

Vol. 4 No. 4  
APRIL, 1985

# THE MSP 99 NEWSLETTER

## 3RD ANNUAL MSP SOFTWARE CONTEST

That's right, Folks. Here it is again. The Annual Software competition. It's open to all members of the MSP 99 User's Group and the format and categories are the same as last year's.

All entries must be received no later than June 15th, and must be accompanied by an official entry form. All entries must meet the acceptance criteria for programs appearing in our catalogue.

For each program accepted, the author will receive 3 free programs of their choice from the library. Be sure to enclose a software order form with your contest entry.

Winners will be announced at the August 20 general meeting. Winning authors in each category will receive prizes to be announced at a later date.

This years categories are:

- Business - BASIC
- Business - XBASIC
- Education - BASIC
- Education - XBASIC
- Games - BASIC
- Games - XBASIC
- Home Management - BASIC
- Home Management - XBASIC
- Utilities - BASIC
- Utilities - XBASIC
- Miscellaneous - BASIC
- Miscellaneous - XBASIC
- Editor/Assembler
- Mini-Memory
- TI Logo

## AT THE MEETING...

March's General meeting provided members with an overview of the many different languages available to users of the TI Home Computer. Several members were asked to speak on the various languages. Among them were Dave Wunderlin (FORTH), Joel Gerdeen (PASCAL), Dick Dunbar (ASSEMBLY), and Mike Kabala (BASIC, XBASIC).

Included inside is a chart comparing the many different features and characteristics of the various languages. This will be especially helpful to those users that are thinking of upgrading their systems and their programming knowledge but are not sure which language would be right for them.

(see CHART on page 19)



The MSP 99 USERS GROUP meets each month for discussions and presentations that enable its members to be better informed about their computers. Users group members share and exchange information. Some members have a broad range of computer expertise, others are just beginning. We are not affiliated with or sponsored by any other group or company. Membership dues are \$12 a year for a family, \$10 for an individual, and \$50 for a sponsor member. You're welcome to visit a meeting before you join. Call or write for more information.

USERS GROUP MEETINGS are held the third Tuesday of each month at Dunwoody Industrial Institute, 818 Wayzata Blvd., Minneapolis, MN 55403.

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The MSP 99 NEWSLETTER is published eleven times per year, on a monthly basis, except during July, by the MSP 99 Users Group. Members are encouraged to contribute articles for publication. Opinions expressed are those of the writers and not necessarily those of the MSP 99 Users Group, its officers, editors, or members. Materials accepted by the editors for publication in the MSP 99 Newsletter, including software listings, are believed to be in the public domain. Newsletter articles may be reproduced by other users groups if appropriate credit is given to the author (if one is listed), and to the Minneapolis St. Paul 99 Users Group.

NEWSLETTER EDITORS:  
Michael Kabala 780-8719  
and Gary Gese (no phone)

Articles intended for the next newsletter should be submitted NO LATER than the Users Group meeting on the month prior to publication. Articles submitted after this deadline are likely to appear in the following month's newsletter.

COMMITTEE VOLUNTEERS are sought for all of our committees. (Education, Equipment, Program, Publicity, Software, Newsletter) If you would like to join one of these committees or have an idea for a monthly program, please contact one of the officers.

COMMERCIAL ADVERTISEMENT RATES:  
Business firms that wish to communicate with our members may do so by placing an advertisement in the newsletter. Rates are: Full Page (7-1/2 X 10-1/2) -- \$40; Half Page (3-1/2 X 10-1/2 or 7-1/2 X 5) -- \$30; Quarter Page (3-1/2 X 5) -- \$22. Each ad must be camera-ready in one of the sizes indicated and paid in advance. Inserts (printed by the advertiser on 8-1/2 X 11 or 8 X 10) may be inserted in the newsletter at \$20 per sheet. Contact the editors for information.

CHANGE OF ADDRESS: Before you move, please mail a change of address to the Users Group at the address listed in this issue. Please allow at least 1 month for processing.

### UPDATE ON THE REVIEW OF AUTO SPELL CHECK (VERSION 1.1)

by Glenn Davis

Now DRAGONSLAYER AMERICAN SOFTWARE COMPANY has improved the 99/4A AUTO SPELL CHECK (\$49.95; add \$3.00 postage and handling) program that I reviewed in the February newsletter. Version 1.1 has several enhancements over Version 1.0.

For those of us who already have 1.0, the update to 1.1 costs \$3.00. Send distribution diskette A (in a disk mailer, of course) with \$3.00 to DRAGONSLAYER at the address below. Although sending cash through the mail is not recommended, I did anyway, and it took only seven days for my update to arrive. That is very good service!

What does the new version of SPELL CHECK offer you? The first thing is that it offers a choice of colors similar to those offered in TI-Writer. They are not the same

### TREASURY BALANCE AS OF MARCH 15, 1985

\$1208.19

|                            |         |
|----------------------------|---------|
| Prevoius Balance (Feb. 15) | 881.27  |
| Expenses                   | 719.85  |
| Income                     | 1046.77 |

### DICK IRWIN REMEMBERED

Dick Irwin, one of the founders of MSP99, died suddenly on February 26th. Dick was one of the first owners of the TI99/4 as part of a market test program. Dick was a real enthusiast who helped many of us to understand and use our computers better. He organized the Business group and later started a Saturday morning group known as the Edina 99ers. Those of us who knew Dick will no doubt remember him for the fun and knowledge he shared with us all.



## MSP 99 Calendar of Events

- APRIL 16: Database Management -- April's meeting will cover the sometimes confusing, sometimes overwhelming field of databases, what they are and what they can do for you. A must for anyone with lots of information to juggle.
- MAY 21: Program Debugging -- The dread of most programmers. It's the inevitable error message. Find out how to deal with these annoying nasties at the May Meeting. You won't want to miss this one.
- JUNE 18: Logo -- It's time to find out about that amazing language that's simple enough for young children, yet intriguing enough to keep adults enthralled for hours.

### Subgroup Meetings

ASSEMBLY LANGUAGE--First Tuesday of month, 7:00 p.m., Bryant Community Center, Bryant Ave. and 31st St.

BUSINESS--Second Tuesday of month, 7-9 p.m., Call Bob DeMars (544-6219) for location.

EDUCATION--At monthly MSP 99 meetings.

YOUTH GROUP--At monthly MSP 99 meetings.

### Committee Chairs

EQUIPMENT--George Madline

NEWSLETTER--Gary Gese & Mike Kabala (780-8719)

PROGRAM--Dick Dunbar (488-0153)

PUBLICITY--Dave Wunderlin (544-8266)

SOFTWARE--Steve Gonnella (533-8494)

YOUTH GROUP--Ed Johnson and Gordy Myers

### LETTERS

MSP Users Group,

Congratulations to all who had a part in putting together the best newsletter ever (the March, 1985 issue)!

I was only going to glance at it for a minute or two, but the articles were so well-written, and on such a wide range of the most pertinent topics, that I read every article before I was able to put it down - and do the things I should have been doing!

Thank you all very much.

Bill McElroy

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### APPLICATIONS SIG FORMED

Members of the Edina 99ers have decided to become a special interest group of MSP99. The SIG studies at least one business, home management, or utility program each Saturday morning. They will be meeting April 13th and May 18th at 10 AM at the Edina Public library, 4801 W. 50th St., Edina. (2 blocks East of Hwy. 100 on W 50th St.) call Dick Clementson (926-8083) for more information.



## POOR RICHARD'S PERIPHERAL ROUND-UP

by Dick Dunbar

As you will see by the time you have finished reading this column, it does not contain a review of the SST Extended Basic Compiler as I had hoped. I simply have not yet had an opportunity to get familiar enough with it to be able to review it fairly. But you will see that review yet.

**INTERESTING DEVELOPMENTS:** I suppose by now everybody has heard about IBM's abandonment of the PCjr. They have apparently decided that they can't rake in enough of the consumer's dollars to make it worth their effort to continue. But this time it is Big Blue throwing in the towel. It will be interesting to watch and see what happens regarding third party development of new software and hardware for the PCjr. So much for those who thought that, because they bought IBM, it couldn't happen to them. Well, it happened to us, and now it has happened to them, too.

**MYARC 32/128K MEMORY CARD:** As they promised, Myarc sent along a flyer containing the official information on their new memory card. The flyer doesn't have in it some unofficial information I was given over the phone, but it would appear that the omissions pertain mostly to use of the card with the new computer to be announced at the June Consumer Electronics Show. More about that later, for now we will concentrate on the memory card.

This card, model MPEX-1, comes in 32K and 128K models, the 32K version having a list price of \$124.95 compared to \$249.95 for the 128K model. The 32K card can be factory upgraded later to 128K for \$149.95. If the upgrade involved nothing more than the addition or replacement of memory chips on the

board, some of our handier members could probably do this themselves for quite a bit less. I suspect more is involved, however.

Either of these models will provide all the benefits of the standard TI PHP1260 or other 32K memory expansion. But the 128K model provides features which no other expansion card currently available can match, including the Foundation 128K card.

There is of course the additional 96K of memory. By itself, this memory is available for use by clever Assembly language programmers but is otherwise not accessible by the programs used by the typical user. But there is more to this card than just the memory, and the "more" is what makes it very usable by the average 99'er.

There are two additional features, both handled by means of firmware provided as a part of the card. For those of you who are not yet quite familiar with all the buzzwords of Computerese, firmware is really a program, software which has been locked into a Read-Only Memory (ROM) so that it remains unchanged even when the power goes away, just like it was part of the hardware. The features provided by this particular firmware are a Print Spooler and RAM disk.

The Print Spooler uses up to the maximum memory allocated to it for buffering data to a printer or any other device connected to the RS232 interface. Special provisions in the firmware permit simultaneous printout and independent operation of the computer. The remainder of the 96K memory not allocated to the print spooler is free to be used in simultaneous RAM disk operation.

The RAM disk lets the user make use of up to 96K of memory just like a disk drive, providing the same limit on number of files as a real disk, and providing all the



capabilities of a disk except permanent, removable storage. The firmware even has provisions for making the RAM disk look like DSK1, so you can use it with software like TI-Writer or Editor/Assembler, which read their program overlays from DSK1. It also allows for a "diskette name" to be assigned to the RAM disk, making it useful with software like Microsoft Multiplan, which reads in program overlays from DSK.TIMP.

I have been told that the RAM disk can even be used with Disk Manager II. Of course, since there are none of the delays associated with disk drives, such as rotational delay and movement of heads, etc., RAM disk operations are faster than a real disk, most particularly when a lot of random access is involved. Since data is transferred at memory speed rather than disk speed, the net advantage in speed is quite significant.

Are these added features worth the additional cost of the 128K card? Have you ever been frustrated while waiting for your printer to finish printing a long listing so that you could start using your computer for something else? It's possible to find a print buffer which will do basically the same job as the Print Spooler feature of the 128K card for roughly the same price as the difference between the 32K and the 128K cards, but then you wouldn't have the RAM disk feature.

Have you ever been frustrated by continually having to change disks on your single drive system? The RAM disk feature can take the place of a second disk drive for many purposes. You can get a second disk drive for less than the additional cost of the 128K card if you look around, as regular Poor Richard readers know, but that doesn't get you a print spooler.

Ultimately, only you can decide how valuable these features are to you, or whether you would be able to otherwise make use of the added 96K of memory in advanced programming.

MYARC, INC.  
P.O.Box 140  
Basking Ridge, NJ 07920  
(201)766-1700

**THE COMPUTER IN THE SKY:** Yes, dear 99'er, we have a further dose of the visions, dreams and hopes that all of us harbor regarding the potential successor to the TI99/4A. The information following has been extracted from several places.

MSP99 received a letter about it from RYTE Data, a Canadian company which is supposedly handling public relations for the new computer, MICROpendium carried an article about it, and I spoke with the developers myself about the middle of March. I really think this may actually be going to happen.

According to the latest available information, the new machine will have 128K memory, expandable to 512K. It will use a TMS9995 processor running at 10Mhz, nearly 3 times the speed of the TI99/4A. The computer will be compatible with the TI Expansion Box.

According to information published in MICROpendium, and attributed to Bruce Ryan of RYTE Data, the new disk operating system will allow configurations ranging from single sided single density up to quad density, and will allow users to interface a Winchester hard disk without an additional controller.

There are a number of aspects of the machine which are not yet determined. For instance, the sound and music capabilities of the new machine have not been fully defined. There is a possibility that speech might be included as a part of the basic machine, or as a PEB card. It had not been finally determined at the time I spoke with the developer whether the display would be 40 or 80 columns. It had also not been determined whether an on-board cartridge port or a cartridge port attachment would be the better implementation.



Development of this machine is very risky. The market is most likely limited, at least initially, to the current owners and users of the TI99/4 and 4A. While there are a lot of us, only time will tell whether enough of us will want to invest in the new machine to make it work for the developer. The price being bandied about (\$300-600 range) is quite reasonable for the features and the capabilities.

I know I will want one of these machines, if the final product has the right stuff. Will you? If so, or if you have any thoughts on what features would make a difference to you, the developer would appreciate knowing. Officially, they want to remain anonymous, but if you would like to give them your opinion or a letter of encouragement, and you don't know where to send it, send it to MSP99 and we will get it to them.

**DISSENTING OPINIONS:** There was an article in last month's newsletter by Tom Fairbairn entitled "TI Disk Controller Misconceptions". If you missed it, go back and read it. It was a good article. However, I have one point of contention. Tom made a reference to the practice of using the "flip" side of disks, advising against it with some rather alarming words. I would like to offer my own (contrary) opinion on the subject.

I have been using "flippy" disks from the second box of disks I bought. At that time, I had only single sided drives. I didn't (and still don't) think that \$20 a box for disks was at all inexpensive, and I saw no reason to buy two boxes when I could get the same amount of storage on one if I used the other sides. In my case, all the diskettes I used were double sided, but as Tom pointed out, the back sides of single sided diskettes usually work just fine, especially with single density.

I have been using these flippy disks since July of 1983. In that time, I have had only one problem

related to flippy usage, and that was due to misplacement of the new index hole punched in the cover. It was easily corrected by making the index hole slightly larger.

For use with the TI, you must punch additional index holes in the disk cover, as well as an additional write protect notch. A standard sized, round paper punch is the right size, for both the write protect notch and the index holes. You can use the same punch to make both, but I prefer to use separate ones, so as not to dull the one I use for the index holes.

The new write protect notch and the new index holes must be located properly, with the new write protect notch on the opposite edge from the original, and the new index hole on the opposite side of the head access slot from the original, but the same distance from it and from the hub. The index holes must be punched in the front cover and the back cover, so they line up with each other, and they are difficult to punch.

When punching the new index holes, you must get the diskette cover up enough to get the paper punch between the cover and the diskette itself without bending the diskette too much. It's OK to flex it, but if you actually put a bend in it, forget it. Use a paper punch with a catcher, as you don't want the scrap pieces of cover and liner to get inside the cover. Also, use a good sharp punch. You want one that will punch a clean hole, not one that will leave a ragged edge or not punch the hole out cleanly.

Be careful, as you insert the punch between the cover and the diskette, not to insert it beyond the point where you have to punch the index holes. From the hub to the index hole, the diskette surface is not used for data, and the fact that you are rubbing the paper punch along it will not harm anything. But beyond the index hole you are starting to get into data territory, which you don't want to



touch. And don't ever touch the bare surface in the head access slot in the cover!

If you have nagging doubts about the advisability of using flippies, consider this: the fact that your disks rotate in the opposite direction when using the flip side is the thing usually cited as most likely to cause problems. Dirt particles have supposedly tucked themselves safely away in your disk liners where they will presumably stay as long as you continue to rotate them in the same direction, but which may be dislodged and cause damage if you reverse the rotation. Personally, I think this danger has been greatly exaggerated.

However, you still may want to cover your bets, to satisfy those nagging doubts. One thing you can do if you would like to use flippies to get the additional storage, but don't quite trust them, is to use the back sides for archival storage, or put those back up copies on the back sides. That way you are never actually rotating the diskettes backwards except on those rare occasions when you must restore a damaged working copy or extract data from an old data file.

**MORE DISK DRIVES:** For those of you who may have wanted to get one of those disk drives I wrote about in the February newsletter, but didn't get your order in soon enough, I have some good news for you. I have found another good deal on disk drives. This time the disk drives are Canon MDD210 2/3 height drives, double sided double density, 6ms track to track time. The price is \$49.95 each, or 2 for \$85.00, from a company called B.G.MICRO.

This same company is selling 1/2 height, DSDD drives, brand name unspecified but IBM compatible, for \$99.95 each. Remember, if you are interested in either of these, CALL before you order to find out about shipping charges and whether they still have any in stock. They had

them on March 25, but they could be out by the time you see this.

B.G.MICRO  
P.O.Box 280298  
Dallas, TX 75228  
(214)271-5546

**VIEW FROM THE CABOOSE:** Bringing up the tail end of this column, my prediction for next month is that I will most definitely have the review of the SST compiler ready for you. Until then, happy computing, and don't forget to write in with your views on the new computer mentioned above.

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MSP99

### THE MSP MARKETPLACE

One of the advantages of belonging to a group such as ours is the ability to purchase desired items at quantity prices. For instance, by now most of you are aware that blank computer tapes and disks are available from the group's Treasurer. What you may not know is that prices have dropped on disks. At this time a box of 10 Elephant disks is only \$17.00 while a comparable box of Wabash disks sells for only \$13.00. There's no telling how long they will last, or if we'll be able to offer them at this price again, so don't wait 'til they're all gone.

The group has also made special arrangements for purchase of the Anchor Volksmodem 12 for resale within the group. The price is only \$179.00 and the required cable runs for an additional \$8.00. This is a 300 - 1200 baud Auto Dial - Auto Answer modem compatible with the Hayes Smart Modem with the additional ability to detect a busy signal.

Last of all, aside from the updates to TI-Writer and Multi-plan, the Software Committee also has TI-Forth with Manual available for a meager \$25.00. (Manual sells for \$15.00 separately.)

MSP 99



## CLEANING UP CAN BE FUN

## AN MSP 99 SOFTWARE LIBRARY REVIEW

by Gary Gese

Title: Sewerman  
 Code: G06112  
 Req: XB (J)

Performance: \*\*\*\*  
 Quality: \*\*\*\*  
 Documentation: \*\*  
 Friendliness: \*\*\*

Just a glance at the MSP Software Catalog will quickly reveal to anyone that the largest section in the book is the Games listing. Yet trying to decide which of those games to purchase for your home library is not an easy matter. That's one of the purposes of this column, to help make that choice easier.

In concept, Sewerman is not altogether unique. It is a maze game similar to the Munch-Man or it's originator Pac-Man variety, but with a subtle difference. In Sewerman, the object is to move your man through the maze of sewer pipes cleaning the crud out from between them while avoiding the giant man-eating rats inhabiting the underground labyrinth. (Sound familiar so far.)

The rats however do not pursue you directly through the maze. Instead they travel straight across the screen either from left to right or vice-versa at varying speeds and each remains in its own screen row allowing you to get behind a rat and remain fairly safe until it comes by again.

Where the big difference comes in is in the form of several cans of rat repellent which are placed randomly around the maze. Unlike the "Power-pellets" in Munch-Man which allow you to pursue the monsters and eliminate them

momentarily from the maze, the rat repellent allows you to remove the rats for the duration of the screen. This makes cleaning up the crud a whole lot easier since you no longer have to worry about rats thus removed.

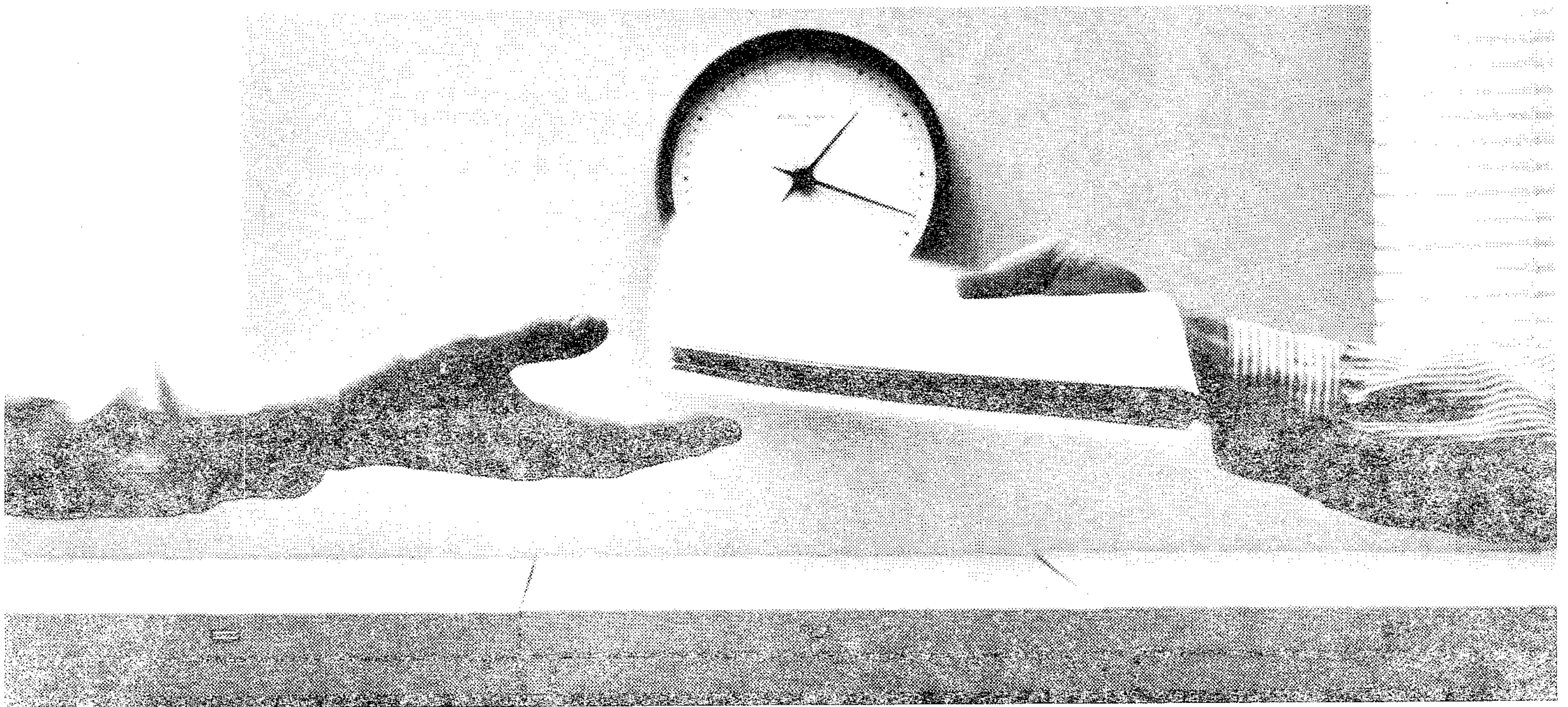
Of course a can of repellent only lasts for a limited amount of time, and unfortunately there is no warning when your can is about to run out. (Unlike Munch-Man where the screen flashes when your monster munching power is about up.) This is the only drawback to this otherwise excellent game. Many times I've lost a man by being lined up to eliminate a rat only to have my can of repellent run out at the last second.

Should you touch a rat, your man is eliminated and the rat remains frozen to the spot, sometimes effectively blocking a passageway. However unless there is some crud under the rat this does not pose much of a problem.

There are only two screens available to this game and both are about equally challenging. After completeing the second, play resumes on the first screen and so on if you can get that far. You begin play with 5 Sewermen and recieve an additional one after completeing a screen. There are also only 6 cans of rat repellent available to you on any screen and as I said they are randomly located each time the new screen is drawn so no two cans are ever in the same place twice.

Joysticks are recommended to play the game, but the keyboard may also be used. But be warned; there are enough corners in this maze to give even the most ardent joystick jockey wrist-lock. However this only adds to the overall enjoyment of the game. It is one of the best maze games I've seen for the TI to come along in some time. Easy enough for the kids while still being challenging enough for the adults. I give this one a thumbs up.





## 2400 bps modems: Do you Really need another speed?

- Is the shift from 300 to 1200 bps going to repeat itself at 2400 bps? The answer is both yes and no. There certainly are applications for 2400 bps asynch dial-up modems, but we shouldn't expect 1200 bps to die overnight.

- 2400 bps modems can improve throughput, thereby getting tasks done quicker and more economically. However, 1200 bps has become the virtual standard for professional dial-up communications, and most users are satisfied with it. So why consider a 2400 bps modem at all?

- One reason is flexibility. If the modem you select operates at all three speeds (300, 1200 & 2400) in accordance with accepted industry standards, it will serve virtually all dial-up applications now and in the foreseeable future.

- The modem you select should be the MultiModem224. It is Bell 212A and 103 compatible at 1200 and 300 bps, and CCITT V.22bis compatible at 2400. It is also 100% compatible with the Hayes command set, meaning that it will work with virtually all communications software packages, at all three speeds. Other features include both synchronous and asynchronous operation, full intelligence and a phone number memory.

- The MultiModem224 is available in both desktop and IBM PC™ internal card versions. (There is also a rack-mounted version for central sites.) And as a bonus, we provide free offers from ten of the most popular on-line information services, including CompuServe™, Dow Jones™ and The Source™.

- A 2400/1200/300 bps modem is just a plain good investment. Why not let the MultiModem224 provide your communications for both today and tomorrow?

**MultiTech**  
Systems 

*The right answer every time.*

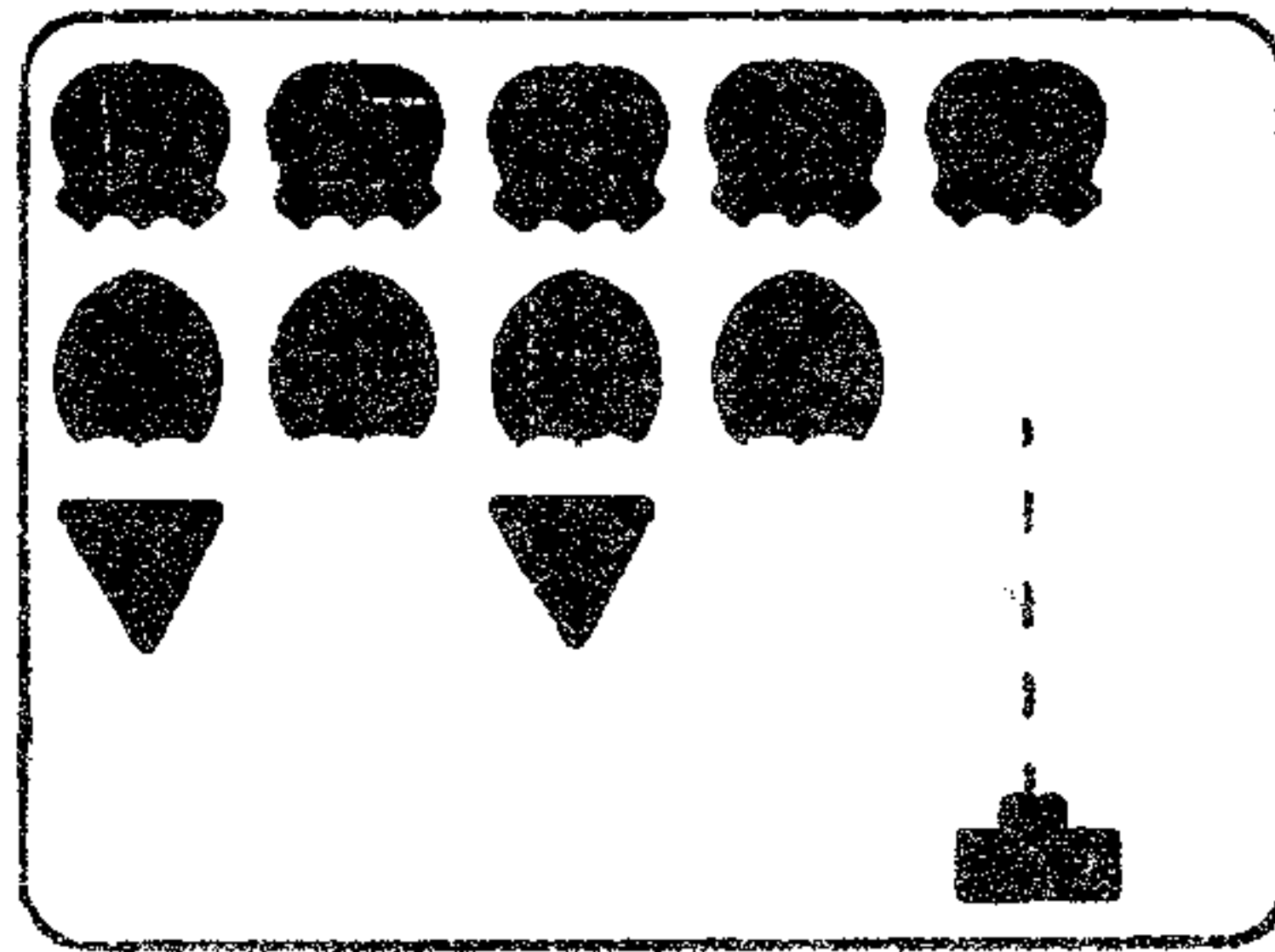
82 Second Ave. S.E., New Brighton, MN 55112 (612) 631-3550, TWX: 910-563-3610

**MultiTech**  
Systems 

**MultiModem 224**



## The GAME ROOM



### COMPUTER GAMING

by Gary Gese

To begin with this month, here's an interesting little bit of information for you ardent game players. Many of the TI game Command Modules have a special Test mode designed into them. You can access this mode by simply typing Shift 8-3-8 within the first 3 seconds after the games title screen appears. This will give you access to various features of the game not normally attainable to the average player, such as which level of play you wish to try and the number of men or ships or whatever you wish to play with. (Usually up to 9)

Exactly which games are accessible through the Test Mode is uncertain. The ones I know about are Munchman, Alpiner, Hopper, and Star Trek. Try it with your Command Modules and let me know what you discover. It would be interesting to compile a list of them all.

Now on to more serious business. Beginning with last months issue, I started this column off with a hardware project, and maybe a few misconceptions about what this column is all about. Therefore, I would like to take a couple of minutes to elucidate on its purpose.

To begin with, it was never the intention of this column to merely

cover the playing of games, although I do intend to keep you abreast of new developments in the field of computer gaming, but that is not all.

There is a more intriguing and satisfying aspect to computer gaming that I feel should not be overlooked. That is the area of creating your own games, and I intend to offer you a series of articles on programming games for the TI Home Computer.

This is an area that few people actually attempt to tackle since it can easily become overwhelming to all but the experienced programmer. Yet, it does not have to be that way. Many people feel that the creation of a game is far more enjoyable then actually playing the game. Puzzling over how to coax the computer into operating along the guidelines, rules, and restrictions of the game can be more enthralling then playing the finished product.

So in an effort to steer a few more people into the field of writting computer games, (as well as the opertunity to play some new and exciting games on my TI) I would like to offer some suggestions and hints to help you accomplish your goals in upcoming installments of the Game Room.

To get you started, I would like you to think about what kind of game you would like to program. Perhaps you would like a home-brewed version of Munch-man (Pac Man), or maybe you would prefer something a little more original. Whatever your game design, it will be a lot easier to program with plenty of advance planning.

Begin by writting an outline on paper of the game in the exact order that it will play once the game is finished. Keep this outline handy as a reference while actually programming the various routines. It will help to insure



that you do not get off track, and it will guide you through the inevitable maze of GOSUBS and GOTOS.

One thing to bear in mind at this stage is which language is the program best suited for. Of course if you are limited to BASIC you will not be able to make use of such things as Sprites or Display At and Accept At statements which are available in Extended BASIC. Also some functions of your game may not be available to you if you do not have access to Assembly Language routines. Try to remember the limitations of your programming languages when writing your outline.

Using this outline, you will be able to break down your program into various sections. In most cases, you will also begin to see how your outline could be further broken down into a more detailed outline. By doing this you will begin to formulate the steps required to program the lines necessary to accomplish the end result.

Now is the time to decide which portions of your program would best be suited to the main listing and which to turn into sub-routines. This should not be too difficult. Just look at which portions of your eventual listing that will be repeated and allocate these to sub-routines.

It might even be a good idea at this time to rewrite your outline placing these sub-routines in order at the end of the listing, just so that you don't become confused when you sit down to actually begin programming. This is a procedure used by many professional programmers and the added amount of careful planning in the beginning can save a lot of wasted time and effort reprogramming later on.

Until next month...

**WANTED:** For use at the Monthly meetings. We have received numerous complaints about the unsatisfactory quality of viewing the monitor at the regular meetings. We realize that it is difficult to see the program examples on either the small 9" monitor or the larger projection screen system usually used at the meetings from anywhere but directly in front of the screen.

Therefore, we are turning to our members for help to solve this annoying problem. We are looking for any generous souls that might have an old television set that is not being used (preferably color) which they could donate to the group for this purpose. Our hope is to be able to string several of these monitors together in order to make viewing the screens possible from anywhere in the audience. (Televisions that do not work, but are in repairable condition may be acceptable.)

This could save a lot on the groups budget since if no monitors are found in this manner, we will be forced to purchase one outright and at the price of a good colored monitor nowadays, we would rather not have to do this.

Along the same lines, any unused TI computer consoles that you could donate to the group would also be greatly appreciated. With the reinstatement of the Youth Group and some other ideas the officers have been toying with, the need for extra consoles and monitors has been growing.

Any help we can receive from our members would be greatly appreciated. We have an excellent organization here, and we require the support of all our members to keep it so and to help it grow. Donations of equipment may be brought directly to the meetings, or if this is inconvenient, you may contact one of the officers for a possible pick-up.



## TIPS 'N THOUGHTS

by Tom Fairbairn

One of the things which affects those of us who are using printers extensively is the cost of paper for scratch work. I, for one, am working within a limited budget (why do you think I bought the TI in the first place??) and can ill afford to throw away expensive fanfold sheets used for trial activities and file checks. For this reason, I looked for alternative means to supply my hungry printer with pulp fodder.

The best solution I have run into so far has been ordinary Teletype rolls. One roll is the equivalent of about a third to a half box of printer paper. Now I can hear you shouting, "You want me to use that Gawd awful yeller junk??!!" but hold on a minute. The rolls I am using are nice white paper with a smooth finish and no holes. I get perfect repros out of them on any photocopier I've yet tried. Best of all, they come up on sale at various times at places such as Bank's and several of the office supply stores like Miller-Davis. I have gotten the stuff for as little as 50 cents a roll, up to a buck. Full price is about \$3.50 at an office supplier. You can't hardly get no cheaper'n that!!

But even if you can only find the "yeller junk", do you really need anything better for proof copies of TI-Writer files or when you are dumping a program file to mark up? I concur that your nice white basic fanfold is pleasant to work with. But uff da!! The cost!!

A lot of printers can use roll paper with a little attention to the guiding. I had some problems with the roll wandering sideways on my Gemini 10X when I first ran it. I finally licked it with two of the small IDL binder clamps, the sort that have the little wire handles and look like a flying insect. The ones I use are IDL number 20, and I clamp them to the forms guide on

both sides of the desired paper path. Now my paper runs straight. And now I can happily fill up 2 or 3 wastepaper cans a week with what stuff I have thrown out after re-working my printouts or making the changes in my programs, without robbing the grocery money to pay for it.

So far as fanfold paper is concerned, it is usually less expensive per sheet to buy the singlepart forms, by the box of 2800 or 3300 or whatever number of sheets, rather than the nice pack of 500 or 250 that some places like to sell. Check this out the next time you buy. You might find you are paying from 2 to 3 times as much as you would really have to per sheet by buying the smaller lots.

I'm not going to fan the flames of "What is the best printer??" except to say this: first cost is not the only consideration. I've seen some printers that are very good, not overly expensive, and yet they cost a fortune to use due to the special paper or special ribbons you must use. One highly touted dot-matrix rig uses ribbon cassettes that run about \$12.50 a whack and are good for 8 hours or less printing. Another dot machine uses reel-to-reel ribbons that also work on Teletypes and portable typewriters and last for 12 to 16 hours print time; these cost \$3.00 each in quantity at any office supply store. I've picked up the latter ribbons for 10 cents each at Bank's on occasion.

Of course, you have to be careful with the ribbons you buy. Some of the dot printers depend on oil in the ribbon to keep the tiny print wires from sticking. With these, you don't ever want to substitute conventional typewriter ribbons. IBM and DEC matrix printers (such as the IBM 3215 and the DEC LA36 and 120) must have the oiled ribbons or the print wires get very nonchalant about doing their job.

By the same token, ribbons that are



too heavily inked or are oily should not be used on thimble or daisy-wheel printers. They will cause the print element to clog very rapidly. Also, with plastic elements, one needs to beware the possibility of chemical reactions between some inks or oils and the plastic. If you are using this type of printer for final-typing the novel of the century, you can possibly give thought to one of the carbon-film ribbons -- non-clogging and very professional in the final appearance. Also very expensive in most cases!!!

The first couple years we had a computer, our printer was an old Teletype 33. We acquired one from a school district sale "for the sum of \$1.00 and other good and valuable considerations." The considerations were hauling it home.

The machine was in excellent condition, and we put a lot of miles on it. It isn't hard to make the necessary interface. I've also seen Okidata CP-110 dot printers around with upper and lower case and e-x-p-a-n-d-e-d print for less than a hundred bucks in good shape and with manuals. We had one of these things, too. It has a semi-italic typeface that is absolutely unique, and is an industrial-grade printer you will never wear out in any home service. It is also quite large and heavy. But I sure did like that nice cheap roll paper and Teletype ribbons it uses!!

If you have any suggestions on any topic you would like to see some discussion about, let us know at a meeting or give us a call. I won't guarantee to be an expert on every topic, but I'm sure someone in the crowd will be, and we'll tap him on the head to help us out. We're trying to concentrate on general tips and ideas that you can use to make your system more efficient, less costly to improve, and perhaps show you some ways to use the equipment that you may not have thought about.

## NEW STAFF MEMBERS

There are some new faces in our group to be on the look-out for. No these are not new members, in fact most of these folks have been members for quite some time. Rather, they have graciously volunteered their time and energies to assist in some of the group functions.

To begin with, Steve Gonnella is our new Software Committee Chairman. He'll be in charge of seeing to it that you get all the software that you order from our groups library. He is taking over for Ed Neu who is no longer able to continue in this post, but who has done a terrific job for the group in the past. I'm certain Steve will continue to provide the same prompt service that we have all enjoyed previously.

George Madline, whom I'm sure is familiar to many of you has volunteered to take over the role of Equipment Chairman and will probably end up needing a hand at the meetings setting everything up. (Hint, Hint.)

Also on our list is Ed Johnson and Gordy Myers who will be taking over the task of managing the Youth Group. As has already been noted this is one area that has been lacking since Jon Todd was forced to vacate the post back in December.

We want to publicly thank each of these individuals for stepping forward and taking a hand in making our group function. Volunteers are still needed in these and many other areas so if you feel that you can spare some of your time to help make our group work, your assistance will be greatly appreciated. People are still needed in the areas of Publicity, Equipment, Library, and Program Development. Sign up sheets will be available at the regular meetings, or you may feel free to contact one of the officers directly.



"Innermost Secrets Of The  
TI 99/4A"

by Randy Holcomb

A Review by Glenn Davis for MSP99

A new book on the TI 99/4A has surfaced from Computer Shopper (see the December newsletter). "The Innermost Secrets Of The TI 99/4A" by Randy Holcomb (COMPUTER SHOPPER, P.O. Box F, Titusville, FL 32781, \$5.95 a copy) is the new entry.

Randy Holcomb has written a TI 99/4A column in Computer Shopper for about a year, and it seems the demand for back issues and reprints of his early articles was so great that Computer Shopper ran out. To satisfy demand--and, according to the book, to see if the public will support a machine long after the manufacturer stopped production--they put together "Innermost Secrets".

The book, really a booklet, (page size is 8-1/2" by 11", with three columns per page of newspaper-size text) is 13 pages of information and diagrams. (COMPUTER SHOPPER didn't waste any space. The diagrams are not big).

SECRETS contains lots of good information on the TI that may not be available elsewhere. Randy Holcomb packs a lot of information in those 13 pages. Topics include: VDP usage and graphic modes, the 9900, UCSD P-system, how to get the most speed out of the 99/4A, and assembly language characteristics of DSRs. Included is a disassembly of the TI RS232 DSR (Device Service Routine) ROM. The information on DSRs is the best I've seen anywhere.

At the back of INNERMOST SECRETS are ads from several third-party TI hardware and software producers.

INNERMOST SECRETS does, however, contain a few errors. They are quite obvious and they shouldn't be too much of a problem for novice 9900 programmers. At one point,

for example, the statement READ#1: is used. This is illegal on the TI (but not on some other machines). INPUT#1: is the correct syntax.

At another point the VDP Write to Register (VWTR) routine is used like this:

```
REF VWTR
LI R0, >0420
BLWP @VWTR
SWPB R0
BLWP @VWTR
```

The correct syntax is used throughout Randy's T99 dumb-terminal emulator program (available separately), so I am bewildered to find this kind of error (the SWPB and second BLWP @VWTR and not necessary, and may crash the system) in an otherwise excellent text. Randy seems to have gotten the VWTR utility confused with direct access of the VDP write-only registers, which use a construct similar to this. Holcomb also refers to the address >83C0 as "Begin GPL workspace". >83E0 is the correct address. >83C0 is "Begin interrupt workspace".

The only other thing that disappointed me about "Innermost Secrets" was the disassembly of the RS232 DSR ROM. It is literally a listing of a disassembly. No attempt has been made to clean it up, add comments, labels, or EQUates and "jump" tables or give a clue to how it was created. Even though the RS232 DSR is only about 2K bytes long, this listing is still 10 pages long! Its appearance is similar to listings made by TI's SBUG and Navarone's BFIX programs.

In spite of this, the text provides ample information to begin study of the listing; shows where important features are and what to look for. This was apparently provided as an exercise in assembly study, and nothing more. People seem to learn

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## Converting Programs To TI BASIC

by Ellen Rule

(Reprinted from the NHUG  
Newsletter)

Most TI 99/4A owners can remember a time (not so long ago!) when the written word for the TI was scarce indeed. Once our creative interests were sparked by the program listings in the back of the Users' Manual, then what? Sooner or later, most of us stumbled across Compute, 99'er (now Home Computer Mag.) and other scattered issues of magazines with listings for the TI. Books of computer programs appeared on the shelves, but woefully few written for the TI. Thus began the job of converting programs from "other" forms of BASIC to something the Home Computer could understand.

The easiest conversions involve the semi-obvious transformations from commands such as CLS to CALL CLEAR. A chart demonstrating these changes follows this text. One must exercise some caution, however, to avoid assuming faulty conversion. For example, CLEAR in TRS-80 BASIC instructs the CPU to allocate memory space for subscripted variables, NOT to clear the screen. In this case the error would be of little consequence.

However, while POS(n) in APPLESOFT returns the current horizontal column of the cursor (a # from 0-39), Pos(string 1, string 2, numeric expression) in TI BASIC produces the position of string 2 in string 1, beginning its search at the position specified by the numeric expression.

One area of conversion that can be confusing is the transfer of proper punctuation from one genre of BASIC to another. If you keep in mind that a colon (:) will effect a carriage return, the semi-colon (;) continues the data on the same line, and the comma (,) places the string at the beginning of the next "zone" (zones begin at columns 1

and 15), then you should be able to avoid syntax errors and obtain the output that you desire.

Another item not to be overlooked is the minor difference in punctuation for the TAB command. The User's Reference Guide demonstrates proper use of punctuation signs under the PRINT command descriptions and should be consulted for exact form.

Multiple statement lines pose one of the trickiest aspects of program conversion for those without TI Extended BASIC. First, it is necessary to determine just exactly where the program goes in each segment of the mutiple statement line.

Remember that the first part of an IF-THEN statement directs the program on to the next line if the criterion is NOT met; the line must therefore be reworded to direct action past ALL of the lines being created by the dismantling of one multi-statement line. For example:

```
100 IF J<6 THEN PRINT "YOU
ARE LOW ON FUEL":GOTO 290
110 PRINT "WHICH DIRECTION?"
120 INPUT D$
```

translates to:

```
100 IF J>=6 THEN 110
105 PRINT "YOU ARE LOW ON
FUEL"
108 GOTO 290
110 INPUT "WHICH
DIRECTION?":D$
```

Notice the use of TI's INPUT statement in the converted example.

You may be able to use Boolean Operators AND (\*) and OR (+):

```
200 IF B$(X)=A$ AND K=5 THEN
L=16:GOTO 1620
210 PRINT "THE DOOR IS
LOCKED"
```



becomes:

```
200 IF (B$(X)=A$)*(K=5) THEN
203 ELSE 210
203 L=16
205 GOTO 1620
210 PRINT "THE DOOR IS
LOCKED."
```

If you don't have enough room to insert new lines, RESequencing will create 9 potential lines between each present line. (HINT: document the program subsections with REM statements to provide "landmarks" before resequencing.)

Like IF-THEN statements, Random-number functions are easy to convert ONCE you figure out what range of numbers is desired. In TRS-80 BASIC (and most generic BASICS), RND(2) will return 1 or 2; TI BASIC requires INT(RND\*2)+1 for the same result. In APPLESOFT, RND(n), where n is positive, returns a new random number; if n=0 APPLESOFT re-uses its last random number. For example:

```
10 IF RND(2)<.5 THEN 500
60 IF RND(0)<.75 THEN 600
```

becomes:

```
10 Q=RND
15 IF Q<.5 THEN 500
60 IF Q<.75 THEN 600
```

If n is a negative number, it acts as a "seed" number, and all other random functions will follow a standard sequence. In IBM (or many other BASICS), you may find an INKEY\$ statement within a loop which increments a variable; when a key is pressed, the variable is used to seed the random-number generator. Or, you may see RANDOMIZE VAL(RIGHT\$(TIMES\$,2)).

Don't panic! Use RANDOMIZE (SEED) or leave out the seed altogether.

Other Number-Related "Houskeeping" Items:

\* ASCII values for upper case alphabet on the ZX-1 start at 38, not 65, and must therefor must be adjusted.

\* Some BASICS will allow out-of-range values to "fall through" an ON GOTO statement. To avoid a BAD VALUE error in TI BASIC, weed out extraneous values with an IF-THEN statement that directs the program around the ON GOTO line should the value be out-of-range.

\* The BASIC statement FOR Z=A to B (where A>B) will execute once in some versions of BASIC but not at all in TI BASIC. Use STEP -1 or test for A>b and make b=a before entering the loop.

String functions require little translation. Remember to DIMension any array with over 10 items, and don't forget to use "\_" (shift 7) instead of "+" to concatenate (join) strings. Guidelines for the SEG\$ function are:

LEFT\$(A\$,n) becomes  
SEG\$(A\$,1,n)

MID\$(A\$,n1,n2) becomes  
SEG\$(A\$,n1,n2)

RIGHT\$(A\$,n) becomes  
SEG\$(A\$,LEN(A\$)-n+1,n)

The other thing to remember about strings is that the TI won't allow the use of the same variable name for a numeric variable AND a subscripted variable. Hence, no L and L(x) in the same program. (Otherwise known as a STRING-NUMBER MISMATCH.) It's good programming technique to inventory the program's variables BEFORE you end up having to go back and make a lot of messy corrections.

Next time I will discuss translating the dreaded PEEKs and

(continued on page 18)



## BACK ISSUES AVAILABLE

Many members have inquired about the availability of back issues of the MSP 99 Newsletter. Yes we have several issues in our files although some have already sold-out. These are on sale for only \$1.50 per copy and may be purchased either at the meetings or direct from the Newsletter Staff using the handy order form provided in this issue. (We recommend you photocopy the order form rather than cut up your copy of the April issue.)

A partial listing of the contents of each issue follows to make selection easier for you.

Remember: only a limited number of copies is available on a first come - first serve basis, so get your order in early. When they are all gone there will be no more.

JAN/FEB '83 - Hidden Statements In XBASIC; Gathering Analyzing Information; Beginner's Tutorial; Header Listings; Review(Joystick)

MAR/APR '83 - Beginners Tutorial; Display At Routine For BASIC; Reviews (TI-Pwriter, 99'er Magazine)

MAY '83 - Perferation Skipper; Local Software Dealers; Reviews (Signalman III Modem, TI-Writer)

Jun '83 - Contest Winners; Multi-Level Software Companies

JUL '83 - "Lily Padder" Enhancement; Scrolling Program; Adventure Quirk

AUG '83 - "Farmer's Dilemma" Pt 1 (article listing); Other Short Routines

SEP '83 - "Farmer's Dilemma" Pt 2; XBASIC Overview; Questionnaire Results; Review (Henhouse)

NOV '83 - Committee Reports; "Counting" Enhancements; BASIC Tips; Listing: "Cave Maze"

DEC '83 - BASIC Tips 1; Review (Stand Alone Printer Port); TI-Writer Bug

JAN '84 - BASIC Tips 2; Writing Math Problems; Listing: "Hangman"; Reviews (Rescue, unmerge, Typo II)

FEB '84 - BASIC Tips 3; 1983 Treasurer's Report; Speech Helper; Bulletin Board Systems; Review (Trucker)

MAR '84 - BASIC Tips 4; Using Tapes For Sound Data; Prowriter Graphics; Reviews (Gravity Game, Shape Art

APR '84 - TI-Writer Tips; Power Of FORTH; Listing: Benchmark Reviews (Q\*Bert, Walk The Plank, Snakes Ladders; Physical Fitness)

MAY '84 - Disks Drives Pt 1; TI-Writer Tips 2; Listing: "Spanish Tutor"; Expansion Equipment

JUN '84 - Disks Drives Pt 2; Stopping TI-Writer Auto Form Feed; Listing: "Stars"

AUG '84 - "Magic Spell" Revision Listing: "Spritepede"; Reviews (TI-FORTH, Super Bugger); Poor Richard

SEP '84 - Poor Richard; FORTH Tutor; Review (Super Sketch)

OCT '84 - Adventure Gaming; Load Program; TI-Writer Tricks; Tokenized BASIC Chart

NOV '84 - FORTH Disk Fixer; Addin A Keypad; TI-Writer Tip

DEC '84 - FORTH Update; Debugging The Super Bugger; TI Care Packages; Poor Richard

JAN '85 - Questionnaire Results; Noiseless PEB; Using Call Ke Display/Variable 80 Translat Translator

(continued on back cover)



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five color combinations, but pleasant nonetheless. Any key may be pressed to change the colors, although the screen prompts suggest the space bar. For those TI owners who have monochrome monitors, it offers both white on black and black on white. When ENTER is pressed, the program loads the second part of the program.

Version 1.1 is significantly faster than 1.0 was. The article which took about 10 minutes to check (not including corrections because that amount of time is fixed) took only 3 minutes to check under the new version. This makes the program reasonable to use under almost all conditions, from multi-page letters to full reports.

Incidentally, the error of using "capitalisation" instead of "capitalization" was an error on my part, not AUTO SPELL CHECK's. I blew it and told the program to use the former "word" as the spelling. It just goes to show you that human error will still crop up when you least expect it.

What doesn't the new SPELL CHECK have? It still doesn't suggest spellings for words it doesn't recognize. The only spelling correction programs that I know of that will do that are on larger (more expensive) machines. SPELL CHECK still doesn't recognize TI-Writer format commands that are several-to-the-line either. My only other suggestion to the author, Mr. Tom Kirk, is to have SPELL CHECK try to load the CHARA1 file that TI-Writer loads, if present.

Overall, SPELL CHECK is now a better value than when I first reviewed it two months ago.

DRAGONSLAYER AMERICAN SOFTWARE CO.  
2606 Ponderosa Dr.  
Omaha, NE 68123

(continued from page 14)

assembly more easily if they have the opportunity to study existing code and figure out what it does.

INNERMOST SECRETS contains more "inside" information on the TI than a whole year of Home Computer Magazine or COMPUTE!, and costs about as much as two issues. Some of the information has been published elsewhere (on the VDP and graphic modes, for example); but this is one of the few works that condensed the vital facts into a small package.

Overall, this booklet is worth the \$5.95, since \$5.95 is not much money, and should not be construed to be a tutorial since it gives hints, not actual code and assumes a prior knowledge of 9900. If you need a tutorial, I suggest you buy one of the many books available at local bookstores. Combined with Miller's Graphics' "Super Programmer" newsletter, you are given powerful ideas on improving and writing complex programs.

(continued from page 16)

POKES, TI BASIC modifications for ACCEPT AT, and how to DISPLAY AT (or SET, PLOT, or LOCATE) without Extended BASIC.

## CONVERSION CHART

| TI BASIC                      | "OTHER"                        |
|-------------------------------|--------------------------------|
| CALL KEY.....INKEY\$, GET     | SEG\$.....LEFT\$,RIGHT\$,MID\$ |
|                               | A\$(n1,n2)                     |
| CALL CLEAR.....CLS, HOME, CLR | DEF.....DEF FN(name)           |
| CALL HCHAR....HLIN...AT       | CALL VCHAR.....VLIN...AT       |
| CALL GCHAR.....PEEK           | RND.....RND(n)                 |
|                               | String of n spaces....SPC(n)   |
| CALL COLOR(3,2,16)...INVERSE  | (black numbers on white)....   |
| CALL COLOR(3,16,2)....FLASH   | (white numbers on black)....   |
|                               | resets FLASH and INVERSE.....  |



## TI 99/4A LANGUAGES OVERVIEW CHART

|                              | BASIC | XB | LOGO1 | LOGO2 | FORTH | ASSEM | PASCAL |
|------------------------------|-------|----|-------|-------|-------|-------|--------|
| MIN HARDWARE                 |       |    |       |       |       |       |        |
| console:                     | X     | X  | X     | X     | X     | X     | X      |
| 32K memory:                  |       |    | X     | X     | X     | X     | X      |
| disk drive:                  |       |    |       |       | X     | X     | X      |
| cartridge:                   |       | X  | X     | X     | X     | X     |        |
| p-code card:                 |       |    |       |       |       |       | X      |
| GEN CAPABILITIES             |       |    |       |       |       |       |        |
| access 32K mem:              |       | X  | X     | X     | X     | X     | X      |
| relative speed:              | 1     | 1  | 2     | 2     | 15    | 255   | ?      |
| sound access:                | X     | X  |       | X     | X     | X     |        |
| speech access:               | X     | X  |       |       | X     | X     |        |
| sprites:                     |       | X  | X     | X     | X     | X     |        |
| graphics:                    | X     | X  | X     | X     | X     | X     | X      |
| text:                        |       |    | X     | X     | X     | X     | X      |
| multi-color:                 |       |    |       |       | X     | X     | X      |
| bit-mat:                     |       |    | X     | X     | X     | X     |        |
| I/O CAPABILITIES             |       |    |       |       |       |       |        |
| advan output format:         |       | X  |       |       | X     | X     | X      |
| advan screen i/o:            |       | X  |       |       | X     | X     | X      |
| data file handling:          | X     | X  |       |       | X     | X     | X      |
| printer output:              | X     | X  |       |       | X     | X     | X      |
| PROGRAMMING AIDS             |       |    |       |       |       |       |        |
| line-by-line editor:         | X     | X  |       |       |       |       | X      |
| full screen editor:          |       |    | X     | X     | X     | X     |        |
| trace:                       | X     | X  |       |       | X     | X     |        |
| breakpoints:                 |       | X  |       |       |       | X     |        |
| ADVANCED FEATURES            |       |    |       |       |       |       |        |
| programmable error handling: |       | X  |       |       | X     | X     | X      |
| link to assembly programs:   |       | X  |       |       | X     | X     | X      |
| floating point support:      | X     | X  | X     | X     | X     | X     | X      |
| fixed point support:         |       |    |       |       | X     | X     | X      |
| logical expressions:         |       | X  | X     | X     | X     | X     | X      |
| graphics primitives:         |       |    | X     | X     | X     |       | ?      |
| direct RAM access:           |       | X  |       |       | X     | X     | X      |
| direct VDP access:           |       |    |       |       | X     | X     | X      |
| recursion allowed:           |       |    | X     | X     | X     |       | X      |
| program chaining:            |       | X  |       |       | X     | X     | X      |
| extensible:                  |       |    | X     | X     | X     |       | X      |
| structured:                  |       |    |       |       |       |       | X      |
| compiled:                    |       |    |       |       | X     | X     | X      |
| concurrent:                  |       |    |       |       |       |       | X      |



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FEB '85 - 1984 Treasurer's Report;  
Joystick Converter; Facelift  
For TI-Writer; Reviews (Auto  
Spell Check, Dual Disk Drive)

MAR '85 - Printer Comparison;  
Listing: "Title Frame"; Disk  
Tips; Reviews(Shrink, REMover)

APR '85 - Language Comparison;  
Programming Games; Printer  
Paper Tips; Reviews (Sewerman,  
Innermost Working Of The TI)

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