SYNTAX

SERVING TIMEX-SINCLAIR PERSONAL COMPUTERS

A PUBLICATION OF **THE HARVARD GROUP**

VOL.5 NO.2 ISSN 0273-2696 FEB., 1984

IN THIS ISSUE

MONEY TALKS; TIMEX LISTENS

Timex withdrew from retail sales of home computers and will employ their resources in other product lines.

SINCLAIR TO CONCENTRATE ON QL IN US

Nigel Searle announced that Sinclair does not plan to re-enter the US market with ZX81s or Spectrums. Talks with distributors (to follow QL mail order) are proceeding.

KEY SUPPORT OPERATIONS WILL STAY

SoftSync announced its intent to keep on selling its existing line of TS programs. SoftSync, 14 E. 34th St., NY, NY 10016

Byte-Back announced changes to the MD2 modem to make it compatible with all machines and provide both originate and answer tones. See review, this issue, for more details.

Microsync Services will keep offering service agreements for ZX/TS machines at $10/yr. Write them at 162R Marlboro St., Keene, NH 03431 for details.

Profile 2068 is available now with brief operating instructions. You will get all the detailed, 100-page documentation later at no extra cost. $29.95 ppd. Thomas B. Woods, POB 64, Jefferson, NH 03583

Tom Woods asserted whole-hearted support and will start "new, interesting products."

Timex Vice President of Marketing and Sales, C. Michael Jacobi, announced that "Consumer warranties will be honored and out-of-warranty service will continue."

Banta Software intends to continue sales of their Timex-related programs.

Robert Schiller of Kopak says their new version of Hi-Res Word Processor allows 80 column printing. He also announces a sale on Timex and Softsync software for the ZX/TS (4 cassettes for $20) with a large selection.

SYNTAX will continue (see story p.10).

SYNTAX ERRORS: Ohm's ZXLaw, Dec.83, line 390, should read:

```
 390 PRINT "POWER      (P)=";(V**
2)/R;" W"
```

PROGRAM IMPROVEMENTS

You can stop Firstloader before it translates by POKEing 45013,201. This stub leaves the ZX/TS bytes in high memory, starting at 49277. To restore the translator, you simply POKE 45013,205 and then enter the command RAND USR 45013. This trick lets you examine the original data.

VENDOR REPORT

Address complaints about Frog Software or Sinclair Computing to Regional Chief Inspector, Northeast Region, 1633 Broadway, New York NY 10097 Attn: Mail Fraud Division, 212/974-8501.

Mindware advertised a Monitor program to use with ZX/TS machines in SYNTAX Dec.83. They inform us the program doesn't work and isn't available anywhere.

Pegasus Microsystems will fill all outstanding orders but stopped accepting any after January. They will shift their business to other machines and stop selling retail.

Memotech continues to support the TS1000 although they are getting out of the Timex business.

SYNTAX received a complaint about Roger Valentine's book, The Timex-Sinclair 2068, published by John Wiley. Wiley told us that an independent reviewer, using a 2068, checked the complaint by choosing 5 programs at random and they ran without change. Ignore references to a 16K Timex 2000, the programs work on 48K 2068s. Watch out for graphics, they differ. Wiley used advance versions of Timex manuals to check the book and some problems exist because of late changes in the machine. If you note problems in this book, write to Wiley Press, John Wiley & Sons, 605 Third Ave., NY, NY 10158. They will reply to your inquiry and use your input to correct the next printing. If you consider buying this book, satisfy yourself that you will be able to repair minor problems.

C-20 Magazine stopped publishing and has issued refunds for its undelivered issues.

Starburst Software ceased publication of ZX/TS software and gone out of business on Feb. 1, 1984.

We received another complaint of non-delivery by Kopak Creations, dated Feb.12 '84, amounting to $40.

We've heard that Timex Town Software, Omnitronics (Z-dubber), and Jameco (keyboard conversion kits) plan to drop Timex-related lines. We also hear that Z-West newsletter stopped printing.

ZX/TS USERS' GROUPS

To check for a local group that's not listed, or to announce a new group, call 617/456-3661 or write SYNTAX, RD 2 Box 457, Bolton Rd., Harvard, MA 01451. Send SASE for name of group in your area.

Clinton, CT: Southeastern Connecticut TS User's Group meets at Hull Library. Contact Gary Cummings, 203/669-2342.

New Haven, CT: Sinclair Study Group, c/o Chris Baldwin, 16 Lewis St., New Haven, CT 06513.

Collinsville, CT: New group forming, contact David Dubay, 28 Claire Hill Rd., POB 78, Collinsville, CT 06022, 203/673-7069.

Stamford, CT: New group, contact Barbara Karp, 139 Downes Ave., Stamford, CT 06902, 203/359-2124.

Memphis, TN: Memphis User Group, **Correction:** Andy Boles, 2059 Pennel Cove, Memphis, TN 38116, 901/346-0890.

Butler, WI: New address for Sinclair Milwaukee Users Group Ltd. (SMUG), Box 101, Butler, WI 53007.

NEW PRODUCTS AND SERVICES

TS-INTERCOM, a special interest group on CompuServe, allows ZX/TS users with ZCOMM software and a modem to exchange programs and information. Contact TS-INTERCOM, 1908-715 Don Mills Rd., Don Mills, Ontario, Canada M3C 1S4, 416/424-1895, CIS ID 70261,166.

Pheonix Enterprises (1780 N. DuPont Hwy., No. 17, Dover, DE 19901, 302/734-0179) announces T/S COUNT, an accounting package ($29.95), and OPERATION PHEONIX, a strategy game using music and hi-res color graphics ($19.95). Both written originally for the 2068 but available for the ZX/TS at $20 and $14.95, respectively.

D. Lipinski Software (2737 Susquehanna Rd., Roslyn, PA 19001) offers CHECK-B, a comprehensive check book program for the TS2068. $20 price includes cassette and a free update when Timex releases a new mass storage device for 2068s.

Textwriter 2000 TS2068 word-processor prints standard or full width pages on TS2040 (two column output). Includes full editing, reformatting, word wrap, tab stops, and block moves. $18.95 cassette from Robert Fingerle, 39639 Embarcadero, Fremont, CA 94538.

A&J Micro Drive, a reworked Entrepo (formerly Exetron) stringy floppy works with CAI Instrument's wafers, but incorporates an improved operating system including program chaining and MC SAVE/LOAD. For ZX/TS, $149.50 from A&J Micro Drive, 1050 "I" East Duane Ave., Sunnyvale, CA 94086, 408/732-9292.

Maples Enterprises (688 Moore St., Lakewood, CO 80215) introduces Harmonium, a 4 voice ZX/TS sound board kit utilizing normal components + $9 sound chip. Schematic, doc. and suppliers list, $5. ACZ General Ledger 2.000 comes with a comprehensive instruction manual, binder, and cassette for TS2068 at $39.95 + $1.50 P&H. Designed to meet the accounting needs of a small business, the program produces printed reports on the TS2040 including journal, ledger, monthly and YTD income statements, balance sheets, trial balances, and a chart of accounts. Interfaces to CARDCO numeric keypad ($44.95+$1.50 P&H). From Cottage Technology, 5720 W. Little York, Suite 178, Houston, TX 77091, 713/448-7058.

JK Audio is back in business (POB 3295, Escondido CA 92025-0580, 619/741-5132) and offering the JK-500 series of interfaces for the ZX/TS. Features include 2 16-bit I/O ports, real time clock, ADC, and 8K nonvolatile RAM, in many different combinations, from $125.95 to $174.95 (bare board $49.95), + 3% P&H (US), 8% (for).

HS-1 High Speed Interface connects two ZX/TS machines together, using one for computing and one for display. Results in steady display while running 5.5 times faster than SLOW mode. $98 assemb., $78 kit, from Interface Design, POB 151, Rexford, NY 12148.

Timex/Sinclair Ideabook demonstrates how to solve problems with 50 ready-to-run programs for the ZX/TS. By David Ahl, softcover, 150pp., $8.95 from Creative Computing Press, 39 E. Hanover Dr., Morris Plains, NJ 07950.

Adropos Technology (1071-A Avenida Acaso, Camarillo, CA 93010, 805/482-3605) announces SIN-16, a 16K RAM ($25.95+$4 P&H), Dr. Floyd, an Eliza like program, Graphics Pak 1, five programs for drawing and saving graphics, and Wordplay, five game programs for teaching literature and grammar ($12.95 ea or $25 for all 3, plus $2 P&H), all for ZX/TS machines.

HARDWARE REVIEW

Product: MD-2 Modem
Machines: ZX/TS 2K or 16K
From: Byte-Back Co.
Rt 3 Box 147, Brodie Rd.
Leesville SC 29070
803/532-5812
Price: $149.95 Assem.
$119.95 Kit

Byte-Back continues their tradition of fine products for the ZX/TS with the MD-2, an originate only direct connect modem with software for ASCII translation, program and text upload/download, and printing (RS232 or TS2040).

Since the introduction of the MD-2B, Byte-Back no longer sells the MD-2. The MD-2B can originate or answer via a hardware switch, but in all other respects is an MD-2. None of the modems answer the phone or dial. Byte-Back has upgrade kits from MD-2 to MD-2B. They also sell a TS2068 Modem with identical features, same price, under the name MD-68. You can get a kit allowing you to switch your MD-2 or 2B to a MD-68 at will.

ZCOMM, the software provided with Byte-Back modems, comes on cassette with a 2K RAM version on one side, and a 16/64K version on the other. Both versions are recorded twice with different recorders to ensure the tape will load. It seems a sturdy program.

Several times during testing the modem I thought I had uncovered a bug in ZCOMM, but it turned out to be a feature: when storing text from the phone line into program memory, ZCOMM's stores the bytes in memory. When memory fills, the system appears to crash. Actually, it munches the text for a while (over a minute) and turns it into REM statements. This way, you can store an entire conversation in memory, then SAVE or LLIST it.

For a sturdy product with better support than you'll get from Timex, get the MD-2B.

RECIPES FOR 2068 ADVANCED VIDEO

Your TS2068 can display lines of 64 characters, more detailed color, or a completely separate display file. We show you how to activate these functions and plot hi-res (512x192) points.

First, use program 1 to move system variables out of the area used by DFILE 2, change video mode, and clear DFILE 2. Timex supplied this machine code. LOAD & RUN it; use p.248 of your 2068 manual to choose video mode. (Mode 62 gives the best 64 col. display.)

Now use program 2 to accept Y,X-pairs and plot on the 64-column screen. Prior plots aren't erased.

Hints: G=file number (0-1)
K=high digits, character line (0-2)
I=scan line in character line (0-7)
J=low digits, character line (0-7)
H=character position in line (0-31)
S=dot position in character (7-0)
POKE 01GK KIII JJJH HHHH,SSS
Binary: High byte Low byte,Data

```
  1 REM Don't NEW after this
  2 CLEAR 65399
  5 READ A,B,C,D,E,F
  6 DATA 10,11,12,13,14,15
 10 READ 0$
 15 LET P=1
 20 FOR X=65400 TO 65437
 30 LET X$=0$(P TO P+1)
 40 LET V=VAL (X$(1))*16+VAL (X
$(2))
 50 POKE X,V
 60 LET P=P+3
 70 NEXT X
 80 INPUT "Video Mode:";V
 90 POKE 65412,V
 95 RANDOMIZE USR 65400
100 DATA "F3,3E,01,D3,F4,DB,FF,
CB,FF,D3,FF,3E,01,F5,FB,CD,8E,0E
,F3,DB,FF,CB,BF,D3,FF,AF,D3,F4,F
1,FE,80,20,03,32,C2,5C,FB,C9"
SYNTACTIC SUM:  23223, TS2068
  5 DEF FN R(N,D)=N-INT (N/D)*D
  7 OUT 255,62
 10 INPUT "Y<=191 from top? ";Y
 20 LET KK=INT (Y/64)
 30 LET JJJ=INT (FN R(Y,64)/8)
 40 LET III=FN R(FN R(Y,64),8)
 50 INPUT "X<=511 fm left? ";X
 60 LET HHHHH=INT (X/16)
 70 LET G=INT (FN R(X,16)/8)
 80 LET SSS=FN R(FN R(X,16),8)
 90 LET DAT=2↑(7-SSS)
110 LET ADDR=16384+G*8192+KK*20
48+III*256+JJJ*32+HHHHH
120 POKE ADDR,DAT
130 GO TO 10
SYNTACTIC SUM:  20919, TS2068
```

KEYBOARD SCANNING

Your 2Ø68 uses ports to scan its keyboard, as do all Sinclairs. Each uses the same addresses, but the data differs.

As you know, Sinclair uses the CPU to scan its matrix keyboard. Forty keys, arranged as 8 half-rows of 5 keys each, provide all the functions. Additional keys simply connect parallel to a primary key.

From the ZX/TS schematic, we know that the 5 lines KBDØ-KBD4 connect vertical columns of keys--Ø connecting SHIFT, A, Q, 1, Ø, P, ENTER, and SPACE; 4 connecting V, G, T, 5, 6, Y, H, and B. You'll find this pattern from Z to SYMBOL SHIFT, X to M, and C to N.

Each half-row connects to one **ADDRESS** line of the CPU. As you see in Figure 1, the half-row connects to A8-A15 (via a diode).

When Z8Ø processors execute a port command--IN or OUT--the lines A8-A15 contain a number from one of the registers. The instruction IN r,(C) reads the port number held in C, places the data read in r, and puts register B on address lines A8-A15 during the read (see p. 254 of the Zilog programming manual). If r stands for register A, this assembles to ED, 78 (237, 12Ø dec.)--just what you find in the Spectrum at Ø296H (662 dec.). C contains the port address FE (254). By using LD BC,portadd followed by IN A,(C) we can specify portadd as the 16 bit number to place on the address bus during a port read. Effectively, we get 16 bit port addresses. Now let's arrange the data from the Spectrum manual.

BC Register			Scanned			BC Register	
Hex	Dec	n	Keys	Keys	n	Dec	Hex
F7FE	63486	3	1-5	Ø-6	4	61438	EFFE
FBFE	64510	2	Q-T	P-Y	5	57342	DFFE
FDFE	65Ø22	1	A-G	NR-H	6	49150	BFFE
FEFE	65278	Ø	CS-V	SP-B	7	32766	7FFE

Note that register C always holds FE, port 254, to read the keyboard. Register B sequences

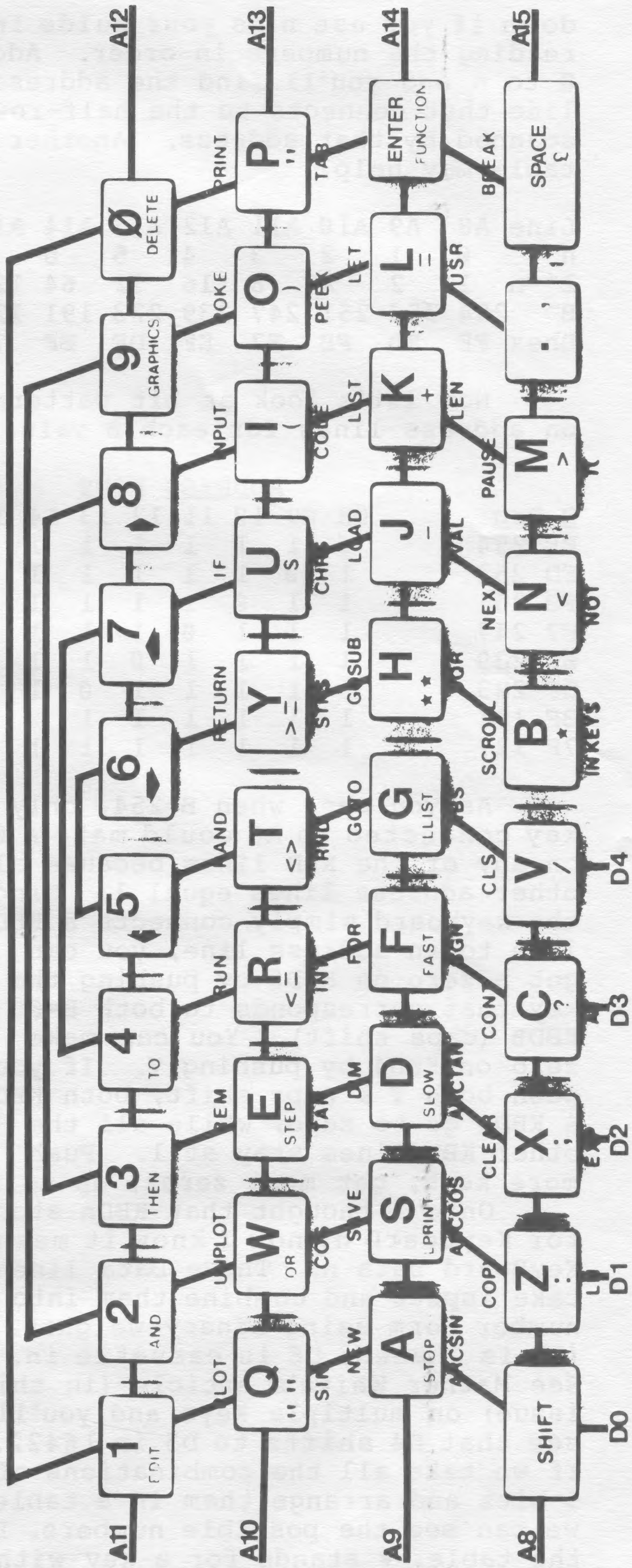

Figure 1. ZX/TS Keyboard Wiring

down if you use n as your guide in reading the numbers in order. Add 8 to n and you'll find the address line that connects to the half-row scanned by that address. Another table may help.

Line	A8	A9	A10	A11	A12	A13	A14	A15
n	Ø	1	2	3	4	5	6	7
2**n	1	2	4	8	16	32	64	128
B	254	253	251	247	239	223	191	127
Bhex	FE	FD	FB	F7	EF	DF	BF	7F

Now let's look at bit patterns on address lines for each B value.

	ADDRESS LINE							
B Reg	Ø8	Ø9	10	11	12	13	14	15
FE 254	Ø	1	1	1	1	1	1	1
FD 253	1	Ø	1	1	1	1	1	1
FB 251	1	1	Ø	1	1	1	1	1
F7 247	1	1	1	Ø	1	1	1	1
EF 239	1	1	1	1	Ø	1	1	1
DF 223	1	1	1	1	1	Ø	1	1
BF 191	1	1	1	1	1	1	Ø	1
7F 127	1	1	1	1	1	1	1	Ø

As you see, when B=254, only a key connected to A8 could make a Ø on any of the KBD lines because all other address lines equal 1. Since the keyboard simply connects a KBD line to an address line, you can get a zero on KBDØ by pushing the key that corresponds to both B=FE & KBDØ (caps shift). You can make zero on KBD4 by pushing V. If you push both V & caps shift, both KBDØ & KBD4 go to zero, while all the other KBD lines stay at 1. Push more keys, get more zeros, up to 5.

Once I thought that KBDn stood for KeyBoarD n; now I know it means KeyBoard Data n. Those Data lines take inputs and combine them into number form using binary weights. (D5 is unused; D6 is cassette in. See Mather White's article (in this issue) on multiple keys and you'll see that D4 shifts to D5 in 16422.) If we take all the combinations of 5 bits and arrange them in a table, we can see the possible numbers. In the table, # stands for a key with no letter--a SHIFT, SPACE or ENTER.

Number	DØ	D1	D2	D3	D4	Keypress
31	1	1	1	1	1	NO KEY
3Ø	Ø	1	1	1	1	#AQ1ØP##
29	1	Ø	1	1	1	ZSW29OL#
27	1	1	Ø	1	1	XDE38IKM
23	1	1	1	Ø	1	CFR47UJN
15	1	1	1	1	Ø	VGT56YHB
Binary Val	1	2	4	8	16	

See that if you press no key, all the data bits equal one and the machine sees 31. Pressing one key makes the corresponding bit equal zero and subtracts the binary value from 31 to generate the number in the left column. If you read down any column under the keypress heading, you will recognize a half-row of your computers keyboard. On the right side of the computer, the keys read from right to left, just what you expect when you look at a ZX/TS schematic for the key matrix.

Well, what if you push more than one key? Stay in one half-row and you will generate the remaining numbers. If you push keys in other rows, the keyscan routine will sort them as B takes different values.

Every combination of keys in a half-row generates a unique value. Pressing combinations subtracts the key-values from the no-key value.

Although Sinclair machines do not use this keyboard property, you can see it with a simple program on your 2Ø68. If you enter:

```
1ØØ PRINT AT Ø,Ø;IN 65Ø22:GO TO 1ØØ
```

you can press ASDFG half-row keys in combination and see what values result. Change the argument of IN to 57342 and you move to the POIUY half-row. Try each address shown in the first table of this article. Notice that the value depends only on position in the half-row; half-row selection varies with address.

Now try this. With no key pressed, and the preceding one-line program entered, put a tape in your recorder and play it into the machine. Notice that the number on your screen changes. As bits come in from the EAR jack, D6 goes to 1, and the number jumps to 95 (31

because no key is pressed plus 64 from the D6 line).

Spectrum computers differ slightly in the values returned for keypresses. But the differences are regular and understandable.

Machine Name	No-Key Value	D Ø	D 1	D 2	D 3	D 4	D 5	D 6	D 7
TS1ØØØ	63	1	1	1	1	1	1	Ø	Ø
TS2Ø68	31	1	1	1	1	1	Ø	Ø	Ø
SPECTRUM	255	1	1	1	1	1	1	1	1
SPECTRUM3	191	1	1	1	1	1	1	Ø	1

As Robert La Jeunesse pointed out in SYNTAX (Oct.83, p22), you need only use LD BC,portadd plus an IN A,(C) to achieve register indirect addressing on your ZX/TS computer. For convenience, we will also use RAND to convert decimal to hex and store the result in the system variable SEED (16434,5). (A trick we learned from the June 1983 issue of the Sinclair-Timex User Group Newsletter published by The Boston Computer Society.) To get the widest possible application of this, let's set RAMTOP below 1K and use a routine that can run on a ZX81, but make the machine code run independent of location. This code simulates IN for your ZX/TS.

```
POKE 16388,236;Set RAMTOP To 17388
POKE 16389,67
NEW
POKE 17388,237;ED LD BC,(nn)
POKE 17389,75 ;4B nn=SEED
POKE 17390,5Ø ;32 Address of SEED
POKE 17391,64 ;4Ø sys var (16434)
POKE 17392,237;ED IN r,(C) r=A
POKE 17393,12Ø;78
POKE 17394,6  ;Ø6 LD B,Ø
POKE 17395,Ø  ;ØØ
POKE 17396,79 ;4F LD C,A
POKE 17397,2Ø1;C9 RETURN TO BASIC
     Now use this BASIC loop:
1Ø INPUT N  (n is a number from our
2Ø RAND N                 first table.)
3Ø LET X=USR 17388
4Ø PRINT AT Ø,Ø;N,X
5Ø GOTO 3Ø
```

Special thanks to Andy Boles & his users' group, 2Ø59 Pennel Cove, Memphis, TN 38116, 9Ø1/346-Ø89Ø

SYNTACTIC SUM--TS2Ø68

This program calculates Syntactic Sums for TS2Ø68 programs. The number returned by USR 65500 should match the one printed after our program listings. The program runs anywhere in RAM.

Syntax, Inc. hereby grants everyone the right to use the this program, to generate Syntactic Sums and to publish them with programs. Replication is strictly prohibited without our written consent.

Michael S. Shaw, Enfield CT

```
  5 REM 2068 Syntactic Sum
 10 CLEAR 65499
 20 FOR a=65500 TO 65534
 30 READ d
 40 POKE a,d
 50 NEXT a
 60 PRINT "TS2068 Syntactic Sum
Loaded"
 70 PRINT "Use PRINT USR 65500
to execute."
 80 DATA 167,042,075,092,237,07
5,083,092,080,089,237,066,035,22
9,033,000,000,193,011,120,177,04
0,009,197,026,019,006,000,079,00
9,024,241,068,077,201
SYNTACTIC SUM:  22803, TS2068
```

DETECTING MULTIPLE KEYS

INKEY$ returns the character of the key currently being pressed, returning the empty string for no key and for multiple keys. But you can use the system variables and a few bytes of machine code to detect multiple keys of your choosing.

Memory locations 16421 & 16422 store a keyboard matrix code for the keys currently held down. Your ZX/TS system calls these system variables LAST_K; they have no direct counterpart in Spectrum and 2068 machines.

Contents of	16421		16422
KEY	Bit=0		Bit=0
ZXCV	0	SHIFT	0
ASDFG	1	AQ10P##	1
QWERT	2	ZSW29OL.	2
12345	3	XDE38IKM	3
09876	4	CFR47UJN	4
POIUY	5	VGT56YHB	5
#LKJH	6	(# means shift,	
#.MNB	7	enter, or break)	

Both locations are all ones (255 dec.) when no key is pressed. When you push a key, one or more bits in each system variable become zero. For example, depressing B makes bit 7 of 16421 and bit 5 of 16422 go to zero. All other bits remain set to 1. So the contents of these locations for B equal:

(16421)=01111111=127
(16422)=11011111=223

Only the SHIFT key works with a different pattern--bit 0 of 16422 becomes 0 while all bits of 16421 remain 1. In typing, you use SHIFT with another key, and the exception permits the ZX/TS to allow one two-key pair while rejecting other combinations.

Thus, SHIFT B returns:

(16421)=01111111=127
(16422)=11011110=222

Use the following program to see these patterns on your screen. Compare the results to the charts preceding.

```
  10 GOTO 1000
  30 LET K$=INKEY$
  40 IF K$="" THEN GOTO 30
  50 RETURN
  60 SCROLL
  70 LET Z=16421
  80 LET A(S)=PEEK Z
  90 LET A(S+S)=PEEK (Z+S)
  95 PRINT K$;S$;
 100 FOR D=S TO S+S
 110 LET A=A(D)
 120 PRINT A;S$;
 130 FOR F=7 TO 0 STEP -1
 140 LET X=2**F
 150 PRINT A>=X;
 160 IF A>=X THEN LET A=A-X
 170 NEXT F
 180 PRINT ,
 190 NEXT D
 200 GOSUB 30
 299 GOTO 60
1000 DIM A(2)
1100 LET S$=" "
1200 LET S=PI/PI
1500 GOSUB 30
1999 GOTO 60
SYNTACTIC SUM:   22782, 8K ROM
```

A	253	11111101	253	11111101
S	253	11111101	251	11111011
D	253	11111101	247	11110111
F	253	11111101	239	11101111
G	253	11111101	223	11011111
V	254	11111110	223	11011111
G	253	11111101	223	11011111
T	251	11111011	223	11011111
5	247	11110111	223	11011111
6	239	11101111	223	11011111
Y	223	11011111	223	11011111
H	191	10111111	223	11011111
B	127	01111111	223	11011111
>	127	01111111	246	11110110
+	191	10111111	246	11110110
(	223	11011111	246	11110110
I	223	11011111	247	11110111
K	191	10111111	247	11110111
M	127	01111111	255	11111111

When you run this program, hold the key down until the first decimal value prints.

Now we can construct a machine code routine to detect multiple-key presses. But first we will need to choose a specific set of keys to test for. Use the preceding charts to see which bits should equal 0. (Convert them to decimal if you wish.) Now change all the ones to zeros and all the zeros to ones. (Subtract from 255 if you are using decimal.) POKE these new values in locations 16519 and 16523.

For example to test for S, G & A, you must decide which bits to zero. From the preceding tables we see these required zeros:

Letter	16421 Bit=Ø	16422 Bit=Ø
S	1	2
G	1	5
A	1	1

So we need the following:

(16421)=11111101=253
(16422)=11011001=217

To get the values needed for our program, we must reverse all 1s and Øs, bit by bit (complement the number). You can do this using the decimal values by subtracting them from 255. Thus:

```
 11011001=217
+00100110= 38
 11111111=255
```

So we will use 2 and 38 as values to put into our sample MC program.

Now use the following machine code routine to test for a specific combination of depressed keys.

```
   1 REM E9RND7 NEW ="""7 NEW A""
=  TAN
SYNTACTIC SUM:  1848, 8K ROM
  42  37  64 125 230   2 192 124
 230  38 192   1   0   0 201
```

Now enter:

```
2 PRINT USR 16514
3 SCROLL
4 GOTO 2
RUN
```

When you press the selected keys, you'll see a zero on-screen, otherwise you get 16514. So if you use IF NOT USR 16514 THEN...instead of IF INKEY$=...THEN..., you can test for more than one key. This extends your ability to write two-player games or to make combination locks for your programs.

Mather White, Rome PA

[Values stored in 16421 & 16422 are related to the numbers we generated in KEYBOARD SCANNING. Except for the SHIFT key, the content of 16421 equals the B-register value that scans a half-row. Bits 1 through 5 of 16422 equal the data line inputs DØ-D4. For the SHIFT key, 16421 holds 255, and 16422 holds 254.

Cassette input values do not show up in these variables, despite their appearance in keyscans.--KO]

PAUSE WITHOUT FLASH

PAUSE n makes your ZX/TS display a screen for n/6Ø seconds or until a key is pressed. If n exceeds 32767, your computer waits until you press a key. If that key was down when the PAUSE began, the computer ignores it--you must press another. In SLOW mode, the screen flashes at the end of the PAUSE.

You can avoid these problems with the following MC routines. If flash bothers you, use the first of these in a 1 REM to control PAUSE without flash, and without ignoring keys already down when it starts.

```
   1 REM 5▒ ACS UNPLOT 6ORNDUPRN
DACS ?""UARNDW""/ NEXT
SYNTACTIC SUM:  2510, 8K ROM
 33 128   0 203 252  34  52  64
 58  53  64 203 119 192  58  38
 64  60 192  24 243
```

Set this up with:

```
LET A=length of pause-1
POKE 16515,A-256*INT(A/256)
POKE 16516,INT(A/256)
```

AND start it with LET L=USR 16514.

If you simply want to wait for a keypress, you can substitute this code for PAUSE 4E4:

```
   1 REM UARNDW""/ RAND
SYNTACTIC SUM:  1047, 8K ROM
 58  38  64  60 192  24 249
```

Mather White, Rome PA

You can use this MC REM loader to get the numbers listed in Mather White's articles into the REM statements. Be sure to start with line 1 containing as many X's as bytes in the MC, then enter the numbers one at a time. Stop with STOP followed by ENTER.

```
   1 REM XXXXXXX
   2 LET A=16514
   3 INPUT D
   4 POKE A,D
   5 LET A=A+1
   6 GOTO 3
SYNTACTIC SUM:  4031, 8K ROM
```

SYNTAX IS NOT DONNE, NOR BROWNING

SYNTAX will keep on publishing and actively seek to to identify or provide support for Sinclair/ Timex computers. We'll use our existing resources--such as drop-shipping capability--to help other suppliers continue to support users.

If you must stop supplying the products you developed, but want to continue supporting your customers, SYNTAX will accept documentation, program listings, tapes, annotated ROM listings--anything that would help your customers--notes, partial manuscripts, designs, PC layouts, or even special parts.

Want to donate your mailing list to suppliers who are going to continue? SYNTAX will accept list donations and make them available to all suppliers existing as of the donation date at the least cost we can manage for distribution.

To conserve cash, SYNTAX will print smaller issues until our ad base rebuilds. You control this--if you tell advertisers you saw their ad in SYNTAX when you buy, we get more ads. We use that money to bring you more applications as well as utilities, tutorials, hardware projects, and machine code.

Those of you who save money by reading a friend's copy (or illegal copies) of SYNTAX, make advertisers believe it costs more to reach you in SYNTAX than in our competitors. Suppliers count warm bodies per ad dollar and compute bucks spent on an ad per resulting sale. **You** sell the ads. Products are advertised where you tell vendors--by purchase and referral--to contact you.

Within weeks, your free ride stops. You'll see why brand x is in XXXX. Ask not for whom the bell tolls, it tolls for thee, ad buyers and readers who believe big outfits stay in small markets. ECC & Timex quit on you. Whither XXXX?

SYNTAX was made for thee! The best is yet to be, The last of this for which the first was made.

CLASSIFIED ADS

Reach thousands of ZX/TS users--for just $9/line! Send your typed copy (35 characters per line) with check or MO to read us by the 15th to be published in the next issue <u>exactly</u> as typed. No fractions or cent symbols. Include your phone No.
SYNTAX Classified,
RD 2, Box 457, Harvard, MA Ø1451

GET THE WORKS NOW AND SAVE
Get **The Works II** and take, absolutely **FREE**, your choice of three valuable products for your ZX/TS. See our ad on back cover.

SOLVE LOAD PROBLEMS! WINKY BOARD 2 cassette-computer interface also helps programs for loading TS1ØØØ tapes into TS2Ø68 +MORE $2Ø.95 assm 15.95 kitPPD Free catalog G.RUSSELL ELEC. RD1-539 Centre Hall PA 16828

CRYSTAL COAST SOFTWARE: Educational Entertaining and Practical Programs
Send for FREE catalog:
PO BOX 233, MOREHEAD CITY, NC 28557

<u>PRO/FILE UPDATES</u>: the newsletter for ZX Pro/File owners. Get mods, enhancements, and explanations as they occur for $9.95/yr.
Get the <u>PRO/FILE program</u> for $16.95
VISA/MC welcome-Call (6Ø3) 586-7734
Tom Woods Box 64 Jefferson,NH Ø3583

*** THE DEFINITIVE TAX 1983 ***
Fr 16K ZX81/TS1ØØØ. EASY DATA ENTRY AUTO-TAX COMPUTATION FOR EACH CHNGE INCLS INCOME AVERAGING. For APR 84 List:5.95 Cassette:15.95 ** LQP 2365 Newcastle,Cardiff,Ca,92ØØ7 **

HOT Z-II FOR THE 2Ø68
The best of the TS1ØØØ machine utilities has migrated to the 2Ø68. Assemble, disassemble, label, relocate, single step, print/save listings with this multi-purpose utility. HOT Z-II is the way to learn Z8Ø code and discover how the computer works. Just $24.95 + $2 ph from Sinware

SYNTAX is published monthly by a wholly-owned subsidiary of The Harvard Group.

Syntax ZX80, Inc.
RD 2, Box 457, Harvard, MA 01451.
Telephone 617/456-3661.
12 issues, $29. Single issue, $4.

Publisher: Kirtland H. Olson
Editor: Eric K. Olson
Consulting Editor: Ann L. Zevnik
Technical Consultant: Kirtland H. Olson

 ISSN 0273-2696

OUR POLICY ON CONTRIBUTED MATERIAL

SYNTAX invites you to express opinions related to any Sinclair or Timex computer or peripheral, or the newsletter. We will print, as space allows, letters discussing items of general interest. Of course we reserve the right to edit letters to a suitable length and to refuse publication of any material.

We welcome program listings for all levels of expertise, written in either Sinclair BASIC or Z80 machine code. Programs can be for any fun or useful purpose. We will test run each one before publishing it, but we will not debug programs; please send only workable listings. Programs submitted on cassette can be tested more quickly and with less chance of error.

In return for your listing, we will pay you a token fee of $2.00 per program we use. This payment gives us the nonexclusive right to use that program in any form, world-wide. This means you can still use it, sell it, or give it away, and so can we.

We will consider submissions of news and hardware or software reviews. Please keep articles short (350–400 words). Again, we reserve the right to edit accepted articles to suitable length. We will pay 7 cents per 6 characters, including spaces and punctuation, for accepted articles.

When you send in articles for possible publication in SYNTAX, please include the following information:

- How to operate the program, including what to input if it does not contain prompts.
- Whether you can run the program over again and how.
- How to exit the program.
- The Syntactic Sum (program published in June 81; send SASE for a free copy).
- What RAM size program requires.
- What ROM program uses (8K, 2068, Spectrum).
- For MC programs, what addresses must change to relocate the code and what ROM calls are used.

We pay for this explanatory text at the same rate as we pay for articles in addition to payment for the program itself.

If you want us to return your original program listing or article, please include a self-addressed, stamped envelope. Otherwise, we cannot return submitted material.

FOR ADULTS ONLY:Software Package,8 games,8-14K ea..Send $24.95:R.Todd 206 Sheridan St. N.Easton,Ma.02356

*** TEXTWRITER 2000 ***
TS2068 WORD PROCESSOR. DOUBLE WIDE PRINTOUT FROM TS2040. FULL EDITING. WRITE FOR INFO. $18.95 CASSETTE. BOB FINGERLE, 39639 EMBARCADERO FREMONT, CA 94538

MARINE & TROP. FISH PROGRAMS,Set up feeding, maint.,all you must know. 2 cass. $13 ea.:KIDSMATH, add, sub, mult, div. 1 to 3 digits:$9:HANGMAN 500 words,10 categ:$10:LITTLE BLACK BK. mail & phone list:$7: ZX/TS 16k all on cass. lists $3:CAJUN SOFTWAR PO BOX 624, Chal., La., 70044

CASINO KENO - for TS1000 or TS2068. A game for one or a room full. Mark your tickets then watch the numbers come up on the display - just like the Casinos at Las Vegas. T/S 2040 Printer recommended or use printed tickets supplied. SASE for printout fact sheet or order CC44 for TS1000 or CC144 for TS2068. $17.95 + $2.00 P&H. Calif residents add sales tax. MACSHAK SOFTWARE 73-312 IRONWOOD ST PALM DESERT CA 92260.

GOLF HANDICAPPER computes USGA han. for 46 players. 16K. $20 ppd. Personal Computer Products 11200 Lockwood Dr. #307 Silver Spri. MD 20901

Fill out the coupon below and mail to: SYNTAX, RD 2, Box 457, Harvard, MA 01451

s2/84

☐ My check is enclosed.
Make checks Payable to:
SYNTAX ZX80, Inc.

☐ Please charge my ☐ VISA
☐ Diner's Club ☐ Mastercard
☐ American Express ☐ Access
☐ Carte Blanche ☐ Barclaycard

Account number _____

Exp. date _____ Bank number (MC only) _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Phone: Day (___) _____ Evening (___) _____

☐ My subscription number is: _____
☐ This is a new subscription

YES! Please send me:

☐ The Combination II (13 issues of SYNTAX and SQ Winter 82–Summer 83) $39
☐ The Catch-up II (SYNTAX Jan. 82–Jan. 84, SQ Winter 82–Summer 83, plus binder) $77
☐ **THE WORKS II** (SYNTAX Nov. 80–Dec. 83, SQ Winter 82–Summer 83, plus 2 binders) $97
☐ 12 issues of SYNTAX $29
☐ 3 issues of Syntax Quarterly (Winter 82–Summer 83) .. $25
☐ 1 issue Syntax Quarterly ☐ Winter 82 ☐ Spring 83 ☐ Summer 83 ..... $9
☐ 1 Binder ..... $9 ☐ 1 issue of Syntax $4

Telephone orders call
617-456-3661
These offers expire 4/15/84 — SUBSCRIBE NOW.

THEIR LOSS IS YOUR GAIN

A major software retailer went belly up, so we can bring you these great values! Get **THE WORKS** now and take, **absolutely FREE,** any three of these valuable products for your ZX/TS computer.

Includes:

- **THE WORKS II**, our complete collection of SYNTAX and SQ through December 1983--three years of our experience and expertise for your ZX81/TS1000.

Plus your choice of any three:

- **TS1016 16K RAMpak**--upgade your system or get a spare now! These are becoming difficult to find.

- **The ZX81/TS1000 Home Computer Book**--one of the finest books about the ZX/TS, including beginning and advanced BASIC, machine code, memory maps, ROM calls, code charts, and more!

- **Vu-Calc, Frogger,** or any of the other Timex software packages listed on our order form--thousands of these sold at $10 to $20 each!

Due to limited supply, we ask you to list five preferential choices on the order form. We will do our best to deliver your top three choices. Products may be ordered seperately at the prices listed on the order form. We pay all shipping for **THE WORKS** and your 3 free products. Shipping for additional products $1/item.

This offer expires 4/15/84, so order now!

Quan	Code	Item	Price	Amt
	WRK	**The Works II** plus any three items below (only one free RAM per order, please). My preferences for 3 **FREE** products are: [ ] [ ] [ ] [ ] [ ] (1st 2nd 3rd 4th 5th)	$97	
I also want to purchase these products:				
	HCB	**The ZX81/TS1000 Home Computer Book**	$9	
	RAM	**TS1016 16K RAMpak**	$17	
	VUC	**Vu-Calc**	$6	
	FRG	**Frogger**	$6	
	ORG	The Organizer	$6	
	BDG	The Budgeter	$6	
	AMT	Loan/Mortgage Amortizer	$6	
	CHK	The Checkbook Manager	$6	
	CPN	The Coupon Manager	$6	
	CAR	The Car Pooler	$6	
	STP	The Stamp Collector	$6	
	STK	Stock Option Analyzer	$6	
	MAT	Super Math	$6	
	STC	States and Capitals	$6	
	CCC	Chess and Chess Clock	$6	
	BGM	Backgammon and Dice	$6	
	GAM	The Gambler	$6	
	CUB	The Cube Game	$6	
	GFT	Grimm's Fairy Trails	$6	
We pay all P+H for WRK and **FREE** products.			P+H ($1/item)	
			TOTAL	

SYNTAX, RD 2 Box 457, Harvard, MA 01451

[] Check (payable to SYNTAX ZX80) enclosed
[] MC [] VISA [] AMEX [] Diners Club
Account Number _____
Exp. Date _____ Bank Number (MC) _____
Signature _____
Name _____
Address _____
City _____ State ___ Zip _____
Phone Day (___)_____ Night (___)_____
[] I am already a subscriber to SYNTAX

TELEPHONE ORDERS CALL (617) 456-3661

SYNTAX

THE HARVARD GROUP
Bolton Road, Harvard, Mass. 01451

First Class

U.S. Postage PAID Harvard, MA Permit No. 8 01451

MR WILLIAM TOMLINSON
3635 RIVEREDGE DR.
JACKSONVILLE FL 32211

0585XU68 J U L 8 4