

# SYNTAX

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## **TIMEX TO SELL REPLACEMENT PARTS FOR TS1000**

You will be able to get Timex replacement parts for your TS1000 sometime this spring. According to Carlos Dragovich of Timex, the Little Rock, AR, facility will sell parts and schematics, probably by this May. Timex will also set up an 800-number line for inquiries.

## **MEMOTECH 32K-TIMEX INCOMPATIBILITY REPORTED**

Readers report their Memotech 32K RAMs do not work with TS2040 printers. Memotech knows about this problem and sent a TS2040 to its British office for testing. Said Fateh of Memotech told us one customer exchanged his TS2040 for another, which does work with his 32K RAM. So far no theories on the cause.

## **DEFECTIVE LASERSCAN RAM REPLACEMENT AVAILABLE**

Laserscan Electronics just discovered that some of their early model 16K RAM packs, produced until mid-January 1983, are defective. These RAMs are green and carry the number CB-004 on the circuit board. Laserscan will replace your early model 16K RAM free of charge. President Dennis Hawkins says the new RAM, smaller and white, has no reported problems. He adds you can get a free listing of Laserscan's ZX81 Disassembler and Tic Tac Toe programs for an SASE. Laserscan Electronics, 2305 Broadway, Riviera Beach, FL 33404, 305/842-4255.

## **NORRIS ELECTRONICS BACK IN SLIDELL**

We reported incorrectly that Norris Electronics moved to Metairie, LA (Apr.83). Tracy is at his former 144 Terry Dr., Slidell, LA, address. Please don't call his beleaguered relative at the Metairie number. Contact Eileen Linker, Office of Consumer Protection, POB 44091 Capitol Station, Baton Rouge, LA 70804-4091, 504/925-4401 for complaints.

## NEW PRODUCTS AND SERVICES

Timex announces new 2-16K software for kids and adults, \$9.95-\$19.95, available in retail stores: IRA Planner, Home Improvement Planner, Ator the ABC Gator, Punctuation Master, Geometry I, Algebra I and II, Frogger and Stock Market Game.

J.V. Kane's system to measure voltages, temperatures--complete analog-digital computer systems include 64K TS1000 with ZX printer, assembler, disassembler, utilities, A/D input/output routines, TV or monitor, recorder, 8 analog inputs and outputs with 8-bit resolution and 2ms read time. \$1000. J.V. Kane and Co., 109 Ardmore Ave., Ardmore, PA 19003, 215/649-1782.

Silicon Valley North of Hammond, IN (where smokestacks meet RAM packs), offers ZX/TS education software. Its menu-driven first program, GRADEBOOK, is sophisticated, flexible and friendly, says president R. Boltuck. User club discounts. Free catalog and simulated output for SAE. Tape with documentation, \$7.95 plus \$1 P&H. Silicon Valley North, POB 2442, Hammond, IN 46323.

Data Storage and Display System gives you graphing capabilities in a data storage program. Enter data then recall it as a tabular list or graph. Either display gives a summary of highest and lowest points, closing point, file number and title, file sum and mean score. Menu-driven. On tape, \$14.75 plus \$1.25 P&H. ZX-Panding, POB 25, Newton, NC 28658.

Mutual Fund Advisor helps you buy and sell no-load mutual funds. 16K tape, listing, instructions and sample data, \$12.95 plus \$1.25 P&H. 16K Compute helps you work with math or statistics. \$14.95 plus \$1.25 P&H. Both by Rolf Miller, from Computer Engineering Services, POB 1222, Show Low, AZ 85901.

Handy utilities from M-Ware: ZX to ASCII code, decimal-hex-binary and degrees-radians conversions, plot sine, parabola and circles, and memory remaining. Tape plus instructions, \$11.95. M-Ware, Garnet Ridge Road, Rt.1, Hiram, GA 30141, 404/445-6544.

Virtuoso, a 2K music synthesis program, offers 10-octave range, 150-note length, whole to 32nd and dotted notes and rests. It plays through TV, amplifier or AM radio. Tape and instructions (includes coding from written music for non-musicians), \$6.95 (no P&H in US). W.D. Maples, 688 Moore St., Dept. X, Lakewood, CO 80215.

Find pinouts for virtually all 54/7400 TTL ICs on a single card. Two-sided, two-color card of durable plastic covers part number, family type, description and pinout in compact tabular format. \$5.95 plus \$1 P&H. Micro Logic Corp., POB 174, 100 Second St., Hackensack, NJ 07602, 201/342-6518.

SL-6 Shift lock kit for ZX/TS/MicroAce computers gives one-finger typing. Tap the adjustable touch-sensitive contact and SHIFT key holds for 3-5 keystrokes. LED indicates SHIFT on. Kit (SL-6 module, capacitor, LED) \$17.46 ppd first class. BC-80 blinking cursor module for ZX80s causes normal and syntax error cursors plus various graphics to blink, \$17.46 ppd. 1st class. Kaltek Calculator Technology, Box 7462, Rochester, NY 14615, or Box 971, Adjuntas, PR 00601.

Design and print upper/lower case, special foreign language letters, or any new characters. 20K program requires 64K RAM and ZX printer. On tape with two keyboard overlays and instructions, \$22.50 money order or check (five-week delivery on check orders). J.J. Castillos, POB 7274 Station A, Toronto, Ont. Canada M5W 1X9.

Two new program listings: Madame Ruby simulates artificial intelligence in matters of life, love and health. 16K listing, \$5. Arcade games package gives two 16K listings, Tic Tac Toe and Tank Zap. \$3. Florida Creations, POB 16422, Jacksonville, FL 32245.

See those bats and dragons with new animated adventure game, Caves of Zulu. Needs 16K RAM. \$19.95 plus \$2 P&H. Stuart Software, 25381-G Alicia Pkwy., Suite 316, Laguna Hills, CA 92653, 714/855-4753.

Build a 16K RAM for \$39.95, optional plastic case \$4.95. Assembled 16K RAM \$44.95. Add \$2.95 P&H, FL residents add 5%. 90-day warranty, layaway available. Laserscan Electronics Corp., 2305 Broadway, Riviera Beach, FL 33404, 305/842-4255.

Personal Weight Control Program helps tailor and monitor your diet. Tape and guide available from IPS distributors for \$29.95. International Publishing and Software, 3952 Chesswood Dr., Downsview, Ont. Canada M3J 2W6, 416/636-9409.

Working Mother's Dilemma offers four 2K games: Mad Dash, Carfool, Harried Housewife and Shopping Mall. \$14.95 (CA residents add 6%). 2-Bit Software, POB 2036, Del Mar, CA 92014, 619/481-3629.

The SpecialWare Directory lists instructional, administrative, professional and evaluation software for special education. Expect some but not lots of ZX/TS software, out late May. LINC, 1875 Morse Rd., Suite 215, Columbus, OH 43229, 614/263-2123.

Sell your programs through on-line referrals to software publishers. Listing and one program category, \$20, extra categories \$5 each. Blind box service \$10. Programmers' Pipeline, POB 666, Glendora, CA 91740, 213/914-4317.

## PROGRAM IMPROVEMENTS

Here's a more efficient way to simulate ON GOTO statements (Feb.83). Look at this short program:

```
10 PRINT "WHAT IS YOUR COMMAND
(1-4)?"
20 INPUT A
30 ON A GOTO 50, 70, 90, 110
40 GOTO 20
50 PRINT "NORTH"
60 GOTO 20
70 PRINT "SOUTH"
80 GOTO 20
90 PRINT "EAST"
100 GOTO 20
110 PRINT "WEST"
120 GOTO 20
```

To adapt it, change line 30 to:

```
30 GOTO (50 AND A=1)+(70 AND A
=2)+(90 AND A=3)+(110 AND A=4)+(
40 AND A<1 OR A>4)
```

This line directs the computer to the designated line numbers when an A value matches. When A does not equal a listed value, the computer goes to line 0. Thus, the last part (40 AND A<1 OR A>4) sends the computer to the next line number.

Carl Bush, Baltimore, MD

Joe Glass noted his program Office Manager (Apr.83) gives an error 5 when you view files. Add:

```
500 PRINT AT 21,0;"PRESS ENTER
TO CONTINUE"
510 INPUT Z$
520 CLS
530 RETURN
2727 IF PEEK 16442<=5 THEN GOSUB
500
2912 IF PEEK 16442<=5 THEN GOSUB
500
```

George T. Milonas, Tacoma, WA

In Office Manager, menu choices 3 and 9 incorrectly imply you can alter phone book and report files. The word "ALTER" should read "ADD."

To alter files, add this line:

```
2906 PRINT L
```

When you choose menu item 12 the slot number prints before the line. Then enter in the immediate mode:

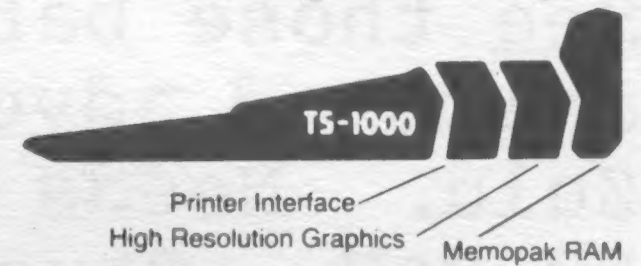
```
LET F$(slot)="altered information"
GOTO 2900
```

Also, the program cannot reach line 250; it serves no purpose.

R.B. Mason, Arlington, VA

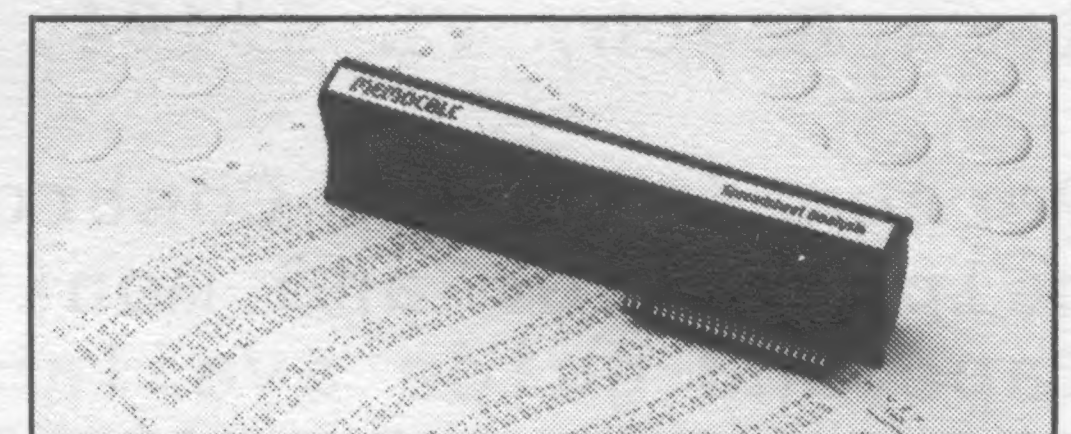
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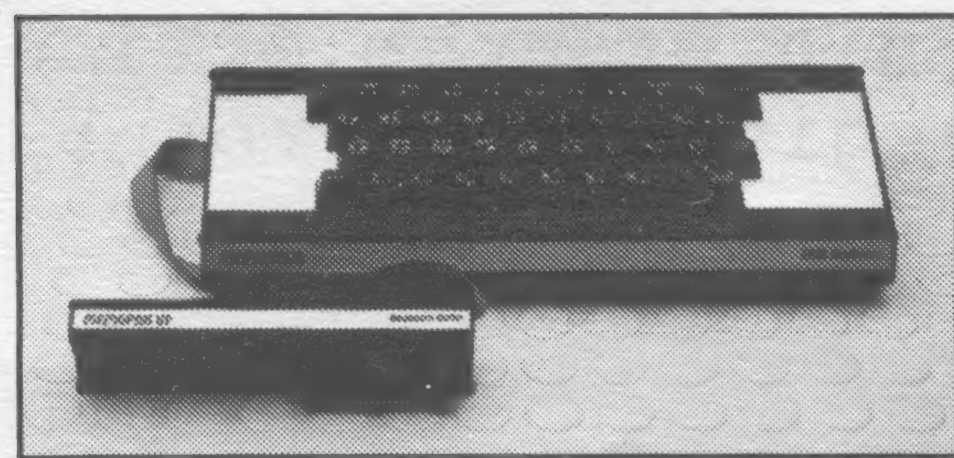


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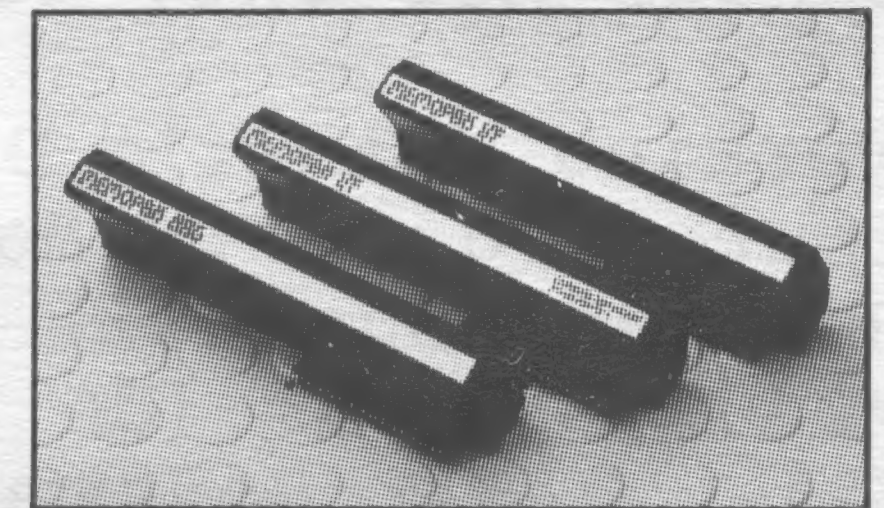
**MEMOTECH KEYBOARD** For ease of operation, the Memotech keyboard is a high quality standard typewriter keyboard, with TS-1000 legends. The keyboard is cable connected to a buffered interface which is housed in a standard Memopak case and plugs directly into the back of the



TS-1000 or other Memopaks. **MEMOPAK HRG** The Memopak High Resolution Graphics, with up to 192 by 248 pixel resolution, enables display of high resolution "arcade game" style graphics through its resident 2K EPROM, programmed with a full range of graphics subroutines.

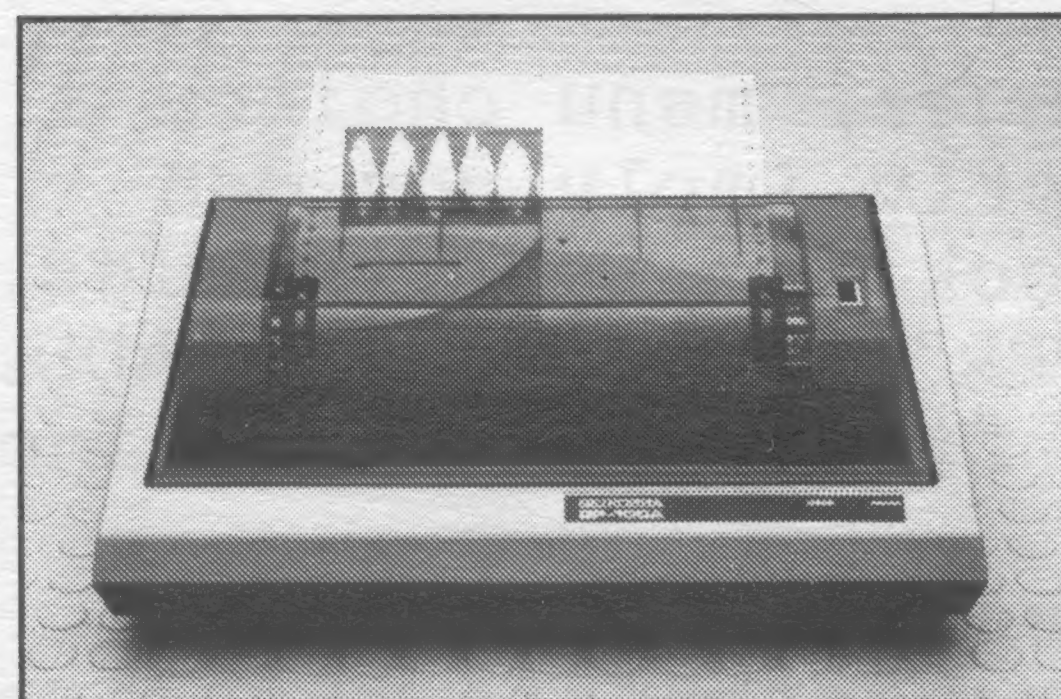
### CENTRONICS PARALLEL AND RS232 INTERFACES

Memotech's Interfaces enable your TS-1000 to use a wide range of compatible printers. The resident software in the units gives the



complete ASCII set of characters. Both Memopak Interfaces provide lower case character capabilities and up to 80 column printing. The RS232 Interface is also compatible with modems and terminals.

**SEIKOSHA GP 100A PRINTER** The Seikosha GP 100A uses a 5x7 dot matrix printing format with ASCII standard upper and lower case character set. Printing speed is 30 characters/second with a maximum width of 80 characters. The printer uses standard fanfold paper up to 9-1/2 inches wide. The GP 100A is offered as a package including cable and



interface. Other printer packages are also available through Memotech.

**ORDER AT NO RISK.** All Memotech products carry our 10 day money back guarantee. If you're not completely satisfied, return it within ten days and we will give you a full refund. And every Memotech product comes with a six month warranty. Should anything be

defective with your Memotech product, return it to us and we will repair or replace it free of charge. Dealer inquiries welcome. To order any Memotech product use the order coupon or call our toll-free number **800/662-0949**.

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32K RAM	99.95		
64K RAM	149.95		
Memocalc	49.95		
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## HARDWARE REVIEW

**Product:** Sun KD-81 full-size keyboard conversion for the ZX/TS

**From:** Suntronics Co., Inc.  
12621 Crenshaw Blvd.  
Hawthorne, CA 90250

**Price:** \$69.95 plus \$4 (P&H)  
CA residents add 6%

"Easy to install--no soldering, no modifications," said the ad. Guess what? It was right!

In five minutes I felt like a professional programmer, efficiently inputting on a fast, full-sized keyboard. Installation is easy:

1. Remove three screws under foot pads securing ZX/TS case and two screws holding ZX/TS PCB. Remove the bottom case, then the two screws holding the top case.
2. Unplug the two ribbon cables from the ZX/TS keyboard.
3. Attach the PCB to the KD-81 case with four screws and washers.
4. Plug the two ribbon cables from the KD-81 keyboard into the KD-81 keyboard case.
5. Close the case and install the remaining four screws in the bottom of the KD-81 case. (All screws and washers are supplied.)

You get a professional-looking full-size keyboard with 41 keys, including a full-size space bar and shift keys on both sides of the keyboard. Keytops spell out commands and illustrate graphics for easy entry. Two colors make the keys easy to read. High-impact black plastic and vaporized metal shielding enclose the keyboard.

I like the unit's close resemblance to the original keyboard; following the ZX/TS manual is easy as pie. The new shift key where the space key was and the full-size space bar make touch typing convenient and comfortable.

I highly recommend this product to Timex Sinclair users.

Daryl Faulkner, Fountain Valley, CA

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(7) Bio-map	Not Avail.	Not Avail.	\$14.95
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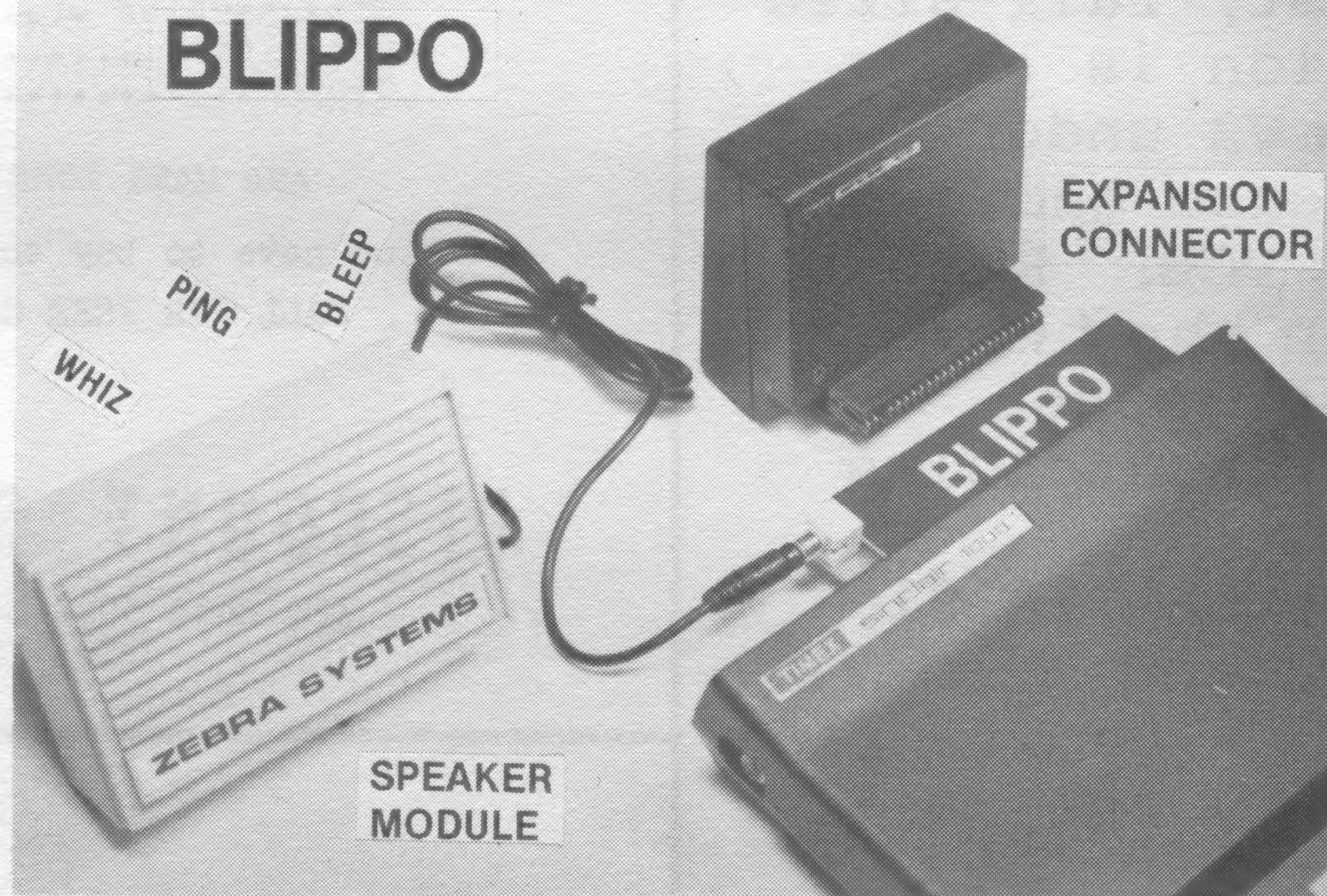
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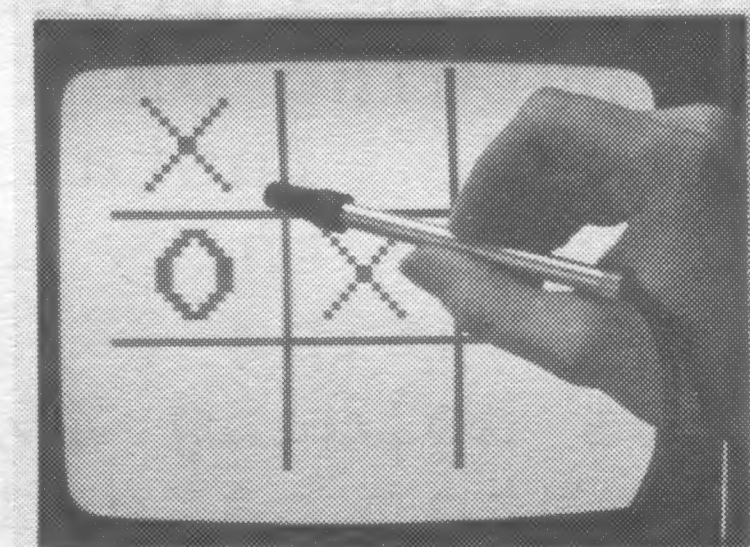
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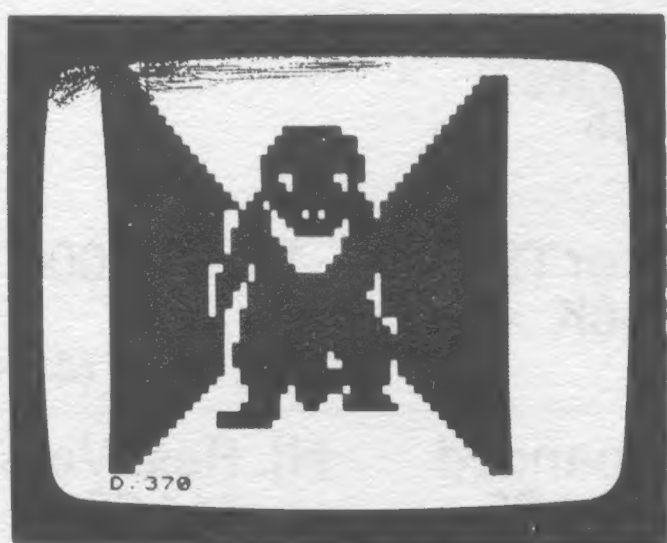


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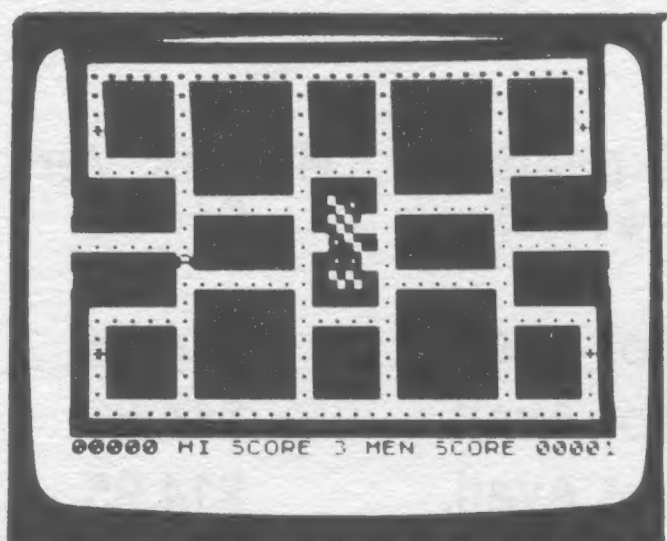
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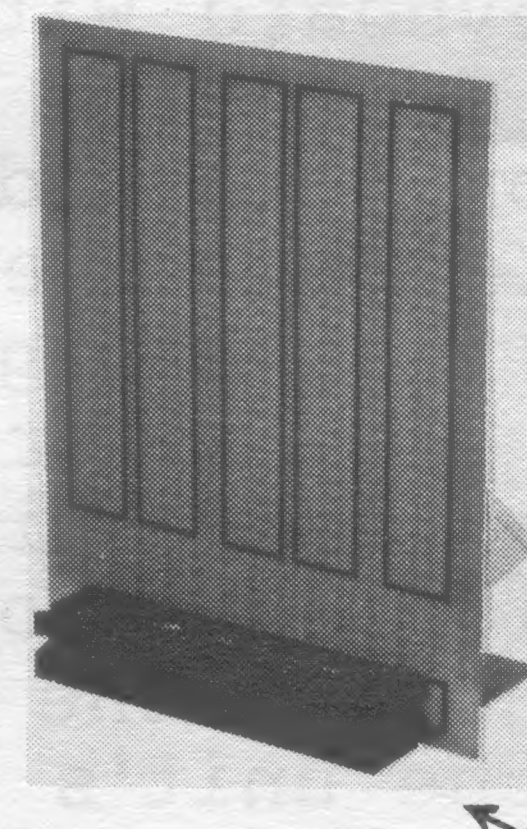


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## THE ZX/TS AND 2716 450ns EPROMS

You may run into trouble using 450ns 2716 EPROMs on your ZX/TS. Though the PROM programs and verifies in the programmer, it won't function. The problem results from inadequate speed--the EPROM must respond in less than 427ns; most 2716s offer 450ns response.

Let's examine an operating timing cycle to see where the problem lies, then look at available solutions. You'll see why you can program and verify a 450ns EPROM, but you cannot use it.

Consider all Z80 CPU instructions in a ZX/TS computer as a sequence of basic machine operations. The most fundamental of these is an operation-code fetch (OFC), called machine cycle 1 or simply M1. With this operation the CPU fetches the instructions to execute from the program stored in memory.

Each machine cycle is divided further into a series of T states.

For example, the basic M1 cycle consists of four T states. The processor's frequency (3.25 MHz for the ZX/TS's Z-80A) determines the length of each T state. So each T state's period is 1/3.25 microseconds or 308ns.

Examining an OCF timing diagram, we see that MREQ NOT goes low halfway through the first T state and that the CPU reads the data on the bus with the rising edge of the third T state. Ideally then the memory device has only 3/2 T states to get ready to be read in an M1 OCF operation if the MREQ NOT signal is used in the device's address decoding (as is usual). This time amounts to 462ns.

Unfortunately, propagation delays through the decoder used to select the particular memory device reduce this time. Each LSTTL gate used delays the device select signal by about 5ns. For example, an MREQ NOT signal might be delayed about 35ns when delivered through

THE INS AND OUTS OF THE



# TIMEX TS1000 & ZX81



DON THOMASSON

A HARDWARE MANUAL FOR TS1000 & ZX81

## At last a reference manual which covers all the hardware aspects of the TS1000 - includes complete circuit diagrams!

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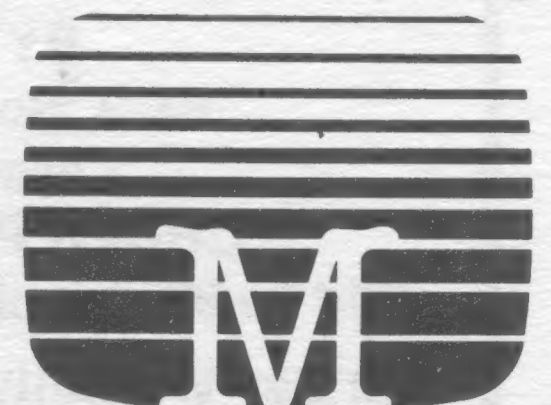
Enclosed is my check or money order for \$ \_\_\_\_\_

Please charge my  Visa or  MasterCard Card # \_\_\_\_\_ expiration date \_\_\_\_\_

Signature \_\_\_\_\_ Name \_\_\_\_\_

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two halves of a 74LS139 decoder. The time available to the memory device is therefore reduced to 462 minus 35ns, or 427ns.

Maximum CE NOT to output delay ( $t_{CE}$ ) of a 2716 450ns EPROM is 450ns. Some offer an access time lower than 450ns but others are near the limit. Using 450ns EPROMs in a system running at 3.25 MHz is therefore marginal at best.

You have two options: use EPROMs with a shorter access time (you can now get single 2716-1 350ns EPROMs for \$4.50), or insert a wait state into every M1 cycle, increasing the time available to the memory device by one T state to 769ns (ideally). See Figure 1.

Ordinary memory read operations add an additional half T state before the CPU samples the data on the bus. In other words, the memory device has 615ns to get ready. This extra delay can lead to the frustrating phenomenon of being able to verify a 450ns EPROM

with your ZX/TS EPROM programmer, but being unable to use it.

Paul Hunter, Okemos, MI

This circuit is not implemented in Hunter's non-volatile RAM.--AZ

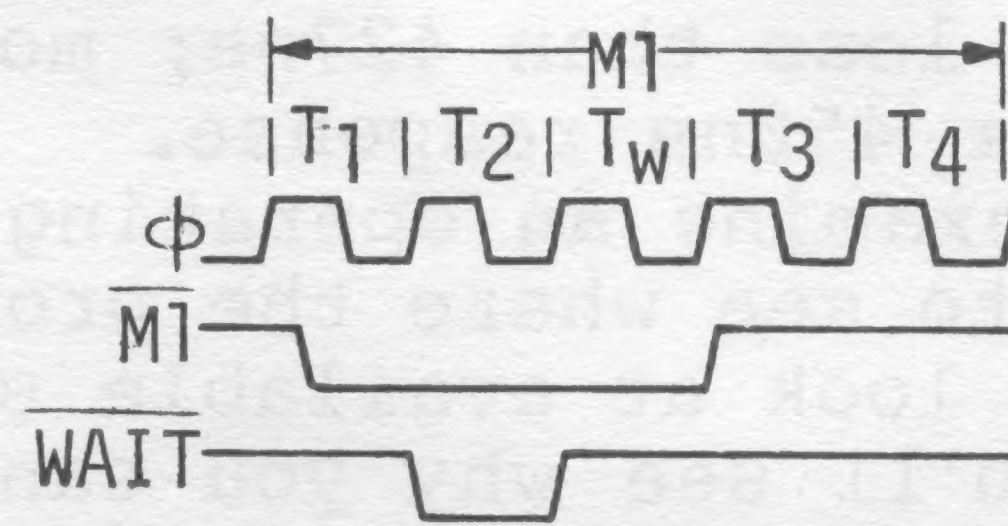
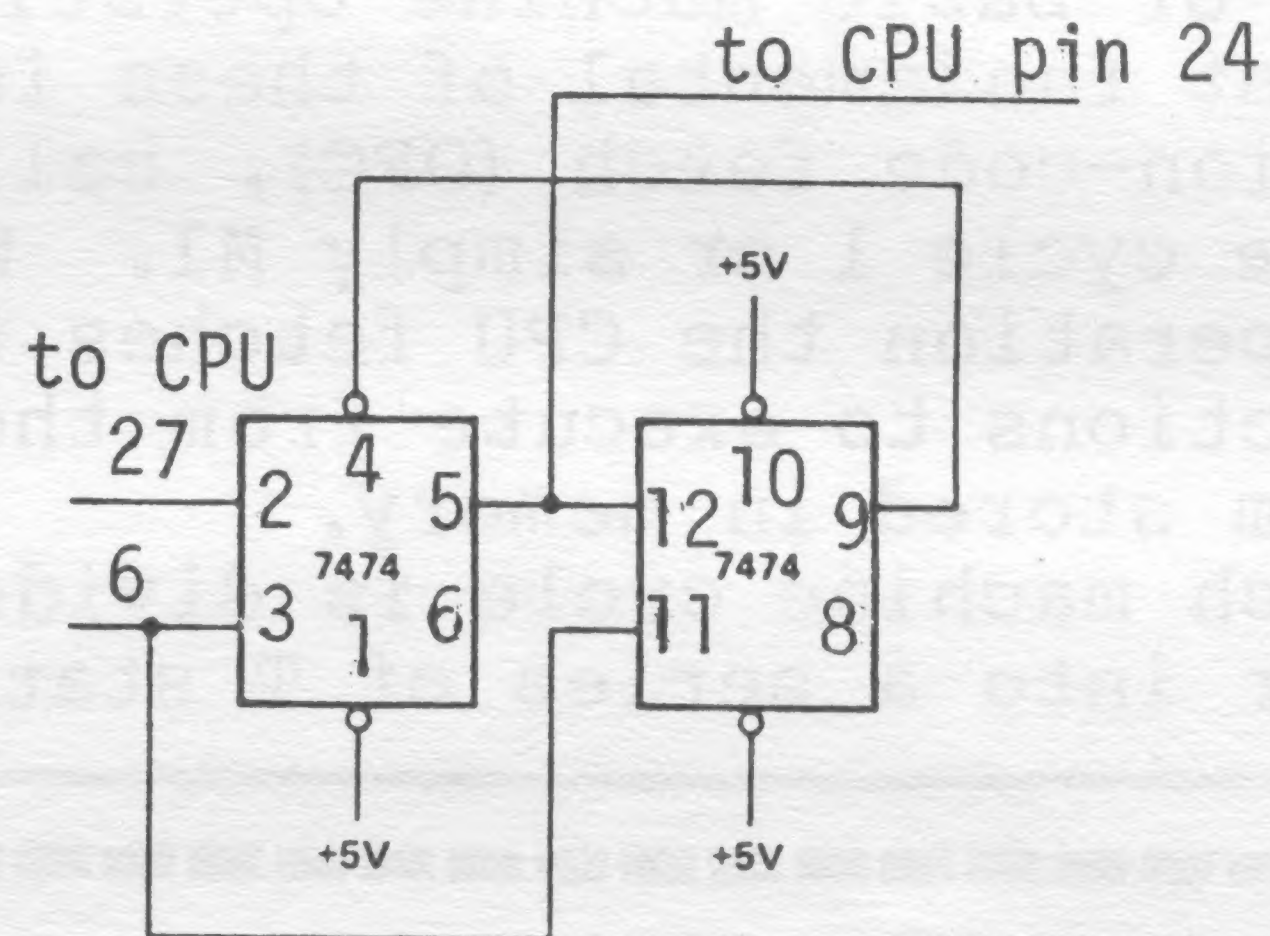


Figure 1. ADDING ONE WAIT STATE TO AN M1 CYCLE



Schematic courtesy Zilog Inc.

+5 to pins 14, 13, 10, 1 of 7474

0V to pin 7 of 7474

### DECIMAL TO FLOATING POINT BINARY

John Bowden describes an interesting pencil-and-paper procedure to convert decimal numbers to ZX/TS floating point binary (Jan.83).

His procedure works fine, but is slow and can only handle positive integers smaller than  $2^{*}32$ . Your ZX/TS ROM has a number conversion routine that is faster, not as limited and easy to use. You can even use it in command mode:

```
LET X0X=N
LET Y0Y=PEEK 16404+256*PEEK 16405
PRINT PEEK (Y0Y-5),PEEK (Y0Y-5)
,PEEK (Y0Y-4),PEEK (Y0Y-3),PEEK (Y0Y-2)
```

These three commands display a list

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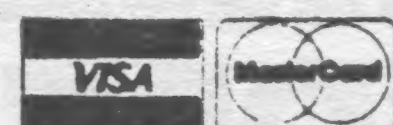
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3





of decimal values of the five bytes for number n, in Sinclair-type floating point format. But this routine requires a lot of typing to convert one number.

It works by assigning a decimal number to the variable X0X, the last item stored in the variables area of program memory. The last-defined variable is always located just before the address held in system variable E\_LINE. The second command PEEKs E\_LINE to get the address. The third command backs up from that address and displays bytes containing the floating point number, exponent byte first, followed by the mantissa (decimal part of a logarithm) bytes in order of decreasing significance.

Yet, a BASIC program modeled after the preceding command sequence gives problems--primarily insuring X0X is always the last-defined variable. Avoid this problem by using the variables start area marked by system variable VARS, rather than the variables end area marked by E\_LINE.

Listing 1 shows 11 lines you can use to start any program needing decimal to binary conversion.

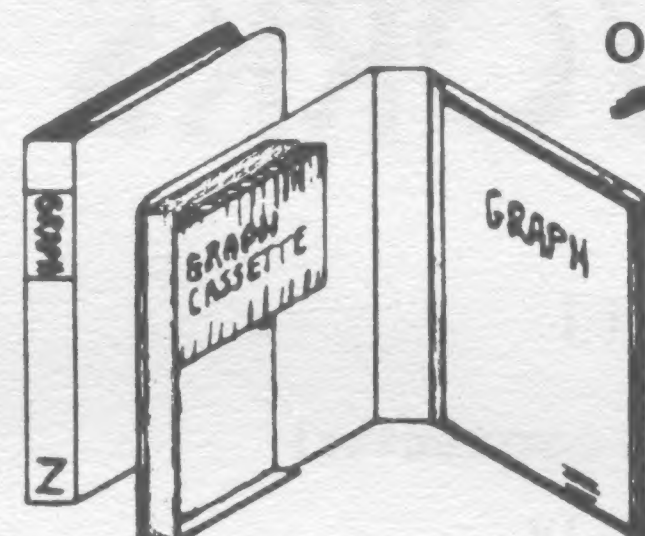
To use this program assign the decimal number (or numeric expression) to variable X0X, and then GOSUB 50. When executing the program by RUN or GOTO, line 10 clears the variables area of program memory. Thus, variable X0X initially gets the value 0 and becomes the first-defined variable. System variable VARS always holds variable X0X's address.

On executing a program line that assigns a value to a variable, the computer automatically converts the value to floating point binary form and stores it that way. Line 50 gets the X0X address from VARS. Lines 60-68 put each byte of the binary number into its own variable. After the subroutine returns, the main program can do anything it likes with the information, held in variables Z1Z to Z5Z.



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This conversion routine uses unique variable names to minimize inadvertent re-use of the same names later in the main program. Reusing variable names won't bother the conversion routine, but the main program might go berserk.

This routine is reasonably fast, and can convert any number--positive, negative, fractional, or any ZX/TS numeric expression.

C.C. Stadler, Orlando, FL

Listing 1.

```

10 CLEAR
20 LET X0X=0
30 GOTO 80
40 REM SUBROUTINE TO CONVERT
DECIMAL NUMBER IN X0X TO FIVE
BYTE F.P. BINARY IN Z1Z TO Z5Z
50 LET Y0Y=PEEK 16400+256*PEEK
16401
60 LET Z1Z=PEEK (Y0Y+3)
62 LET Z2Z=PEEK (Y0Y+4)
64 LET Z3Z=PEEK (Y0Y+5)
66 LET Z4Z=PEEK (Y0Y+6)
68 LET Z5Z=PEEK (Y0Y+7)
70 RETURN
80 REM CONTINUE FROM HERE WITH
MAIN PROGRAM
SYNTACTIC SUM: 17300, 8K ROM
  
```

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Line 130 controls the background--try another value. STEP in line 70 and variable G in the FOR-NEXT loop control the height and thickness of the lines. In line 180, try using CH (from line 55) in place of CNTR. Generate inverse characters by swapping values in lines 130 and 150. Switching the order of A and B in line 180 rotates the letter another 45 degrees--upside down.

Enter any length message. Each character takes about 35 seconds in FAST to generate and print. Press RUN, ENTER to create another message; BREAK exits.

Joseph P. Williamson, Timex Users' Group, Gainesville, FL

```

10 PRINT "INPUT MESSAGE"
20 INPUT M#
30 LET LEN=LEN M#
40 FOR L=1 TO LEN
50 LET CH=CODE M#(L)
60 LET R=7680+(CH*8)
70 LET A=1
80 LET B=1
90 FOR R=R+7 TO R STEP (-0.25)
100 LET RC=PEEK R
110 FOR H=1 TO 7
120 LET D=RC
130 FOR G=1 TO 3
140 IF G=2 OR 3 THEN LET RC=D
150 LET CNTR=0
160 IF RC<128 THEN GOTO 170
170 LET CNTR=128
180 LET RC=RC-128
190 LET RC=RC*2
200 PRINT AT A,B;CHR# CNTR;
210 LET A=A+1
220 NEXT G
230 NEXT H
240 LET A=1
250 LET B=B+1
260 NEXT R
270 STOP
SYNTACTIC SUM: 29426. 8K ROM

```

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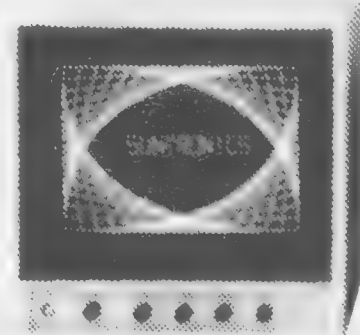
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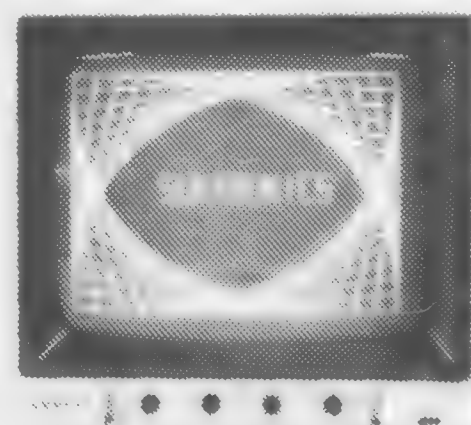
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DEAR EDITOR:

I am developing an interactive educational program. Unfortunately we are in a rural area at the very end of REA power lines over 20 years old. The system inflicts frequent drop outs and power failures, real disasters after five hours of programming.

So I recently built a 15V regulated power supply and wanted a convenient package. I combined it in the same case as the battery back-up unit in SYNTAX, Aug.82.

I built the full system as described, including filter cap and LED power indicator, but added a DPST power switch to control AC and output power (DC). I found with a switch controlling AC only turned off, the battery pack still supplies DC to the computer. I didn't want to unplug my ZX81 each time I shut down; now a simple double pole switch does the job.

I housed the unit in a larger chassis (Radio Shack 270-269), and used both new and scavenged parts.

My system works perfectly, with a total improvement cost (excluding power supply built earlier) under \$20. A small price for peace of mind and non-disappearing programs.

Joseph Dominiecki, Wisdom, MT

If your printer copies the ZX/TS printer buffer at address 16444 or 403CH, you have this problem: Any floating point number with more than one and fewer than five leading zeros (.01-.00009) prints garbage for the second through last leading zero.

The Print-Ch routine at 07F1H carefully preserves the contents of the CPU's A register when printing to the screen. When the LPRINT flag is set, the Print-Ch routine falls through to the LPRINT subroutine at 0851H. This subroutine fills the buffer with Sinclair character code to output to the printer. Lprint-Ch leaves the A

register loaded with the value of PR\_CC (counter for the printer buffer). The print-a-floating-point-number subroutine at 16B2H outputs a decimal point, a zero, and loops up to four times, causing it to print leading zeros. The code for zero is stored in the A register. When this loop returns from Lprint-Ch, the A register is not set back to zero.

Put the ROM onto EPROM (as in John Olinger's EPROM project, SQ, Winter 82), changing ROM address 16BCH to FBH. Now the loop starts from the point where the A register is set to zero, correcting the bug.

Mike Wagner, Waukesha, WI

About a month ago I bought Sinclair's VU-FILE program, and it works well. I want to use Personal Software Services' QSAVE package with it, but your Nov.82 QSAVE review says that it will not work with self-running programs, nor with those that are saved by name. Since VU-FILE has both these features, I have not been able to eliminate them. How do I modify VU-FILE to use it with QSAVE?

Paul Crecca, Tonawanda, NY

Load it up and get to the main menu. Hit BREAK to get to the BASIC listing. From here you can change the lines for saving to use QSAVE's USR call, or leave the old ones (put a REM in front of each to inactivate it) and add new ones for QSAVE.--AZ

Is it true that Sinclair's disk drives are only sequential access and not random access, due to Sinclair BASIC? As a TS1000 owner, do I have any hope?

Ralph Hilton, Salt Lake City, UT

Sinclair Research in Boston says the "disk drive" about to appear in the UK is really a stringy floppy.

It runs a continuous loop tape, not a true disk. Thus its 3.5 second access is sequential. Sinclair's Microdrive, designed for Spectrums, will not work on ZX81s or TS1000s without a special interface. Timex may offer an inexpensive ZX/TS-compatible disk drive, but not in the immediate future.--AZ

---

Freak your system out without using POKE or USR. Run this program, then try to edit a line. Even CLEAR won't return it to normal.

```
10 GOSUB 20
20 GOTO 10
```

The system does not catch the resulting stack error in time.

---

Dean A. Cuadra, Los Angeles, CA

I want to mention the fine service I received from People's Computer Supply. On Mar. 16, I ordered a Memotech Centronics Printer Interface from them. On Mar. 28 I had the unit--not much more than travel time both ways. In addition to the fast service, they notified me that the price went down and reduced my charge. Service like this deserves praise.

In contrast, CAI Instruments has yet to provide a Stringy Floppy and CAI/O board ordered Jan. 31 (8 1/2 weeks ago as I write). When I call, I am told they'll go out "this week" or "tomorrow." Besides the slow service, CAI charges \$10 more than its current ad states.

---

James R. Shoaf III, Santa Clara, CA

Thanks to Jon Harder for his low-cost, low-tech approach to solving the ZX/TS desktop tangle problem (Mar.83). Two suggestions for lowering cost and improving results: First, ask for a correct sized scrap of finish-quality plywood at the lumber yard. Interior/furniture grade plywood looks good and won't cup (warp across the grain). I got a piece of white

pine ply (10x16x3/4") for \$1.25.

Second, for the switched extension cord, get a feed-through switch (\$.99-1.25) at the hardware store, then dig up a spare extension cord. Put the switch exactly where you want it for easy reach. You can easily install one in five minutes with just a jackknife and a screwdriver.

---

Bob Rettew, Derry, NH

I bought a Byte-Back M-16 RAM module kit, which I highly recommend, in April 1982. I had no problem with assembly and operation until I bought a Timex tape. It wouldn't load. After lots of frustration, I called Byte-Back. They asked if the program contained any machine code (it did), then told me I needed a modification.

They told me to cut the trace from IC U3 pin 9 to IC U14 pin 9, then tie pins 9 and 10 of IC U14 together. Since the mod I've had no more loading problems.

Like many others, I have some problem with RAM crashes. While troubleshooting my RAM for the loading problem, I noticed that touching my logic probe to pin 21A on the RAM edge connector caused the RAM to lose its contents. The schematic showed that pin 21A is a not RESET and my probe showed it was floating. So I tied pin 21A high using a 10K resistor to the 5V supply. This eliminated about 95% of my RAM crash problems.

---

Sidney E. Parker, Newark, CA

I found an ad in January's Creative Computing for Arkay Engravers, 2073 Newbridge Rd., Bellmore, NY 11710, 516/781-9859, for keytops. I have never done business with them.

Steven Rohall, Pittsburgh, PA

Contact Ken Kaplan of Arkay for info on ZX/TS keytops.--AZ

## PERSONAL NET WORTH--8K/16K

Do you wonder if you will ever "get ahead" financially? Personal Net Worth keeps track of your personal finances and figures your current net worth.

It calculates, stores and plots your net worth for 14 years. The table option shows yearly total assets, liabilities and net worth.

Once the array is full, the program lets you add years by deleting the oldest year. With this routine, you don't need to reenter data in new array locations.

Lines 4000 on tell you how to initialize the program. DIMension each variable in line 4010 by preceding it with DIM and pressing ENTER. For lines 4020 on precede each variable with LET and enclose words in quotes. For example, LET N\$="NET WORTH" (ENTER). In line 4030, LET A(1,1) equal the 4-digit year you want to start with, no quotes necessary. (Delete lines 4000-4060 after initializing to save memory.--AZ)

To start, GOTO 10. Pick function 3 to SAVE. After reloading, the program self-executes to reduce the risk of clearing data. After entering data, do not RUN or you lose all data entries including initialization.

Lines 2080-2130 automatically scale the graph. If the current range of numbers doesn't fit your situation, change the values.

To print the table out, change PRINT in lines 2390-2450 to LPRINT (or comparable printer command) and delete lines 2460, 2480, 2490 and 2500. Line 2220 keeps the program from plotting a negative net worth.

When you choose the table option to display data, the program stops after two years. Press CONT and ENTER to proceed.

Inverse graphics are:

990 DATA ENTRY            2999 SAVE DATA  
1990 DISPLAY DATA        4000 INITIALIZE

Russell Crum, Canton, MI

```

1  REM PERSONAL NET WORTH
2  REM R. CRUM FEB.6,1983
10 PRINT AT 0,5;"PERSONAL NET
WORTH"
20 PRINT "SELECT FUNCTION"
30 PRINT AT 3,3;"1. ENTER DATA"
LET 4,3;"2. DISPLAY DATA";AT 5,3;
"3. SAVE DATA"
40 INPUT R
50 IF R<1 OR R>3 THEN GOTO 40
60 CLS
70 GOTO A+1000
999 REM DATA ENTRY
1000 PRINT "LAST ENTRY WAS FOR "
A(Y,1)
1010 IF A(14,12)<>0 THEN GOTO 12
70
1020 PRINT "WHAT YEAR? "
1030 INPUT R
1040 FOR I=1 TO 14
1050 IF A(I,1)=R THEN GOTO 1090
1060 NEXT I
1070 LET A(Y+1,1)=R
1080 LET Y=Y+1
1090 CLS
1100 FOR I=1 TO 8
1110 PRINT A$(I);" AMT?"
1120 INPUT A(Y,I+1)
1130 CLS
1140 NEXT I
1150 LET A(Y,11)=A(Y,2)+A(Y,3)+A
(Y,4)+A(Y,5)
1160 LET A(Y,12)=A(Y,11)+A(Y,6)+
A(Y,7)+A(Y,8)+A(Y,9)+A(Y,10)
1170 FOR I=1 TO 8
1180 CLS
1190 PRINT L$(I);" AMT?"
1200 INPUT L(Y,I)
1210 NEXT I
1220 LET L(Y,7)=L(Y,1)+L(Y,2)+L(
Y,3)+L(Y,4)
1230 LET L(Y,8)=L(Y,7)+L(Y,5)+L(
Y,6)
1240 LET N(Y)=A(Y,12)-L(Y,8)
1250 CLS
1260 GOTO 10
1270 PRINT "DATA STORAGE FULL"
1280 PRINT "WANT TO SHIFT DATA?
(WILL LOSE "
1290 PRINT "OLDEST YEAR) (Y=YES,
N=NO) "
1300 INPUT R#
1310 CLS
1320 IF R#="N" THEN GOTO 10
1330 FOR I=1 TO 13
1340 FOR J=1 TO 12
1350 LET A(I,J)=A(I+1,J)
1360 NEXT J
1370 NEXT I
1380 FOR I=1 TO 12
1390 LET A(14,I)=0
1400 NEXT I
1410 FOR I=1 TO 13
1420 FOR J=1 TO 8
1430 LET L(I,J)=L(I+1,J)
1440 NEXT J
1450 NEXT I
1460 FOR I=1 TO 8
1470 LET L(14,I)=0
1480 NEXT I
1490 FOR I=1 TO 13
1500 LET N(I)=N(I+1)
1510 NEXT I
1520 LET N(14)=0

```

```

1530 LET Y=Y-1
1540 PRINT "DATA SHIFT DONE"
1550 PAUSE 300
1560 CLS
1570 GOTO 10
1600 REM SAVE DATA
2000 PRINT "DO YOU WANT TABLE OR
GRAPH?"
2010 PRINT "ENTER ""T"" OR ""G""
"
2020 INPUT R#
2030 IF R#="T" THEN GOTO 2070
2040 LET MAX=0
2050 FOR I=1 TO 14
2060 IF N(I)>MAX THEN LET MAX=N(
I)
2070 NEXT I
2080 IF MAX/1000<=5 THEN LET MYP
=5
2090 IF MAX/1000>5 AND MAX/1000<
=20 THEN LET MYP=20
2100 IF MAX/1000>20 AND MAX/1000
<=40 THEN LET MYP=40
2110 IF MAX/1000>40 AND MAX/1000
<=60 THEN LET MYP=60
2120 IF MAX/1000>60 AND MAX/1000
<=80 THEN LET MYP=80
2130 IF MAX/1000>80 AND MAX/1000
<=100 THEN LET MYP=100
2140 CLS
2150 FOR I=0 TO .75 STEP .25
2160 PRINT AT I*20,0;MYP-I*MYP
2170 NEXT I
2180 FOR I=0 TO 19
2190 PRINT AT I,4;"-"
2200 NEXT I
2210 FOR I=0 TO Y-1
2220 IF N(I+1)<0 THEN GOTO 2270
2230 FOR J=4 TO ((N(I+1)/1000)/M
YP)+4
2240 PLOT 10+3*I,J
2250 PLOT 14+3*I,J
2260 NEXT J
2270 NEXT I
2280 LET Y#=STR$ A(1,1)+"-"+STR$
A(Y,1)
2290 PRINT AT 21,16-LEN Y#/2;Y#
2300 POKE 10418,0
2310 PRINT AT 22,2;"PRESS ""CONT
"" THEN ""CONT"" AND ""ENTER""
TO RETURN TO MENU"
2320 POKE 10418,2
2330 PAUSE 474
2340 STOP
2350 CLS
2360 GOTO 10
2370 CLS
2380 FOR I=1 TO Y
2390 PRINT "YEAR: ";A(I,1)
2400 PRINT A#(10);" #";A(I,11)
2410 PRINT A#(11);" #";A(I,12)
2420 PRINT L#(7);" #";L(I,7)
2430 PRINT L#(8);" #";L(I,8)
2440 PRINT N#;" #";N(I)
2450 PRINT
2460 IF I/2=INT (I/2) THEN GOTO
2480
2470 NEXT I
2480 STOP
2490 CLS
2500 NEXT I
2510 GOTO 10

```

```

2000 REM SAVE DATA
3000 CLS
3010 PRINT "PREPARE TAPE RECORDER
"
3020 PRINT "PRESS ""CONT"" TO SA
VE"
3030 PAUSE 454
3040 SAVE "WORTH"
3045 CLS
3050 GOTO 10
4000 REM SAVE DATA
4010 REM DIM A(14,12);A#(11,27);
L(14,8);L#(8,27);N(14)
4020 REM N#="NET WORTH"
4030 REM A(1,1)=FIRST YEAR-4 DIG
ITS
4040 REM Y=1
4050 REM A#(1)=CASH;A#(2)=ASSETS
AND NOTES RECEIVABLE;A#(3)=SECU
RITIES;A#(4)=OTHER CURRENT ASSET
S;A#(5)=REAL ESTATE;A#(6)=LIFE I
NSURANCE-CASH VALUE;A#(7)=AUTOMO
BILES;A#(8)=PERSONAL PROPERTY;A#
(9)=OTHER LONG TERM ASSETS;A#(10
)=TOTAL CURRENT ASSETS;A#(11)=TO
TAL ASSETS
4060 REM L#(1)=NOTES PAYABLE TO
BANKS;L#(2)=NOTES PAYABLE TO OTH
ERS;L#(3)=ACCOUNTS AND BILLS DUE
;L#(4)=OTHER CURRENT LIABILITIES
;L#(5)=MORTGAGES;L#(6)=OTHER LON
G TERM LIABILITIES;L#(7)=TOTAL C
URRENT LIABILITIES;L#(8)=TOTAL L
IABILITIES
SYNTACTIC SUM: 11613, 8K ROM

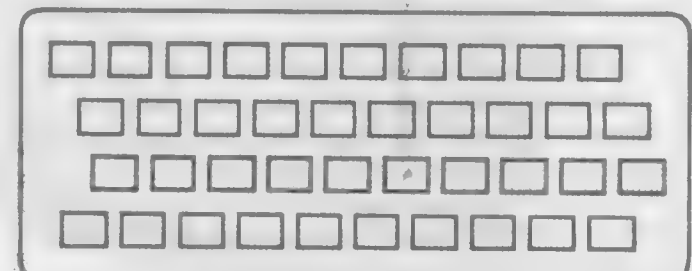
```



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### HARDWARE REVIEW

**Product:** ZX81 Keyboard  
**From:** Memotech Corp.  
7550 West Yale Ave.  
Denver, CO 80227  
303/986-1516  
**Price:** \$99.95 (assembled only)

When UPS delivered my new keyboard, I hastened to see what marvel Memotech developed this time.

Inside I found a full-size keyboard with legible, all-white ZX/TS legends on the keys. The keyboard duplicates Sinclair's keyboard, but with full-travel keys and an extra shift key in the top right corner.

It took longer to unpack the keyboard than to connect it to the computer. The keyboard attaches to your edge connector via an interface in Memotech's standard product housing. The "black box" sandwiches between their other products. Besides attractive to the eye, the functional metallic blue

board is immune to the "wobble and die" syndrome common to most products connecting by the edge connector. The 12-inch flat cable between the keyboard and interface gives the keyboard free movement.

All Memotech products are FCC-approved so that no unwanted RF emissions bother your TV or stereo. I recommend it to anyone who values his or her system enough to buy only the best.

Jeff Pack, Seattle, WA

At SYNTAX we also enjoy our Memotech keyboard. I like the shift key in the upper right corner--I can delete or move the cursor with just one hand. Contrary to Jeff's report, we find the interference level on TVs high. We use a monitor with little trouble. Also we find another change from the original ZX/TS keyboard--the legends are located a little differently. Each key performs the same functions, but the command appearing over a key on the original now appears on the key and below the other legends. Those below keys are on the key fronts. So you need to light your keyboard from the front so you can read the keys.

Our keyboard came with a sticky row of keys on the right side that we fixed by sliding the circuit board left. Now the keys operate smoothly. The connecting cable is a little short, so you must put your computer to the left of the keyboard.

Said Fateh of Memotech tells us that Bill Wright of Sinclair Users' Network (SUN) called about the TV interference. Bill suggested replacing the computer's video cable with a good quality coax cable, preferably gold-plated at both ends. Memotech tested this solution with a Radio Shack 59/U (#15-1535) coax cable, not gold-plated, \$3.99. Said says it clears up interference caused by any add-on. We have not tested it.--AZ

## SAVE ON SAVE AND LOAD

Save about 15 seconds when you save or load. Add this code somewhere in your program (here shown at end) to auto-save:

```
9995 FOR I=1 TO 22
9996 SCROLL
9997 NEXT I
9998 SAVE "NAME"
```

SAVE with RUN 9995. Each SCROLL execution collapses the bottom line; 22 rounds collapse the whole display except last two edit lines. In SLOW the computer takes a while to unscroll to full screen.

Bob Berch, Rochester, NY

## VENDOR REPORT AND NOTES

Has Frog Software, a recent SYNTAX and SQ advertiser, croaked? We've tried to get them on the phone for over two weeks; now it's disconnected. If you have unfinished business with them, let us know.

Gwen Marsh of Brainchild reports they are back-ordered on Kolorworks. If you are waiting on an unfilled order, call Brainchild collect at 414/691-3903.

Memotech and its distributors have advertised RS232 interfaces for several months, but no one has any in stock. We suggest you check periodically with Memotech at 800-662-0949. They tell us to expect interfaces in the next month.

According to a voice on Timex's 800 line, the first issue of Ramblings, the Timex newsletter, is out. You should get a free copy if you sent in a warranty card to Timex. Questions? Call 800-24-TIMEX.

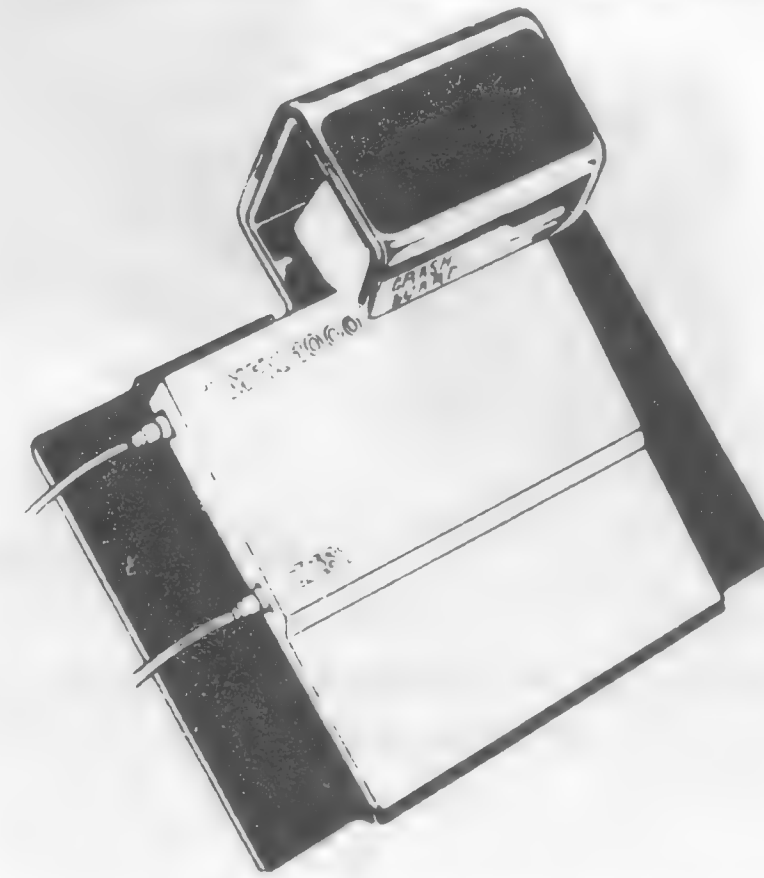
Call Dilithium Press, Beaverton, OR, at 800/547-1842 for orders and info. Their latest, Using and Programming the TS Computer, is due out in June at \$9.95. Someone answers tech questions at that number on Tuesdays and Thursdays.

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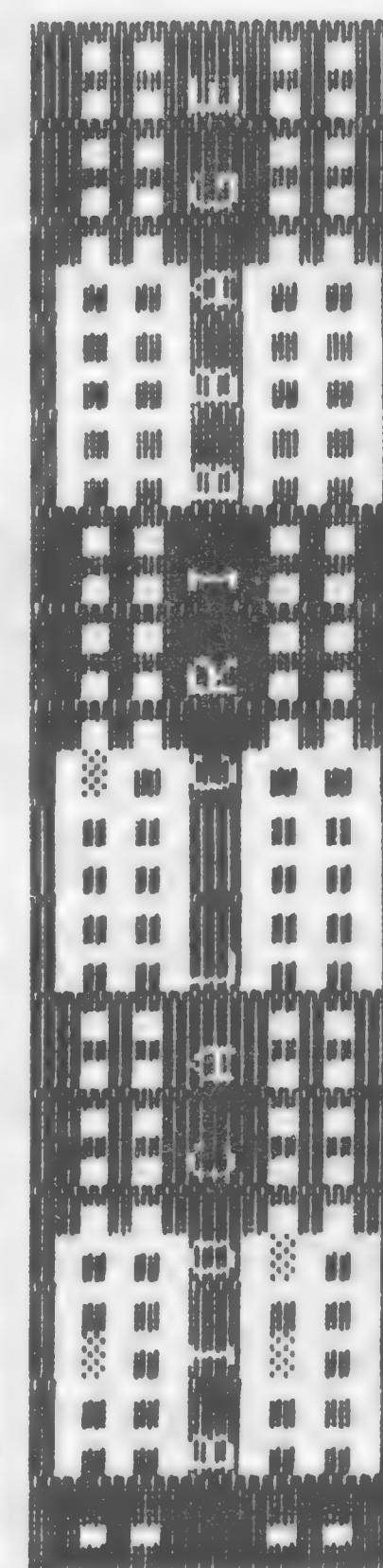
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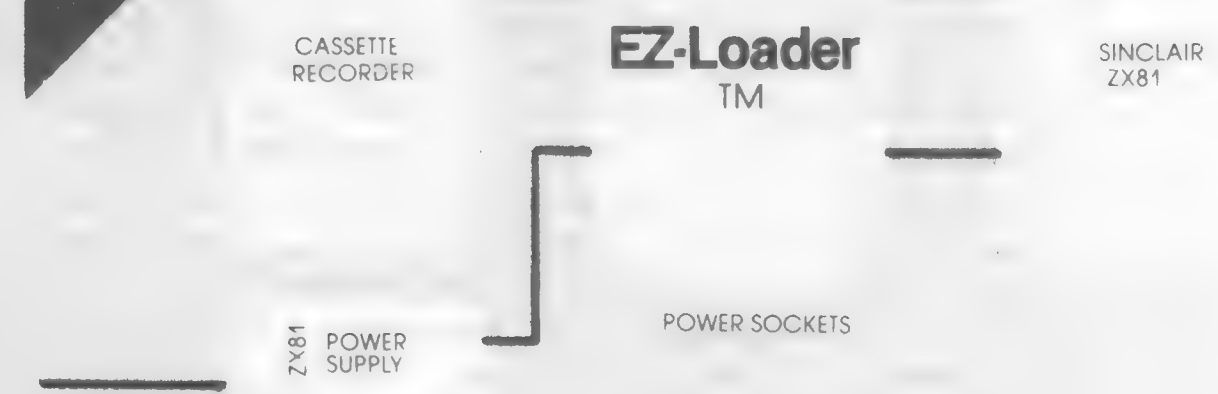
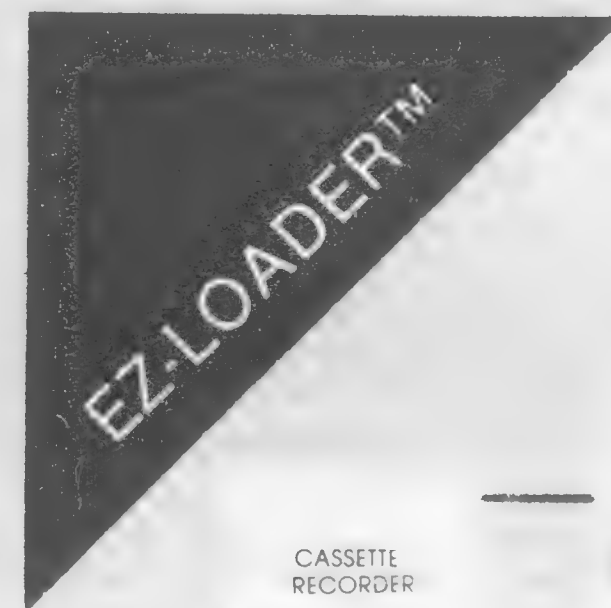


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## RUNNING MC IN A STRING VARIABLE

You can place and execute machine code (MC) in three places: REM line, memory reserved above RAMTOP, and a string.

Using a REM line lets you SAVE the code, but listing it can upset the system as it tries to interpret values not designed for display.

Using memory above RAMTOP eliminates the listing problem, but the code won't SAVE. You must reserve the memory and reinstitute the MC each time you power up.

Using a string to store the code eliminates these disadvantages. But take care not to destroy the string variable. Also, unlike the other methods, the code's start address does not remain constant; the system moves variables as needed to accommodate program and display space needs. So don't use a string to execute MC if during execution, the space used by the programs or display changes.

Finding the string to execute it is no problem if the string is the first variable assignment in the program. The first assigned variable is always the first variable in the variable storage area, no matter where that area may be. To find that area, VARS, enter:  
PEEK 16400+PEEK 16401\*256  
The string's contents begin three bytes beyond.

This program assigns Z\$, which holds the MC hex representation. Here Z\$ holds two concatenated routines. The first 54 characters represent the 27 decimal codes for renumber. The rest is Syntactic Sum. Line 2 finds VARS+3. Lines 3-6 PEEK the contents of line 1, convert the character code to decimal, and POKE it into the space the Z\$ assignment set aside in VARS. The decimal code occupies only half the space of Z\$--check by PRINT Z\$ after running--but Z\$'s length doesn't change.

RUN in FAST. It stops at line 7. GOTO 9990 to renumber the program lines by 10. It doesn't renumber GOTOs and GOSUBs. (After renumber, Syntactic Sum is 20570.)

Renumbering does not alter program space because all line numbers are held in two bytes.

If after running the program you delete lines 1-7, remember that RUN will wipe out the code. Obviously, do not reassign Z\$.

Rolf Miller, Ventura, CA

```
1 LET Z$="217D40110A007223732
34E204623097ED676C8010A00EB09EB1
8EB217D40ED5B0C40DD2100007CBA200
87DBB2004DDE5C1094E0600DD092318E
0"
2 LET Z=PEEK 16400+PEEK 16401
*256+3
3 FOR A=16518 TO 16633 STEP 2
4 POKE Z,(PEEK A-28)*16+PEEK
(A+1)-28
5 LET Z=Z+1
6 NEXT A
7 STOP
9980 RAND USR (PEEK 16400+PEEK 1
6401*256+3)
9981 STOP
9990 PRINT USR (PEEK 16400+PEEK
16401*256+30)
9991 STOP
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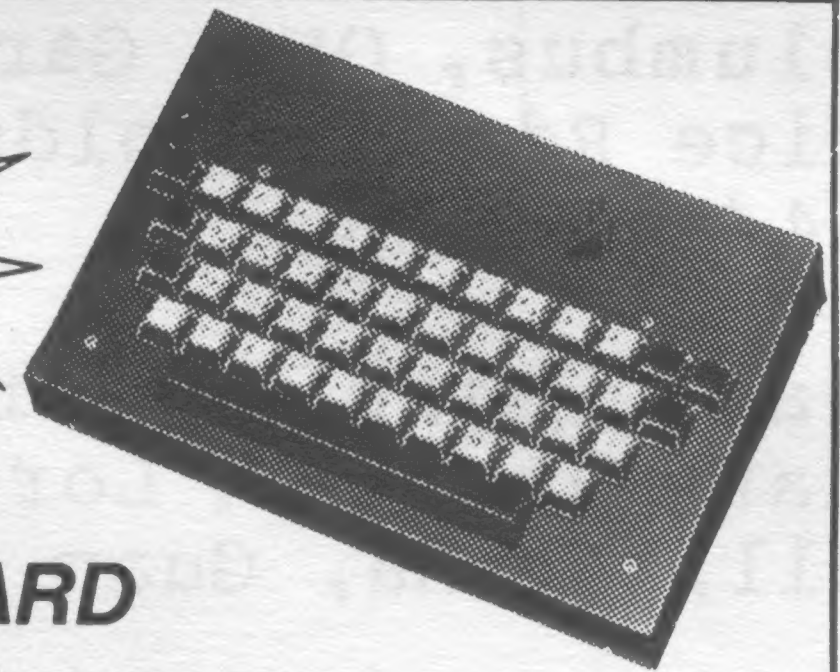
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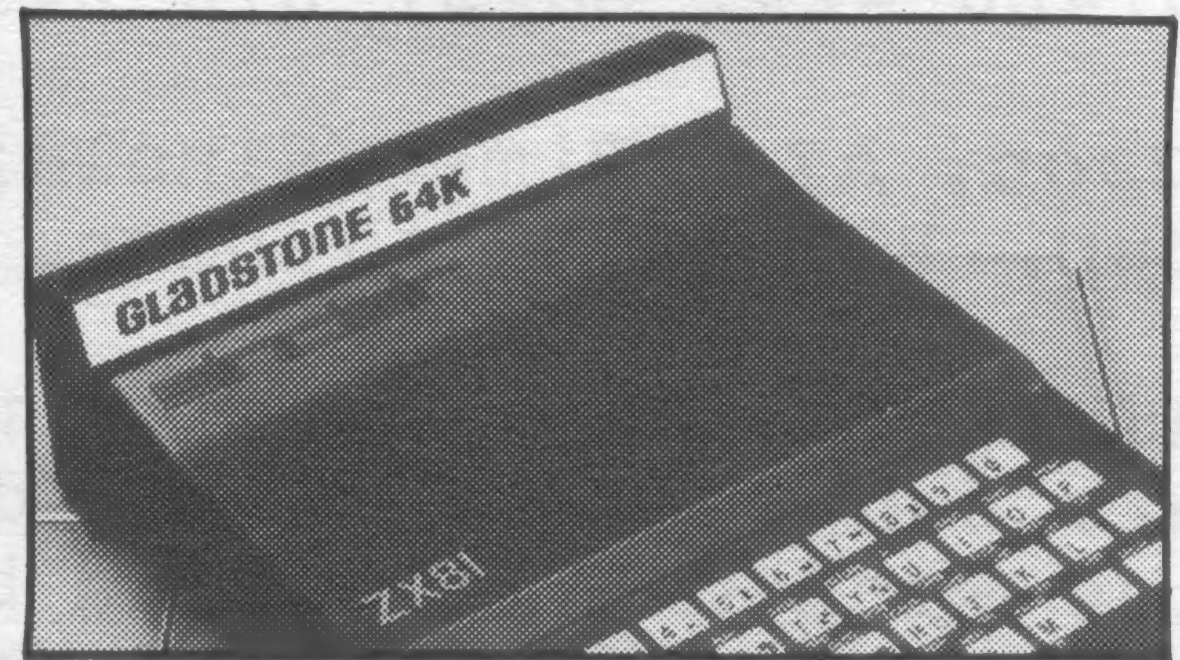


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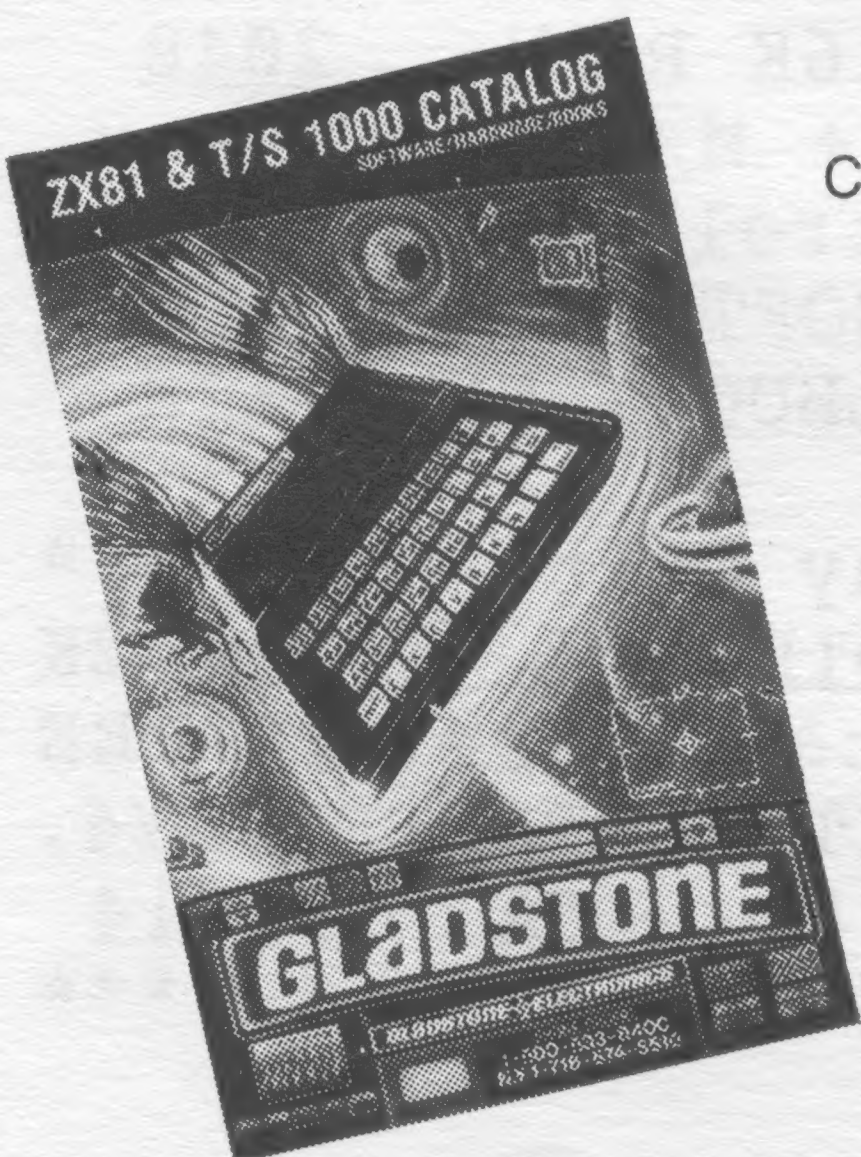
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