

## GETTING MORE FROM EACH KEYSTROKE

by Cliff Danielson

If you haven't already done so, add a large keyboard to your ZX-81 or T/S 1000! The external keyboard will greatly improve, not only the speed and accuracy of data entry, but also your confidence in the computer. You may either purchase a new keyboard designed for the Sinclair or modify one found in an electronics junk store. The junk store approach is cheaper, but choose the keyboard carefully. Select only a keyboard with metallic closure switches -- usually recognized by the presence of only two contacts on the rear of each switch. Make sure that the previous circuitry is exposed such that it can be easily removed or modified. Also, choose a keyboard with more than 40 keys. The extra keys can be used to add new features.

Wiring of the salvage keyboard is easy. There are eight address lines and five data lines to the keyboard. Each address line connects with the anode (the end that is not banded) of a diode and is thus easily identified. Normally, pressing a key causes a switch closure between one address line and one data line. Wire each switch of the new keyboard in parallel with the corresponding switch of the original keyboard. This can be done by duplicating the circuit on the Sinclair keyboard. Now for those extra keys.



## DECEMBER HIGHLIGHTS

Boy were there a lot of Sinclair-Timex Group meetings in December!

Because of some confusion in scheduling and co-ordination with the BCS main office our group's general meeting was held twice last month. The first of the two was on Wednesday December 14.

Sue Mahoney began the meeting with some opening remarks and presided over a discussion of the state of the Timex Computer community and Timex Corp's marketing strategy.

This was followed by a demonstration by Sue of The Wordsinc TS1000 Word Processor. It is a simple but useful tool. Sue indicated that she was pleased with its performance.

Charles Warner of Games To Learn By (GTLB) and Marty Warner of Timex were there to tell about their respective products.

GTLB demonstrated a couple of its educational and recreational game programs. Particularly interesting was their TS2068

10 REM

Phew!

I went to a Sinclair-Timex meeting on three out of the four Wednesdays last month. What's kind of frightening is I enjoyed it. It could become habit forming. It'd be nice but what my life needs right now is fewer meetings not more.

The continueing adventures at Timex Computer Corp. continue, sort of. A good source within Timex reports that, "The Timex Computer Corp. is no longer."

The source explains that the TCC has been essentially dissolved and all it's functions absorbed into the Timex parent corp. With the departure of TCC Vice President Dan Ross the hierarchy now seems to be: Timex VP Kirk Pond in charge with three more-or-less equal lieutenants: Doug Smith, Bill Skirm, and Dick Longo.

Charles Warner of Games to Learn By, a Timex retailer, after a meeting with Timex higher-ups, says that he senses a new, positive feeling there. "I'm very encouraged by their new attitude."

Warner says Timex told him they planned to start moving forward again. That they had a renewed sense of the value of their products and were going to start promoting them more aggressively.

If all this is so, then it's good.

#### A Final Note:

Listen, don't blame it on the Post Office, this newsletter is late this month for other reasons. I'm sure you'll be able to find something else to blame on the Post Office.

# ↓ The ↑ Boston → Computer ← Society

This newsletter is produced to inform group members of the agenda and logistics of future meetings, as well as to recap and amplify the information provided at the meetings. It also provides a forum for members and interested parties to communicate what they have learned or developed relating to Sinclair and Timex computing. Meetings are open to the public (non-member admission is \$3); however attendees are encouraged to join the Boston Computer Society (BCS) This newsletter is free to members. Back issues are one dollar each.

**DIRECTIONS TO MEETING:** The S-T User Group meets in the Large Science Auditorium (Room 8/2/009) of the University of Massachusetts, Boston Harbor Campus. It is located only 3 miles from downtown Boston and easily accessible by public and private transportation. From the north or west, take the Southeast Expressway to Exit 17.

Turn left onto Columbia Road. Follow construction signs to get to Morrissey Boulevard in the direction of UMASS and the Kennedy Library. Bear right on traffic island, get in the right two lanes, following UMass/Boston signs. Turn left at the light into Campus. From the south, take Morrissey Boulevard northward to the campus. On the MBTA, take the Red Line (Ashmont Train) to Columbia Station. Transfer to the free University shuttlebus in the T parking lot.

— JGH III

## The Sinclair Timex User Group

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The Sinclair Timex Newsletter is published monthly by the Sinclair Timex User Group of the Boston Computer Society. Membership in the BCS is \$24 per year which includes a subscription to its magazine "The Computer Update" and subscription to two of its group newsletters (such as this one).

Advertising space is available in this publication on a limited, first come first served basis. The rate is \$60 per quarter page. At this time no other ad sizes are available. For detailed rate and discount information contact the Advertising Manager or the Publisher.

## HIGHLIGHTS continued

hi-res drawing and painting program, "Art for All Ages". With this program the user can create all sorts of high resolution images on the Timex Color Computer. These images can be edited, saved and incorporated into other programs. It sells for \$16.95. Call GTLB at 413-268-7505.

In addition to programs from GTLB we were shown some upcoming games from another source. We saw "Cycle Path", a motorcycle chase game with terrific animated graphics; "Crazy Bugs", a PacMan look-a-like; "Androids", a maze adventure; and cartridge version of "Flight Simulator".

Part Two of the December Meeting was held the following Wednesday downstairs in the small science auditorium. Co-chairs Will Stackman and Jack Hodgson met with about twenty attendees and demonstrated Simulusion's "Marvelous Music Machine" reviewed here a few months ago, and the British Sinclair ZX Spectrum Computer, the predecessor of the TS2068.

## MACHINE LANGUAGE AND HARDWARE DESIGN SUB-GROUP

by Dick Forsyth

The major presentation at the December meeting of the Machine Code sub-group was a demonstration of "Hot Z" by Jack Hodgson. A complete and powerful editor and disassembler program for machine code programmers, "Hot Z" most impressed this writer with its ability to single step through a program, displaying the status of the registers and flags at each step.

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Two candidates for "Project Dazy" were presented, duly appreciated, and returned for modification. "Project Dazy" is a forum for the presentation of short machine language display programs written by group members. You can get details on participating in "Project Dazy" from group leader Bob Heath.

The January meeting of the machine language sub-group took place as usual on the 1st Monday of the month at Itek Optical in Lexington.

Bob Heath demonstrated his home budget program. Written entirely in machine code, it is very user friendly, with well thought-out prompts and displays. The integer arithmetic system is space efficient and allows fast calculations. It is an impressive effort.

The first "dazy" program to meet project specifications was incorporated into the overall program and tested. Several modifications to improve program operation were made in an interesting session.

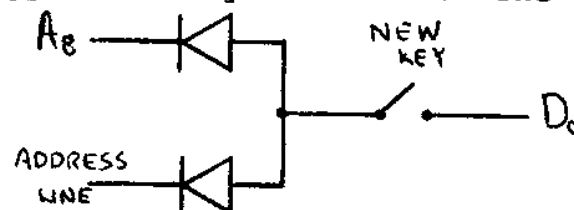
The Machine Language and Hardware Design Sub-Group meets on the first Monday of the month at Itek Optical in Lexington. For details and directions call Bob Heath days at 276-2424.

#### KEYSTROKES continued

With the addition of simple circuitry, it is possible to obtain shifted functions, such as EDIT or the cursor controls, with a single keystroke. Normally, the shifted functions require both the shift key and the function key to be depressed, an operation requiring two fingers -- really two hands. Two circuits providing the single keystroke capability

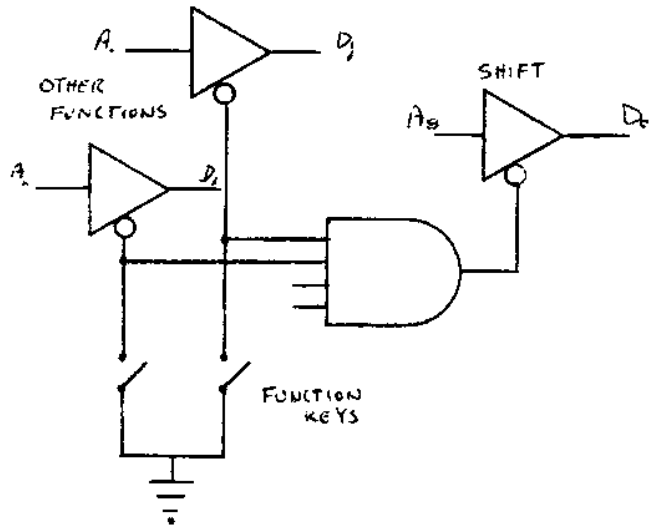
are explained. The first uses only passive components, namely diodes, and allows EDIT, "", DELETE, STOP, ", FUNCTION, and # (the British version) with a single switch closure. The second circuit uses active components, but can generate any shifted function. (Note that these circuits are not new. Two years ago they were discussed during User Group meetings. Henry April expanded upon the diode approach to also allow :, ;, ?, and /. Henry implemented his design with the E-Z Key keyboard. The active circuit approach was first described in Syntax in March 1981.)

The circuit for the diode approach is given below. The



anode of two diodes is connected to an extra switch. The cathode end of one diode is connected with address line A8, the address line going to the shift key, and the free end of the second diode is connected to the address line for the desired function. The other side of the switch is connected to data line D0, the same data line as are the shift and other possible functions for the diode approach.

The active component approach uses two chip types: the 74LS125A, tristate buffer, and the 74LS21, dual 4-input AND. The number of chips required depends upon the number of function keys implemented. (Dave Wood implemented 23 functions with 10 chips. Diode logic can be used, in some cases, in place of the AND. The operation of the circuit is simple. Each tristate buffer simulate a switch closure.



Normally, the buffer is in an high impedance state -- an open switch. When a low level signal, such as a switch closure to ground, is applied to the control for the buffer, the buffer repeats its input signal -- a closed switch. The AND is used to detect the closure of any of the function switches and control the tristate buffer corresponding to the shift key. Thus, with the closure of one switch, two buffers are enabled and the computer will sense two switch closures.

**A BASIC ERASER**  
by Dave Wood

The following 5-line BASIC program demonstrates several useful machine language concepts. One; it shows the idea of entering machine code as decimal character triplets, which are translated into decimal numbers by the VAL instruction using three characters at a time. Two; it shows the use of the print

buffer at 16444 for temporary storage of a short machine code program. Three; the program itself shows the application of a number of ROM routines

TFAST (02E7h) will temporarily place the computer in FAST mode. LINEADDR (09DBh) will locate the memory address of a BASIC line, given its line number in the HL register. ZAPDIF (0ASDh) will erase memory from where HL points up to, but not including, where DE points. RMODE (0207h) will return the computer to the original mode (FAST or SLOW). RST 8 goes to the system error return.

This BASIC/machine code program will erase a block of BASIC program extending from where the cursor is pointing to the end of BASIC. To use the program, simply set the cursor and enter GOTO 100. By using the error exit (RST 8) rather than return, the erase program is oblivious to self destruction - it can erase itself with no ill effects. Do make sure that line 100 is correct before you run it. The string should contain 63 characters with no blanks.

```

100 LET X$="205231002042010064
205216009235042012064205093010
205007002207255"
110 FOR I=0 TO 20
120 POKE 16444+I, VAL X$(3*I+1
TO 3*(I+1))
130 NEXT I
140 RAND USR 16444
    
```

The machine code in statement 100:

CD E7 02	CALL TFAST	Go to temporary FAST
2A 0A 40	LD HL,(E-PPC)	Fetch line no. of cursor
CD DB 09	CALL LINEADDR	Get address of that line
EB	EX DE,HL	Move addr. to DE
2A 0C 40	LD HL,(D-FILE)	Get addr. past BASIC end
CD ED 0A	CALL ZAPDIF	Erase BASIC
CD 07 02	CALL RMODE	Return to original mode
CF	RST 8	Return control to system;
FF	DEFE FF	and provide "0" return code

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### Sign me up for these user/interest groups:

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- Business User Group
- Consultants & Entrepreneurs Interest Group
- Database User Group
- Displaywriter User Group
- Educational Resource Exchange
- 80/Boston (TRS-80)
- Family Home User Group
- Logo User Group
- IBM User Group
- North Star User Group
- Osborne User Group
- OSI/Boston (Ohio Scientific)
- Pascal User Group
- PET/CBM/VIC User Group
- Robotics Interest Group
- Sinclair/Timex User Group
- Telecommunications User Group

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## Review: Timex 2068 Color Computer

**BY MICHAEL WEISENBERG**  
*Contributor*

**T**he Timex/Sinclair 2068 Personal Color Computer resolves many of the complaints users of its predecessors — specifically the T/S 1000 and T/S 1500 — have lodged. It has real keys; its larger size is easier to work with; it has a better tape interface; it even has an on/off switch. We believe that this machine, designed to compete with the Commodore 64 and the Radio Shack Color Computer and priced at under \$200, offers many desirable features usually found on more expensive machines.

The 2068 is a more convenient size than its tiny brothers, measuring 14½ × 7½ × 1½ inches. Its keys actually click when you press them — with this machine, you can touch-type.

Instead of the puny 2K of RAM offered on the T/S 1000 and the 16K of RAM that comes with the T/S 1500, the T/S 2068 comes with a respectable 48K of user memory that, according to the company, is expandable by bank switching to 16 megabytes.

Responding to complaints from users of other Timex systems, Timex has given the T/S 2068 color. The user can select border, background and character colors.

Graphics were primitive on the two simpler machines. The 2068 can address separately any of 512 × 192 pixels and, in its Extended Color Mode, give each row of 8 pixels — the width of one character — its own color.

Although some users and third-party vendors have devised tricky ways of adding sound to the 1000 and 1500, the computers are not designed for such usage. The 2068 has sound capabilities that make it rival the best synthesizers, controlled programmatically with keyboards that are part of the BASIC. The Beep command generates tones that span more than ten octaves, with frequencies varying by as little as one thousandth of a tone and durations up to ten seconds in

steps as small as one thousandth of a second. You can generate tones much lower and higher than the human ear can hear.

The Sound command generates three simultaneous channels, enabling you to compose music in harmony. You have very sophisticated control over this synthesizer, permitting not just the composition of music, but also the development of interesting sound effects for your programs. And — if you know what you're doing — you can generate speech.

The quality of the built-in speaker is the only complaint we have about the 2068. Clicks and beeps sound fine, but synthesized speech is pretty raspy. You can, however, easily connect an external speaker.

Tape saving and loading on the 2068 considerably more flexible than on earlier

Open #, Close #, Move, Cut, Erase and Reset commands make evident.

The 2068 is fast compared to its "baby brothers." The 1000 and 1500 spend 60% of their time maintaining the screen display in software. The two machines have a Fast mode that turns off the display during calculations, blanking the screen. If you want the screen display to remain in place, the computer has to run in Slow mode, making programs run painfully slow. A program that executed on the 2068 in 2.8 seconds, on the 1500 in Fast mode took 11.5 seconds and in Slow mode required an agonizing 1 minute, 10.5 seconds.

The 2068 is easy to set up. You plug its power supply into the wall and into a socket at the rear of the computer marked "Power." You attach a switch box to the VHF terminals on your TV and connect

and the like for the T/S 2068.

The excellent users' manual is aimed at beginners, taking them from no knowledge of computers to being able to write extensive programs for the 2068. The manual was obviously written by a writer, not a programmer. The manual starts with the basics of setting up the machine. The book includes much information for advanced programmers on using machine code, accessing system variables, how memory is mapped and how variables are stored. The table of contents and index are extensive, and the appendices are filled with useful tables and advanced information.

Timex's 2068 Personal Color Computer is an excellent product, which compares well with computers costing far more. It has features that make it attractive to a wide audience, from beginners to assembly-language programmers. For under \$200, you get a lot of computer.

**The Timex/Sinclair 2068, priced at under \$200; offers many desirable features usually found on more expensive machines.**

models. In addition to being able to save a program on tape, you can save a program so it will begin executing at a certain point when loaded. On the 1000 and 1500, loading a new program also removed the current program from memory, but the 2068's Merge command leaves the old program in memory. On the earlier machines, you had no way of knowing a program did not load until the tape ran out. The 2068 displays different loading patterns, depending on whether it is searching for a program, has found it or is actually loading it; and displays the name of each program it finds. After saving a program, you can use the Verify command to make sure the program was correctly saved.

Commercial programs are available on tape, which take about two minutes to load, or on plug-in cartridges, which take about two seconds to load. The tiny (2½ inches by 2¾ inches by less than ½ of an inch) cartridges fit into a slot normally concealed under a small door next to the keyboard.

Timex obviously plans to offer storage devices other than tape. The BASIC language supplied with the machine contains certain commands that currently do not do anything and are listed in the manual under the heading, "Commands for Future Peripherals." Disk drives should become available, as the Format,


the other end to the 2068. You set a switch on the bottom of the 2068 to 2 or 3, whichever channel isn't used in your area. Turn on the computer, and it waits for you to begin programming or to load a program from tape. If the program is on cartridge, you must switch off the computer first. When you turn it back on, the auto-loading program begins running almost instantaneously.

Once you get used to the single-stroke entry of keywords possible on this machine's keyboard, the 2068 is easy to use. Each key has five different symbols on it. In case you find any of this process tricky, Timex supplies an excellent tutorial on cassette. It demonstrates the use of every key, all the modes and how to produce each of the five or more possibilities on each key. At the end of the extensive introduction to the keyboard, the tutorial tests you, asking how to produce each of the possible symbols and keywords and giving you hints if you respond incorrectly.

The demonstration package also includes a simplified form of turtle graphics and a home-accounting program.

Just as an entire submarket sprang up for developers of software and peripherals for the T/S 1000 and T/S 1500, look for many developers to jump in with word processors, assemblers, other languages, expanded memories, disk drives, printers

**InfoWorld**  
**Timex 2068 Color Computer**



	Poor	Fair	Good	Excellent
Setup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ease of Use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Serviceability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Summary:** Timex's 2068 Personal Color Computer is an excellent product that compares well with computers costing far more. It has features that make it attractive to a wide audience, from beginners to assembly-language programmers.

**Product details:** List price, \$199.95. Equipped with Z80 CPU; Sinclair BASIC; 48K RAM; 24K ROM for system and BASIC; television adapter; cables and connectors; demonstration tape, output port for printer and other peripherals; joystick socket. Manufactured by Timex Computer Corporation, Waterbury, CT 06720; (203) 574-3331.

# T S U E R

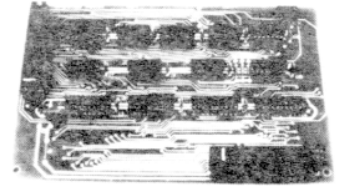
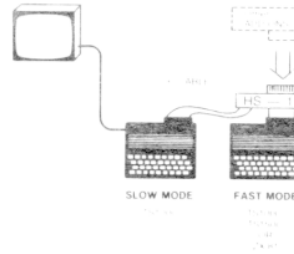
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