TI*MES

Supporting the **TI-99/4** and **/4**𝔸, the MYARC GENEVE 9640, Michael Becker SGCPU card,
And any other compatible machine.

TI*MES index…

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Disclaimer

The views expressed in the articles in this magazine are those of the individual author, and not necessarily the view of the magazine or the group.

Email membership terms and conditions! ☺

At this point we would like to give a warning to those who have subscribed with email membership. You have expressed this preference because you want your TI*MES magazine to be delivered by a more reliable medium than the Royal Mail! However, as you must realise, PC file formats these days are bloated beyond belief and the Microsoft Word file of a newsletter could be as big as 18 Megabytes!!!
PDF files do compress the file size down, but they may still be a considerable size!

Receiving large attachments these days is no big deal, as Yahoo.co.uk offer a free email service which gives you a maximum in-box of 100Megabytes!

If you specify an email address for your email membership then you **_MUST MAKE SURE_** that the email account has **_sufficient capacity_** to be able to receive these attachments!!!

It's not all doom and gloom though! Trevor and I have been pondering converting the magazine to HTML format and putting it on the web site so that people could read it online. Trevor already has the web code to allow us to make it password protected from non-signed-up visitors! We also need to make sure that it only uses bog-standard HTML and GIF or JPEG images so that it is available to a wider audience. Trevor has the habit of automatically using loads of flash and applets on his websites, but I think we need to make things a bit simpler so it can be accessed by a wider range of web browsers. ☺

Important Information

Membership Renewals

If you have access to the interweb, you are now able to pay your group membership directly from the user group website using your PayPal account.
For those who aren't in the know, PayPal is a web site that allows you to send and receive money internationally. It's excellent, and has recently been purchased by a little company called **ebay!**

The group's web address is **www.ti99ug.co.uk** then just click the "**join TI user group**" button!
While still on the subject of the website, don't forget the TI picture book where you can see photos from TI events. Check back regularly for updates.
The website now has a passworded zone where you can read or download previous and current issues of TI*MES magazine.

The **skype** Page

Welcome to a new regular page in the magazine. Trevor and I did have our Skype contact details on the committee members page, however I've decided to add a separate page to try and promote Skype since it's free and will enable us to keep in touch with TI'ers around the world much more easily!
Hopefully having this dedicated page will raise the profile of Skype and encourage more members to use it.
If we have enough we could have big online conference which is what we've talked about doing in the past.

Name	Skype Username
Richard Twyning	richardtwyning
Trevor Stevens	trevorstevensmegatech
Mark Wills	markrobertwills
Berry Harmsen	berry.harmsen
Tom wills	twills44

I'm deliberately keeping this page sparse as it's your job to fill it by contacting us on Skype and letting us have your username! Also, read the small print below!!!
I don't think Skype will work on Windows 98, but it's available for most other things including Pocket PC's running Windows Mobile.   If you've got an older PC then you might want to consider installing Linux, because there's a version of SKYPE available for it!

Please pay careful attention to the usernames as some of them may contain full stops between forename and surname and they won't work unless they are entered correctly!!!

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FROM THE CHAIRMAN'S CHAIR
BY TREVOR STEVENS

Where on earth did that year go? It seems to go almost as fast as the computing world.
I have just got my self a SPV M3100 pocket pc, which is a glorified phone. I bought this baby from Orange at a really stupid price. The price in fact was about half I paid for my original TI/99-4a console. How things have changed. I really can't compare the two devices as one is 25 year older than the other. However other than size, memory and speed I suppose the basics are still the same. It is a computer!!

When you think back what could and can still be done on the TI/99-4a console, it really is a credit to all those at Texas Instruments that produced such a robust and sturdy machine.

Things are slowing down a bit for the old TI. The expansion of it really has just about been fulfilled. However one never knows what some bright spark has just around the corner.

You will notice that there is going to be a TWO day AGM down in Poole, Dorset. This will be attended by Berry Harmson from Holland. So there will be at least three of us…Richard Berry and myself. We are expecting John Murphy and his friend Trevor Tabener. Trevor is a real TI fanatic; however he is now nearly blind so has to rely on John. **We hope to see you there as well.**

 The meeting details are set out in this magazine.

We had some comments about the front cover of the last Magazine. I can only say that we are sorry for any offence caused. This issue however will remain totally non political.

We have had a few articles in recent months from our members; however we still need more to fill the magazine. So pick up that pen and give us your views.

This is an update from the article regarding the keyboard interface. I have this reply for our readers from the constructer of the project.

"I have a new design as soon as I have a weekend to spare that solves a lot of the power and cabling issues - I can very nearly piggyback it onto the 9901.
That'll take some time but make for a project/kit that I'm actually capable of distributing with my limited time".

So there you are someone who is doing expansion for the TI still working at it.

The emulator for the PC Win994a has just been up graded to version 3.008 this can be found on line at
http://www.99er.net/download2/index.php?act=category&id=15
However this will soon be on line at our site.

Here are few tips from the programmer Corry Burr…

Programming Tips By Cory Burr

Thanks guys for your words. I know there's still more things that don't work. At best, Win994a is a compromise. It is a trade off between a desire to make a good emulator and the fact my time is not infinite. Tursi, you are well aware of this. Usually, there's not enough time in a day. All we can do is keep plugging away, and do the best we can. Thanks again. Your words make the effort more worthwhile.

In the disk manager, please remember there are a few functions under the program icon in the upper right. Left click on the icon. Also, right clicking on file items brings up a menu of additional "single file" type functions.

Left clicking on items selects the file (for deleting or copying). To select multiple items, left click on various files while holding down the the Ctrl Key. To select a block of files, left click on the top file. Then, while holding down the Shift Key, left click on the bottom file of the block. The entire file block will become selected.

To quickly go to a file...for example, files that begin with the letter "T". Left click somewhere in the list box. Then simply press the the "T" key on your keyboard. The list will instantly scroll to the first file beginning with T.

Just a few shortcuts I threw in but didn't write about. Have fun!

While going through some files I found this article. This may be an old article but maybe of interest, so here goes.

Diary of a Kracker-Hacker

I've had a lot of fun and a lot of frustration in the last couple of weeks working with my GRAM-KRACKER, working with very fragmentary information about GPL, trying to make my 'custom' machine do what I wanted it to do. In the course of all this I've found out a few things and picked up a couple of tips that may interest some of you. I am not claiming that my techniques are the best, my code the most compact or efficient, or my knowledge particularly profound. The fact is the opposite of all that is probably more an accurate picture of where I'm at. On the other hand, these notes may save somebody else some of the frustration I went through, and thereby make for more _fun_, which is what this deal is all about!

I got an 80K G/K, mainly because I wanted to load custom character sets in GROM 0, and store E/A and TIW in GROMs 1 and 2. Loading character sets is no big deal, once you discover that the utility provided with the GK only copies the last seven bytes each character definition and that the operating system only holds seven bytes for each 'small' character, using them to define the _last_ seven bytes of each eight-byte definition. Anyway, once I had the characters loaded I wanted to be able to get at them all easily. This required adding two new calls: one to load the so-called 'title screen' characters (upper

case only) and one to restore lower case (since the built-in CHARSET already restores the upper case.) The code for these calls was already available in the operating system, spelled out in the June '84 issue of SMART PROGRAMMER. The problem I ran into, however, was figuring out th proper method to RETURN from the CALL so that I would re-enter X-BASIC cleanly, and that the CALL would work in a running program.

Understand that it is _easy_ to program directly in GPL _without_ an assembler, as long as you are writing short, simple CALLS which use no symbolic or relative references. Commands translate fairly directly into bytes, and GPL is compact enough so that you can literally read it direcly, once you get the hang of it.

From various sources, The EXPLORER manual, SMART PROGRAMMER, and especially the excellent and fairly complete manual for the Pascal GPL Assembler in DL4, it seemed that the simple byte command >00 was a RETURN and, sure enough, using >00 seemed at first to work. It always worked in command mode and sometimes worked from running programs. But obviously sometimes is not good enough. From checking out other calls in X-BASIC and in the XBCALLS GK utility, I finally realized that RETURN itself needed to be called. CALL in GPL is >06, and CALL must be followed by a _vector_ for the called routine. That is, an address containing the address of the routine. The EXPLORER manual tells all, including the address of a routine which is suppossed to be "Return from LINK or DSR." Well it also works as a return from CALL, so it seems.

Its address is at >0012 in GROM 0, so the complete RETURN fragment in GPL turns out to be:

```
>06        CALL
>00,>12    GPLLNK VECTOR FOR RETURN
```

Now that may not be the best way to return from a simple CALL, but it has an obvious advantage: it works. So does another fragment used by some of the simple calls in XBCALLS:

```
>05        BRANCH
>C1,>E3    (an address in the XBasic
           GROM which apparently also
           CALLS the correct RETURN)
```

So add the return to the Load Title Screen Characters code listed in the June *SP* and you get:

```
>31        GROM to VDP MOVE
>02,>00    # of bytes to move
>A9,>00    VDP DESTINATION ADDR plus offset
>04,>B4    GROM SOURCE ADDRESS
>06        CALL
>00,>12    RETURN VECTOR
```

Unfortunately, this moves the definitions to the wrong address for BASIC, because of the notorious BASIC offset. But alter the VDP DESTINATION adress and it works just fine! Another approach is to CALL the Load Title Screen routine provided for use by GPLLNK. This is a a _different_ routine from the code above, and it uses a vectored destination address. (You remember, place the destination address at FAC...)

```
>BF          CPU STORE
```

```
>A4              at >83A4 (addresses in PAD are referenced by LSBy)
>04,>00          VDP DESTINATION without offset
>06              CALL
>00,>16          GPLLNK VECTOR for LOAD TITLE SCREEN CHARACTERS
ROUTINE
>06              CALL
>00,>12          RETURN
```

Both versions are 10 bytes long; both work.

Of course, when you add a CALL you have to go to the last 'SUBROUTINE HEADER' or what I call the last entry in the CALL ref/def table, and add the header for the new CALL. You have to modify the previous header to point to the addre ss of the new header; give the address of the next header (or >00,>00 if there are no more); give the length of the CALL name and the name itself; and finally give its address. Where to put the code? Anywhere you want, but consider MG's XBCALLS. They continue the chain of CALL headers starting at G>D800, but scatter their code through the remaining GROM space. I found that the code for CLSALL and CLKOFF, both short six-byte sequences with no relative references, are stuck out in the middle of nowhere, so I moved them to G >DA58 (right after CLOCK) and changed their headers. This left me lots of room to add my new CALL headers. I then tacked the code for my CALLS after CLSALL and CLKOFF, at G>DA64 and beyond. [The long blocks of code that constitute CLOCK and CAT contain relative references, symbols and the like, and are too messy to try to move. One tip here though; don't overwrite the >00,>00 you find at G>DEC3. These bytes are part of the CAT code and must be left blank. Add anything you want at >DE40 and beyond.]

Once I got my CALL BGCHAR working to load my custom Title Screen character set, I added CALL LC to restore the lower case character set to 'normal;' very useful for chaining programs:

```
>BF              CPU STORE
>A4              at >83A4
>06,>00          VDP DESTINATION without offset
>06              CALL
>00,>4A          GPLLNK VECTOR for LOAD LOWER CASE CHARACTERS
>06              CALL
>00,>12          RETURN
```

Using these built in GPLLNKs and CALLing other CALLS is so _easy_, letting the GPL intrpreter keep track of returns, that I went on and added CALL BEEP and CALL HONK:

```
>06              CALL
>00,>34          VECTOR for BEEP
>06              CALL
>00,>12          VECTOR for RETURN

>06              CALL
>00,>36          VECTOR for HONK
>06              CALL
>00,>12          VECTOR for RETURN
```

And finally I checked out the actual GPL code for HONK and decided to try to add CALL CHIME. I had to store the data for the CHIME sound list somewhere (the data is in the E/A manual) so I tucked it down at G>DE40. The code for the CALL is as follows:

```
>BF              CPU STORE
>58              at >8358
>DE,>40          address of my sound list
>F6              INPUT/OUTPUT INSTRUCTION
>58              CPU SOURCE address vector
>00              I/O FLAG: defines this as a SOUND operation with the
sound list in GROM
>06              CALL
>00,>12          VECTOR for RETURN
```

This code turns on the sound and immediately returns to the next GPL statement. The E/A manual includes >8358 in a general area defined as a stack area, used by DSR's, etc. I don't know if any other PAD address would work as well.

Once I got this entire stuff going, I decided to go for the big one. I had previously written a package of text-mode utilities for X-BASIC [see X40 in DL4] and I decided that I could store the code for those utilities in the remaining unused X-BASIC GROM space and write a simple CALL to read them into memory. I mean, SYSTEX is great, but memory-to-memory is the ultimate.

First I had to refine the X40 code a bit. I already had my alternate character set in console GROM, so I took out the ALCHAR routine and its PAB and a little associated baggage. Then I moved all the buffers to the _end_ of the source code so all the real meat of the code would load contiguously at the top of low memory. I wanted to be able to fit everything I needed into the unused space in GROMS 3,4, and 5, leaving the rest of GROM 6 free for more extensions of X-BASIC and GROM 7 free altogether.

I had >17F0 blank bytes of GROM available; all I needed to save was my program code and the ref/def table. My code took up the space between >24F4 (the First Free Address after CALL INIT) and about >3870, the start of the buffer space. This was only >137C of code; the ref/def table was another >A0 bytes, still plenty of room. But how to get this code, with all its symbolic and relative addresses, from low memory into GROM? True, I only had to do this once, but I certainly didn't want to have to type it all in!

I couldn't use the GK editor for the move, because _it_ resides in lower memory, and overwrites the code I needed to move. So I took a round-about route. I wrote a temporary GPL CALL to move the entire 8K low-memory into high memory from X-BASIC (after CALL INIT::CALL LOAD(DSK1.X40:OBJ"). Then I used the GK editor to move the code from high-memory into GROMs 3, 4, and 5. Here's the code that moved the stuff from low to high:

```
>35              CPU MOVE
>20,>00          BYTE COUNT
>8F              CPU
>1D,>00          DESTINATION ( ->8300 OFFSET)
>8F              CPU
>9D,>00          SOURCE (MINUS OFFSET)
>06,>00,>12      THE USUAL RETURN
```

This is lifted of course straight from CM's tutorial on GPL moves.

I moved the code into GROM in three chunks, >7F0 bytes to G>7810 (>7800-7809 used by the defeat auto-load patch), >800 bytes to G>9800, the remaining bytes to G>B800 with the ref/def table moved to G>BB90. This was very easy with the GK editor. I immediately saved the module with the A/L code in place just in case I screwed up the next step. Then I wrote the GPL CALL to move the code back into place in low memory.

Friend Miller does advise that it's faster to write an A/L mover, use GPL to move it into place in low memory, then branch to it and let it move out the rest of the code. This kind of boot-strapping is said to be faster than using GPL to move the whole works directly; it's certainly more elegant. GPL is still simpler, however, and the speed is fast enough with memories of loading this stuff from disk so fresh in my mind. So, four GPL move instructions gets the three code blocks and the ref/def table back into place, and one last move instruction moves out new First Free Address and Last Free Address values to >2002. It may be driving a nail with a sledge-hammer, but it works! Here's the actual code:

```
>31              GROM to CPU move
>07,>F0          BYTE COUNT
>8F              MARKS CPU ADDRESS
>A1,>F4          DESTINATION, CPU >24F4 MINUS >8300 OFFSET
>78,>10          GROM SOURCE
```

And so on...

```
>31,>08,>00,>8F,>A9,>E4,>98,>00
>31,>03,>86,>8F,>B1,>E4,>B8,>00
>31,>00,>B0,>8F,>BC,>50,>BB,>90
>31,>00,>04,>8F,>9D,>02,>DA,>B8
>06,>00,>12
```

Now from X-Basic I issue CALL INIT :: CALL X40 and I am ready to use text mode! Who need MYARC!

I hope these code fragments and procedural notes do serve a useful purpose. I am glad we are all respecting TI's copyright and not uploading actual altered modules, but it does make for more emphasis on technique in the message base and the DL's.

Once more written material on GPL is available this will all be a lot easier, I am sure, and my examples will be seen for the clumsy dross they probably are. Personally, I look forward to having a nice manual and not having to read through the GRAM KRACKER manual, the EXPLORER manual, SMART PROGRAMMER, and various other sources, feeling like a biblical scholar trying to pin down specific references and cross-reference ambiguities. But then again, I guess that's why they call us KRACKER-HACKERS! Richard Minutillo

Well that it for another time from the chairman's chair.   Fctn / Quit…

GOLDEN TI – *By Richard Twyning*

Dear Reader!

Here we are at the end of another year. It's very difficult for me to say when my favourite time of year is! It's really nice to get the Christmas tree up and get the candles lit and sit back with a nice glass of mulled wine.
It's also nice to cast my mind back to the summer and think how nice it is to open the patio doors, get the candles lit and sit back with a nice glass of refreshing white wine! Sounds quite similar doesn't it?!?!?

I'm casting my mind forward to next year and looking forward to a weekend in Dorset. You know already that I'm talking about the two-day AGM in Poole. More about this in my dates for your diary section.

Upcoming events for your diary...

Two-day AGM in Poole, Dorset in May 2007

On behalf of DORTIG, the Dorset TI Group, we are proud to announce our two day AGM and workshop. As promised in the last issue, we have full details of the event. It will take place at the Poole Sports Centre on the 19th and 20th May 2007.
It's taken one or two of my lunch times and a bit of phoning around to arrange!
We're planning to stay in a B&B and we'll be organising a meal on Saturday night for those that will be staying over. We have been lucky to find the sports centre. The room sounds excellent. It's secure, and we're able to leave the equipment locked in the room on Saturday night. All of the hotels I phoned were trying to charge wedding prices and wanted £300 per day! They should be shot by the Dorset tourist board! I think that they should only charge that if the event is actually a wedding! Poole Sports Centre are only charging £35 + VAT per day!
We'll have full details in the Spring issue of TI*MES.

A word of warning if you intend to attend the two day AGM.

The event is being held in the town centre of Poole, which is in Dorset. Please note that this is nowhere near Kenya. Here are two maps so you can tell them apart…

If you see signs for Nairobi, then you might have travelled too far and you will certainly need to turn round! Also remember that there is probably not a very good mobile phone coverage on Mount Kilimanjaro, so if you do need to phone for directions, do it before reaching the mountain!

Treff 2007

Not much new in the way of information regarging Treff 2007. Trevor and I had a conference call via SKYPE the other night and Berry has found a venue and fixed a date which we think will be the last weekend in September 2007.
We'll have proper information as soon as it's available.

It is to take place in a town which is 50 minutes from Amsterdam by train and trains run late so we will be able to have a night out in Amsterdam.

Sorry I've only written a short one again. I've been pondering the idea recently of writing a new TI game in Extended BASIC. Watch this space for more details.

THE END
BUT...
RICHARD TWYNING WILL RETURN
IN
CONSOLE ROYALE.

Francesco Lama – Media Librarian

Many thanks to Francesco for supplying us with a new updated module library listing.

MODULE LIBRARY

```
        TITLE                       QTY IN STOCK              PRICE (POUNDS)

32k SUPERSPACE (MODIFIED ROMOX) ........ 1 ................... 25.00

ADDITION & SUBTRACTION 1 ............... 1 ...................  3.00
ADVENTURE + PIRATE TAPE (OTHERS TOO) ... 5 ...................  5.00
ADVENTURE MODULE ONLY .................. 4 ...................  3.50
ALPINER ................................ 3 ...................  8.00
A-MAZING ..............................10 ...................  3.00

BEGINNING GRAMMAR ...................... 4 ...................  3.00

BIG FOOT ............................... 0 ...................  3.50
BLASTO ................................. 1 ...................  5.00

CAR WARS ............................... 1 ...................  4.00
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JAWBREAKER 2 ........................... 1 ...................  4.00

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THE ATTACK ............................. 1 ...................  4.00
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MODULE LIBRARY continued…

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TI LOGO + FOLDER & MANUAL .............. 1 ................. 15.00
TI WRITER MODULE ....................... 1 .................  8.00
TOMBSTONE CITY ......................... 3 .................  4.00

VIDEO CHESS ............................ 1 .................  5.00
VIDEO GAMES 1 .......................... 1 .................  3.50

YAHTZEE ................................ 2 .................  3.00
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100 Best Corporate Citizens for 2006

Business Ethics Magazine Spring 2006
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[Green Mountain Coffee Roasters'] meticulous attention to corporate social
responsibility conveys well what the 100 Best Corporate Citizens list is about.
The best-managed firms today - in this era when societal expectations of business
are rising - can no longer focus solely on stockholder return.
Companies that aim to prosper over the long term also emphasize good jobs for
employees, environmental sustainability, healthy community relations, and great
products for customers.
Rest of top 10: Hewlett-Packard (HP), Advanced Micro Devices, Motorola, Agilent
Technologies, Timberland, Salesforce.com, Cisco Systems, Dell, Texas Instruments.


Others in top 100: Intel, Johnson & Johnson, Nike, Wells Fargo, Starbucks,
Wainwright Bank, Office Depot, Whole Foods, United Parcel Service (UPS), Student
Loan Corp., McGraw-Hill, Citigroup, Johnson Controls, Micron Technology, Brady
Corporation, Cummins, Ecolab, Graco, Herman Miller, Modine Manufacturing, Pitney
Bowes, Procter & Gamble, St. Paul Travelers, Southwest Airlines, Whirlpool


You'll notice that TI made it into the top ten and intel didn't!  So much for
their misleading T.V. campaign where they claim to have "The world's best
processors!"  Every one of us know that's not true!  ;-)
```

My TI Story – By Eamon Doran

My name is Eamon Doran and I bought a TI-99/4a in the spring of ´82.
I had no idea at all about computing and looked at several on the market at the time. Sinclair machines had no proper keyboards but the VIC20 had a proper keyboard which could be used by a touch typist but it was out of my price range. The Atari and BBC machines were also out of my price range.

I was working as an overseas telegraphist at the time and when I saw the TI in Argos at a bargain price I knew that the keyboard was for me. I bet not many people have bought a computer because of its keyboard. I have read in many magazines where people complained about its size but as a telegraphist I can tell you it is a very good keyboard and not small as some say. I was used to telegraph typewriters and telex machines with keyboards of only 3 banks (rows). With the help of my 10 year old daughter we got the TI working and I asked her what do I do next and she promply showed me how to write my name on the screen with a few lines of basic.
I had absolutely no idea about bytes, kilobytes or even what a CPU was all about. My son was only seven and he was intrigued with it as well. Although my daughter was familiar with computers at her school she really had no interest so it was left to me and my son to play with it. My daughter introduced us to basic and left us to get on with it. At first it was a bit frustrating especially trying to save and load programs from a tape recorder that we had so I purchased one from Boots which was made for the job and we had no further problems. I still

have that tape recorder working today and connected to the TI. I joined several clubs and when TI pulled out of the market some disappeared and we didn't get any magazines or money back. It was typical of the time and lots of cowboys were offering all kinds of goodies and ripping people off with high prices. I dealt with one west country cowboy who I realized after was selling me second hand goods but as I was ignorant of hardware for the TI and didn't realize it. While you bought his goods and they worked everything was ok but should you have to get a replacement he was not at all helpful. He also had a magazine which disappeared as well with no refund of subscriptions. I bought a PEB from him as my first big purchase but nothing after that because of his bad business practice.

I dealt with another dealer from up north who was the most helpful person I had come across in the TI community and he set me up with disk drives and all the help I needed. I got extended basic and started learning about sprites and of course all those programs in magazines in extended basic were soon up and running. My son and I started looking into assembly using the mini-memory, and by then my son was ten years old and was picking it up faster than I could, so I bought the editor assembler, manuals and disks. My son was soon showing me things with sprites that he had learned using assembly. We took the TI to his secondary school one Saturday when the school was trying to raise money for charity and of course there were all the other machines there. When we set up the TI not many were interested till we put in the Parsec Cartridge with speech. Suddenly everyone wanted a go and we made several pounds for the charity.

When my son was 12 he bought a second hand Commodore 64 and started learning assembly on that machine and drifted away from the TI. Later he bought an Amiga and started programming on that.
He started learning PASCAL etc. on a two year course at college. When he was in his second year he had a friend who said that the computer firm he was working for were taking on new programmers.
My son went for an interview and there were several people there with university degrees in computing waiting to be interviewed so he wasn't too confident.
However, when he was interviewed the man who owned the company asked him what he had learned and done. My son told him about the TI and the Commodore and that he worked in assembly. As soon as he mentioned that, the owner offered him the job on the spot and said he was really only interested in people who had had experience with such machines as the TI and the Commodore.
My son went back to college and told the instructor about the offer and the instructor said grab the job because it is very hard to get into programming and if the job fails you can always come back to college and finish the course.
Well my son is still in computing and works in California as a games programmer. All thanks to the TI-99/4A.

My wife is Spanish and when I retired we decided to move to Spain and have been here for a couple of years now.
I packed all my TI gear really well, but the PEB was dropped on the runway at Stansted. The airline said it was not packed according to their standards so I got no compensation. Anyway when we got home in Spain I put it all together and the PEB, disks drives and all the cards worked as well as before.
The top plastic cover was completely broken away from the box but I glued it all together and bolted it to the metal part of the top. The front panel is cracked in several places but apart from that it looks decent. If it had been this PC that I am typing on it would have been in the dustbin. I am presently making a new desk for the TI so I can get back to doing some programming on it. I have bought several cartridges from the library to boost my collection. All I can say is that the TI has been a big part of my computing life and I wonder if I would still be interested today if I had bought something else.
We still have our house in Colchester and I have to bring over all my magazines and some tapes.
I can't remember when I joined TI*MES but it was sometime in the 80´s. Over the years the club has changed and had its ups and downs. It seemed to disappear for a while and I have not got all the mags, however I think it has really improved in the last year with a website and sending the mag as an email.
I must say that Trevor, Richard and Francesco have really put in time to bring it back to a high standard and that goes for anyone else in the background that we don't hear about. You really have to be committed to be on the committee and have a wife that will tolerate computing the amount of time you have to put in to keep things running smoothly.
Well, that's my little contribution for the magazine and I hope someone else takes up the challenge and writes a bit to let us know how the TI came into their life.

Report on Chicago Faire By Hal Shanafield

The 24th Annual Chicago TI International World Faire has come to a close. Those who attended have deemed it a success, although not without its problems. The first problem was that the Evanston Public Library scheduled another event in our rented room at the same time.
They never even bothered to notify me until the day before the Faire! Nevertheless, this scheduling conflict afforded us the opportunity to meet informally at a local restaurant and have a leisurely breakfast and renew old friendships. This actually was the second opportunity for the folks who arrived early, because we had our traditional "smoker" at the local American Legion post the night before.

Well before noon the meeting room had been vacated and completely set up for our use, and the attendees and vendors were able to begin to take their places. Victor Steerup, president of the Chicago TI User Group, distributed a CD of interesting graphics and programs to all the attendees of the Faire. Shortly thereafter, the demos and seminars began. This year we were fortunate to have a number of very interesting speakers who presented a great amount of information and debuted new products and programs.

This year's Faire was dedicated to Harold Mayo, who was unable to attend this year owing to health problems. We called him using Skype, and many of the visitors to the Faire were able to talk with him and wish him all the best. He said he hoped to be able to come next year.

Berry Harmsen, the chairman of the Dutch User group, reported on the most recent European TI event, the TI Treff, held this past September in Flensburg, Germany. He spoke about the new developments in the European TI community, and gave hints of upcoming projects and programs that sound very promising for the future of the TI. He also pointed out that there several new programs currently available on various European TI websites. He also demonstrated a sampling of hardware that is currently available to connect Compact Flash cards to TI IDE cards and also TI SCSI cards. The latter is a most recent development from Germany. Berry answered questions concerning the use of Compact Flash cards on the TI. The European Treff of 2007 will take place in the area of Amsterdam (Berry's hometown).

Bill Gaskill was next up, and introduced the lastest version of his Cartridge Collector's Kit. It is set of three TI disks, a PC CD and a 70-page manual. Included in this package is the Index Card File program, which can be used for a variety of purposes to catalog collections of any type. It comes with an extremely comprehensive database of TI cartridges, those released, promised, or advertised.
A rarity rating accompanies each listing, so that a collector can help determine whether a cartridge is common or not. Bill explained his program extremely well, and answered all questions to the satisfaction of his audience. His package was very reasonably priced, and a good proportion of his listeners took one home.

Gregg Lemke of Emkel Software, debuted several new games for the TI.
Gregg is a recent returnee to the TI community, who is now rapidly renewing his skills, and gaining expertise in Assembly. His early efforts were written in Extended Basic, and aimed at the younger set. He promises to have even more to show at next year's Faire.

It is heartening to see a new software company start in the TI world. Gregg explained that he has started his company for love of his first computer, not to get rich, which is a very realistic attitude! Gregg and his partner Terry also distributed colourful cup holders with the new company logo on them.

The last presentation of the day was done by Tim Tesch, who discussed the programs he is currently working on. These include a program originally written by the late John Birdwell, Disk One. Tim is in the possession of the original source code, and is in the process of testing and adjusting it, to make it available to the TI community.
He is also working on several other items in the legacy of John Birdwell. In addition, Tim showed an updated version of Barry Boone's Archiver program, which had new capabilities. Amongst these was the compatibility with the most recent storage devices like IDE and Compact Flash cards. This new version of Archiver is Beta version 5 and not fit for distribution yet. Both of these updates to venerable programs will be of great value to the TI community.

The Faire was filmed again this year by Bruce Maret, who will soon be making DVDs of the entire event available. Please watch for his announcement if you would like to see the video record of the 24th edition. Many other DVDs and videos of this, and other TI events are available from Bruce. Photos of the Faire will also be found at the Dutch TI Yahoo site, and possibly other sites as well.

After the official close of the Faire, a large group of us moved over to another local restaurant for our annual banquet. As soon as everyone was finished with their meals, we began the award portion of the evening. The John Birdwell Memorial Prize, given annually by the Birdwell Trustees, and presented by the Chicago User Group, went to Fred Kaal, the well-known programmer from Holland. The award is richly deserved, and will be carried back to the Netherlands by Berry Harmsen. Teams of juries were then selected from the dinner guests, and the judging of the Rob Tempelmans Plat Award, which goes to the TI Website deemed best according to various categories, was underway. One hour later, the six sites in the competition had been winnowed down to just one, and the winner was announced.
This year Bryan Roppolo Boulder's site, "The TI Videogame House" was selected as the overall champion. He will be able to display the RTP logo on his site from now on.

The evening ended as the last group of die-hards repaired to a local watering hole to celebrate another successful Faire.

Hal Shanafield

TI-Writer's Friend Conversion Programs

The writer's friend... well, what it did was convert TI-Writer DV80 files into 'companion' IV254 files, and vice-versa. The program was able to maintain very simple formatting settings and make the files at least readable to the other program. This program was written in Extended Basic, so I present the listing, and the executable.

```
100 ! THE WRITER'S FRIEND
  110 ! TEXT FILE CONVERSION UTILITY
  120 ! VERSION 3.2
  130 !
  140 ! 11/84 RICHARD MINUTILLO
  150 !
  160 ! SET-UP
  170 !
  180 CALL CLEAR ::  CALL INIT
  190 CALL CHAR(127, "0000005A52DAD2DB", 128,
"00000010000000000000000000000000E080808EEA0E0C0A007C9494947C1414")
  200 CALL CHAR(134,"3C4299A1A199423C", 136, "F090F087880B090F6090402795650704",
143, "FFFFC3C3C3C3FFFF") ::  CALL SCREEN(15)  ::  CALL COLOR(14,8,9)
  210 DI$ =  RPT$( CHR$(143) ,28)
  220 RESTORE  2000 ::  FOR I = 1 TO 8 ::  READ A,B ::  EASUB$ = EASUB$ &  CHR$(B)
:: COMPSUB$ = COMPSUB$ &  CHR$(A)  ::  NEXT I
  230 DISPLAY DI$,,"    THE  WRITER'S FRIEND    text file conversion utility"
  240 DISPLAY ,,,,,, CHR$(134)  & "1984 - RICHARD G. MINUTILLO a product of the
fine-arts   bluesband & poetry press"
  250 DISPLAY ,,DI$,,,,,,,,,,, ::  FOR D = 1 TO 1000 ::  NEXT D ::  CALL CLEAR ::
CALL COLOR(14,2,1)
  260 !
  270 ! GET DRIVE NUMBERS:
  280 ! TI-WRITER DISK IN DRIVE A
  290 ! companion DISK IN DRIVE B
  300 !
  310 DISPLAY ,,"TI-Writer  DRIVE #(1-3):"
  320 ACCEPT  AT(23,25)  SIZE (1)  BEEP  VALIDATE ( NUMERIC ) :A
  330 IF A < 1 OR A > 3 THEN   310
  340 DISPLAY "companion" &  CHR$(127)  & " DRIVE #(1-3):"
  350 ACCEPT  AT(23,25)  SIZE (1)  VALIDATE ( NUMERIC )  BEEP :B
  360 IF B < 1 OR B > 3 THEN   340
  370 !
  380 ! SELECT TI TO companion
  390 ! OR companion TO TI
  400 !
  410 DISPLAY ,,"SELECT OPTION:",,,"[1] TI-Writer TO companion" &  CHR$(127)  & "
[2] companion" &  CHR$(127)  & " TO TI-Writer",,,
  420 DISPLAY "OPTION:" ::  ACCEPT  AT(23,8)  VALIDATE ( NUMERIC )  SIZE (1)  BEEP
:AN
  430 IF AN = 2 THEN  1060 ELSE  IF AN <  > 1 THEN   410



  440 !
  450 ! **************************************************
  460 ! * READ TI-WRITER FILE AND WRITE AS companion FILE *
  470 ! **************************************************
  480 !
  490 DISPLAY ,,"TI-Writer FILENAME?","DSK" &  STR$(A)  & "."
  500 ACCEPT  AT(23,6)  SIZE (10)  BEEP :EAFNAME$
  510 IF EAFNAME$ = " THEN   500 ELSE EADRIVE$ = "DSK" &  STR$(A)  & "." &
EAFNAME$
  520 DISPLAY ,,"companion" &  CHR$(127)  & " FILENAME?","DSK" &  STR$(B)  & "."
  530 ACCEPT  AT(23,6)  SIZE (10)  BEEP :COMFNAME$
  540 IF COMFNAME$ = " THEN   530 ELSE CDRIVE$ = "DSK" &  STR$(B)  & "." &
COMFNAME$
  550 DISPLAY ,,"CARRIAGE RETURN AT END OF   EACH E/A RECORD? (Y/N):N" ::  ACCEPT
AT(23,24)  VALIDATE ("YN")  SIZE ( -1)  BEEP :AN$
  560 IF AN$ = "Y" THEN LINEFEED_ON = 1 ELSE LINEFEED_ON = 0
```

```
 570 DISPLAY ,,"WORKING....",,"PLEASE TRY NOT TO INTERRUPT",,,
 580 OPEN #1:EADRIVE$, DISPLAY , INPUT , VARIABLE 80 ::  OPEN #2:"DSK" &  STR$(B)
& ".TEMP$$$$$$", INTERNAL , OUTPUT , VARIABLE 254
 590 !
 600 ! INSERT SIX BLANKS AT START OF companion ON  RECORD #1
 610 !
 620 FOR K = 1 TO 6 :: INSERT$ = CHR$(0)  ::  GOSUB  840 ::  NEXT K
 630 !
 640 ! LOOP THROUGH E/A RECORDS
 650 !
 660 LINPUT #1:EA$
 670 LEADING = 1
 680 FOR EA_SEG = 1 TO  LEN(EA$)  :: INSERT$ = SEG$(EA$,EA_SEG,1)  ::  IF
INSERT$ = CHR$(32)  AND LEADING THEN   700 ELSE LEADING = 0
 690 GOSUB  820
 700 NEXT EA_SEG
 710 !
 720 ! INSERT SPACE OR LINEFEED AFTER EACH DISPLAY 80 RECORD
 730 !
 740 IF LINEFEED_ON THEN INSERT$ = CHR$(130)  ELSE INSERT$ =  CHR$(128)
 750 GOSUB  840
 760 !
 770 IF  EOF(1)  THEN   900 ELSE  GOTO  660
 780 !
 790 ! SUBROUTINE TO SUBSTITUTE CHARACTERS IF NECESSARY
 800 ! AND ADD TO COMP_OUT$ AND TEST FOR LENGTH
 810 !
 820 IF INSERT$ = CHR$(94)  THEN INSERT$ = CHR$(137)  ::  GOTO  840 ELSE  IF
ASC(INSERT$)  > 33 AND  ASC(INSERT$)  < 127 THEN   840
 830 IF  POS(EASUB$,INSERT$,1)  THEN INSERT$ = SEG$(COMPSUB$,
POS(EASUB$,INSERT$,1) ,1)  ELSE  RETURN
 840 COMP_OUT$ = COMP_OUT$ & INSERT$ :: COMPLEN = COMPLEN + 1
 850 IF COMPLEN = 253 THEN  PRINT #2:COMP_OUT$ ::  DISPLAY ,,"RECORD #";LENGTH +
1,,COMP_OUT$ :: COMP_OUT$ = " :: COMPLEN = 0 :: LENGTH = LENGTH + 1




860 RETURN
 870 !
 880 ! EXIT SEQUENCE
 890 !
 900 CCOUNT = (253 * LENGTH)  + COMPLEN
 910 PRINT #2:COMP_OUT$ ::  DISPLAY ,,"RECORD #";LENGTH + 1,,COMP_OUT$ ::  CLOSE
#1 ::  CLOSE #2
 920 !
 930 ! REWRITE TEMP FILE WITH companion 'SIGNATURE'
 940 !
 950 OPEN #1:"DSK" &  STR$(B)  & ".TEMP$$$$$$", INTERNAL , INPUT , VARIABLE 254
::  OPEN #2:CDRIVE$, INTERNAL , OUTPUT , VARIABLE 254
 960 INPUT #1:FIRSTREC$
 970 NFIRSTREC$ =  RPT$( CHR$(0) ,4)  &  CHR$( INT(CCOUNT/256) )  &  CHR$(CCOUNT
-( INT(CCOUNT/256) )  * 256)  &  SEG$(FIRSTREC$,7, LEN(FIRSTREC$)  -6)
 980 PRINT #2:NFIRSTREC$ ::  IF  EOF(1)  THEN  CLOSE #1: DELETE  ::  CLOSE #2 ::
GOTO 1550
 990 INPUT #1:NEXTREC$ ::  IF  EOF(1)  THEN  PRINT #2:NEXTREC$ ::  CLOSE #1:
DELETE  ::  CLOSE #2 ::  GOTO 1550
1000 PRINT #2:NEXTREC$ ::  GOTO  990
1010 !
1020 ! ***************************************************
1030 ! * READ companion FILE AND WRITE AS TI-WRITER FILE *
1040 ! ***************************************************
```

```
 1050 !
 1060 DISPLAY ,,"companion" &  CHR$(127)  & " FILENAME?","DSK" &  STR$(B)  & "."
 1070 ACCEPT  AT(23,6)  SIZE (10)  BEEP :COMFNAME$
 1080 IF COMFNAME$ = " THEN  1070 ELSE CDRIVE$ = "DSK" &  STR$(B)  & "." &
COMFNAME$
 1090 DISPLAY ,,"TI-Writer FILENAME?","DSK" &  STR$(A)  & "."
 1100 ACCEPT  AT(23,6)  SIZE (10)  BEEP :EAFNAME$
 1110 IF EAFNAME$ = " THEN  1100 ELSE EADRIVE$ = "DSK" &  STR$(A)  & "." &
EAFNAME$
 1120 DISPLAY ,,"CONTROL CHARACTERS IN YOUR  DISPLAY 80 FILE? (Y/N):Y" ::  ACCEPT
AT(23,24)  VALIDATE ("YN")  SIZE ( -1)  BEEP :AN$
 1130 IF AN$ = "N" THEN CCAR = 0 ::  GOTO 1160 ELSE CCAR = 1
 1140 DISPLAY ,,"SUBSTITUTE "~" [TILDE] FOR  CONTROL CHARACTERS? (Y/N):Y" ::
ACCEPT  AT(23,27)  SIZE ( -1)  BEEP  VALIDATE ("YN") :T$
 1150 IF T$ = "Y" THEN TILDE = 1 ELSE TILDE = 0
 1160 DISPLAY ,,"RIGHT MARGIN POSITION?        (34-79):71" ::  ACCEPT  AT(23,9)
SIZE ( -2)  BEEP  VALIDATE ( NUMERIC ) :MAXLEN
 1170 IF MAXLEN < 34 OR MAXLEN > 79 THEN  1160
 1180 DISPLAY ,,"NUMBER OF LEADING SPACES?   (0-10):8" ::  ACCEPT  AT(23,8)  SIZE
( -2)  BEEP  VALIDATE ( NUMERIC ) :LEADER
 1190 IF LEADER < 0 OR LEADER > 10 THEN  1180
 1200 DISPLAY ,,"WORKING....",,"PLEASE TRY NOT TO INTERRUPT",,,
 1210 OPEN #1:CDRIVE$, INTERNAL , INPUT , VARIABLE 254 ::  OPEN #2:EADRIVE$,
DISPLAY , OUTPUT , VARIABLE 80
 1220 !
 1230 ! LOOP THROUGH companion RECORDS
 1240 !


 1250 LENGTH,LINEN = 0 :: EA_OUT$ =  RPT$( CHR$(32) ,LEADER)
 1260 INPUT #1:C$ :: LENGTH = LENGTH + 1
 1270 !
 1280 FOR C_SEG = 1 TO  LEN(C$)
 1290 INSERT$ =  SEG$(C$,C_SEG,1)  ::  IF LENGTH = 1 AND C_SEG < 7 THEN  1300 ELSE
GOSUB 1360
 1300 NEXT C_SEG
 1310 IF  EOF(1)  THEN  1540 ELSE  1260
 1320 !
 1330 ! SUBROUTINE TO SUBSTITUTE CHARACTERS IF NECESSARY
 1340 ! AND ADD TO EA_OUT$ AND TEST FOR LENGTH
 1350 !
 1360 IF  ASC(INSERT$)  > 32 AND  ASC(INSERT$)  < 127 THEN  1410
 1370 IF  POS(COMPSUB$,INSERT$,1)  THEN INSERT$ =  SEG$(EASUB$,
POS(COMPSUB$,INSERT$,1) ,1)  ::  GOTO 1410
 1380 IF CCAR AND TILDE THEN INSERT$ =  CHR$(126)  ELSE  IF CCAR THEN INSERT$ =
CHR$(32)  ELSE  RETURN
 1390 GOTO 1410
 1400 IF INSERT$ =  CHR$(32)  THEN  1410 ELSE  IF CCAR = 0 THEN  GOSUB 1450 ::
RETURN  ELSE EA_OUT$ = EA_OUT$ & INSERT$ ::  GOSUB 1450 ::  RETURN
 1410 EA_OUT$ = EA_OUT$ & INSERT$
 1411 IF  LEN(EA_OUT$)  > MAXLEN OR INSERT$ =  CHR$(10)  OR INSERT$ =  CHR$(12)
OR INSERT$ =  CHR$(13)  THEN  GOSUB 1450 ::  RETURN  ELSE  RETURN
 1420 !
 1430 ! WORD WRAP
 1440 !
 1450 LINEN = LINEN + 1 ::  IF INSERT$ =  CHR$(32)  OR INSERT$ =  CHR$(10)  OR
INSERT$ =  CHR$(13)  OR INSERT$ =  CHR$(12)  THEN P_EA_OUT$ = EA_OUT$ :: N_EA_OUT$
= " ::  GOTO 1500
 1460 FOR II =  LEN(EA_OUT$)  -1 TO 1 STEP  -1
```

```
 1470 IF  SEG$(EA_OUT$,II,1)  =  CHR$(32)  THEN P_EA_OUT$ =  SEG$(EA_OUT$,1,II)
:: N_EA_OUT$ =  SEG$(EA_OUT$,II + 1, LEN(EA_OUT$)  -II) ::  GOTO 1500
 1480 NEXT II
 1490 P_EA_OUT$ = EA_OUT$ :: N_EA_OUT$ = "
 1500 PRINT #2:P_EA_OUT$ ::  DISPLAY ,,"LINE #";LINEN,,P_EA_OUT$ :: EA_OUT$ =
N_EA_OUT$ &  RPT$( CHR$(32) ,LEADER)  ::  RETURN
 1510 !
 1520 ! EXIT SEQUENCE
 1530 !
 1540 PRINT #2:EA_OUT$ ::  DISPLAY ,,"LINE #";LINEN + 1,,EA_OUT$ :: EA_OUT$ = " ::
CLOSE #1 ::  CLOSE #2
 1550 DISPLAY ,,"DO ANOTHER FILE? (Y/N):"
 1560 ACCEPT  AT(23,24)  BEEP  VALIDATE ("YN")  SIZE (1) :AN$
 1570 IF AN$ = "Y" THEN   310
 1580 CALL PEEK(2,A,B)  ::  CALL LOAD( -31804,A,B)
 1590 !
 1600 ! ERROR TRAP
 1610 !
 1620 DISPLAY ,,,,"DISK ACCESS ERROR!","CHECK DRIVES AND
FILENAMES:",,,EADRIVE$,,CDRIVE$
 1630 FOR D = 1 TO 2000 ::  NEXT D
 1640 RUN
 2000 DATA 128,32,130,13,136,12,130,10,131,13,137,94,132,13,129,13
```

PC to TI picture converter – By Tursi

I've finished off and released a little project I've been toying with on and off for a few years, cause with all the activity lately I thought some people might be interested. It's a program that converts to 9918A bitmap mode, taking in standard BMP, JPG, GIF, PNG, PCX or TIFF. This program handles resizing, color remapping, and dithering, and lets you save the result in TI Artist+ format with TIFILES headers attached, ready for transfer.

In my testing, the files load fine in TI Artist under Classic99. TIDIR can read the color or pattern file separately, but I found that it does not load the color file if the pattern file is not in V9T9 format (you can convert using V9T9's 'XMDM2TI' or other tool, but I didn't mess with it too far). I haven't had time to transfer to a real TI yet but I've every confidence that should be fine.

The place to get this windows utility is:
http://www.harmlesslion.com/cgi-bin/showprog.cgi?search=convert9918

Here are the screen shots
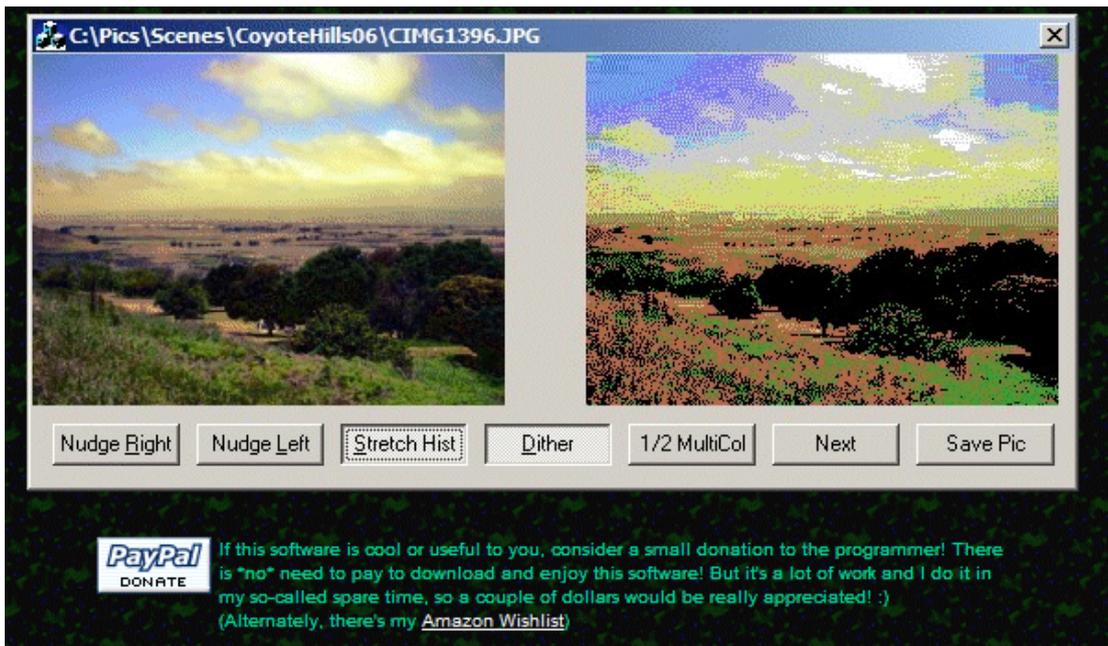
Donations for this program would be gratefully received by the author.

INVERSE VIDEO AND TI-FORTH

I had always thought of inverse video as something other computers could do and my TI-99/4A could not. When I obtained TI's MICROSOFT MULTIPLAN and saw that program's use of inverse video I realized the obvious: while TI's built in video firmware cannot provide an inverse image, software can be written to do the trick. TI-FORTH makes the trick easy.

One approach to writing an inverse video routine makes use of an internal memory map which leaves all 256 ASCII characters available for definition and display. This is the approach taken by MULTIPLAN, and there is plenty of room in that configuration to define a whole alternate set of inverted characters between characters 128 and 256. Since the VDP processor thinks of the screen image as a long array of single byte values, it is an easy trick to just find the values which define the section of the screen you want to invert, and then add the 128 offset to each byte to obtain the inverted characters.

Unfortunately there are several drawbacks to that approach. First you have to store the 95 inverted character definitions in your TI-FORTH routine, and that'a a lot of wasted space. Second, you have very few characters available for graphics, if you want them. Finally, it is extremely inelegant.

A relatively compact and much more elegant solution can be written in TI-FORTH, however, and I have found it so valuable that I have added it to my personalized 'BSAVEd' kernal, so I can have it available for all my applications as I write them.

Here's an outline of the task:
Define screen segment to be inverted by position and length.
Read the defined segment of the screen image byte array into a character buffer.
Read the 8-byte character definitions of each character to be inverted into a pattern buffer.
Invert the pattern buffer.
Write the inverted patterns consecutively into VDP memory to redefine a predetermined set of unused ASCII characters.
Write an appropriate sized section of redefined characters into the screen image array at the correct location.
By use of variables to hold the screen location and the segment length, and use of a character buffer to hold the original screen segment, reversal of the inversion is simple: re-write the character buffer to the saved screen location.

The pseudo-code program presented above is easlily implemted in TI-FORTH. The version presented here is actually a direct conversion from TMS 9900 Assembly Language. The set of "system synonyms" provided in TI-FORTH makes it possible to translate many machine language tasks without use of the separate (and somewhat cumbersome) **ASSEMBLY** and **CODE** vocabularies. All kinds of VDP memory manipulation are possible, and since this program is almost entirely VDP manipulation, all you need to do is make sure the **-SYNONYMS** screen is loaded before you load the screens listed here.

The program listing is largely self-documenting and straightforward. Enter a row number, a column number and a segment length on the stack and the word **INVERT**, and you get inverse video. **REVERT** restores the original characters. **INVERTS** uses the same primitives to flash your inversion, and requires the addition of the number of flashes on the stack. Use of the User Variable **SCRN_WIDTH** to convert row and column to screen location means the procedure will work in **GRAPHICS** or **TEXT** modes. It will not work in bit-mapped or multi-color modes, obviously.

Notice that extremely deep stack manipulations are avoided by the simple expedient of using the **LOC** and **LEN** variables, and the word **VARS** to set those variables once from the initial stack. The information could be passed in the stack, but that would make for a much less elegant solution, and a listing a lot less easy to read. The definitions as presented provide no error checking, and allow for a

maximum segment of 40 characters. Enter inappropriate values on the stack at your own risk! The original machine language version was meant to link with TI's Extended BASIC and could only use characters 128 through 143. The longer segment lengths in TI-FORTH are achieved at the cost of increased memory size for the buffers. One could easily modify the buffers and maximum segment length to conserve memory.

Richard Minutillo
74 Hawthorne Street
Roslindale MA 02131
May 20, 1985

Happy new year from all at TI-99/4A User Group U.K.