

Feb/Mar

No. 17

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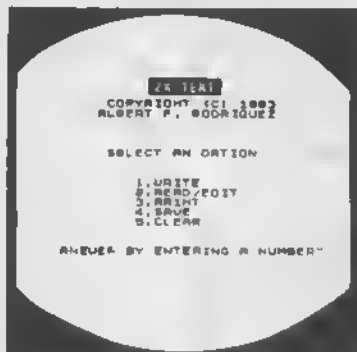


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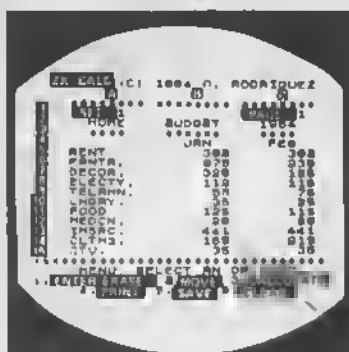
ZX-TEXT



A word processor is to a computer user what a typewriter is to a typist, except that the former has more advantages than the latter. ZX-Text can operate in 16-64K RAM providing from 1,300 to 6500 words per document. It features 6 different options: write, read, edit, print, save and clear text. Text is written on a per-line basis with quick speed and with horizontal back-space and delete capabilities being available. You can also access the editor directly from write mode and vice-versa. Text can be proof-read on a per-line basis allowing for enough time to determine if any editing is needed. The text editor allows a line of text to be deleted, inserted, replaced and listed for editing. You may also change a word or expression within a line, stop or start text while it is scrolling up the screen, begin reading text from the first line of the file, re-enter write mode from the editor, return to the main-menu or create a window so that you can read-add two files simultaneously. The print option takes text displayed in 30-column format on the screen and outputs to either the ZX/TS printer. (With Memotech's Centronics Parallel Interface 60-column and lower/higher case output is possible.) Files may be saved on tape cassette with the use of one single command, or by the same token they can be erased from memory / storage so that the full capacity of the program can be used for other purposes such as composing letters, reports, articles, memos, standard forms, instructions, ads, graphs, telephone directories, lists of customers, members, friends, etc. Also copies of files are always less expensive and easier to run than using a photocopier. Other advantages are savings in time, paper, ink, correcting mistakes and adding afterthoughts more efficiently than doing them through either handwriting or using a typewriter.

\$16.95

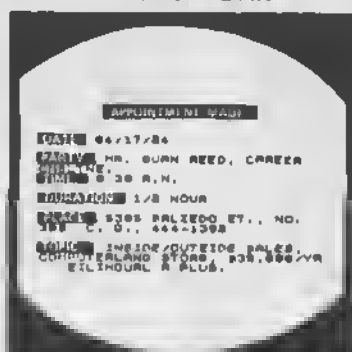
ZX-CALC



An electronic spreadsheet calculator is the fundamental basic tool for summarizing, reporting and analyzing in matrix form any accounting, mathematical or scientific manipulation of numbers. ZX-Calc operates in 32-64K RAM and affords a maximum of 3360 characters / spreadsheet. The entire matrix consists of 15 columns (letters A-O) and 30 rows (numbers 1-30) with 6 characters / cell. Unlike other popular ESCs, ZX-Calc uses in calculations and within cells all 14 math functions on the ZX-81 / T/S1000. It offers a unique *SUM function that totals one or more rows / columns simultaneously. Parenthesis can be used within equations. There is no fixed limit on how many equations may be entered. Formulas may be stored in all 420 cells of the spreadsheet. The display affords 15 rows / column. Loading of data into more than one cell can occur across / down one or more row / column simultaneously. With vertical windowing you can arrange a set of columns in any order, or practice using fixed-variable-alignment display formats. The menu offers 6 options: enter / erase, move, calculate, print, save and clear the spreadsheet. Enter / erase allows the entering, deletion or data alignment within a cell through the use of a mobile cursor. With the move option you may move around the entire spreadsheet to access any row, column or cell. The calculate option allows you to enter labels, values or formulas into a cell or write and enter equations that will act upon the data already within the spreadsheet. You can also enter bit graphs into a cell in the option. Absolute / relative replication, down / across a column / row, is also allowed by this option. Also this option allows the automatic calculation of the entire spreadsheet with one single command. Print allows you to output to either the ZX / TS printer the entire spreadsheet by column sets and row-panels through use of the COPY command. The entire spreadsheet may be saved on cassette tape or you may clear all data from it or erase the program from RAM entirely. The most salient advantage provided by an ESC over specifically vertical applications software is that an ESC provides a reusable framework with which you can compose any specific financial model rather than just be limited to only one statically fixed format for storing, displaying and manipulating numerical data.

\$11.95

ZX-CALENDAR



Time management is an important aspect of any serious business and personal agenda. Planning how to spend our time leaves us better prepared before and while we are spending it and we remain better organized after we finish spending it. ZX-Calendar operates in 16-64K RAM affording 25 appointments in 16K, 100 m 32K or 180 m 48K and 84K. Each appointment record holds a maximum of 220 characters. The main menu includes enter, search/cback/sort, change, save, clear and print any and all appointments made on a specific date or with any party. Output to either the ZX/TS printer is permissible. This program will permit you to remember to do something or to be somewhere important by cataloging your answers to six questions that you must account for in order not to waste time when it is scarce: when, with whom, at what time, for how long, where and what are you going to discuss and conclude when you get together with someone else? The program lets you permanently originate, record, classify, attach, sort, calculate, modify, summarize, obtain a written report and store your answers to the preceding questions so that you will not forget what you decide to do with your time. This program identifies your time according to when you are going to spend it and with whom you are going to share it. Through these forms of labeling appointments you are able to verify or modify how your time is budgeted without wasting ink, paper or more time trying to remember what you said to yourself or what someone else said to you or where you placed certain written messages that you now can't find. With this program you will know where you can find exactly what you need to know about where you want to go and have to be, or where you have been, before you get and after you get there. Thus, ZX-Calendar will let you plan your time so that you will never have to worry about what is ahead or what came before, for you will always know, by using it, to never be caught astray by any time-frame.

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TS HORIZONS

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#1 Nov '83 Creating/Saving Files (Johnson), Repeat Key and Uninterruptible Power Supply Projects, Numerical Analysis, Load/Save Problems, Reviews, and more!



#2 Dec '83 Matrix/Cursor Input (Johnson), User-Friendliness, Reset Switch Project, Memory Reduction, Rule of 78, IX Cash Register, Graphics Tutorial, etc!



#3 Jan/Feb '84 Two Animation Programs, Simple Loading Aid Proj. (Young), Tape File Protection, Differential Equations, Ham Radio Reviews, User Group News & More!



#4 March '84 The Death of TCC, TS1000 Bank Switching (Hunter), Error Recovery (Johnson), Edge Connector Schem., Simpson Rule, Reviews, Reader Input, & more!



#5 April/May '84 "WORM" Word Processor (Young) Pt. 1, Least Square, TS1000 Graphics Program, TS2068 Future?, Bank Switching Pt. 2, Program Tips, Reviews, and more!

#11 Jan '85 - 46 Pages, Lower Cost on the TS 1000, 2068 Word Processor Eval.-Pt.1, Bar Graph, Experimenting with Byte Back Modem, Bank Switching-7, INDEX of Issues 1 to 10, Reviews, and more.

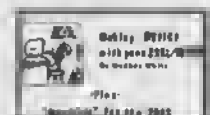
#12 Feb/Mar '85 - 2068 New Storage, Software from England, Program Tips for TS1000, 2068 W.P. Eval.-Pt.2, Bank Switching Concluded, MTERM Patches, 2068 Tutorial, Programs.



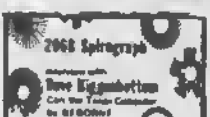
#6 June '84 Te1000 As Church Aid, Interfacing Books, Num. Analysis, Hardware Tips, "WORM"-2, Switching-3, Good News from EA Brown, Six Reviews, and more!



#7 July/Aug '84, Telecommunications Issue, 2068 Program Tips, How A Compiler Works, Rotating Globe, Byte-Back Modem, TC for Beginner, Switching-4, WORM-3, S.I.N., etc.



#8 Sept '84 TS 1000 Music Program, 2068 Plotter, 2068 Character Set (Young), Address Program, Mine Reviews, Telecommunications Column, TS News, and more!



#9 Oct/Nov '84 - ANNIVERSARY ISSUE, TS 2068 Spirograph, Dave Higgenbottom Interview, FORTH for T/S Computers, Spectrum section, Bank Switching-5, Telecommunications, Reviews, etc.



#10 Dec '84 - 40 PAGES, Making Backups of 2068 Software, Banner Programs, QL, TS1000 Program Tips, Christmas program, RS100vs.TS1000, MTERM/Horizon Awards, Switching-6, TSUGs, New Column, more!

#13 April '84 - Complete 2068 W.P. Listing, TS1000 Simulated READ-DATA Worm Enhancements, User Defined Graphics for 2068, "Try These", Changing "Fonts"-2068, Reviews.

#14 May/June '85 Special HARDWARE Issue, TS1000 Keyboard Add-on, ZX1 Rampacts on the 2068, Surge Suppressor Project, User Group Report, U.P. Eval. Concluded, QL Report, Cassette Tips.

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NOTE: RATE CHANGE effective March 31, 1986.
 New rate will be \$15 for NINE issues (in U.S.)
 After 3/31/86, back issues will be \$2.50 each.

ENTER

Dear Readers,

I owe all of you an apology - that is for certain. But please forgive me if I keep it short and sweet. We have quite a bit of material to cover in this issue, and I don't want to waste too much space on apologies.

In view of our persistent difficulties in sticking to a monthly schedule, we have decided to make a change. From now on TS Horizons will be published every six weeks instead of monthly. At the bottom of this page is a schedule we intend to hold to come heck or high water. Of course, if you are a current subscriber you will still be getting 12 issues of TS Horizons for your \$15 subscription.

SUBSCRIPTION RATE CHANGE

However we are planning to change that for new subscriptions and renewals that we receive after March 31. Our new subscription rate will become \$15 for 9 issues, and back issues will be sold for \$2.50 each. We feel that these increases will be very helpful in creating a new, more dependable TSH than has been seen recently.

Another note to subscribers. In the address label of every issue of TSH that you receive is a special code that tells you when your subscription started and when it will expire. This code is two 2-digit numbers separated by a hyphen or dash. The first number tells you the issue number of the first issue of TS Horizons you received as part of your subscription. The second number tells the final issue you are to receive unless you renew your subscription.

Note: On two occasions in the past we have made our mailing list available to others companies to use for direct mail. Both of these occasions were to respectable, Timex supporting dealers who were mailing catalogs of Timex related products. And in both cases the lists were for them to use only one time. The point I'd like to make is that if you are a subscriber and you would rather not have your name and address used by anyone but TS Horizons just drop us a postcard and we will respect your wishes. (We received a letter late last year from a subscriber who had received a chain letter from a company that apparently had access to our mailing list -

the address label on the letter exactly matched his TSH subscription label. At one time we had an outside mailing list service, and they said part of our list had been accidentally put on the wrong disk by mistake and had been released to another one of their clients. At any rate we now manage our own list in house, and that should not happen again. We apologize to those who have received any unwanted junk mail.)

CHANGE OF ADDRESS

By the way, we would like to remind everyone that if you are planning to move, please send us your change of address notification as soon as possible. Now that our mailing list is kept in house we are able to process changes more quickly, however TSH is mailed by third class mail, so even if the post office has your change of address on file, in most cases if we mail TS Horizons to your old address they would not forward it to you. Also please be sure to include the zip code of your old address.

UPCOMING MIDWEST TS COMPUTERFEST

(May 3rd & 4th)

Some very exciting meetings have been taking place in Cincinnati Ohio lately. My favorite city will be the site of the First Annual Midwest Timex Sinclair Computerfest. I was initially very pessimistic about the prospects for such an event, but now I'm convinced it has the potential to be a true success. The committee that planned the Fest (made up of TS users from Ohio, Indiana and Kentucky) has done a survey to sample the interest in the event, and we've been quite pleased. Although it's still early to say for sure, from the initial response we feel we could have as many as 1000 or more attendees. The Ramada Inn where we have reserved facilities has already gotten quite a few room reservations for the Computerfest. I got a phone call from a subscriber in Kansas City who will be flying in for the weekend.

The very active TS User Groups in Columbus, Cleveland, and Cincinnati, have already reserved display tables. (I may even try to round up the semi-active Portsmouth user group.) Zebra Systems, Aerco, E. Arthur Brown, G. Russell Electronics and other

<u>Cover Date</u>	<u>Issue No.</u>	<u>Ad Deadline</u>
February/March	17	February 7
April	18	March 21
May/June	19	May 2
July	20	June 13
August	21	July 25
September/October	22	September 5
November	23	October 17
December	24	November 14

companies have already reserved display space. I'm really looking forward to meeting these people.

What can you expect if you come to the Fest. Well, we've invited the dealers who will be there to give seminars and answer questions about their products. We will be having other knowledgeable speakers also. If you've ever wanted to see a QL, or disk drives for the TS 2068 or 1000, or some other product up close, here's a great chance. We're also planning a "swap-fest", where you can buy, sell our trade used hardware, software and books with other users. User groups have original and public domain software that you can copy for free or at a nominal cost. (Pirating of copyright software will be strictly prohibited. The entire committee has agreed that such pirating would be very damaging to purpose of the computerfest, and we will do everything we can to make sure it does not take place.)

Also we will try to provide information on activities in the Cincinnati area to make the trip enjoyable for your entire family - if you decide to bring them, and they aren't interested in the Computerfest.

Cincinnati is a beautiful city and if it's within your means you should consider coming to this historic event. Bring your family and make it a vacation. Riverfront Stadium, Cincinnati Zoo, Kings Island and other theme

parks, and several 5-star restaurants are located in the area. A registration form and more information are found on the next page. We'll have more on the convention in the next issue.

IN THIS ISSUE

We have a present for all of you TS 2068 users. Turn to pages 16 and 17 of this issue. The yellow insert there is a bonus from Zebra Systems. The present is strip at the bottom of the pages. This is a special keyword finder that can be taped on the top of your 2068. With it you can rapidly find any keyword or symbol without looking it up in your manual. (If you don't want to mangle your magazine you can Xerox it in two pieces and tape them together). This bonus appears through the courtesy of Banta Software.

We hope to have a similar cut-out and page of goodies for TS1000/ZX81 users next issue.

There are a lot of good words I'd like to say about Peter McMuffin, Bob Woish and our other contributors in this issue, but I'm afraid we don't have the room. Thank you all, subscribers and contributors for your patience and understanding. That makes it all worthwhile for me.

See YOU in six weeks,
Rick Duncan

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OFFICIAL "MIDWEST TS

CINCINNATI, OHIO

MAY 3RD AND 4TH 1986

9:00 AM to 5:00 PM

RAMADA INN, SHARONVILLE

The Midwest Timex/Sinclair Computerfest is now committed and WILL be a reality.

Organized and sponsored by users from Ohio, Indiana and Kentucky this event promises to be an outstanding assembly of TS users from throughout the Midwest, if not the nation. Response to the initial mailing notice of the planned Computerfest has been much much greater than anticipated and your committee is proceeding with great excitement for an unequalled assembly of TS users.

The Ramada Inn location is located on I-75, and is easily accessible from I-71, I-275, and other connecting Interstate highways.

Response to the initial mailing notice of the planned Computerfest has been much much greater than anticipated and your committee is proceeding with great excitement for an unequalled assembly of TS users.

The Ramada Inn location is located on I-75, and is easily accessible from I-71, I-275, and other connecting Interstate highways.

We have contracted for 1280 square feet of floor space, with an option for an additional 1200 square feet if necessary.

Excitement is running at a high level as your committee receives letters and telephone calls from dealers and vendors indicating their full support and participation.

Program Chairman Tom Surt is scheduling activities for both days that will be of interest to everyone attending including door prizes and drawings.

Your participation in this affair is necessary for complete success.

Guest Attendance rates, includes both days.

Individual Registration, prior to March 15.....	\$4.00
Registration after March 15.....	\$5.00
Family Registration, prior to March 15.....	\$7.00
Registration after March 15.....	\$8.00

All advance registration fees must be received prior to March 15 to qualify for the discount prices

CONVENTION" Registration

LODGING:

We have made arrangements for Commercial room rates at the RAMADA INN.

\$40.00 single, \$48.00 double.

Mention The Midwest Timex Sinclair Computerfest when making your reservations.

Other area Motels include the Holiday Inn, North; The Marriott Hotel; The Raddisson Inn, Cincinnati; and The Sharon Exit Motel. We do not, however, have commercial arrangements with any motel except the Ramada Inn.

Access to the Ramada and other motels is from the Sharon Rd. exit off I-75, 1/2 mile south of I-275.

The Tri-County shopping mall is located in the Computerfest area with more than 100 shops to serve your every need or desire.

ENTERTAINMENT:

The Ramada Inn, Sharonville, and other area motels, is conveniently located on I-75 just minutes from downtown Cincinnati and Northern Kentucky night club and entertainment areas. Only 12 minutes to fabulous KINGS ISLAND; The Football Hall of Fame; The Jack Nicklaus Sports Center, featuring an 18 hole Championship course, and other sports activities. The Riverfront Stadium, home of the Cincinnati Reds, hosts the Reds and Mets on May 3 and 4 for afternoon games starting at 2:15.

Make your plans now to visit the Queen City, and help to make this a memorable Timex Sinclair gathering.

ADVANCE REGISTRATION

I'LL (WE'LL) BE THERE!!!!

NAME:
ADDRESS
CITY, STATE, ZIP.

NO. _____ INDIVIDUAL REGISTRATIONS @ \$4.00\$_____

NO. _____ FAMILY REGISTRATIONS @ \$7.00\$_____

Send this form together with your check or money order to:
The Midwest T/S Computerfest
3832 Watterson Ave.
Cincinnati, Ohio 45227

You will have a great time!!!!

Guest EDITorial

From the "SAVE A DOORSTOP" Department

Many of you are aware of the CompuServe TIMEX forum in the club section. Every Wednesday night at 10:00 Eastern Time, there is a Timex Sinclair Conference on a private channel. This is a great place to stay in touch firsthand with the TS world. Regulars include representatives of many companies - Curry Computer, Zebra, TS Connection, and RMG, just to name a few. Here you can keep abreast of up-to-the-minute products and developments from all over the globe. You can even place orders for products 'live' on-line and get immediate checks on availability, prices, acknowledgements of orders, etc. This is really front-line stuff, here. One need only purchase a modem and sign up for CompuServe to participate.

Another benefit of the CIS club is the message board, where TSers from all over leave notes for each other. The receiving party is automatically notified at log-on when there is a message waiting for him. Unless the sending party chooses to make it a private message, anyone else can read it and even respond.

After last Wednesday night's meeting on the private Conference channel, I stopped by the message board to read the mail. One of the on-going strings of messages caught my attention, and even stirred me somewhat. It concerns the disposition of all those ZX80s and TS1000s that are collecting dust in the bottoms of closets nationwide. A few of the ideas were to use two of them to hold up color monitors, to gut them and use the cases to store floppy disks, and even to use them as doorstops!

Kinda sounds like some of us have forgotten the virtues of the small computer. Remember back in the very early '80s when the notion of owning ANY computer was an exciting



thought? Remember how exciting it was when that little black wizard first graced your kitchen table? Maybe you even experienced the exhilaration of seeing the ominous little inverse 'L' on the bottom-left hand corner of a ZX80. Yes, it's pretty easy to forget all that initial anticipation after a few years of fancy computing tables, color monitors, complex sound generators, microdrives, modems, and all we've learned since. Think back to those first dozen or so issues of 'SYNC'. Really now, wasn't it wonderful?

Well, why not pass that magic on to someone else? If you're not using that ZX80 or B1 anymore, why not let it live on in the eager hands of someone who'll learn from it, be delighted by it, come to love it just as much as you first did in those early days when home computers were just becoming popular? If I may, I'd like to suggest younger people - kids in the 10 to 18 bracket. These kids are not likely to have been overwhelmed by the fancy colors and sounds of the present generation 206Bs, QL's, Amigas, and IBMs. Think now, how many of you have a TS1000 you have forgotten about sitting in the bottom of a drawer somewhere? Why not donate it to the local Cub Scouts or Brownies, or the local Grade School? Maybe you have a nephew or niece who doesn't have a computer in the house. How about a neighbor? The local Big Brother or Big Sister chapter would certainly welcome a donation of this kind.

If you would like to get your unneeded micro to a good home and don't have the time or means to do so, I will volunteer to take care of it for you and let you know exactly where it went.

Mail to: Computers for Kids
C/O Bob Woish
1700 Butler Pike, 32-F
Conshohocken, Pa. 19428

Please don't let these marvelous little machines turn into doorstops! If you make a donation of this type, let me know. If you want me to do it for you, send it along. Either way, each donation will be mentioned in a future column and submitted to TS HORIZONS for publication.

Help keep the TS Spirit alive!

TSH

THE BOX TRILOGY

For the TS 1000, 16 K RAM

by C. Vernon Tidwell

FASTBOX + FLASHBOX + DOODLEBOX

This program will put a box outline anywhere on the screen at machine code speed. A machine code subroutine is generated into a REM statement and that relocatable subroutine is called with a RAND USR statement.

Enter the following program as listed (Line 10 contains 71-numbers). Check for errors!

```

FASTBOX
10 REM 12345678901234567890123
45678901234567890123456789012345
6789012345678901
100 REM "FASTBOX"
102 REM BY: C. VERNON TIDWELL
104 PRINT AT 3,10;"FASTBOX"
;TAB 40;"(A SUBROUTINE)",,,,,,"CO
LUMN TO START BOX= ?"
106 INPUT C1
108 PRINT AT 7,21;C1
110 PRINT "COLUMN TO END BOX= ?"
"
112 INPUT C2
114 PRINT AT 8,19;C2
116 PRINT "ROW DOWN TO START BO
X= ?"
118 INPUT R1
120 PRINT AT 9,23;R1
122 PRINT "ROW DOWN TO END BOX=
?"
124 INPUT R2
126 PRINT AT 10,21;R2
128 LET A=(33*R1)+C1
130 LET A1=INT (A/256)
132 LET A2=INT ((A/256-A1)*256)
134 LET B=C2-C1-1
136 LET C=R2-R1
138 LET D=32-B
140 LET E=C2-C1
142 POKE 16519,A2
144 POKE 16520,A1
146 POKE 16525,B
148 POKE 16541,C
150 POKE 16549,D
152 POKE 16555,E
154 POKE 16563,D
156 POKE 16569,B
158 CLS
180 RAND USR 16514
182 STOP
9000 REM MACHINE CODE LOADER
9001 DIM Z$(3)
9002 FOR N=16514 TO 16584
9003 INPUT Z$
9004 PRINT Z$;" ";
9005 POKE N,VAL Z$
9006 NEXT N
9007 STOP

```

Do not RUN the program yet. First enter GOTO 9000. Now enter the following machine code from the table of number sets. There are 71-sets of numbers to enter. Starting at the top left, type the first set, "42" then press ENTER and work your way across the table in the same manner. When you are done, your table will look exactly as the following table of number sets. Save a copy of your program now for safety!

42	12	64	35	1	0	0	9
54	7	6	0	167	120	254	1
56	5	35	54	3	16	251	35
54	132	6	0	167	120	254	2
56	14	17	0	0	25	54	5
17	0	0	25	54	133	16	242
1	0	0	9	54	130	6	0
167	120	254	1	56	5	35	54
131	18	251	35	54	129	201	

Before running the program, remember that the columns are numbered across the screen from 0 to 31 and rows are numbered down the screen from 0 to 21. (The smallest box 0,1,0,1; and the largest box 0,31,0,21).

Run the program and answer the questions when prompted. Upon completion, the screen will clear and a box will appear. Line 10 is now the completed FASTBOX subroutine. Each time you enter a RAND USR 16514 statement in a program added to this line a box will appear.

To have some fun with the program after loading the initial machine code, do the next alteration. This new program is called FLASH BOX. Remove Lines 100 through and including Line 126. Add the following lines:

```

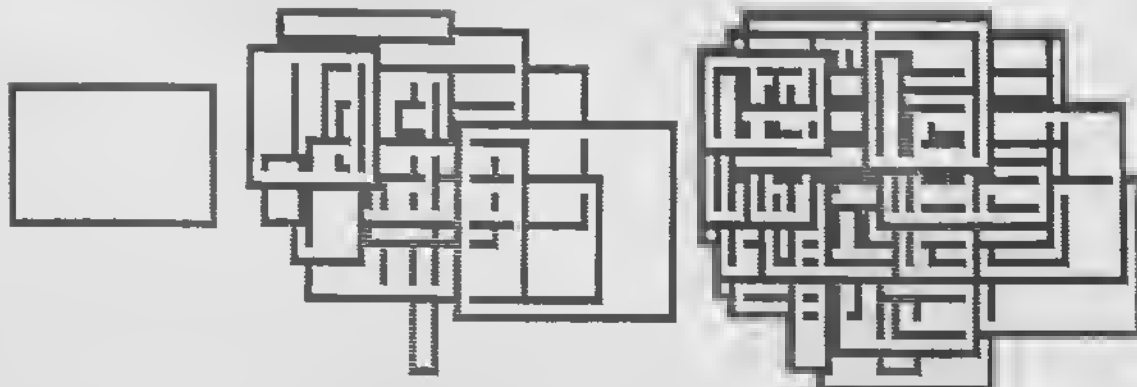
100 RAND 0
102 LET C1=INT ((K*Dt15)+1)
104 LET C2=C1+INT ((RND*16)+1)
106 LET R1=INT ((RND*10)+1)
108 LET R2=R1+INT ((RND*11)+1)
161 GOTO 100

```

Check your work and run the program; press BREAK to exit.

If you are a little eccentric and wouldn't own a pencil but do remember the old days before computers when you liked to doodle, then try this further program alteration to the FLASHBOX program you just created.

Remove Line 158. Run the program. You guessed it, DOODLEBOX!and the computer will doodle-all-day.



ZX 81 NEWS AND RESOURCES

BY PETER McMULLIN

I offer two unequivocal statements for the record:

1: Yes, ZIBI user support has moved 'underground'.

2: NO, the ZIBI support market is NOT dead!

Because of fact#1 despite fact#2 ? 1, I am constantly encountering fellow computerists who simply don't know where to turn for information about support for their computer. The state of the ZIBI market is such that user participation, communication, and mutual support are absolutely crucial. When Timex pulled the plug, so did many of the larger aftermarket support companies. What did that leave? The truly dedicated supporters and enthusiasts who saw the potential of the machine, rather than just the dollar signs in an 'up' market.

Fact is, folks (newcomers and old hackers alike): the free rides are long since over. It's up to US to support suppliers with our business if we expect them to continue. It's up to US to communicate with each other - to share information and ideas. I speak from both sides of the fence here: Timex's exit has rendered us equal, supplier and user alike, in mutual support requirements.

Many newcomers to ZX land have expressed concern that there isn't much ZIBI support available these days. NOT SO! A lot of the extraneous garbage (which certainly padded out the appearance of the marketplace) has disappeared, but what's left is the cream of the crop. More virtually any conceivable software application, hardware upgrade, or communications support that was ever available during the 'Timex peak': all the best is still available, and will continue to be for a while. My list is still growing, not shrinking!

Now arise the questions:

-How do I find out who this stuff is available from?

-Where and how can I learn more about my computer, and share what I've discovered with others?

Fortunately, there are several answers. Participate in the activities of your local User Group. Get to know the skills & interests of other members - and make yours known, too. There's ALWAYS someone who can benefit from knowledge you may take for granted. Similarly, those who don't ask don't get. DO NOT be embarrassed to ask questions of more experienced users. We all must start somewhere. I've never met an unfriendly ZX user!

There is no rule that says you can only belong to one User Group. Currently, in addition to at least 3 dedicated 'real' magazines, there is a large (and growing) number of active User Groups across the continent, many of which publish excellent newsletters. By subscribing to a few of these publications, you will find yourself overwhelmed at the resources available to you. Your interaction with support publications should NOT stop with your subscription check! The articles & letters you read were contributed by someone just like you. So if you have a program you've written, news you'd like to share, praise, or a gripe, then write about it and send it in! Most newsletters also offer free classified ads to subscribers as an additional benefit.

** BUG ALERT ** BUG ALERT **

Owners of AERCO CP-ZX Vers. 2.2 Centronics interfaces please take note. The AERCO CP2.2 ROM has, in addition to an ASCII printer driver, a Disk Boot routine patched into the machine's initialization. On power-up, it checks for an AERCO Disk Interface, and if there is one, it proceeds to load the Directory page from Drive A. If there's no Disk system, the initialization continues, and up comes O/O (!). This is because during the Disk? check, the CP2.2 actually forces the

machine to execute a BASIC line embedded in the EPROM code. Thus, the machine coaxes up with a O/O instead of a K cursor.

To the point: In the midst of this exotic initialization scheme, the CP2.2 somehow sets up addresses 16507 and 16508 to hold a critical status flag for the operating system. To the normal ZX/TS ROM, these two bytes are completely unused and ignored. They frequently get used as a 'cache-all' register by many Machine Code programs (e.g. MOT-2, ZILRB, & many 'toolkits'). The problem is, with the CP 2.2 interface attached, ANY PROGRAM which loads in from tape with values other than 0 in 16507/16508 will crash if you try to BREAK it. Even if a program loads in with these bytes OK, if it changes their value at any time, you are probably out of luck.

Some programs which exhibit this problem can be 'cured' by loading the program without the interface attached; Break, then POKE 16507 and 16508 with 0, and re-SAVE the poked version to tape. The new version should now LOAD (and Break) OK with the interface attached.

AERCO now have available an improved version of their CP-ZX ROM, Vers. 2.3, which they claim has the problem eliminated. If you have a 2.2 or earlier version of the AERCO ZX CP1, you should enquire about getting an updated version (either free or for a very nominal price) from AERCO, 7606 Robalo Rd., Austin, TX 78757.

** HARDWARE USER REPORT **

SUBJECT: The JLO Video Upgrade Project, available from The John L. Ollger Co., 11601 Whidbey Dr., Gunderland, IN 46229

INTRODUCTION: Since Mr. Ollger manages to keep quite busy without doing any real advertising, a lot of folks are unaware of the fine products he has available for the ZX81. A certain mystique has built up around JLO products, which I hope to dispel. Yes Virginia, John Ollger is a real person, who answers mail, ships orders on a realistic schedule, and has some pretty neat ideas.

Just what sort of peripheral is this Video Project? Let me begin with a sweeping analogy: the Video Upgrade Project is just like a video monitor, a disk interface, or a fullsize printer. Once you hook up a monitor and get used to it, the ol' TV set just won't do anymore. When you get a disk drive, you easily transfer all your software, and then avoid cassettes like the plague. When you get a real printer, the 2040 generally becomes a hi-tech paperweight.

Likewise, after having the Video Project IVP from here on for a couple months, I loathe going back to the flashing, flickering snail's pace of 'normal' video which I have lived with for so long.

WHAT IS IT? Remember the ill-fated Kolorworks board, and the ColorSInBI? Both were color video boards for the ZX81, which never really hatched due to various impracticalities. The JLO VP surpasses both. It is elegantly simple, thus economical. The firmware integration to BASIC reflects the same qualities, and is virtually transparent to 99% of existing software.

The VP consists of 2 circuit boards which plug into the back of your computer. These boards have a male edge connection only, and are meant to plug into a motherboard.

Compatible motherboards are available from JTD, or from Maplin or Epron Services in the UK.

Video Board "A" holds a Texas Instruments TMS9918A Video Display Processor, 128K of dedicated Video RAM, and 1 decoder chip. This video RAM does not occupy any of the 180's address space- the 280 communicates with the VDP & video RAM through I/O ports 3F & 7F.

Video Board "B" has sockets for two 2764 (8K) EPROMS, and 4 decoder chips. Epron "A" is mapped to the 0-8K area, and overrides the Internal ROM in your computer. It is identical to the ZX BASIC ROM, except for the parts which deal with generating a video display. All the real work is now done by the VDP. The 280 just sends it the necessary data and is free from the actual task of generating video.

WHAT DOES IT DO? Two advantages which are immediately apparent are speed, and continuous display. In SLOW mode, the computer is now almost as fast as in FAST mode. In fact, it can be difficult to tell which mode you're in at times. In FAST mode, the display doesn't go blank. It just remains static until you come to a PAUSE, INPUT, or SLOW command. There is absolutely no screen "juep", flashing, or flickering, at all, in either SLOW or FAST mode. Entering and editing BASIC programs is a real pleasure, especially in FAST mode. The old screen reformatting games of the ZX81 are gone! When you Enter a line, it simply (zap) appears in the listing. LOAD and SAVE are rather interesting. When you enter a LOAD or SAVE command in FAST mode, the command plays on the screen through the tape operation. SAVE and LOAD activity is shown by the border rapidly flashing through a sequence of 16 colors! The effect is similar to that of the 2068 LOAD & SAVE patterns.

How about software compatibility, kit building details, and the bottom line?

SOFTWARE COMPATIBILITY: As mentioned, the JLD VP is compatible with just about all software. The main exceptions are fast machine code arcade games, like Frogger, Pac Rabbit, etc. They run, but so fast they're generally impossible to play. By the same token, some games that were boringly slow before are now a real challenge. Pelion Flight Simulator now responds like a jet fighter rather than a Cessna. Mazogs is simply a hoot. BASIC programs with lots of calculations or plotting really benefit, too. The only software I have found that's truly incompatible with the VP uses software-only means to simulate hi-res with the standard machine, or tries to peek the character generator of the ROM to get pattern data. This includes games like Forty Miner, Sea Minee, and Zlricator, and utilities like M. Elialeh's SW M1 RES and Callisto's Graphica. You simply have to unplug the video boards and use standard video for these programs.

CAVEATS, THE BOTTOM LINE, ETC.: The Video Project, as the name implies, is available only in kit form. You may purchase either just the bare circuit boards with instructions, or get an (almost) complete kit of parts. For \$48.95 U.S., you can get both boards and all parts except for the actual VDP chip and its crystal. The TMS9918A VDP chip is available from several parts suppliers at widely varying prices. The best I've seen is \$9.95 from Jameco Electronics, in Montreal. The 10.7386MHz. crystal is also generally available for about \$5.00. When you order a VP kit, JTD will include a listing of the current best sources for the VDP & crystal. By the time you account for all the tidbits, allowing for a motherboard if you don't already have one, etc., this whole thing is roughly a \$100.00 proposition.

The kit instructions are complete and reasonably clear, but I really can't recommend this as a first-time project for the prospective kit builder. You must be able to do very fine soldering on these circuit boards, and have familiarity with good electronic assembly & soldering practices to truly an asset. My only complaint is that, for economy's sake, the feedthrough holes on the double-sided circuit boards are not plated through. This means you must solder in a healthy number of tiny wire feedthrough conductors before mounting any parts

on the circuit boards. Believe me, this is a tedious and time consuming task, after which soldering the actual parts in place is a breeze.

A minor modification must be done inside your computer to permit functioning of the VP. The NMI line between the UTA and the CPU must be cut, and a diode and resistor added. This is very simple to do, and does not affect the normal operation of the computer. This mod is much easier to do on the older Issue 1 ZX81 boards than on the later Issue 3 layout.

Fast but not least, you must supply and program your own 2764 EPROM for the modified operating system. Mr. Dillger will supply a tape for his 2764 programmer, which contains the necessary code and will automatically program your new EPROM. Most of the code is gotten from your resident ROM, so if you have, for example, Tom Bent's 8K ROM UPGRADE, all the improvements in it will also appear in your new video ROM.

John Dillger has kindly put his operating code in the public domain. If you don't have an Epron programmer, don't despair. Tom Bent will supply the VP EPROM with his Vera-10 ROM improvements as well, for \$25.00. I can supply a VP EPROM based on the TS1000 ROM for \$10.00, to cover cost of the EPROM and postage. In either case, you must specify whether you want 16K or 64K RAMTOP initialization, default paper, ink, and border colors, etc. That's the lazy way out, though. An EPROM programmer is a really handy gadget to have around, and represents a modest investment. JLD's programmer is a snap to assemble- it uses plated through holes. Building up a motherboard & EPROM programmer is good practice- it'll sharpen up your soldering skills (and confidence) before tackling the Video Project. And you'll learn a lot more.

ADVANCED FEATURES: So far, we've discussed only how compatible the VP is with existing software. By executing certain RANDUSR commands, you can choose between normal ZX characters, or lower case instead of inverse on the screen. The old system variable MARGIN is now the COLOR system variable: you can poke different values to this address to select INK and PAPER from 16 different colors. That's the limit of the extra commands available from BASIC, but by using machine code to communicate with the VDP, it is capable of 32, 40, or 64 column screens, true hi-res color graphics which are in some respects superior to 2068 graphics capabilities, and real sprites, definable on 32 different planes! In addition to this, the VP removes virtually all the funny display-dependent limitations of the machine. Minor modifications will permit machine code to run anywhere in 64K, and even Mode 2 interrupts can be used. For machine code programmers, the IX register is now available for use, and the R register is used in the normal 280 fashion. No limitations exist on the location of DF1TE in RAM, and "illegal" characters (i.e. tokens) can even be poked into the DF1TE without causing a crash. Since the character patterns are stored in video RAM rather than in ROM, it is possible to have programs load in with user-defined character sets- excellent for games and wordprocessors. I'm now running Word Sync 11.3 with upper and lower case onscreen, as well as special symbols for control characters. Prospective software support is exciting, too: Silicon Mountain Software now have a tape version of Memotext with a 64 col. onscreen viewing option, as well as a 64-col. hi res color extended BASIC for release in the not too distant future. And Callisto Software will be producing an exotic graphics toolkit for use with BASIC, as well as a hi-res screen, color version of Sinc-Artist!

IN CONCLUSION: The JLD Video Upgrade Project is an extremely well conceived and executed product. For the ZX81/TS1000 hobbyist, this is an excellent opportunity. It gives you speed and video capabilities at least equal to the 2068 [the video is actually MUCH more stable], and improves the performance of most existing software. You get SUPPORT, too. If you can't get your kit to work, you can send it back to JTD along with \$15.00, and he will locate & fix the problem for you.

FEATURED NEXT ISSUE: THE AERCO FD-ZX FLOPPY DISK

MACHINE CODE FOR THE MASSES: PART 2

FOR THE TS 1000 by KEVIN R. BULGRIEN

Well, here we are again! For those of you who may not have seen the last MCM article, I'll explain what we are doing. The object of this series is to present you with several machine language programs that can be used to enhance your BASIC programs. You don't have to know anything about machine language to use these routines though. If you follow the instructions carefully, you shouldn't have any trouble. Last time, I gave a more detailed introduction, and we covered a DATA-READ simulation. If you find this article interesting, I am sure you'll want to get a copy of the last one.

This month's feature consists of five short screen scrolling routines (138 bytes total). There's one for each of the four directions: up, down, left, and right. These may be used individually to scroll the screen in the desired direction; or, by running the fifth routine, you can call up any of the other four. In other words, you may use a different USR statement for each of the scrolls, but it's also possible to use a single USR statement to access all of them. By using the later method, you also get the ability to combine a vertical and a horizontal scroll to get a diagonal scroll. Another feature of these routines is that they don't affect the CLS command in any way. As you have probably noticed, the TIMEK scroll command causes CLS quite a bit of grief. There is one limitation though, you must have at least 4K of memory so that the screen is always fully expanded.

I've thrown in a sixth routine as well. It allows you to find the address of any BASIC line rather easily. This will be especially useful as the REM statements which contain machine code start to pile up. If you POKE the line number in the right place, running this routine will give you the appropriate address. You won't have to use the mile long, and potentially troublesome, PEEK expressions that you used in the last article. I figured that this would be a welcome addition.

We are ready to enter the routines now, so you need to LOAD the loader program that I gave you last time. You should LOAD the version which has the DATA-READ routine saved with it. That way, you can have all your machine code routines in one BASIC program. If you didn't SAVE it last time, here it is again:

LOADER PROGRAM LISTING

```
10 PRINT "ENTER START ADDRESS"  
20 INPUT A  
30 CLS  
40 FOR B=A TO A+175  
50 PRINT (STA$ PEEK B+" ")(  
TO 4);  
60 NEXT B  
70 LET B=0  
80 LET N=999  
90 LET M=9999  
110 LET Y=INT (6/6)  
120 LET X=(B-Y*3)+4  
130 PRINT AT Y,X;" "  
140 INPUT C  
150 IF C<256 THEN POKE A+B,C  
160 PRINT AT Y,X;(STA$ PEEK (A+  
B)+" ")( TO 4)  
170 IF C=N AND B>0 THEN LET B=B  
-1  
180 IF C<>N AND B<175 THEN LET  
B=B+1  
190 GOTO 110
```

If the line number of the DATA-READ routine is 9999 or 9998, then EDIT the line and change it to 9997. DO NOT MOVE THE CURSOR PAST THE REM! For reasons I'll discuss later, the address finding routine must be stored at the very end of a BASIC program. It is this routine which we will enter first.

To start, enter the 9999 REM statement which will hold the new routine. It should have exactly 30 characters after the REM, and, should look like this:

ORIGINAL REM LISTING 1

```
9999 REM 12345678901234567890123  
4567890
```

Now, RUN the loader program (in FAST mode). When it asks for an address, type this statement in: PEEK 16396 + 256 * PEEK 16397 - 31. For those of you who aren't using REM statements, be sure to answer with <ADDRESS - 6> so that your screen matches the table except for the first six numbers. After the screen fills and the cursor (three inverse question marks) appears, you may enter the numbers in TABLE 1. As I explained last time, those not using REM statements should skip the first six numbers. They aren't a part of the routine, they just fix the REM statements so that the DATA-READ routine doesn't use them as data. Remember, you MUST NOT alter any of the numbers beyond the end of the table.

Here's a refresher on using the loader. When you enter a number, the cursor advances to the next position. If you find that you entered a number incorrectly, you can back up one space at a time by entering the letter N. Back up until the cursor is on top of the offending number, then re-enter the correct number. Use the letter M to get back where you left off. It advances the cursor one space at a time. If you BREAK the program by mistake, don't worry, just RUN the program again. The numbers you entered before will still be there. After you have fixed ALL of the errors, you can quit by entering the letter Q. You will notice that the screen looks exactly like the table in the magazine, except that the screen doesn't stop where the table does. This facilitates error checking. I'll remind you again, DO NOT change the numbers beyond the end of the table.

When all the numbers in TABLE 1 have been entered and checked, you should break the loader program. The REM statement should look like this:

MODIFIED REM LISTING 1

```
9999 REM  
ADD USR E7 AND FAST LN ***SGN ??  
C=INT 4000 RUN TRN
```

Add this line to help you remember how to use the routine when you don't have this article with you:

ADDRESS FINDER I.D. REM

```
9999 REM  
POKE 16508, INT (LINE/256) : POKE  
16507, LINE-INT (LINE/256)*256 :  
LET ADDRESS=11+USR (PEEK 16396+  
256*PEEK 16397-25)
```

SAVE the loader program with the REM statements now. This is in case you have missed an error that will crash the computer. Obviously, you will also need this on tape anyways, but it's important to SAVE it before testing.

To test the address finder, type the following lines into the computer. If the message "IT WORKS OK" appears, the routine is fine. If the message is not printed, or if the computer crashes -- go back and fix the errors. You may try re-entering the test lines if you think you made a mistake there.

```
POKE 16507,15
POKE 16508,39
IF PEEK 16396+256*PEEK 16397-38*
USP (PEEK 16396+256*PEEK 16397-2
5) THEN PRINT "IT WORKS OK"
```

Here follows more detailed instructions for the use of the address finding routine: NEVER RUN A USR STATEMENT WITHOUT CALCULATING THE CORRECT ADDRESS! You must use this routine to calculate or re-calculate the addresses of your routines after changing ANY part of your BASIC program. You should include the address calculating statements within the program itself. If you don't recalculate the addresses, you will probably crash the computer! It may seem annoying, but that's the price one has to pay for the added benefits. You should never erase the lines holding this routine as they will be needed as long as you use any machine language routines. The instructions REM is, of course, optional, but I think you will find it helpful.

Here follows a short demonstration program that I will use in explaining the use of the address finder:

ADDRESS FINDER SAMPLE LISTING

```
10 LET ADDRESS=PEEK 16396+256*
PEEK 16397-25
20 POKE 16508,INT (9997/256)
30 POKE 16507,9997-INT (9997/2
56)*256
40 LET RESTORE=11+USR ADDRESS
50 LET READ=RESTORE+32
```

TABLE 1 ADDRESS FINDER

113	39	16	0	25	2115	42	123
54	229	205	316	9	1808	368	123
40	229	207	321	15	1808	368	252
35	125	187	32	247	201		

TABLE 2: SCROLL ROUTINES

113	39	16	0	140	231	55	244
58	33	64	31	48	31	331	256
9	24	22	31	56	51	441	33
33	64	31	31	31	48		101
216	24	38	31	2203	24	63	107
245	42	12	64	2203	4	93	1
33	0	0	1	2244	90	207	2337
176	16	3	9	2244	2	207	337
119	16	3	241	2244	1	63	267
245	42	12	64	2244	90	207	2337
33	0	0	1	2244	90	207	2337
237	184	151	6	32	32	35	119
16	252	241	208	24	17	7	117
25	12	42	18	64	0	4	43
126	185	40	4	114	37	24	247
16	243	201	1	117	24	12	42
12	64	22	0	35	126	185	40
4	114	37	24	247	18	243	201

Line 20 defines the address of the address finding routine IF AND ONLY IF it is the very last line in the BASIC program!

Lines 30 and 40 specify the line whose address you wish to find. Any lines used in this manner should appear at the beginning of your BASIC program. This is because other machine code routines may use the same addresses. It's a good place anyways, because then you can be sure you always have correct addresses when you RUN the program. It is not necessary to enter the whole expression after the POKE. You may fill in their equivalent values. For example, line 30 could be replaced by 30 POKE 16508, 39 since 39 = INT (9997 / 256). If you change the line number of the routine, be sure to change these lines also.

Line 50 puts the correct address for the RESTORE command into the variable. If a non-existent line number was specified, the program will stop with an L/<line number> error message. The 'L' stands for a 'Line number error'. Note that you must add 11 to the value of the USR expression. The address returned is the address of the actual beginning of the line. To get the beginning of the machine code, you have to add 11 to this address! This means that the routine could possibly be used for purposes other than the one I wrote it for.

Oh! One more thing: you'll find that your computer will never automatically list the lines after the DATA-READ REM. They are there though. If you specifically say LIST 9998 (or whatever line follows), then the computer will list the lines.

With our 'librarian' routine taken care of, we can go on to bigger and better things. You guessed it... it's time to enter the scroller routines. To do so, you need to LOAD the loader program again. Be sure to LOAD the version that has the address finder routine SAVED with it.

Let's make use of the new address finding routine by slightly modifying the loader. (Of course, if you don't store the machine code in REM statements, this paragraph does not apply to you.) By adding two POKE statements and a USR statement, the loader will accept a line number as an address. By changing the program so it looks like this, you now have a loader that's a lot easier to use:

MODIFIED LOADER LISTING

```
10 PRINT "LINE NUMBER OF REM F
OP M-CODE?"
15 INPUT A
20 POKE 16508,INT (A/256)
25 POKE 16507,A-INT (A/256)*25
5
30 LET A=5+USR (PEEK 16396+256
*PEEK 16397-25)
35 CLS
40 FOR B=A TO A+175
50 PRINT (STR$ PEEK B+" ")(
TO 4);
60 NEXT B
80 LET B=0
90 LET N=9999
100 LET M=99999
110 LET Y=INT (8/3)
120 LET X=(B-Y)*4
130 PRINT AT Y,X;" "
140 INPUT C
150 IF C<256 THEN POKE A+B,C
160 PRINT AT Y,X;(STR$ PEEK (A+
B)+
"")( TO 4)
170 IF C=N AND B>0 THEN LET B=B-
-1
180 IF C<>N AND B<175 THEN LET
B=B+1
190 GOTO 110
```

After the loader program is ready, the first thing to do is type in a REM statement that has exactly 144 characters after the REM. The line number is not critical, but I'd suggest you make it 9995 so that it is right next to all the other machine code REMs. An example REM follows:

ORIGINAL REM LISTING 2

```
9995 REM 123456789012345678901234
45678901234567890123456789012345
87890123456789012345678901234567
89012345678901234567890123456789
0123456789012345678901234
```

With the REM entered, you may RUH the loader in the FAST mode. If you have modified the loader, respond to the resulting prompt with the line number of the REM that you just typed in. As always, those not using REMs are advised to enter the desired address of the routine - 6. In either case, enter the numbers in TABLE 2. Once again, skip the first six numbers if you're not using a REM. It may seem repetitive, but once again I'll warn you not to alter anything beyond the end of the table.

With the data entered and verified against the table, quit the program by entering a Q. The following REM shows what the line should look like:

MODIFIED REM LISTING 2

```
9995 REM
9000 SCROLL R PRINT USRND3K 35 /
-35N LET USRND333K 3**/235OR /23
PRINT ERAND FAST ??5 * RUN *
AL GOSUB [AT LPRINT *47? UNPL
OT LET SOR /SOR S PRINT ERAND FR
ST FAST * FOR LPRINT * RUN *
T GOSUB *4 LPRINT ?? UNPLOT LE
T SOR /?;2E(RND- F/ RUN ( NEXT
TAN *??EEPND- T/ RUN ( NEXT TA
```

How, enter the following name tsg REM so that you know which routine is in the line you just entered. This will be important later when you have forgotten.

SCROLLER I.D. REM

```
9994 REM SCROLLER - DISPATCHER
```

At this point, SAVE the loader and routines on tape.

It's now time to explain how to use the scroll routines that you have just finished entering. Once again, I'll remind you that they must not be used unless your screen display is fully expanded. I'm told that it is always expanded when you have 4K or more of RAM hooked up for BASIC. In any case, a 16K machine will definitely be using a fully expanded display.

As I mentioned before, there are two ways to access these scrolls. The first way is to use separate USR statements for each of the four individual directions. The following listing shows how you can use the scroll routines in this manner:

INDIVIDUAL USR EXAMPLE LISTING

```
10 LET ADDRESS=PEEK 16398+256*
PEEK 16397-25
20 POKE 16503,INT (9995/256)
30 POKE 16507,9995-INT (9995/2
56)*256
40 LET DISPATCH=11+USR ADDRESS
50 LET UP=DISPATCH+33
60 LET DOWN=DISPATCH+65
70 LET LEFT=DISPATCH+96
80 LET RIGHT=DISPATCH+117
90 PRINT AT 10,15;"X"
```

```
100 RAND USR UP
110 RAND USR RIGHT
120 RAND USR DOWN
130 RAND USR LEFT
```

Try it out. If it doesn't work, you had better find any errors you missed while entering the table of numbers. You'll have to use the loader to fix them.

The second method of using these scrolls is via a single dispatching routine which can call up any one of the four separate scrolling routines. For the dispatcher to know which scroll is desired though, requires some data to be stored somewhere. I've chosen the byte located at address 16417 since it is normally unused by the computer. A simple POKE 16417,<number> will provide the data required by the dispatcher.

The scroll that will occur when the dispatcher is called depends upon the number that is POKED into address 16417. If a 1 is poked, the routine will cause an UP scroll. A POKE 16417,2 will yield a DOWN scroll. Likewise, a 4 will initiate a LEFT TO RIGHT scroll and an 8 yields a RIGHT TO LEFT scroll. You may combine more than one scroll by simply adding the numbers required for a particular direction. In other words, POKE 16417,5 or POKE 16417,4+1 will cause the dispatcher to scroll the screen diagonally towards the upper right hand side of the screen. Using this method, you may achieve a scroll in 8 unique directions. Note that adding an up and a down scroll does not do anything. Likewise, neither does adding a LEFT-RIGHT and a RIGHT-LEFT scroll.

As you can see, using the scroll routines is quite elementary. The following listing is an example of how you can use the scroll dispatcher:

SCROLL DISPATCH EXAMPLE LISTING

```
10 LET ADDRESS=PEEK 16398+256*
PEEK 16397-25
20 POKE 16503,INT (9995/256)
30 POKE 16507,9995-INT (9995/2
56)*256
40 LET SCROLLER=11+USR ADDRESS
50 LET DIRECTION=16417
60 PRINT AT 10,15;"X"
70 INPUT X
80 POKE DIRECTION,X
90 RAND USR SCROLLER
100 GOTO 70
```

Now that you know how to use the scroll dispatcher, try it out. If the computer crashes, you have either made an error in calculating the address of the routines, or you have failed to correct an error while typing in the machine code numbers. Carefully check the USR statements against my examples first. If they are correct, then you'll have to recheck and correct your mistake in the machine code numbers. You do this by following the same procedure you used when you started the loader to enter the table the first time. Be sure to SAVE the corrected version to tape.

When you want to write a program using these routines, the loader is no longer needed, and may be erased line by line. You may also delete any REM statements containing unused machine code routines. The address finding routine is ALWAYS used.

If you would like to fix up an already written program with these routines, you may do so by adding the loader listing to the existing program listing. Type in the appropriate 9999 REM for the address finder, and enter it. Then you can add an appropriate REM for the other routine you wish to add. Modify the loader for use with the address finder, then enter the desired routine. It is

a lot more bother to fix up an existing program, but its probably less bother than re-entering the whole thing with the REMs previously created.

As with the DATA-READ routine, I will make an assembly language listing available to those who are genuinely interested. It is fully documented so that a programmer can follow the logic incorporated in the routines. If you would like this listing, please send 50 cents to cover my costs. If you have questions not answered in the article, I will attempt to answer them if you send a self-addressed and stamped envelope. If you missed the article featuring the DATA-READ simulation, you may check with TSH about getting a back issue, or I can provide a copy of the article with the assembly listing (\$2.00). My address is:

Kevin R. Bulgrien
LeTourneau College #1014
P.O. Box 7001
Longview, TX 75607

Note: Usually I can respond to a request within a day or so. If, however, I can't, please be understanding. Being a college senior means that my schedule is very full. I work on this project if I find time. I had planned to try to get these articles in for every TSH issue, but it's proving to be nearly impossible - time is hard to find!

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The following "Little Goodies" are a collection of tips, aids, utilities, etc. that should prove helpful in 206B programming. Special thanks to John Kuhn of the SINC TIMES in Florida and Stuart Ree of the TIMELINEZ N/L In Northern Calif. for their help. If you have a "Little Goodie" to share, please send it along and we will add it to the next edition. THANKS.

TIMELINEZ
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1. POKE 23609,X
For keyboard click (x = 1 to 255)
2. POKE 23692,2
Use before every print for automatic scrolling. Works like the scroll command on the 1000/1500.
3. POKE 23692,1
Another way to control scroll. Scrolls 22 lines, then a key must be pressed for every line.
4. POKE 23658,8
Put 2068 in caps mode.
5. POKE 23658,0
Take 2068 out of caps mode.
6. PAUSE 0
Pause until any key pressed.
7. POKE 23561,* (* = 1 to 35)
Time that a key must be held down before it repeats. Prefer 10-15 for text.

8. POKE 23562,* (* = 1 to 5)
Delay between successive repeats of a key held down. 3 for text.
9. USR 15002
Try this to get our of an infinite input loop w/o crashing.
10. DIM A\$(704)
PRINT AT 0,0; OVER 1; PAPER 1; INK 6; A\$
Allows you to change paper and ink color w/o clearing screen.
11. PRINT *1; AT 0,2; "HI"
PRINT *1; AT 1,5; "BY"
PAUSE 0
Prints on lines 22 and 23.
12. LOAD ""CODE
RAND USR 33792
For programs that will not load.
13. LET x=INT(x | y+.5) / 10 | y
Use for rounding. x=NO. To be rounded. y=NO. of dec. places.
14. 1 DEF FN r(x,y)=INT (x*10 | y+.5) / 10 | y
2 INPUT "Enter a number "; a
3 INPUT "Round off to ? "; b
5 PRINT FN r (a,b)
Sets the defined function to the formula used to round off. a=no. before rounding. b=no. of dec. places desired after rounding.
15. INPUT LINE A\$
Prevents computer from placing "" on screen when waiting for input. Note: can't use stop with this method, but cap shift 6 will stop. Bug in system.

BRNTR S

FUNCTION	CURSR	KEYS	FUNCTION	CURSR	KEYS	FUNCTION	CURSR	KEYS	FUNCTION
RBS	E	G	COS	E	U	INPUT	K	I	OVER
RCS	E	+CS+U	DATA	E	0	INT	E	R	PRPER
RND	KCL	++SS+Y	DEF FN	E	SS+1	INVERSE	F	CS+M	PAUSE
ASN	E	CS+0	DELETE	K	++CS+0	INV VIDEO	KCL	CS+4	PEEK
AT	KCL	SS+I	OIM	K	0	LEN	E	K	PI
ATN	E	CS+E	DRAW	K	U	LET	K	L	PLOT
RTTR	E	CS+L	EDIT	>	CS+1	LINE	E	SS+3	POINT
BEEP	E	CS+Z	ERASE	E	SS+7	LIST	K	K	POKE
BIN	E	B	EXP	=	X	LLIST	E	U	PRINT
BORDER	K	B	FLRSH	E	CS+U	LN	E	Z	RRNOOH
BRIGHT	E	CS+B	FN	E	SS+2	LORD	K	J	RERO
CBS LOCK	KCL	CS+2	FOR	K	F	LPRINT	E	C	REM
CRT	E	SS+9	FORMRT	E	SS+0	MERGE	E	CS+T	RESET
CHR\$	E	U	FREE	E	CS+R	MOVE	E	SS+6	RESTOR
CIRCLE	E	CS+H	GO SUB	K	H	NEW	K	A	RETURN
CLEAR	K	X	GO TO	K	G	NEXT	K	N	RND
CLOSE#	E	SS+5	GRAPHICS	KCL	CS+9	NOT	KCL	SS+5	RUN
CLS	K	U	IF	K	U	ON ERROR	E	CS+F	SAVE
CODE	E	I	IN	E	CS+I	OPEN#	E	SS+4	SCREEN
CONTINUE	K	C	INK	E	CS+X	OR	KCL	SS+U	SGN
COPY	K	Z	INKEY\$	E	N	OUT	E	CS+0	SIN

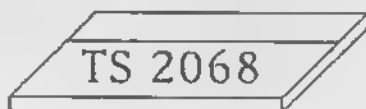
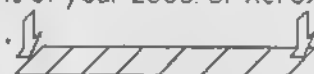
16. PRINT PEEK 23635+256*PEEK 23636
Use to find starting address.
17. PRINT -
Gives line feed to print statement.
18. RANDOMIZE USR 0
Use to reset computer.
19. INPUT AT 22,0; AT 10,0; "input value"; a \$
Input at any position on screen.
20. 1 FOR I=0 TO 21
2 FOR X=0 TO 31
3 LPRINT SCREEN\$(I,X);
4 NEXT X
5 NEXT I
Copy screen to printer without using copy command.
21. OPEN #2
Sends all data normally destined for the screen to the printer.
22. CLOSE #2
Cancels above command.
23. 1 LET C=2
2 FOR I=32 TO 255
3 PRINT AT 0,0,"
4 PRINT AT 0,0; CHR\$I
5 IF CODE SCREEN\$(0,0)-0 THEN PRINT AT -1,0;
CHR\$I: LET C=C+2
6 NEXT I
Lists characters not recognized by the screen\$ command.
24. CLEAR 63255
Do this first if you plan to use UDG's in a long

basic program that will incorporate a video mode change. A bug in the system will allow a long basic program to overwrite you UDG's if RAMTOP is not first lowered.

25. POKE 23750,0
If you are using cartridge S/W that can be stopped by the break key, this will allow you to enter your own basic lines into RAM. To return to the cartridge ROMWARE, POKE 23750,128.
26. POKE 23693,S6
To give starting paper/ink color.
27. BASIC STARTS AT 26710
28. CAPS SHIFT 3
Scroll two screen when listing.
29. POKE 26711,0
Gives line no. 0. POKE 26711,1 to change line 0 to 1.
30. POKE 23659,0
To use all 24 lines (make program unstopable), POKE 23659, 2 resets. (Use with "INKEYS" only, INPUT resets.)

continued on next page...

Cut out the strip below and tape to the top front of your 2068. Or Xerox and tape.



Courtesy TS Horizons and Banta Software.

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KEY	CURSR KEYS	FUNCTION	KEY	CURSR KEYS	FUNCTION	KEY	CURSR KEYS	FUNCTION	KEY	CURSR KEYS	FUNCTION
E	CS+N	SOUND	E	CS+G	=	KCL	SS+L	%	KCL	SS+S	
E	CS+C	SQR	E	H	<=	KCL	SS+0	&	KCL	SS+6	
K	H	STEP	KCL	SS+D	<>	KCL	SS+U	f	KCL	SS+X	
E	O	STICK	E	CS+S	>=	KCL	SS+E	⊗	CL+E	CS+P	
E	H	STOP	KCL	SS+A	<	KCL	SS+R	⊗	KCL	SS+7	
K	O	STR\$	F	Y	>	KCL	SS+T	⊗	KCL	CS+5	
E	SS+8	TAB	E	P	.	KCL	SS+M	+	KCL	CS+6	
K	O	TAN	E	E	?	KCL	SS+N	+	KCL	CS+7	
K	P	THEN	KCL	SS+G	?	KCL	SS+C	+	KCL	CS+8	
IZ	T	TO	KCL	SS+F	:	KCL	SS+0		G	CS+1	
E	A	TPU VDEO	KCL	CS+3	:	KCL	SS+Z		G	CS+2	
K	E	USR	E	L	:	KCL	SS+P		G	CS+3	
K+E	P	VAL	E	J	:	KCL	SS+7		G	CS+4	
RE	S	VAL\$	E	CS+J	:	KCL	SS+1		G	CS+5	
N	Y	VERIFY	E	CS+R	:	KCL	SS+8		G	CS+6	
E	T	+	KCL	SS+K	:	KCL	SS+9		G	CS+7	
K	A	-	KCL	SS+J	:	E	CS+Y		G	CS+8	
K	S	±	KCL	SS+B	:	E	CS+U	±	CS=CAPS SHIFT		
4\$	CS+K	/	KCL	SS+V	:	KCL	SS+2	±±	SS=SYMBOL SHIFT		
E	F	↑	KCL	SS+H	:	KCL	SS+3	±±±	DELETE KEY CAN		
E	O	↘	E	CS+D	:	KCL	SS+4	±±±	BE USED AT ANY TIME		

31. POKE 26710,255
Use to make lines disappear (makes line NO. over 9999). POKE 26710,0 will reset.
32. INK OR PAPER 9
Gives contrasting base color.
33. E' MODE/CAPS SHIFT AND A COLOR 1 - 7
Gives ink color in listing.
34. E' MODE/UNSHIFTED AND A COLOR 1 - 7
Gives paper color (go back to original color at the end of the line, if not, all the lines will be the same color.)
35. 1 INPUT "COMMENT"; A\$; CHR\$ 13;
"COMMENT"; B\$
2 PRINT "COMMENT"; A\$; CHR\$ 13;
"COMMENT"; B\$
Example of double inputs.
36. 9000 FOR I=1 TO 200
9010 BORDER 1: BORDER 2: BORDER 3: BORDER
4: BORDER 5: BORDER 6: BORDER 0: PAUSE 1
9020 NEXT I: RETURN
Gosub 9000 for a striped border.
37. POKE 23617,236
Use to get a question mark cursor in input statements.

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38. PRINT *0; "COMMENT"; PAUSE 0
Use to print on line 24.



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2068
Screen-Save

" IN SYNC "

by
John Bell

When you are writing a BASIC program it is often necessary to be able to switch between two screens of information. Perhaps you would like the user to be able to call a help screen, or have a player instantly "transported" to another location in an adventure game. It is simple to call the original screen drawing subroutine, but if the screen display is created by the user when the program is operating, there is no way to re-create it once it is erased or written over. This month's column is about a program that solves that problem.

The following "Screen-Save" program is written in machine code and will allow you to instantly save and re-call two graphics screens in the memory of your computer. If you have a Spectrum ROM in your 2068 the program will also work. (The people who program on the 1000 series of Timex/Sinclair machines can find two articles on saving screens in issue #3 of T-S HORIZONS). You will have to enter and call the routine from BASIC but once it is in memory it can be saved and loaded along with the stored screens as machine code.

To enter the machine code, type in, save and run program 1. The machine code will be checked as it is being poked into memory and the program will inform you if you have made any typing errors. If you have not you can save the machine code to tape by pressing the "S" key. Press any other key and the program will stop. If you would like a demonstration of the program in operation type in program 2. It draws, saves and switches between two screens.

Using the machine code in your own programs

The first line in your basic program has to "make room" for the machine code and stored screens. Use the command 'CLEAR \$i484'. This will ensure that the BASIC program won't write over your machine code. The code is actually comprised of four routines. Each one has a different function and is called by its own RANDOMISEUSR command. The first routine saves the first screen into memory. It is called by: RANDOMISEUSR 65319. The routine that re-calls the first screen using: RANDOMISEUSR 65331. The routine to save screen 2 into memory is called by: RANDOMISEUSR 65343. To re-call the second screen use: RANDOMISEUSR 65355. To load the machine code from

tape once it has been saved by program 1 use: LOAD "code"CODE. If you have saved two screens in memory and want to save them to tape use: SAVE "code"CODE \$i4484,i4051. This saves the program, the two screens, and any User Defined Graphics you might have created.

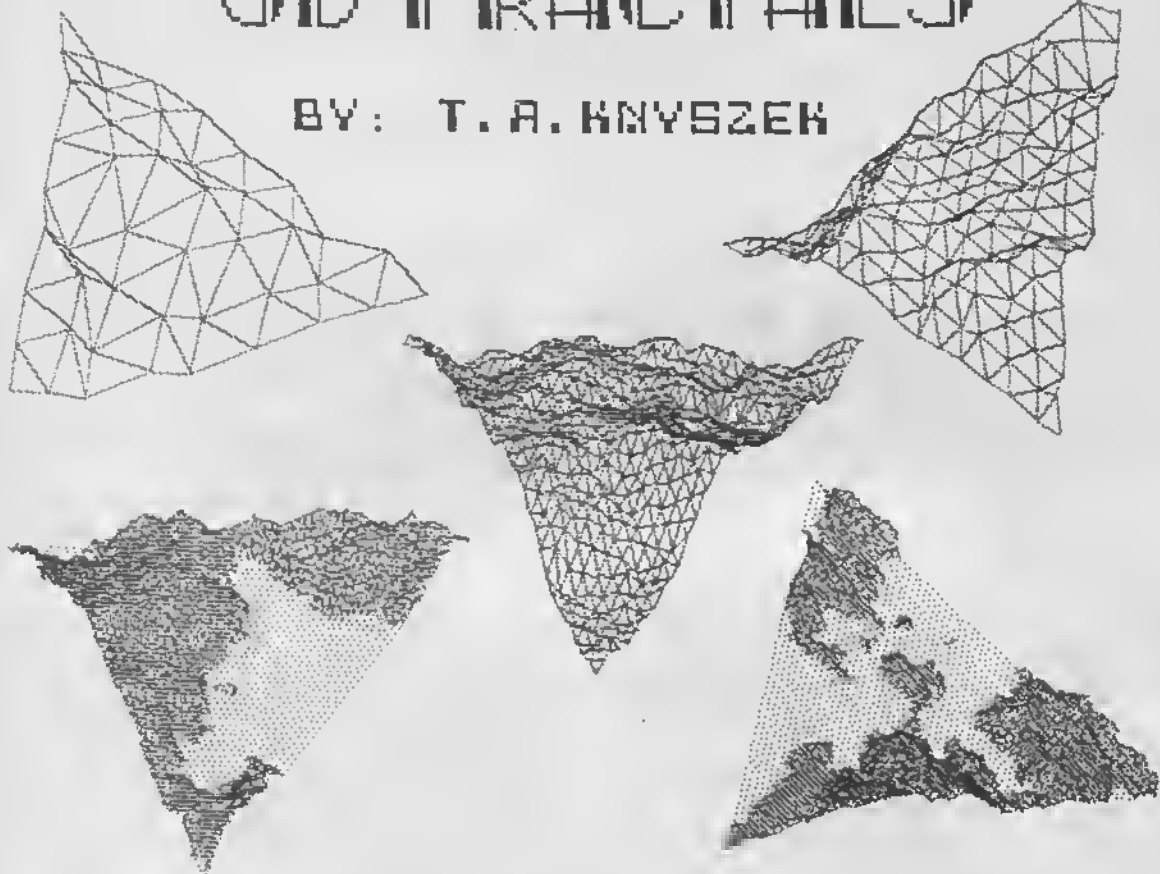
```
10 REM PROGRAM 1
   *****
20 CLEAR 51495
30 LET c=0
40 FOR a=65319 TO 65366
50 READ b
60 LET c=c+a-(775*b)
70 POKE a,b
80 NEXT a
90 IF c<>6990 THEN PRINT "PLEASE
CHECK FOR TYPING ERRORS!": STOP
100 PRINT "TYPING OK"
110 DATA 33,0,64,17,39,201,1,0,
27,237,176,201,33,39,201,17,0,64,
1,0,27,237,176,201,33,0,64,17,3
9,236,1,0,27,237,176,201,33,39,2
28,17,0,64,1,0,27,237,176,201

10 REM PROGRAM 2
   *****
20 PAPER 5: CLS
30 FOR a=0 TO 77
40 PRINT "screen 1 ";
50 NEXT a
60 RANDOMIZEUSR 65319
70 PAPER 6: CLS
80 FOR a=0 TO 77
90 PRINT "screen 2 ";
100 NEXT a
110 RANDOMIZEUSR 65343
120 FOR a=30 TO 1 STEP -1
130 RANDOMIZEUSR 65331
140 PAUSE a
150 RANDOMIZEUSR 65355
160 PAUSE a
170 NEXT a
180 PAPER 7: CLS
190 PRINT "DEMONSTRATION COMPLETE"
TE"
```

Now that you have the Screen-Save program up and running, you should be able to find some interesting uses for it. Perhaps you could even do a simple form of animation with it. Next issue I'll be writing about the SCREEN\$ function on the 2068 and 1000. TSH

3D FRACTALS

BY: T. A. KNYSZEK



A new graphics technique called FRACTALS is being used in modelling applications to simulate crystal growth, clouds, and three-dimensional landscapes. We will work on landscapes.

A FRACTAL is an object that is put together by beginning with some basic shape, and then adding or removing fractions of it. First large pieces are removed or added, then smaller pieces, all in random fashion. This is repeated until the desired effect and resolution is achieved.

We will use the triangle as our base figure. At the beginning of the program you are asked at what level you wish to work on. Level-1 will give you 4 triangles, level-2 will give you 16 triangles. Each time you increase the level you quadruple the number of triangles, to a level 6, which gives you 4096 triangles. This is close to pixel size.

To make it more realistic, a sea level is added in line 470. You can use different INK colors for land and sea (lines 1070 and 1090) or use the variable (F1) as a flag to draw lines for fractals above sea level and dots for those below sea level or a combination of both.

ACKNOWLEDGEMENTS: Michiel van de Pamme (Creative Computing Jul 85). Scientific American-Sept. 84. And to Benoit Mandelbrot the father of FRACTAL GEOMETRY.

```
5  REH ***** FRACTALS *****
10 REH Converted from APPLE II
    to T5-2063 by Ted Knyszek
15  BORDER 1: PAPER 5: INK 0: P
RINT : CLS
20  DIM D(65,33)
30  INPUT "NUMBER OF LEVELS (1-
6)";LE
```

```
40  LET DS=2+LE+1
50  LET HX=OS-1: LET HY=HX/2: L
ET RH=PI/6: LET UT=-PI/5
51  LET RQ=COS (RH): LET RS=5*SIN
(RH)
52  LET VC=COS (UT): LET VS=5*SIN
(UT)
60  FOR N=1 TO LE: LET L=10000/
1.8+N
```

```

70 PRINT #1;RT 0,0;"UOAKING OH
LEVEL ";N
80 LET IB=HX/2+H: LET SK=IB*2
90 GO SUB 150: REM #ASSIGH HEI
GHTS ALONG X IH AARY#
100 GO SUB 220: AEM #RSSIGH HEI
GHTS ALONG Y IH AARY#
110 GO SUB 290: AEM #ASSIGH HEI
GHTS ALONG OIAG. IH AARY#
120 HEXT N
130 GO TO 640: AEM #ORAU#
140 AEM ### HEIGHTS ALONG X ###
150 FOR T=0 TO HX-1 STEP SK
160 FOR K=IB+T TO HX STEP SK
170 LET I=K-IB: LET J=T: GO SUB
370: LET O1=0: LET I=K+IB: GO S
UB 370: LET O2=0
180 LET O=(O1+O2)/2+(RHO-.5)*L/
2: LET I=K: LET J=T: GO SUB 420
190 HEXT K
200 HEXT T: RETURN
210 AEM ### HEIGHTS ALONG Y ###
220 FOR K=HX TO 1 STEP -SK
230 FOR T=IB TO K STEP SK
240 LET I=K: LET J=T+IB: GO SUB
370: LET O1=0: LET J=T-IB: GO S
UB 370: LET O2=0
250 LET O=(O1+O2)/2+(RHO-.5)*L/
2: LET I=K: LET J=T: GO SUB 420
260 HEXT T
270 HEXT K: RETURN
280 AEM ### HEIGHTS ALONG OIAG.
###
290 FOR K=0 TO HX-1 STEP SK
300 FOR T=IB TO HX-K STEP SK
310 LET I=K+T-IB: LET J=T-IB: G
O SUB 370: LET O1=0
320 LET I=K+T+IB: LET J=T+IB: G
O SUB 370: LET O2=0
330 LET I=K+T: LET J=T: LET O=(
O1+O2)/2+(RHO-.5)*L/2: GO SUB 42
0
340 HEXT T
350 HEXT K: RETURN
360 AEM ### RETURN DATA FROM RA
ARY ###
370 IF J>MY THEN GO TO 390
380 LET BY=J: LET BX=I: GO TO 4
00
390 LET BY=HX+1-J: LET BX=HX-I
400 LET O=D(BX+1,BY+1): RETURN
410 REM ### PUT DATA INTO AARY
###
420 IF J>MY THEN GO TO 440
430 LET BY=J: LET BX=I: GO TO 4
50
440 LET BY=HX+1-J: LET BX=HX-I
450 LET O(D(BX+1,BY+1))=O: RETURN
460 REM ### PUT IN SEA LEVEL HE
RE ###
470 IF X0<-999 THEN GO TO 500
480 IF ZZ<0 THEN GO SUB 1070: L
ET Z2=ZZ: LET ZZ=0: GO TO 620
490 GO SUB 1090: GO TO 610
500 IF Z2>0 AND ZZ>0 THEN GO TO
610
510 IF Z2<0 AND ZZ<0 THEN LET Z
2=ZZ: LET ZZ=0: GO TO 620
520 LET U3=ZZ/(ZZ-Z2): LET X3=(
X2-XX)*U3+XX: LET Y3=(Y2-YY)*U3+
YY: LET Z3=0
530 LET ZT=ZZ: LET YT=YY: LET X
T=XX
540 IF ZZ>0 THEN GO TO 590
550 AEM ### GOING INTO WATER #
#
560 LET ZZ=Z3: LET YY=Y3: LET X
X=X3: GO SUB 950
570 GO SUB 1070: LET ZZ=0: LET
YY=YT: LET XX=XT: LET Z2=ZT: GO
TO 620
580 AEM ### COMING OUT OF WATER
###
590 LET ZZ=Z3: LET YY=Y3: LET X
X=X3: GO SUB 950
600 GO SUB 1090: LET ZZ=ZT: LET
YY=YT: LET XX=XT
610 LET Z2=ZZ
620 LET X2=XX: LET Y2=YY: RETUR
N
630 AEM ### DISPLAY HERE ###
640 GO SUB 1110: REM ### SET UP
PLOTTING DEVICE ON SCREEN ###
650 LET XS=.04: LET YS=.04: LET
ZS=.04: AEM ### SCALING FACTORS
###
660 FOR I=0 TO HX: LET X0=-999:
FOR J=0 TO I
670 GO SUB 370: LET ZZ=0: LET Y
Y=J/HX*10000: LET XX=I/HX*10000-
YY/2
680 GO SUB 940: HEXT J: HEXT I
690 FOR J=0 TO HX: LET X0=-999:
FOR I=J TO HX
700 GO SUB 370: LET ZZ=0: LET Y
Y=J/HX*10000: LET XX=I/HX*10000-
YY/2
710 GO SUB 940: HEXT I: HEXT J
720 FOR G=0 TO HX: LET X0=-999:
FOR H=0 TO HX-G
730 LET I=G+H: LET J=H: GO SUB
370: LET ZZ=0: LET YY=J/HX*10000
740 LET XX=I/HX*10000-YY/2: GO
SUB 940: HEXT H: NEXT G
750 GO TO 1130: AEM ### OOME PL
OTTING, GOTO END LOOP ###
760 AEM ### ROTATE ###
770 LET OX=XX
780 LET XX=XX*RC-YY*AS
790 LET YY=OX*RS+YY*RG
800 RETURN
850 AEM ### TILT DOWN ###
860 LET OX=XX
870 LET XX=UC*XX-US*ZZ
880 LET ZZ=US*OX+UC*ZZ
890 RETURN
930 AEM ### HOWE OR PLOT TO (XP
,YP) ###
940 GO SUB 470
950 LET XX=XX*XS: LET YY=YY*YS:
LET ZZ=ZZ*ZS
960 GO SUB 770: AEM ### ROTATE
###
970 GO SUB 860: AEM ### TILT UP
###
990 LET XP=INT (YY)+1: LET YP=I
NT (ZZ)
1000 GO SUB 1030
1010 RETURN
1020 REM ### PLOT LINE HERE ###
1030 LET XP=XP*0.55+S: LET YP=17
5-(24-0.7*YP)
1040 IF X0=-999 OR F1=1 THEN LET
X8=XP: LET Y8=YP: LET X0=XP
1045 IF Y8>174 OR Y8<0 OR YP>174
OR YP<0 THEN RETURN
1050 PLOT X8,Y8: ORAU (XP-X8),(Y
P-Y8): LET X8=XP: LET Y8=YP: RET
UAN
1060 REM ### SWITCH TO SEA COLOR
###
1070 LET F1=1: RETURN : REM Add
INK-Optional
1080 REM ### SWITCH TO LAHO COLO
R ###
1090 LET F1=0: RETURN : REM ROO
INK-Optional
1110 RETURN
1150 STOP
2000 SAVE "FRACTALS" LINE 15

```



Mountaineer Software
749 Hill Street #6
Parkersburg, WV 26104

I have been one of those "Sincialr Junkies" since almost the beginning. Yes, I took the abuse... "You have one of those toys?!?"... "I thought that was a high-tech doorstop!"... and so on.

But, you know as well as I do that you wouldn't trade in your T/S for anything. Our motley crew of tinkers

```
10 CLS : INPUT "Program Title:";a$
12 IF LEN a$>32 THEN GO TO 10
14 PRINT TAB 16-(LEN a$/2);a$
20 INPUT "Line #2 Info:";b$
22 IF LEN b$>32 THEN GO TO 20
24 PRINT TAB 16-(LEN b$/2);b$
30 INPUT "Line #3 Info:";c$
32 IF LEN c$>32 THEN GO TO 30
34 PRINT TAB 16-(LEN c$/2);c$
38 PRINT : PRINT : PRINT : PRINT : PRINT
40 INPUT "Bottom Line:";d$
42 IF LEN d$>32 THEN GO TO 40
44 PRINT TAB 16-(LEN d$/2);d$
50 PRINT AT 21,8; FLASH 1;"Correct? (y/n)"
52 IF INKEY$="" THEN GO TO 52
54 IF INKEY$="n" THEN GO TO 10
100 PRINT AT 21,8; "      ": INPUT "Number of copies :";x
110 FOR i=1 TO x
120 LPRINT TAB 16-(LEN a$/2);a$
122 LPRINT TAB 16-(LEN b$/2);b$
124 LPRINT TAB 16-(LEN c$/2);c$
126 LPRINT : LPRINT : LPRINT : LPRINT : LPRINT
128 LPRINT TAB 16-(LEN d$/2);d$
130 LPRINT : LPRINT
132 NEXT i
140 INPUT "More? (y/n)";;x$
142 IF x$="y" THEN GO TO 100
150 INPUT "Another title? (y/n)";;x$
152 IF x$="y" THEN GO TO 10
160 CLS : PRINT AT 10,8;"[Work Complete]"; STOP
```

constantly come up with new and exciting ways to enjoy our "toys".

And with great publications such as this, we will never run out of places to share our newfound knowledge, or gain insight on how to even better use the power within our reach.

*** CRYSTAL COAST SOFTWARE ***
STARVING HACKERS SALE: 3 TRIVIA
QUIZZES ONLY 19.95. Satisfaction
guaranteed. ORDER NOW! VISA
& MC OK. Or send for Free Cat-
alog & Program {listing}. But
HURRY while offer lasts. Over
50 different programs in stock
POB 233; MOREHEAD CITY, NC 28557

With this in mind, I would like to give a gift to you, "the believers". LableMaker is a short program that I wrote to fulfill a need I had for a way to make nice looking cassette labels for my software collection.

Lable Maker will work with any full-size printer interface you may have (AERCO, Tasman, A&J, Olliger) because you will use the print driver software provided with your interface to drive this program.

First, load the driver software for your interface, and save it to a blank tape. DO NOT REWIND THE TAPE!

Next, type in the simple program below. SAVE this on the tape immediately following the driver. Make sure to use the LINE command on the SAVE so that it will auto-run.

That's all there is to it! Just be note. If you plan on using double quotes ("), such as LOAD ", you will need to input TWICE the amount you will want printed. LOAD" will need to be inputted as LOAD****.

I have found a great place to buy form feed cassette labels to use with your full size printer. CUSTOM TAPE LOADERS (8135 COXS DRIVE, SUITE 209 PORTAGE, MI 49061) has them available in 4 colors (White-Yellow-Red-Blue) for \$1.60 per 100. Check out their prices on blank computer tapes, too.

I hope you get as much use out of this program as I did. Let me know if you make any modifications to this program. TSH

IT'S FAST IN SLOW MODE INCREDIBLE IN FAST MODE

THE BEST FILING PROGRAM FOR YOUR ZX81, TS1000,
TS1500 OR YOUR MONEY BACK

INTRODUCING

FASTFILE

PROFESSIONAL DATA MANAGEMENT SYSTEM

Holds more data than you ever thought possible!

Written in lightning fast 100% machine code. Sorts 1500 5-byte records in 24 seconds, 500 in 3 seconds! Searches through 1500 records in 1 second! Adds up 1500 decimal numbers in under 2 seconds. Built in word processor allows easy data entry. 4 data types stores more information in less memory. Add, change, delete, LPrint, search and query are all as easy as pointing your finger. Several different kinds of files can be in memory at the same time. Complete query system answers "How many...?", "How much...?", or "Which...?" type questions. Includes an example checkbook program which can store 400 checks in 16K! Manual includes information on how to create coupon/refund files, mailing labels, inventory control, address book, appointment scheduler/calendar and your own files.

To order send \$19.95 plus \$2.00 P&H for cassette and manual: Tom E. Cole, 1314 Speight #15, Waco, TX 76706. Texans add local tax.



TS 2068 REVIEWS

BY Daniel Richardson

DAMCO Enterprises
97 Bradley Ct, Fall River MA 02720
(617) 678-2110

DAMCO RAINBOW PLUS INTERFACE \$49.95 plus \$2.00 S&H

While they are not the biggest supplier of products for Timex Sinclair market, DAMCO Enterprises has, over the months developed an impressive line hardware for the TS 2068. Most of these hardware products were developed and sold in England and the rest of the Sinclair-ized world for use with the ZX Spectrum and have been well-received there. An example of which is reviewed below, the DK'Tronics Speech Synthesizer. Of course all of these devices must be finagled to get them to work with a 2068.

That's where DAMCO's new Rainbow Plus Interface in. It is DAMCO's major non-imported product and their answer to the finagle problem.

The Rainbow Plus is an elegant and simple alternative to previous Spectrum emulators. It is actually two products in one. It does what other emulators do by switching in a Spectrum EPROM to "replace" the Timex ROM in your computer. This allows the 2068 to run any of thousands of programs available for the Spectrum. But the Rainbow Plus goes a step further.

It allows the 2068 to run Spectrum hardware, like the DK'Tronics Speech Synthesizer (see below).

The EPROM operating system of the Rainbow Plus actually an improvement over the Spectrum ROM in that many of the letter's bugs have been corrected. The EPROM contains an expansion of the character set: 21 new symbols including the superscripts 0-9, some Greek letters and other symbols. The few Spectrum games I have loaded well on my Rainbow-ized 2068 even with my ancient tape player. Damco claims near 100% compatibility with Spectrum software.

A switch on rear of the Rainbow "toggles" your computer between the 2068 and Spectrum modes.

The Spectrum compatible expansion port completes the Spectrum emulator package. Timex users are already used to the concept of piggybacking peripherals, so the Spectrum Plus feels quite natural to me. As Damco's advertising states, the Rainbow really does give the power of two computers at the flip of a switch.

DK'TRONICS SPEECH SYNTHESIZER

\$34.95 plus \$2.50 S&H

Except for on 8-1/2 x 11 sheet of instructions DAMCO provides to supplement the instruction booklet, the DK'Tronics Speech Synthesizer arrives just like you would find it if you got it off the shelf of an English computer store. There are three items on the box: a 4-inch speaker, an interface with front and rear connectors, and a cassette tape. The interface is black, small (roughly 4x2x1 inches) and has a volume control knob and a standard earphone jack to plug in the supplied speaker.

The interface contains an amplifier and the synthesizer chip. The chip is basically the same as the ones used in most inexpensive speech synthesizers for home computers. So if your friend has a speech synthesizer for his C-64 or TI-99 you've heard it before. It's the electronic monotone that everybody expects a computer sound like.

The thing that makes the package fun and not just another toy for computer whizzes in your local user group is the text-to-speech software contained on the tape. Thanks to this software anyone can sit down at his computer and in fifteen minutes, make it talk. Using LPRINT statements in BASIC you just type in any word or sentence you want the computer to say to you, and it starts chattering away. Actually 3.5K of tape contains a table of English pronunciation rules. Using these rules the computer makes its best guess at what you are trying to say.

That's where the fun part comes in. To get the most correct pronunciation possible it is often necessary to purposely misspell words. For example never enter a word like "caught" or it will come out "coggit." A better way would be "cot" or "cout." It's easy once you get the hang of it. (Although I must admit I never could get it to say Carolyn right.)

In conclusion the DK'Tronics Speech Synthesizer is a very nice addition to anyone's computer, if you have the right "connections."

TSH

TS 1000 REVIEWS

EXTENDED BASIC: For the TS1000/ZX81

Reviewed by Peter McMullin

Have you ever wished the ZX81 BASIC allowed multistatement lines, or provided commands such as READ, DATA, RESTORE, IN, OUT, etc? Sure, lots of utilities have been around which provide these features, but most require RAND USR commands and POKEs which just aren't "friendly" BASIC. Programming genius Frits Benest, of Holland, has come to the rescue with a superb piece of software called EXTENDED BASIC.

EX.BAS. is an actual BASIC Interpreter which lives in a 3.5 K long O>REM statement. Since the EX.BAS. statements are very compact, you can still write a large program in 16K. Use of EX.BAS. does not require any POKEs or RAND USR commands. EX.BAS. is activated by the statement GOSUB 0 in your program. The following line begins with REM, then the EXTENDED BASIC commands. After the REM, it's almost like Microsoft BASIC. ALL the commands must be typed in (spelled out). You can include as many commands in a line as you want, separated by colons. A whole new world of BASIC programming opens up, since lots of Microsoft-type commands are included.

This makes it a snap to type in some neat BASIC listings published for the IBM, Apple, TRS80, 2068, etc. which use commands that were nonexistent in ZX BASIC.

EX.BASIC provides 22 new commands, extending Display, Date & String Handling, and Input/Output control.

DISPLAY COMMANDS include: DRAW, UNDRAW, CIRCLE, UNCIRCLE, FILL, PAPER, UNPAPER, PRINT, PRINT AT, MOVE (a window scroll), SCROLL (by N lines), CLS (fast!), COPY, SCREEN\$ (looks up character at specified screen coordinates, & returns it to a specified variable) *These 14 commands use ell 24 lines. PRINT auto-scrolls at the bottom line: no more 5/ reports!

DATA & STRING HANDLING commands include DATA, READ, RESTORE, (to specified DATA line), LEFT\$, MID\$, RIGHT\$ (slice it!)

INPUT/OUTPUT CONTROL commands include KEY (like INKEY\$, but faster, and can deal with multiple keys), IN (tests an input port and returns result to specified variable), OUT (sends contents of specified variable to indicated output port.) With these commands, you can program port-mapped control or measurement interfaces from BASIC.

EXTENDED BASIC seems to be virtually crash proof, and has 12 meaningful new report codes to tell you when you messed up. Due to the ingenious nature of the interpreter, it's incredibly fast - it can print up to 6,000 chars/sec. to the screen in SLOW mode! Due to the speed of the Display utilities, you can easily write animated games or graphics applications in EX.BAS. that rival the speed of Machine Code!

I simply cannot recommend this program highly enough. By the time you read this, it will be available from Thomas B. Woods (P.O. Box 64, Jefferson NH 03583). Send an SASE to Tom for his raw catalog - I don't know his price but it should be in the \$16.95 - \$19.95 range. Fred Nachbeur has written a 20 page manual for EX.BAS., which is loaded with examples, tutorials on the use of the "new" commands, etc. E. Arthur Brown is also distributing EX.BAS., but with the (inferior) documentation provided by the author. Until E.A. Brown makes arrangements to supply the Nachbeur manual, I'd suggest you order EX.BAS. from Tom Woods. TSH

BOOK REVIEW by Tex Foucette

OHI PASCALI

by Doug Cooper & Michael Clancy.
Copyright 1982 by W.W. Norton & Co., Inc.
500 Fifth Avenue, New York, NY 10110

ISBN 0 393 95205 3

OHI PASCALI is without doubt one of the most friendly textbooks I have ever encountered. Thanks to the designing and typesetting of Doug Cooper, it is a "structured" volume. It has 470+ pages and 15 "structured" chapters. Each chapter proceeds in an orderly manner, and contains "error trapping" in the form of "self-check questions" which are answered on the spot. Additional self-test problems are posed at the end of most chapters; answers to these exercises are contained in a special section "in the back of the book". Most chapters also contain a specific section entitled "Antibugging and Debugging", plus a brief chapter review.

Humorous aspects of programming are not neglected. A series of time-lapse photos of a demolition project illustrate the concept that "(Sometimes) It's better to start over from the beginning". The Leaning Tower of Pisa illustrates the truism that, "Testing may show the presence of bugs, but it doesn't say much about their absence".

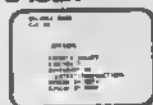
I seem to have damaged my only Pascal tape in mid-stream, so to speak, so I was unable to test the full range of programs and procedures contained in OHI PASCALI. I did manage to run a few, and with excellent results, after making minor changes to accommodate the limitations of the T/S 1000 and Partial Pascal.

OHI PASCALI is highly recommended to those interested in advancing their programming "savvy". TSH

5-Pack of TIMEX Programs ONLY \$12.00 (Add P&H \$1.50)

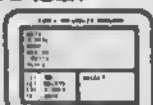
THE CHECKBOOK MANAGER

The Checkbook is a personal or business checking account program which will store banking transactions, keep a running balance of the account, and sort transactions in a number of useful ways.
© John Heaney 1982 Softeyinc, Inc.



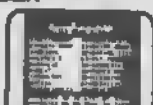
THE HOME ASSET MANAGER

A home inventory program that can be invaluable in case of fire or theft. Records date of purchase, place of purchase, description, price, serial number and model number. Optionally yields total value of all assets.
© TIMEX 1982



THE COUPON MANAGER

For coupon clippers, the T/S 1000 can keep track of those coupons showing what they are for, where they are offered, and starting and ending dates. You can list them by store or type and bring the computer age into your household, saving time and effort.
© TIMEX 1982



SUPERMAZE

Navigate your way through a three-dimensional maze, complete with trapdoors, gold bars, marker stones, and a compass. Ten separate mazes, with up to four options each. Extremely challenging and a fine use of three-dimensional graphics.
© Greg Harvey 1982 Softeyinc, Inc.



THE GAMBLER

Program: Blackjack - Match your Blackjack skill against the T/S 1000 dealer. Full graphical display of cards dealt and winnings. Play is determined by Casino rules. Features include: Double Down, Min-Max betting. The superb graphics of this game lend a degree of realism not seen before.

Program: Slot Machine - Displayed is the T/S 1000 Slot Machine, complete with rolling numbers, payoff values, and condrop.



HCS Software, P.O. Box 1754, Portsmouth NH 45662

T-S NEWS

ITEM: Attention TS User Groups !!!

The MIDWEST TIMEX-SINCLAIR COMPUTERFEST, is scheduled for May 3rd and 4th, 1986. Your club is invited to attend the computer fest in Cincinnati. Clubs may rent a 4' x 8' table for \$10, for selling, copying, and trading of, newsletters and original programs, demonstrating software, hardware, and for generally promoting your club. This is a special exhibitors price for clubs only!

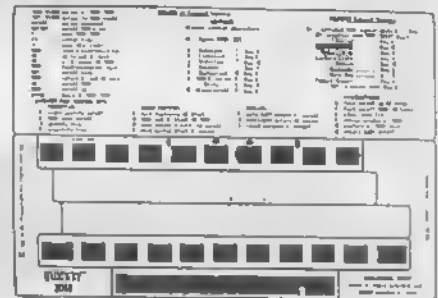
Preregistration. FAMILY-\$7.00 ADULTS-\$4.00
DOOR PRICE... FAMILY-\$8.00 ADULTS-\$5.00

(These admission prices cover both days of the fest.) SEND INQUIRES TO: (S.A.S.E.) T/S COMPUTERFEST, 3832 WALTERSON AVE., CINTI. OH 45227 PLEASE INCLUDE THIS MESSAGE IN YOUR NEWSLETTER!!!!

ITEM: Someone asked me the other day if Byte Back was still in business or not. The answer is yes. Byte Back was one of the earliest American supporters of the Sinclair machines, and their latest catalog still contains quite a lot of great addons for both the TS1000 and TS2068. They carry a 64K RAM for the TS1000/ZX81, with special features like battery back-up, 24 pin EPROM socket, and more, for \$99.95; a real time clock \$79.95; their own modem \$29.95; RS-232 and centronics parallel interfaces \$69.95; and more. Add \$4.95 shipping. Byte Back, Rt. 4, Box 54, Bednbaugh St, Leesville, SC. 29070, (803) 532-5812. Write for a catalog and tell them who sent you.

ITEM: AN-TO Productions(9009 W. Elm St.#2, Phoenix AZ 85057) carries a line of plastic keyboard overlays for the TS 2068, for use with Tasword II and MScript (and soon for Omnicalc and other programs). These overlays help in word processing and data entry by helping you to find the keys and they have tables printed on the top half for quick reference. Only \$3.99 each (specify) or \$7.50 for two. Blank overlays are also available to customize to your needs for \$3.00 each. Add 50¢ per order for postage and handling.

**QUICKEY™
2068**



ITEM: If you've ever heard of OARKSEID, STRONTIUM DOG, DANGERMUSE, and ASTERIX & OBELIX you're probably a real comic book fan. These are just a few of the computer games available for Spectrum users in England. If your interested in any of these games try the English Micro Connection, 5 Kliburn Ct., Newport, RI. 02840. (By the way Oarkseid is featured in the popular "Superman" game for the Spectrum).

ITEM: Remember the TS 1510 cartridge dock that Timex came out with in 1983? It allowed the ZX81, TS 1000, and TS 1500 to run Instant loading, plug-in cartridges. Well now Zebra Systems is selling the TS1510 along with three cartridges-Flight Simulator (considered by some to be the best game type program to come out for the TS1000), Chess (the Timex standard, we assume),and Supermath (never heard of it) as a set for \$39.95. Quantities are limited. Zebra Systems, 78-06 Jamaica Av., Woodhaven NY 11421. Many other items are reduced, too.



**T/S 1510
COMMAND CARTRIDGE™ PLAYER**

T-S NEWS CONTINUED

ITEM: Applied Sinclair: Subroutines and Programs for the Mathematically Minded. A book for all levels of programmers and users of Sinclair computers. It comes with a cassette tape containing 59 demonstration programs (TS2068 only). The book features interesting mathematical diversions, including: Curve-plotting: Cartesian, Polar, and Parametric descriptions; Contour-plotting: 2-d surfaces; Decimal-place calculations; Base-changing: Integer and fraction. It contains experiments in computer programming and numerical-analysis problems, including: Matrix-Inversion, with determinant calculation; Numerical Integration, with error calculation (= and < > step-size); Discrete convolution. It is a source-book for useful programs and subroutines, including: Root-finding: Systems of equations; Data regression: Linear and non-linear, multi-variable; Differential equations. Some of the features of the book are: Line-compatibility: All prog's/sub's and demo's may be in memory at the same time. Some sub's/prog's/demo's make use of

several other sub's so that much repetition has been spared. Written in Sinclair Basic: Sub's/prog's will run on ZX80 with 8K Rom, ZX81/TS1000, TS1500, TS2068, and SPECTRUM. 168 pages, 59 dem's, 25 central sub's/prog's. Price: Book only \$13, Book and tape for TS2068 \$16.00. Address-RICHARD BOOTH, SHERMAN FAIRCHILD LAB, LEHIGH UNIVERSITY, BETHLEHEM, PA 18015 (215) 861-3951.

ITEM: A new 2068 printer interface from Hacksel Electronics, 247 Queen St. W., Toronto, ONT, CAN, MSV 1Z4 (416) 596-1663. Hacksel claims it works with all Centronics-type printers, allows full page, hi-res color screen copies using a gray scale, is compatible with software designed for the Aerco and Tasman Interfaces as well as Omnicalc II, Vu-Calc, and Vu-File. Available in cartridge port or rear-edge connector boards for \$49.95 (U.S.) plus \$4.00 postage and handling. Write or call for more information.

SHARP'S INC.

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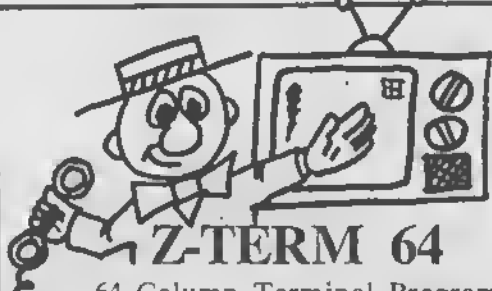


Z-CLOCK

Clock/Calendar
for your TS2068

The Z-Clock's built in battery back-up feature lets you keep track of time even when your computer is turned off. When you turn on your TS2068, the Z-Clock can tell it the YEAR, MONTH, DATE, DAY OF THE WEEK, and the TIME OF DAY down to tenths of a second with crystal controlled accuracy. The clock is easily accessed from BASIC or assembler. The Z-Clock features a 64-pin bus extension connector.

Catalog #: C400 Z-Clock Price: \$39.95



Z-TERM 64

64 Column Terminal Program

When we started shipping our OS-64 64-column operating system cartridge, the most often asked question was: "Will MTERM II work in 64 columns with OS-64?". Unfortunately, the answer was no. But now Z-Term 64 has arrived! And not only does it support 64 column operation, but also the entire list of most often requested modem features including: clearer menus and documentation than MTERM II, Auto re-dialing, built-in text editor, expanded upload and download features including ASCII conversion of BASIC programs, Xmodem protocol, and built-in 80 Column printer support for on-line printing. Z-Term 64 also supports ZEBRA Disk, A & J Stringy Floppy, and Cassetts for storage of downloaded programs, text and data. Supplied on cassette with user's manual. (Requires OS-64, NOT INCLUDED) NOTE: Neither Z-TERM 64 or OS-64 support the 32 column TS2040 or Alphacom/32 thermal printers.

Catalog #: C278 Z-Term 64 Price: \$29.95

OS-64 64 Column Operating System Cartridge

Catalog #: C271 OS-64 64 Column Cartridge Price: \$29.95



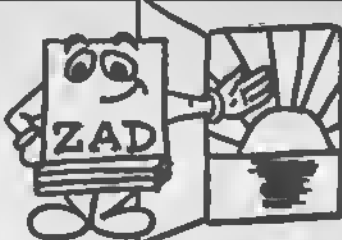
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Zebra Systems is happy to introduce Z-Stick, the ideal companion to your Spectrum Emulator. Z-Stick is a joystick interface for use with Spectrum game software on a TS2068. Because Z-Stick is compatible with the famous Kempston Joystick Interface so popular in Great Britain, it is supported by the majority of British Spectrum Game Software. But that's not all. While our engineers were at it, we decided to throw in some additional features to add to your enjoyment. The Z-Stick includes two jacks for SOUND and BEEP; an L.E.D. power-on indicator so you can tell if you've left your TS2068 on even if your TV is off; and a computer reset switch to save wear and tear on both you and your computer's power switch. For those who don't already own a Spectrum Emulator, we have the Z-Stick PLUS, which includes a Spectrum Emulator for just \$10.00 more.

The Z-Stick interface works with your Timex TS2090 joystick or any Atari compatible joystick. Z-Stick attaches to the rear expansion-connector of your TS2068 and features a full 64-Pin feed-through expansion connector for maximum compatibility with your other TS2068 peripherals.

Catalog #: C401 Z-Stick Price: \$29.95
 Catalog #: C402 Z-Stick PLUS Price: \$39.95
 Catalog #: C121 Atari Compatible Joystick Price: \$ 9.95
 Catalog #: C147 Deluxe Joystick Price: \$19.95



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Catalog #: C403 Z.A.D. Price: \$39.95

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The price of our untested & uncased modem boards is so reasonable that not only are they being used as modems, but also the boards and sometimes just their parts are being put to many other uses by creative Timex hobbyists and experimenters. One of the things we've done at Zebra Systems is develop a very simple circuit to change one of these Modem boards into a general purpose RS232 board, which can then be used to drive serial printers and other devices. We thought this idea was so simple and cost-effective that we're making it available as a product.

We are introducing a complete kit consisting of a small printed circuit board, 3 IC's, a DB-9 connector, other miscellaneous parts, and instructions. The board develops the negative voltage required for true RS232 and has proper Driver and Receiver chips. After installing our RS232 board with a pin and socket system right onto your modem board's 8251 Serial chip, all that remains is to make 3 trace cuts and add one jumper wire to complete installation. Clear instructions are provided with a discussion of the theory of operation and some simple BASIC and assembly language printer drivers.

A short experimenters guide to the WC2050 is included. It explains such things as how to change the address decoding to other port assignments, how to change baud rate under software control, and more.

The WC2050-to-RS232 Kit (Catalog #: C183) includes all parts and instructions necessary for installation and operation. A bare board for the modification is also available.

Catalog #: C183 WC2050-to-RS232 Kit Price: \$19.95

Catalog #: C184 PC Board and Instructions only Price: \$ 5.95

AS-IS ZX81 COMPUTERS

Many months ago we purchased a large quantity of returned ZX81 computers from a Sinclair Repair Depot. These computers were sent back to Sinclair for repair (in some cases by owners who simply could not load tapes or operate the computer properly.). These computers are offered on an AS-IS, NO-RETURN basis. We've been selling these returned computers to members of local Timex clubs who have reported that a large number of these ZX81 are already working, or can be easily repaired.

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Catalog #: W250 Originally \$119.00, Now Only: \$69.95

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Zebra Systems has purchased the rights to publish the MTERM series of Terminal software for Timex computers with WC2050 modems.

MTERM/T for the TS1000/1500/2068

MTERM/T (also known as MTERM I) is a smart terminal program which has the following features: auto-dialing of phone numbers, change modem parameters, change Border, Ink, and Paper colors (TS2068 version only.). MTERM/T is supplied on tape with user's manual.

Catalog #: ST01 MTERM/T Price: \$12.95

MTERM II for the TS2068

MTERM II is an advanced software package for your TS2068 equipped with the WC2050 modem. MTERM II features a 14 Number Auto Dial Directory, 27k Send/Receive buffer which can be erased, viewed, printed, or transmitted, 10 Macrokeys which hold up to 53 characters each for auto logon, codes, etc.. You can transmit and receive BASIC programs, and text from a BBS or another TS2068 Computer. MTERM II is also available on fast-loading Zebra Command Cartridge format.

Catalog #: ST02 MTERM II Tape Price: \$29.95

Catalog #: ST2C MTERM II Cartridge Price: \$34.95

The Complete Guide to MTERM II By Barry Carter

This book tells you all you wanted to know about MTERM II. It details many features of MTERM II that were left out of the manual. A MUST-HAVE book for MTERM II owners!

Catalog #: C139 Complete Guide to MTERM II Price: \$8.00

MINI XMOD 1.7 for the TS1000/1500

MINI XMOD 1.7 allows your Timex 1000/1500 or ZX-81 equipped with a Westridge 2050 modem to Up and Download programs to any XMODEM Protocol BBS (Like ZEBRA BBS). Includes 16k and 64k versions on cassette and User's manual. Requires a minimum of 16k of RAM.

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The FDD-3000 features the same Intelligent Controller as the original FDD, but with an expanded Internal RAM of 64k. Yet it is still 100% software compatible with the original FDD.

Like our original Disk System, the FDD-3000 is compatible with all of your existing TS2068 peripherals including the TS2040 and Alphacon/32 thermal printers, the WC2050 modem, Aerco CPI, Terman CPI, A&J Microdrives, Zebra Talker, Zebra Graphics interface Z-Stick, Z.A.D., OS-64 Cartridge and more! The FDD-3000 is available in one-drive and two-drive models. Each drive stores 160k of data per side of a diskette for a total of 320k per disk.

FDD-3000 64k CP/M 2.2 Option

Available as an option to the FDD-3000 is the 64k CP/M 2.2 operating system from Digital Research. While the FDD-3000's T.O.S. operating system is one of the most powerful disk operating systems available for a personal computer, the CP/M option for the FDD-3000 will let you access the large library of CP/M-80 business and personal software.

The CP/M 2.2 option includes a terminal emulator program which allows your TS2068 to run CP/M in 64 column mode (High-Res Amber or Green monitor recommended). A Driver is included to use your 80-column printer from CP/M through the FDD-RS232 port.

FDD-3000 Spectrum Mode Option

An additional option is available for those who wish to run Spectrum software on their FDD-3000. When coupled with a Spectrum Emulator it allows you to LOAD, SAVE, and RUN Spectrum software from FDD-3000 Disk.

FDD-3000 Single Drive System

Single Drive starter system includes: FDD-3000 with One 3" floppy drive, TS2068 Interface, T.O.S. operating system disk, and user's manual

Catalog #: C550 FDD-3000-1 Price: \$375.00

FDD-3000 Dual Drive System

Same as above, but with two 3" disk drives.

Catalog #: C551 FDD-3000-2 Price: \$425.00

FDD-3000 64k CP/M 2.2 Option

Includes 64k CP/M 2.2 System Disk, 64 Column Terminal Emulator, and user's manuals.

Catalog #: C552 FDD-3000 CP/M Option Price: \$50.00

FDD-3000 Spectrum Mode Option

Switchable option to allow FDD-3000 to operate in Spectrum Mode. (Requires Spectrum Emulator, not included.)

Catalog #: C553 FDD-3000 Spectrum Option Price: Call

Catalog #: ZMUI Deluxe Spectrum Emulator Price: \$29.95

Blank 3 Inch (360k) Floppy Diskettes

Catalog #: C504 Box of 5 3" Diskette Price: \$19.95

Catalog #: C503 Box of 10 3" Diskettes Price: \$39.95

FDD RS232 Serial Printer Cable (Optional)

Catalog #: C605 FDD Serial Printer Cable Price: \$19.95

Original Zebra FDD 64k CP/M 2.2 Upgrade

Same as FDD-3000 option, requires return of FDD Controller to Zebra Systems for exchange/upgrade.

Catalog #: C510 FDD CP/M 2.2 Upgrade Price: Call

Original Zebra FDD Spectrum Mode Upgrade

Same as FDD-3000 option. Requires return of FDD Interface to Zebra Systems for upgrade. (Requires Spectrum Emulator, not included.)

Catalog #: C511 FDD Spectrum Mode Upgrade Price: Call

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Catalog #: C501 FDD Add-on Drive B Price: \$125.00

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