-317	-120
250	-321	-322	-377	-243	-377	-215	-210	-377
260	-377	-101	-102	-303	-104	-305	-306	-107
270	-110	-311	-377	-056	-377	-377	-377	-377
300	-240	-275	-276	-273	-072	-245	-254	-042
310	-252	-050	-251	-243	-377	-377	-377	-377
320	-074	-077	-123	-324	-125	-126	-327	-330
330	-131	-132	-377	-254	-377	-012	-377	-377
340	-137	-312	-113	-314	-115	-116	-317	-120
350	-321	-322	-377	-041	-377	-215	-210	-377
360	-377	-101	-102	-303	-104	-305	-306	-107
370	-110	-311	-377	-056	-377	-377	-377	-377

LETTERS

MK 14 EXPANSION

Can anyone give me details of how to expand the memory of this kit to 4k ? Also, has anyone used the PE VDU with the MK14 ? Any advice gratefully received by Bernard Mantell 'Ardoran',Broadway,Charing, Ashford,Kent tel Charing 2161

MINE WORKS

I have assembled and working the ETI System 68 VDU, and could help anyone in my area having trouble with the thing.
James Beard 13 Mayesford Rd.,Chadwell Heath,Romford, Essex tel 01 590 6641 day or evenings

MINE ALSO WORKS

As one of the fortunate ones to get an original System 68 working, I am particularly interested in any programs on the 6800, and am prepared to share knowledge on the secrets of System 68.
Michael Ahmon, Senior Physicist,The Midland Centre for Neurosurgery & Neurology, Holly Lane,Warley, W Midlands B67 7JX

ADVANCED COMPUTER PRODUCTS

Would anyone who has had recent dealing with Advanced Computer Products, who advertised in ETI, please contact me, particularly if you had problems.
Dave Smith 13 Lea Rd.,Heald Green,Cheadle,Cheshire SK8 3RD 061-437-8271

HIGH SPEED CASSETTE INTERFACE - MODIFICATION

One user (me) has found problems in reading back tapes recorded on a recorder which introduced a high level of mains hum. This can be overcome by reducing the input time constant, either by reducing the input capacitor to about 10nF, or by the addition of a 1k preset between +5V and ground, taking the slider to the amplifier side of the input capacitor. The preset should be adjusted so that with no input signal the schmitt trigger is in the middle of its hysteresis band (i.e. the point about half-way between the two points as which the schmitt changes state). The second mod gives a marginally wider range over which the circuit will read correctly.

Bob Cottis

NASCOM BASIC WANTED

Has anyone developed a BASIC suitable for the NASCOM 1, or developed a method of interfacing a BASIC which is available for another machine onto the NASCOM 1 ? Please contact Christiana Spanchak 27 Bloomsbury Close, Ealing, London 75 01-993-0363

GRAPHICAL HELP WANTED

I've started to build a vector graphics display, having managed to get hold of a 17" picture tube with medium-long persistance phosphor and magnetic deflection. Originally it was used in medical equipment (8 channel electromyograph) and therefore the deflection circuits are not quite as I'd like them. The vector generator is based on an article by Steve Ciorcia in Byte. It expects the monitor has an X-Y input, bandwidth more that 100kHz.
I'd like to hear from any members who have experience in constructing magnetic deflection circuits or vector graphics (both hardware and software) in general.
Klaus Hansen Lysedammen 28, 2650 Hvidovre,Denmark

LIBRARIES

TI (9900) USER GROUP - CHANGE OF ADDRESS

Simon Garth is now at 8 Kestrel Place, St. Neots, Huntingdon, Cambs.

ADDITIONS TO COSMAC LIBRARY

18 CDP 1864 PAL TV interface chip (RCA data release)
19 CDP 1861 Video display data sheet
20 COSMAC product guide. RCA MPG 180B
21 Tic-Tac-Toe for Elf. Popular Electronics 1978
22 CDP 1858 data sheet. 4 bit latch with decode
23 CDP 1831 data sheet. 512 x 8 static ROM
24 MWS 5101 data sheet. 256 x 4 static RAM
25 CDP 1824 data sheet. 32 x 8 static RAM
26 CDP 1853 data sheet. N-bit 1 of 8 decoder
27 CDP 1852 data sheet. 8 bit I/O port
28 CDP 1854 data sheet. CMOS UART
29 CDP 1802 based designs using 8253 programmable counter timer. ICAN 6693
30 CDP 1856/7 data. 4 bit bus buffer separator.
30a Use of CDP 1856/7 in 1802 systems
31 Pro-Log PROM programmer interface for COSMAC development system. ICAN 6622
32 Keyboard scan routine for use with COSMAC Microterminal ICAN 6611
33 CD40114 data. 64 bit RAM
34 COSMAC software development program on GE Mark III time sharing system ICAN 6656
35 1802 microprocessor in CDO 1801 designs ICAN 6509
36 CDP 1823 data. 128 x 8 static RAM
37 CDP 1833 data sheet. 1024 x 8 static ROM
38 CDP 1855 data. Multiply-divide unit
39 CDP 1866/7/8 data. 4 bit latch and decoder
40 COSMAC development system II CDP 18S005 (leaflet)
41 CDP 1851 data. Programmable I/O interface
42 UART applications in microprocessor evaluation and design (New Electronics)
43 RCA microprocessor technology. 24 articles by RCA engineers and scientists.
44 Preliminary Tiny BASIC information.From RCA MPM 224.
45 RCA COSMAC floppy disc system II. CDP 18S805 instruction manual MPM 217
46 Instruction manual for RCA COSMAC Micromonitor CDP 18S030. MPM 218
47 Operator manual for COSMAC development system II CDP 18S005 MPM 216A
48 Instruction guide for the COSMAC Macro Assembler (CMAC) RCA MPM 223
49 Fixed point binary arithmetic routines for RCA COSMAC microprocessors. MPM 206A
50 RCA COSMAC VIP instruction manual RCA VIP300
51 RCA COSMAC VIP CDP 18S711 instruction manual
52 Time sharing manual for the RCA CDP 1802 COSMAC microprocessor MPM 202A
53 User manual for the CDP 1802 MPM 201B
54 Tiny BASIC Manual From RCA MPM 224
55 Instruction Manual for the RCA PROM programmer RCA MPM 222
56 Connection of three CDP 1854 UARTs to the 1802
57 CD40115 data. CMOS high speed 8 bit bidirectional CMOS/TTL interface level converter
58 Programs for the COSMAC Elf (P.C.Moews)
59 Programs for the Elf music & games
60 Floating point arithmetic subroutines of RCA COSMAC microprocessors RCA MPM 207

R C Sheppard 15 Kinnaird Way, Cambridge
tel; 0223 48489

7768 VDU DRIVER

VDU DRIVER - PROGRAM DESCRIPTION

This program occupies 205 (decimal) or CD (hex) bytes. It is designed to drive the 77-68 VDU which has 24 rows of 40 characters each. As listed here it was extracted from my monitor program as it was at that time, which is why it starts at the unusual address of FC8F. However it is completely relocatable.

The reason why such a long program is required to perform a relatively simple function is that the VDU format of 24 x 40 is not completely divisible by binary numbers, as would be 64 x 16 for example. Thus the 1024 byte RAM used to store the VDU characters can not easily be organised so that it can be accessed by the 10 lines inplied by this memory space. In fact the hardware is configured in such a way that the first 32 characters of the first 16 lines only are stored consecutively in the first 512 memory locations, but after that the distribution goes haywire.

The program has a central core section from FCB3 to FD10. It may be entered at FCB3 with any 8 bit value in the A accumulator which will be printed regardless of whether it is an alphanumeric or one of the rather odd graphics in the Texas 74S262 character generator ROM. The full program should be entered at the beginning which is FC8F in which case it will recognise a carriage return by printing spaces until the end of the current line and positioning the cursor at the beginning of the next.

Entry at either point is transparent to the calling program in that the A B and X registers are all preserved for further use if required.

The cursor is non destructive in that it merely inverts the character previously at that location to show black on white. This was done so that the character could be recovered afterwards, for example in an on screen text editing system which needs to move the cursor around.

Because of the complex memory map, the calculation of the next position on the screen involves rather more than just incrementing the X register as is normally required in a simple VDU format. This is the function of the STEPLOC subroutine located from FD11 to FD5B. This particular routine has not been made transparent as there seemed no need; note that it returns with the new location in the X register as well as in VDULOC.

Apart from this description there are sufficient comments in the program itself to make details of its operation clear.

J C Moore

```
FC8F  81 0D     OUTEEE  CMPA £'C/R      Mikbug compatible
FC91  26 20             BNE PUTVDU
FC93  37                PSHB
FC94  36                PSHA
FC95  86 20             LDAA £'SP
FC97  F$ F0 FC  OUT1    LDAB VDUHI
FC9A  C1 FB             CMPB £$FB
FC9C  27 04             BEQ OUT2
FC9E  8D 13             BSR PUTVDU
FCA0  20 F5             BRA OUT1
FCA2  F6 F0 FD  OUT2    LDAB VDULOW
FCA5  53                COMB
FCA6  C5 07             BITB £07
FCA8  27 04             BEQ ENDOUT
FCAA  8D 07             BSR PUTVDU
FCAC  20 F4             BRA OUT2
FCAE  8D 03     ENDOUT  BSR PUTVDU
FCB0  32                PULA
FCB1  33                PULB
FCB2  39                RTS

FCB3  FF F0 F8  PUTVDU  STX TEMPX2      Entry point for graphics
FCB6  FE F0 FC          LDX VDULOC
FCB9  A7 00             STAA X          Print character
FCBB  36                PSHA
FCBC  37                PSHB
FCBD  8C FB F7          CPX £$FBF7      End of screen?
FCC0  27 04             BEQ SCROLL
FCC2  8D 4D             BSR STEPLOC
FCC4  20 3F             BRA CURSOR
FCC6  CE F8 00  SCROLL  LDX £F800
FCC9  FF F0 FC          STX VDULOC
FCCC  B6 F0 FC  SCR1    LDAA VDUHI
FCCF  81 FB             CMPA £$FB       Last fifth of line?
FCD1  26 14             BNE SCR4
FCD3  B6 F0 FD          LDAA VDULOW
FCD6  43                COMA
FCD7  85 E0             BITA £$E0       Line 8 or 16?
FCD9  26 0C             BNE SCR4
FCDB  C6 D8             LDAB £$D8
FCDD  09        SCR5    DEX
FCDE  5A                DECB
FCDF  26 FC             BNE SCR5
FCE1  A6 00             LDAA X          From line 9 or 17
FCE3  A7 D8             STAA D8,X       To line 8 or 16
FCE5  20 04             BRA SCR6
FCE7  A6 20     SCR4    LDAA 20,X       From succeeding line
FCE9  A7 00             STAA X          To this line
FCEB  8D 24     SCR6    BSR STEPLOC
FCED  8C FA E0          CPX £$FAE0      Fill last line with spaces
FCF0  26 DA             BNE SCR1
FCF2  86 20     SCR2    LDAA £'SP
FCF4  A7 00             STAA X
FCF6  8C FB F7          CPX £$FBF7      End of line?
FCF9  27 04             BEQ SCR3
FCFB  8D 14             BSR STEPLOC
FCFD  20 F3             BRA SCR2
FCFF  CE FA E0  SCR3    LDX £$FAE0
FD02  FF F0 FC          STX VDULOC      Beginning of last line
FD05  A6 00     CURSOR  LDAA X          Transparent cursor
FD07  8A 80             ORA £%10000000Invert character
FD09  A7 00             STAA X
FD0B  33                PULB
FD0C  32                PULA
FD0D  FE F0 F8          LDX TEMPX2
FD10  39                RTS             End of      OUTEEE, PUTVDU
FD11  B6 F0 FD  STEPLOC LDAA VDULOW     Calculates next position
FD14  16                TAB
FD15  43                COMA
FD16  85 1F             BITA £$1F       32nd column?
FD18  26 15             BNE STEP1
FD1A  B6 F0 FC          LDAA VDUHI
FD1D  84 0F             ANDA £0F        =08, 09, or 0A
FD1F  48 48 48          ASLA x 3        =40, 48, or 50
FD22  1B                ABA
FD23  8B A1             ADDA £A1
FD25  B7 F0 FD          STAA VDULOW
FD28  86 FB             LDAA £$FB
FD2A  B7 F0 FC          STAA VDUHI
FD2D  20 29             BRA STEP2
FD2F  B6 F0 FC  STEP1   LDAA VDUHI
FD32  81 FB             CMPA £$FB       Column 33 to 40?
FD34  26 1F             BNE STEP3
FD36  17                TBA
FD37  53                COMB
FD38  C5 07             BITB £07        End of line?
FD3A  26 19             BNE STEP3
FD3C  53                COMB            Restore B
FD3D  C4 18             ANDB £$18       If 00, add FD19; 08, add FE11;
FD3F  10                SBA                             10, add FF09
FD40  8B 19             ADDA £19
FD42  B7 F0 FD          STAA VDULOW
FD45  07                TPA             Save carry bit
FD46  54 54 54          LSRB x 3        0, 1, or 2
FD49  06                TAP             Recover carry bit
FD4A  B6 F0 FC          LDAA VDUHI
FD4D  89 FD             ADCA £$FD
FD4F  1B                ABA
FD50  B7 F0 FC          STAA VDUHI
FD53  20 03             BRA STEP2
FD55  7C F0 FD  STEP3   INC VDULOW
FD58  FE F0 FC  STEP2   LDX VDULOC      New position into Index Reg
FD5B  39                RTS             End of STEPLOC
```

Meeting Points

NORTH LONDON

The North London Hobby Computer Club is flourishing and has established several special interest groups, for details contact;
Ted Gregory on 01 607 2700 x 221 for NASCOM.
Jim Edgar on 01 349 1170 (evenings) for Business Users.
M.O'Reilly on 01 607 2789 x 2100 for PET Users.
S.Emmett on 01 607 2789 x 2447 for Homebrew.

LINCOLN COMPUTER CLUB

Is now holding regular meetings, members' systems include a TRS 80 and a 77-68. Potential new members are invited to get in touch with Mike Alexander at 5 Brattleby Cresc., Lincoln LN2 2EB

NORTH KENT AMATEUR COMPUTER CLUB

Has been meeting at Charles Darwin School, Jail Lane, Biggin Hill. Computer enthusiasts in the area are requested to get in touch with Barry Biddles, 3 Acer Rd.,Biggin Hill, Kent tel 71742.

St.JOHNS COLLEGE (OXFORD) MICROCOMPUTER SOCIETY

Is open to all in the Oxford area and holds regular meetings at the College. Their Secretary is Rupert Steele, St. John's College, Oxford.

NEWCASTLE PERSONAL COMPUTER SOCIETY

Is holding meetings on the first Tuesday of each month. For more details contact Dr W G Allen on 0632 851528.

THE COVENTRY (MIDLAND) MEETING. SATURDAY 18th. NOV.

Maurice Oakley distributed forms which, he explained, were to be the basis of a data file with details of members' equipment and interests. Maurice hopes to have the software completed in time for the next meeting, when he will explain the programming proceedures involved.

John Diamond brought along his 77/68 which is now fitted with the 77/68 VDU. John explained the operation of this VDU with particular reference to the 40X24 format which poses problems in the control software for the scrolling and cursor control. The 77/68 VDU has full upper and lower case characters, is memory mapped,and offers excellent value, being one of the cheapest systems on the market.

Tom Broughton showed us his TRS 80 operating with T bug, the monitor program which allows the TRS80 to be programmed in machine language. Particularly impressive was a demonstration showing an animation program programmed in BASIC, and the same thing programmed in Machine Code. The increased speed of Machine Code was remarkable.

Laurence Wilkins brought along a Motorola D2 system which he is using on a project to make a repertory dialer for a telephone.

Stuart Erskine showed us a Nascon which he has just completed, and Ron Brown showed us a development board for a 9980 system.We hope to have more information on this and other Texas systems at the next meeting.

Graham Heggie told us about a CMOS system he had designed based on the 6100 MPU. The unit was intended to be hand held, but was abandonned due to development problems and the high cost of CMOS memories.

The next meeting will be on Sat. Jan. 13th. at 2.30pm. in room B615 at the Coventry(Lanchester) Polytechnic.

EDMONTON/ENFIELD/SOUTHGATE

Anyone interested in forming a local club in this area is invited to contact Mr. Alder 01 805 2989

SOUTHAMPTON AMATEUR COMPUTER CLUB

Has arranged meetings for 9th Feb (lecture by Prof. Barron), 2nd March (Kerr Borland talking on NASCOM), and 9th March (Film; 'Now The Chips Are Down'). All meetings start at 7.30 at the University of Southampton, the first two being in the Arts 'A' lecture theatre, the film being in the medical school lecture theatre 1.

EXETER & DISTRICT AMATEUR COMPUTER CLUB

Has been holding some very successful meetings, attended by more than 50 people. Some difficulty was experienced at first in deciding on the right format for the meetings, but meetings now start with a talk on a particular processor of piece of equipment, followed with what has been termed 'RAM Time', a question and answer forum at which any member is welcome to ask any question on computing and any member may answer the question. New members are invited to get in touch with the Chairman, David Carne 44 George St., Exmouth EX8 1LQ tel; Exmouth 74479

MERSEYSIDE MICROCOMPUTER GROUP & SIGS

The MMG (Secretary John Stout, Dept of Architecture, Liverpool Polytechnic) are attempting to set up a number of specialised groups; readers interested should contact the people listed below;

NASCOM	G Myers, 34 Hillcrest Drive,Greasby,Wirral tel 051 677 9340
Z-80	A G Price Dept of Mathematics,Liverpool Poly,Byrom St. L3 3AF 051 207 3581 x 14
PET	J Stout 6 College Ave,Formby L37 3JJ tel; Formby 74266

S.E. LONDON GROUP

Is now well established, for details contact Roy Mitchell 58 Kenilworth Gdns.,Shooters Hill, London SE18 3JB tel 01 856 2489

LONDON EAST END GROUP

Has fixed meetings for 20th Feb, 20th March, and 17th April from 7.00 until 10.00pm in the Meeting Room of the Harrow Green Library at the Leytonstone Rd. end of Cathall Rd.

HAMBURG COMPUTER CLUB

Meets on the first Wednesday of each month at the Technical Highschool for Radio & TV Eimsbuttler MarktPlatz in Hamburg. Visitors (and residents) are invited to get in touch with Pete Bendall on (04191) 6538.

GWENT GROUP

Held its first meeting on the 17th November at the Cross Hands pub, Beechwood, Newport. Twenty people and two computers turned up to listen to Mike Bale talk about 'Starting Off In Home Computing'. After the talk, the machines were powered up and were played with. One was a PET and the other an ETI System 68 which actually works. It has been claimed that this is the only working System 68 in Wales - are there any others ?.
The group intends to meet once a fortnight on a Wednesday. Although the Cross Hands provided very convivial surroundings, a new (cheaper) venue may be used in the new year. For further details ring Pete Hesketh on Shirenewton (02917) 596

Shop

NASCOM + 5 HOLES FOR SALE

Creed 444 Teleprinter £75
NASCOM computer system £300
Twin Parallel Tape Punch (5-hole) £20
Clive R Bonner 29 Hillcrest Rd.,Orpington,Kent
tel; Orpington (66) 26802

D2 FOR SALE

Motorola D2 kit assembled with extra onboard RAM. On 8 position Exorciser motherboard with partially completed 4k RAM Exorciser board including 3 Amp 5+/5- power supply and cassette recorder. All housed in a case. One year old and good working order. Reason for sale; purchasing a larger system. Also included with above Motorola 6800 Applications Manual. All for £140 o.n.o.
R.W.Wilmot 1 Retreat Cottages,Church Lane,
Broadbridge Heath,Horsham,Sussex
tel; Horsham (0403) 69835

4K FOR SALE

1 4K RAM board for 77-68 built, tested & burned in £55 M.Alger The Old Orchard,Main Rd.,Saltfleetby, Louth,Lincs LN11 7SS tel; Saltfleetby 698

1620 FOR SALE

IBM 1620 processor with 20k core, I/O typewriter, 2M disc drive, 150cps PTR, FORTRAN,Assembler,DOS plus documentation. £150 ono. Definitely buyer collects ! Chris Clark 7 Bramley Rd.,Worthing, W Sussex BN14 9DR tel (0903) 208817

7B & BITS FOR SALE

Creed 7B teleprinter (no paper tape), suitable transformer for the motor and selector magnets, RSGB Teleprinter Handbook (contains mechanical details of the 7B), 5 bit UART with spec, 12 rolls teleprinter paper. £20 the lot, carriage by arrangement.
Tony Caporn 22 Sunna Gdns.,Sunbury on Thames, Middx TW16 5EF tel Sunbury 86576

WIRELESS WORLD COMPUTER FOR FREE

In 1967 Wireless World published a design for a demonstration computer using several hundred transistors and discrete components. It was designed as a teaching aid and now that I am out of the teaching 'rat race' I have this thing sitting on a shelf. If any member of the ACC would like it to assist in their teaching I will be glad to let them have it free of charge. I think it would be ideal for junior or lower secondary school children. It will need to have a power supply constructed for it; +125V @80mA, -6V @ 1A, +4V @ 30mA. Preferably I would like the recipient to collect it but I could deliver up to 40 miles or so.
C.G.Dixon Kyrle's Cross,Peterstow,Ross on Wye

77-68 ETC. FOR SALE

77-68 CPU board, built, tested and working on base plate with binary front panel. Separate power supply and manual included. All components top spec, PCB from NewBear. Demonstration if required. £60 ono
77-68 VDU PC board from NewBear,unused. £6.75 inc P&P.
Amtron instrument case with front panel 11" x 8" x 6" £5.00
ACC Newsletter - 3 years plus WB1 issues £1.75
M6800 Application Manual (photocopies) chapters 1,2 & 3 only £1.75
Purchaser to collect or pay P&P.
R.J.Wallace 26 Broadheath Drive,Chislehurst,Kent
(01 467 9033 after 6pm)

MCS-86 PROTOTYPE KIT FOR SALE

Chip set including 8086 CPU,8284 Clock gen,8288 bus controller,2 off each 8282 & 8283 8 bit I/O ports,2 off each 8286/8287 8 bit bus drivers, 8259 Interrupt controller,8251A Programmable communication interface,4 off 2142 1024 x 4 static RAM, Monitor program in 2 off 2616 2k x 8 ROM. With all documentation, listing of monitor and Intel system software license agreement. Unused. £125 Mike Lord

S-100 SYSTEM FOR SALE

North Star Horizon-0-0K comprising chassis,cover, 12 slot S-100 bus mother board with 2 serial I/O and 1 parallel I/O. 12 x 100 pin connectors, cooling fan,UK power supply, assembled, working. £460.
33RO Teletype fully refurbished and excellent condition best offer over £230 secures.
KSR33 keyboard (non parity) good condition, best offer over £30.
DM 8678 CAB VDU chip £8
P Chamberlain 10 Marl Hurst,Edenbridge,Kent TN8 6LN tel; (0732) 863600

10% DISCOUNT FROM AIRAMCO

Airamco Ltd. are offering a 10% discount for 'cash with order' sales to members of the ACC or any affiliated club. Credit card sales are good for a 5% discount under the same conditions.

BITS FOR SALE & WANTED

5 track punch, 35 ch/sec, good condition £5
Plessey core store, 4k x 18 bits, 5uS cycle time £5
DRI ¼" mag tape transport in working condition with PSU's,cables and manual. £15 ono.

I am looking for the following software items; 8k BASIC and 8k FORTRAN for the PDP8.
James Beard 13 Mayesford Rd.,Chadwell Heath, Romford, Essex tel 01 590 6641 day or evenings

TELETEXT & TRS-80

'Television' magazine design teletext decoder, works well but IF strip needs setting correctly. Kit cost £220, accept £100 ono. (cannot align this because I sold my test gear to make way for upgrade of my system !)
TRS-80 level II 16k RAM with T-BUG,personal finance package. Offers around £700 (may have lower case fitted by the time this advert appears).
D Holloway 48 Wenrisc Drive,Minster Lovell,Oxford
tel; Asthall Leigh 241 evenings & weekends

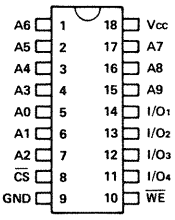
FLOPPY DISCS FOR SALE

IBM Diskette 1 (8" floppy discs) unused £3. only 50 available.
Dave Beaven tel; Uxbridge 34611 evenings

2114

1024 x 4 STATIC RAM

- Single +5V power supply
- TTL compatible interface
- Common I/O THREE-STATE output drivers



TRUTH TABLE

$\overline{CS}$	$\overline{WE}$	I/O	STATUS	MODE
H	Don't Care	High Z	Deselect	Standby
L	H	Data	Selected	READ
L	L	L	Selected	Write 0
L	L	H	Selected	Write 1

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