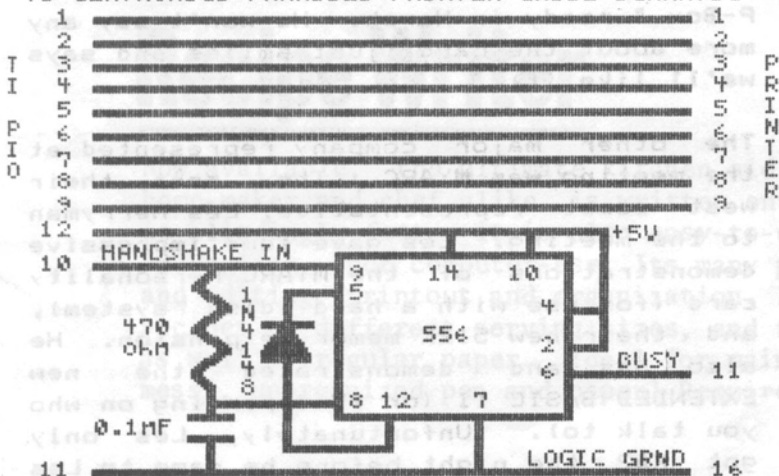


BOX 210 MOUNTAIN STREET  
HALIBURTON, ONTARIO K0M 1S0  
CANADA

## R-D COMPUTING NEWSLETTER

Have you seen TI Artist by Incebot? If not, you're missing one of the greatest products ever designed for the TI 99/4A. This program is truly stunning. The next illustration was done using TI Artist. We received this as a demo... and bought it! Not wanting to heap 100 much praise on this program,... is hard - it goes the distance. A full review will come next issue. It's worth its weight in diamonds!

### TI-CENTRONICS PARALLEL PRINTER CABLE SCHEMATIC



Even though Lou Philips went on public record saying "We've come through on our other products, and we'll come through on this one" (their 256k Computer) ...it is a case of "Real Soon Now". You must remember that the 'climate' for a new computer is very poor among dealers, distributors and venture capital firms. The massive market predictions just never materialized and the megabucks required to field a new machine are daunting.

Same is true of the 128k Extended Basic operating system product discussed extensively at the Chicago TI Faire. Don't get me wrong, I KNOW the market does indeed exist. I support MYARC in all aspects of their efforts. It IS difficult to handle all the areas needed AND do the work AND sell products.

Bob Sherburne and John Martin agreed to cover the events there for us -

by John Martin  
THE LAS VEGAS WINTER CES SHOW

The 14th annual Winter Consumer Electronics Show was held in Las Vegas on Jan 9-12, 1986. For home computer enthusiasts, the Show has lost most of it's glamor. No longer is the East Hall of the Convention Center filled with booths full of new and exciting computer related items. Gone are the days of wandering around in awe at all of the new and marvelous hardware offerings. No more booths with nothing but the latest in video games, word processors, and spread sheets. No more beautiful girls demonstrating some manufacturers newest entry into the home computer field. Instead, we find that the home computer has been shuffled off to one back corner of the giant hall, their previous places of glory taken up by Compact Disk players, 8MM Camcorders, and Stereo Television Sets.

As a matter of fact, I was only able to find one major home computer manufacturer present and actively showing it's new products. Atari was demonstrating some new software offerings and their new 520 ST, comparing it to the Commodore Amiga and Apple MacIntosh.

There were a sprinkling of independant software and hardware manufacturers demonstrating products for a number of different computers, and of course, TI was there with their calculators and talking toys, but I had the impression that the CES had had it's fling with the home computer industry and had all but cast them aside. Very dissapointing.

In conjunction with the CES (and taking advantage of the fact that many people like to use the CES as an excuse to see Las Vegas) the Southern Nevada User Group

(SNUG) held a special meeting on Jan. 11th at which we hosted Craig Miller and Tom Freeman from Miller's Graphics, Les Merryman from MYARC, and Terrie Masters and George Stephan from the LA 99ers. Among the guests in attendance were Roy Hunter of Hunter Electronics in Chicago and Cheryl (REGENA) Whitelaw from COMPUTE! magazine.

Craig and Tom were introducing a new disk-to-disk disassembler called DISKASSEMBLER which will be marketed by Miller's Graphics. This program will disassemble object code from one disk and write the Source code back to another disk without having to have the object file loaded into memory. The source code can then be modified as desired and reassembled into runnable code. Unfortunately, I am not an Assembly Language Programmer, so I can't elaborate in great detail about this program, but from what I saw, even a novice like me should be able to get good results from it. Based on the demonstration given by Craig Miller, I will be ordering one for myself.

Also demonstrated at the meeting was Miller's new Gram Kracker module. This is potentially one of the most useful utilities ever made available to the TI user. This module will allow you to actually customize your module based programs. It will be possible to store your own BASIC programs in the GRAM KRACKER and have them as an option on the main title screen. Loading the Editor or Assembler from GRAM KRACKER is instantaneous, thus eliminating those annoying delays while waiting for them to load from disk (works for Editor and Formatter in TI-WRITER too!). You could even bypass the console ROM entirely and come up in some other operating environment. Possibilities are so great that there is already a special segment of Compuserve (called KRACKER HACKERS) dedicated to the GRAM KRACKER.

As if that weren't enough, Craig also introduced a new book, written by Ron Albright, a sysop on Compuserve, called THE ORPHAN CHRONICLES. This book is a comprehensive history of the TI99/4A and the people who made it what it is today. It covers the introduction of the 99/4 and the 99/4A, the great computer price wars of 1983, the pullout, the great disappearing act by magazines and dealers, the user's groups (real and

commercial), telecommunications, FREEWARE, and insights into many of the people who have become well known to most TI users. At the back of the book is a list of all known user's groups, publications that still cover our "orphan", a list of distributors and dealers, an annotated Bibliography of books relating to the TI 99/4A, lists of software and hardware manufacturers, fairware authors, and TI produced software (modules, cassettes, and disks). All in all, very much worth the \$9.95. The products from Miller's Graphics are available as follows:  
ORPHAN CHRONICLES.....immediatly  
DISKASSEMBLER.....end of Feb.  
GRAM KRACKER.....immediatly with preliminary manual. final manual end of Feb.

Craig also promises to have the GPL ASSEMBLER and DISSASSEMBLER for use with the GRAM KRACKER and "A new card for the P-Box" ready in March. He won't say any more about the card (just smiles and says we'll like it).

The other major company represented at the meeting was MYARC. They sent their west coast representative, Les Merryman to the meeting. Les gave some impressive demonstrations of the MYARC Personality card (for use with a hard disk system), and their new 512K memory expansion. He also had and demonstrated the new EXTENDED BASIC II (or IV depending on who you talk to). Unfortunately, Les only got XB2 the night before he came to Las Vegas, so he didn't have time to get real familiar with the software demo that came with it. What we did see looked very interesting, however, with such things as BIT MAP and TEXT modes, line, circle and fill, commands being directly available from BASIC. This version of EXTENDED BASIC is also said to be as much as 3 times as fast as TI extended basic. Les says that the XB2 will only work with the MYARC memory expansion cards. According to sources at MYARC, the XB2 should be shipping in quantity by the time you read this. This is supposed to be the same BASIC that will come in the new computer (still no official name). The new computer was not at the CES here in Vegas, and Les was not interested in talking about it at any great length, but the word now is that we can expect to see it at the 99'FEST-WEST'86 in L.A. on March 1 and 2.



NEW PUBLICATION

# CRACKING THE 99/4A

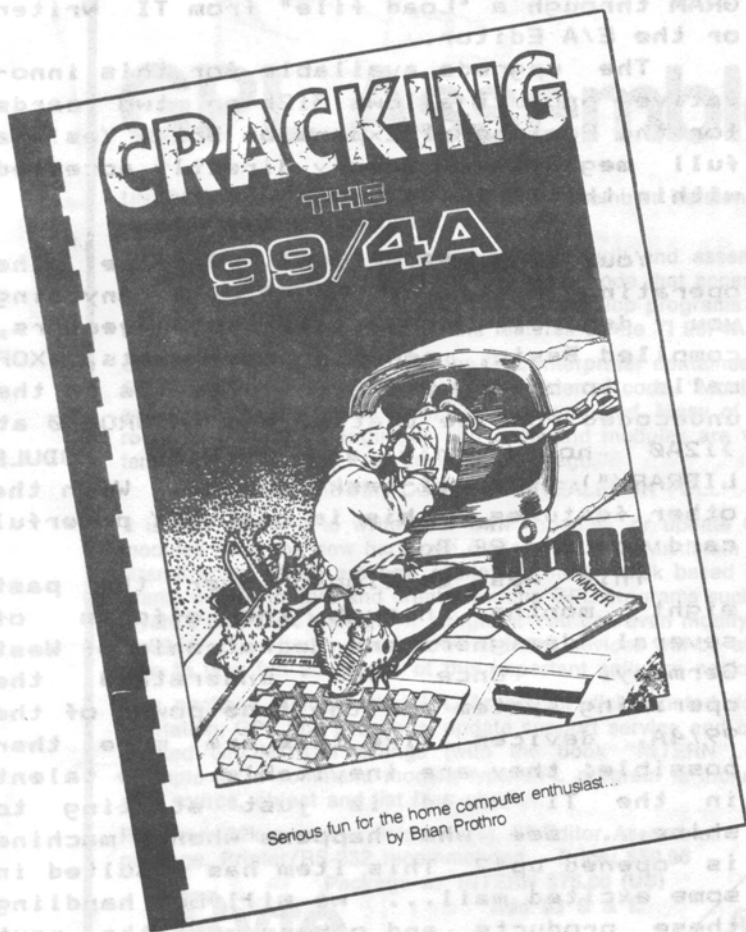
They said the 99/4A was a white elephant, they said it was expensive, they even said it was ugly! But it's still here, and all of us 99ers got the last laugh. So to put one laugh on top of another, from deep in the heart of Texas comes a new book. CRACKING THE 99/4A, written by Brian Prothro and illustrated by Wiley Akins.

CRACKING THE 99/4A is an intermediate level book. There are games and tips (as usual) and for many programs, the code is explained in detail. There are two tutorials. One is a very thorough lesson on Basic that covers structured programming, and linked lists (The sortless sort.) The second tutorial leads you through the powerful use of logical operators—from scratch.

Would you like to use speech in your programs, but it's so much trouble you say "why bother!" This book includes two utilities that allow you to edit allophone strings and/or test speech slope parameters. (Tone of voice.) You'll find some graphics here and a few tips there. And for you dyed in the wool hackers, there are file I/O routines in assembly with additional code that lets you inspect a merged file.

All in all this is a uniquely different book. It is easy going and has tried to hit the middle of the road for all users. A full diskette is available which contains most of the major programs in the book. This should save you a lot of trouble, some of these programs are long.

You're interested—Right! So drop an order in the mail, and if not an order, send us a letter. Any questions can be directed through the address below.



COVER PRICE

BOOK .....	\$12.95
DISKETTE .....	\$ 6.95
BOOK & DISKETTE ..	\$16.95



No C.O.D.'s

Add \$1 shipping per book. Maximum \$3 dollars.

## CRACKING THE 99/4A

MIDNIGHT EXPRESS PUBLISHERS

DEPT. UGL

P.O. BOX 26941

AUSTIN, TEXAS 78755

To set the record straight: WHEN YOU RECEIVE AN ISSUE, THE COVER DATE IS FOR THE PREVIOUS MONTH. In other words, this issue January - is printed at the END of January and mailed then. If you prefer to see a cover date for the month in which you receive the issue; we could do this. Feedback is appreciated!

## 9995

Letters have been written to the chaps with the 9995 computer on-a-card to see if they will produce an upgrade machine for us 99/4A users. I expect a visit to the shop is next order of business. With all the talent in the TI community, there is NO reason that a new machine cannot be done. The industry is not yet sewn up tight - regardless of the opinions from IBM watchers, analysts and industry pundits. Recall that these are the same people that told us the microcomputer industry would grow at 100% per year "for the foreseeable future". The math was not there to support THAT hyperbole either.

How much support is there for a powerful new computer? Research indicates there are a lot of owners 'just awaitin'. Sales of many aftermarket products have expanded. New hardware and powerhouse software continues to be introduced. The opinion here is that better products are coming out now that when TI had their deathgrip on the Home Computer.

Manfred Wilhelm of Mechatronic from West Germany called us here with new products to talk about! Quite the event to witness highly inovative products. We had a great time discussing their work and how we can help them interface with the North American market. Products like these really deserve to be noticed in light of the TI 99/4A universe!

Following is a review of two new items of great importance for TI owners:

## MEGABYTE

Want to add a megabyte of memory to your TI 99/4A? How about running true GPL programs up to 256k in length? Does the concept of multi-tasking power programs make it "real"? Or adding 13k to your Basic programs? Hold on! It's here NOW.

We have more info on the new RAM/GRAM

card noted in issue 1.5 - that little goodie with all the chips packed onto the PEB card. THIS is the power we've been waiting for... the ability to do all of the above AND MORE.

(I can't help it... my background led me to the 99/4A when it was introduced due to the facts - 16 bit processor, design considerations, data on power systems that were based on the 9900, graphics, speech, etc.) Vindication!

The basic configuration for this card starts at 128k - 64k of RAM and 64k of GRAM memory. The operating software is on the card EPROM with a GPL loader and HEX Monitor to change the CPU RAM, VDP RAM and GRAM memory contents directly from the keyboard. The details covered in V 1.5 are all included: Save & load GROM/RAM/ROM memory, Load tagged GPL and Assembler code into RAM, Load GROM 0-2 and Load RAM/GRAM through a "Load file" from TI Writer or the E/A Editor.

The upgrade available for this innovative product allows 512k on two cards for the Peripheral Expansion Box - Yes! a full megabyte of memory directly accessed within the TI 99/4A environment.

You can effectively replace the operating system of the 4A with anything you desire: new interrupt vectors, compiled Basic, new character sets, XOP calls to other system features (as in the undecoded routine that exists in GROM 0 at >12A0 noted only as "REVIEW MODULE LIBRARY") or multi-tasking code. With the other features, this is one VERY powerful card for the PE Box.

This was developed over the past eight months through the efforts of several designers and Mechatronic of West Germany. Once you understand the operating system and the true power of the 99/4A, devices like this are more than possible: they are inevitable. The talent in the TI world is just starting to shine... see what happens when a machine is "opened up"? This item has resulted in some excited mail... we will be handling these products and others over the next several months.

To be perfectly honest, this one is too new to provide an in-depth report. Next issue will have more information, a sample program and pricing details.

## MOUSE

The next new product is a 99 Mouse - the input device made famous at PARC and used on the Apple Macintosh computer (et



# TI-ARTIST

VERSION 2.0

A drawing program from Inscebot, Inc.

## OUTSTANDING FEATURES

Freehand drawing  
Lines, Rays, & Connected lines  
Circles, Discs, Frames, & Boxes  
Smart fill with patterns  
Different brush styles  
Color cursor & Zoom mode  
Move & Copy portions of pictures  
(with horizontal & vertical flipping)  
Character fonts with auto-centering  
Slides (clipboard) features  
(includes a 90 degree rotation feature)  
Instances may be used to interface  
your pictures with other programs  
or other pictures.

Screen dumps to several  
printers:  
Okidata 92 or 93  
IBM  
Epson, & compatibles  
Axiom GP-100  
C-Itoh Prowriter  
Printouts are auto-centered

Plus: You may even write  
your own DSR's to control  
custom input devices.  
(i.e. Mouse, Touch tablet,  
Digitizers...)

\*-ALSO AVAILABLE\*-

## ARTIST EXTRAS

a set of fonts, slides, & pictures

## PRICING

TI-ARTIST V2.0 ..... 19.95  
ARTIST EXTRAS ..... 6.45

Please add \$1.50 for Shipping/Handling  
MD res. add 5% sales tax

**INSCEBOT\***

P.O. BOX 260  
ARNOLD, MD 21012

Minimum system configuration: Disk  
system, 32k memory --- and any one of  
these: EDITOR/ASSEMBLER, MINI MEMORY,  
EXTENDED BASIC, TI-WRITER, CORCOMP  
MANAGER, OR MYARC DISK CONTROLLER

al). The device allows cursor control from your desktop to "point" to screen display areas which activate routines in the computer. The package includes the mouse device and software to operate it. Demo programs are included which demonstrate how this works with user written programs.

We found the device worked flawlessly (as in Mercedes level engineering!) and was a real treat. The only criticism is that existing software packages such as TI Writer cannot use the device. If you've seen a Macintosh or Amiga, you know how nice the point and click mouse effect is. To interface this with the more popular application programs will take some doing. Then again, programmers should provide the interfaces necessary in the near future... The GPL Assembler package and the ability to download modules allows these programs to be altered to accomodate new features such as mouse control. More, of course, in the near future on these developments.

## PE BOX 2

Pat Saturn of MicroStuph in Ohio has contacted us with some great information: First they do a console upgrade with 32k, RS-232 and DS/DD diskcontroller INSIDE the TI 99/4A console. Nice! He hasn't sent us a picture - there's not much to see without lifting the 'hood'. He has been able to get a fully expanded machine inside the existing case AND interface the small 3 1/2" drives to the 4A. You can add up to 4 DS/DD Teac drives to a modified console. Pack up the whole affair in a small case and haul it around (to users group meetings) without the PE Box. Good work! The price for this upgrade console is \$602 all features included. He has several projects on the go - some of which are really hot!

Most important is a new expansion box for the 4A. Work is in progress to develop a unit with five slots, power supply, space for two slim line drives, interface card and a smaller ROUND CABLE without the "aircraft carrier" off the side of the console. The unit should be a logical, less expensive alternative to searching for a Peripheral Expansion Box. Looks as if some of the expansion cards will be going to multi-function soon as well. Indications that the stand-alone 128k memory unit with the PIO port will be done for the expansion box. Frees up one

slot for those who want a parallel printer for their system but do not need the RS-232 features. Pat tells us that GE has a new shielded cable for this project and that this expansion unit will be usefull right out of the box!

We'll keep you posted.

Pat Saturn can be reached at MICROSTUPH, 1456 Grandview Ave., Columbus, OH 43212 (614) 486-7262

## KEYPAD

Chris Bobbitt from ASGARD Software notes that they sell a true numeric keypad with a 2' ribbon cable for the 99/4A. The price is \$55.00 (install yourself - it is quite easy) or for \$65.00 installed including return postage. The do-it-yourself version has a sheet of instructions for installation. Asgard has also sent a copy of their new T.O.D. Editor. Review to follow for all you Tunnels of Doom fanatics:

We hear that a few new games are in the works to be offered under the "free" ware distribution concept.

## GRONOS

Whatever happened to Bill Gronos? The expert who wrote for the International 99 Users Group? People from all over write us and note that they miss his articles and/or that very few technical pieces appear since...

An interesting letter from Spain arrived from yours truly. Exemplary attitude and humour! Better yet, hints of things to come... Mr. Gronos has more technical tips and expertise to share.

We are actively persuing having one Mr. Bill Gronos write for R/D Computing on a regular basis ON ANY SUBJECT HE WISHES. Apparently the IUG attitude was that most people weren't interested in advanced applications or upgrades. "Cranial orgasms" was the term used regarding more sophisticated articles - just before the concept was canned... as if users only want games and limited applications! With luck, next issue might see a new first article by Bill.

The other interesting comment (among many) was that many people will stick with their 99/4A's rather than shell out for a new (Amiga/ST/IBM etc.) computer system. the "TI being capable of any task, once you leave Basic behind".

Enough said!



# NEW HORIZONS COMPUTER USERS GROUP

## RAM DISK PROJECT DEVELOPMENT TEAM

JOHN CLULOW 419-874-8838

RON GRIES 419-874-1414

DAVID ROMER 419-666-6911

### -- HORIZON RAMDISK Fact Sheet --

- 104K Ramdisk card for the 99/4a PE-Box, expandable to 192K (720 sectors).
- Uses low-power CMOS static RAM chips.
- Functions EXACTLY like a TI floppy drive but at Random Access Memory speed.
- Compatible with any software or language that uses a standard TI DSRLNK, including disk utilities, sector copy programs, and programs like DM-1000, DISK MANAGER II, and Millers Graphics EXPLORER program. Compatible languages include TI-BASIC, EXTENDED BASIC, TI-FORTH, TI-LOGO and ASSEMBLY LANGUAGE.
- The only BATTERY-BACKED Ramdisk for the 99/4a, carry it from computer to computer like a floppy diskette. Ni-cad batteries charge while the computer is running.
- Features CALL statements from TI-BASIC to 1) set the Ramdisk drive #. 2) set the maximum number of sectors. 3) set the write protection. 4) turn on CRU for direct DSR access. 5) execute machine code from BASIC.
- DIP switch setting allows CRU addressing from >1000 to >1700.
- Comes with complete DSR source code, including a separate manual that details all DSR routines.
- Documentation explains how users may add their own assembly language CALL routines to enhance BASIC.
- Comes with development software, including a loader for any E/A opt. 3 object files to allow users to modify the DSR as desired.
- Schematic Diagram included.
- Available in three packages. 1) as a ready-to-run card (888D or D88D) with 90 day warranty on parts and labor. 2) as a bare printed circuit board with parts list and instructions (no warranty). 3) as a schematic diagram with parts list. All of the packages include the operating system with full source code, documentation and development software.
- If sold through a traditional concept with wholesale and retail mark-ups the price would be \$340+.

---

For price and ordering information, write to:

DAVID R. ROMER  
BOX 554  
WALBRIDGE, OH 43465

Edgar Dohmann of Freeware and JSC Users Group fame called. He has done a tech modification to the 4A which strikes me as having some great potential. His start with the TI came through work on TI's 990 minicomputers and writing assembly code for the 4A before owning the equipment required!

The JSC UG newsletter had an extensive article about Superbug II and other projects. One of these was using the LOAD interrupt to branch to >FFFC and >FFFE at will.

In the TI operating system, the first two words control the interrupt vector and point to the last two words of high memory. With proper code located at these addresses, you can go anywhere in the system to start executing new code. Being able to CONTROL where the vector points would be even better - the powers you could then command would be amazing...

Edgar built a 24k ROM expansion to provide the addresses needed in high memory. (The other 8k is 'low' memory at >2000 - >3FFF) Using EPROMs for software control, the trick is to branch to the proper locations using the LOAD generator switch. [See issue V 1.2]

It seems possible here to turn control over to a different operating system ROM which could lead back to the 99/4A o/s at appropriate times. Edgar has agreed to share the details of this project and a copy of his Superbug II for the freeware library.

From the TINS newsletter:

Two new devices for the TI 99/4A which add some other worthwhile features:

## GPE

GPE kit from:  
60 Time Products Joe Schulte  
2905 Florida Avenue  
Baltimore, MD 21227  
Price \$50.00

First a review by Mack McCormick on a GROM port emulator (GPE) which allows assembly code in low memory >2000 - >3FFF to run as if located at >6000 "Module" or "GROM" port. It also works to download modules to disk with the exception that only EPROM modules will provide runnable disk files. TI cartridges with GROMs (most of them), of course, won't work with this GPE unit.

Included in the package (very easy to install according to reviewer) are two

software packages EPROM-IT and RUNMOD from Chris Faherty. These allow download and file modifications to load into memory expansion. Bill McAdams is the originator of the hardware modification - which fits into the speech synthesizer.

The review goes on to say that everything worked flawlessly and was "one of the best third party products I have seen". High marks all the way around! Contact 60 Time at the address above.

## CC

Command Centre plans from:

Dwayne Meisner  
Site 3, Box 7, RR #1  
Windsor Jct., N.S.  
B0N 2V0

Price: \$10.00 plans. Write for prices on fully assembled & tested units.

The 'Command Centre' is a module selector which allows four (or more!) cartridges to be selected with one switch. The unit is placed AWAY from the keyboard. A flat ribbon cable is connected to a modified 'module' in the port. No mass of cartridges jutting up from the GROM port deck; you can locate your Command Centre in any convenient location.

The developer notes that no reset button is needed with the single switch selection. A digital LED display informs you which module has been selected. There is no limit to the number of module ports you could build into the Command Centre.

Editor notes: [Sounds like a worthy project to tackle. When a recent test configuration of MAXIMEM, a protoboard for memory chips and a new GPL MEMORY MODULE were foresting my Widget, things were definitely out of control. Will report on the package just as soon as it comes in the door.]

## GPL MEMORY

ANNOUNCING: the new GPL MEMORY MODULE. This module is capable of storing, loading and running true GPL code direct from memory. Basic unit comes with 8k of ROM memory and 8k of CMOS RAM memory. You can load tagged object code into RAM at address >6000 - >7FFF to run as application programs. Your module will work directly with console GPL routines and the GPL interpreter.

This device performs exactly like GROM memory through the operating system. You can use the GPL Assembler to write RAM



# INTERN<sup>o</sup> TI99/4A ROM and GROM Listings w/ Commentary by H. Martin plus GPL Directions

**THIS BOOK IS THE KEY!** INTERN ("Inside") the TI 99/4A reveals the hidden secrets of the 4A. Essential for owners, enthusiasts, programmers, developers or anyone who wants in-depth understanding of how the TI 99/4A works.

Over 200 pages of complete disassembled internal code found in the 4A console. ROM and GROM listings are fully commented with GPL directions explains how the entire operating system functions — including the GPL interpreter. Hidden tricks and tips are discussed along with the commands, format, opcodes and uses of Graphics Programming Language used in the computer.

Starting with the console ROM: address >0000 to >1FFF, this book gives you a detailed look at every secret. Interrupt routines, power-up functions, system Monitor, cassette routines, Basic and Extended Basic interaction and various utility routines. GROM 0, 1 and 2 are also listed and commented in detailed descriptions.

If you've ever wondered why your TI 99/4A acts as it does, what the tricks and hidden features are, where the "blank" spaces exist, why Texas Instruments kept all this information a secret: well, this is your chance!

**Order now! Only \$17.95 (US) Cheque, Money Order or COD. Add \$1.00 via Ground \$3.00 via Air \$5.00 shipping overseas.**

## GPL Assembler v2.1

**UNLOCK ALL THE SECRETS!** New GPL Assembler Version 2.1 available exclusively through RYTE Data.

This program provides the power to write, edit and assemble true GPL programs for the TI 99/4A. Create code that accesses console operating system routines directly. Develop programs that use the GPL Interpreter and all the features of the TI 99/4A.

One of TI's major secrets was the GPL interpreter contained on GROM chips in the 99/4A console. This internal code, "Monitor" and the operating system, was never documented. Many of TI's routines, programs, languages and command modules are written in this "Graphics Programming Language."

**NOW THIS 'HIDDEN CODE' IS REVEALED IN FULL!**

It is now possible to write your own 'modules' or update GPL modules (with the new hardware devices such as Maximem and GramKracker which are now available), modify disk based programs written in GPL and create working GPL programs such as Myarc's new Disk Manager III program. You can even modify the TI 99/4A operating system! New hardware devices will be available to take full advantage of this important software package.

This package includes the GPL Assembler disk, printed documentation, GPL tips and hints, update support service and commented GROM/ROM listings (with the book "INTERN"). An example for a command module type GPL program is included with source, object and list files on disk.

**Requires:** 32k memory, disk drive(s), TI Editor Assembler package. Printer/RS-232 recommended. **Price: \$59.95**  
**Package w/ INTERN \$75.00 (US)**  
**Add \$3 S & I.**

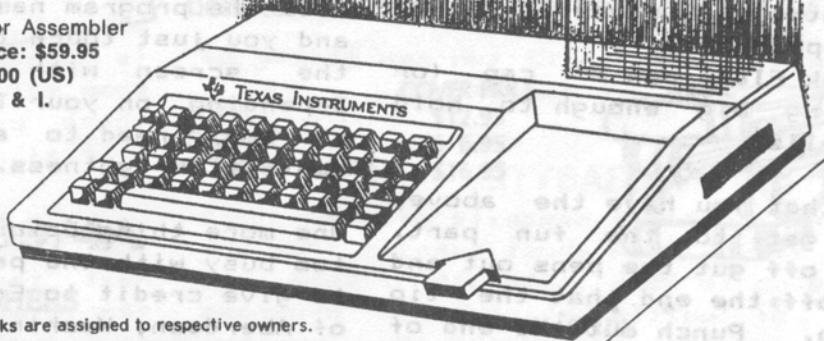
**Ryte  
Data.....**

210 MOUNTAIN STREET,  
HALIBURTON, ONTARIO K0M 1S0

(705) 457-2774

All trademarks are assigned to respective owners.

# INSIDE the TI Operating System



based programs that work just like any GROM cartridge in the port. Primary use is to make an inexpensive GPL device available for the GPL Assembler package.

Additional capabilities include loading TMS 9900 assembly code and optional battery backup for the 8k memory.

Enhanced GPL MEMORY MODULES will be made available with up to 16k of ROM memory and 40k of RAM memory. This provides 56k of memory to console and expanded systems. A cassette loader will be available to improve tape based systems and provide these features for all TI 99/4A owners.

Price subject to future announcement. Availability mid-1986.

Working prototypes have been installed and a production run is being set up for our beta test folks. Feedback will be forthcoming.

## LIGHT PEN

Promised the TI 99/4A Light pen last issue: Comes from Garry Noel and Edwin McFall published in St. Louis 99'ers

At one time I felt that a light pen for the 4A was 1) not possible on the TI and 2) even if it was possible, it would be overpriced. Well I was wrong on both counts. Thru the help of a local 'hacker', we now have a working light pen. This pen is very simple both in parts and construction.

### CONSTRUCTION

First off you will need the following:

- 1 Nine pin D-plug (joystick)
- 2 lengths of 2 conductor wire
- 2 CDS photocells
- 2 junk Flair pen w/ cap (or anything big enough to hold CDS cells)

Now that you have the above, lets get to the fun part. First off gut the pens out and cut off the end that the tip was in. Punch out the end of the cap. Feed the wire through the bottom of the pen and out the tip. Solder the two wires to the leads of the

To supporting subscribers we are sending out the DOT program on disk. We will be adding certain freeware and public domain software to the list as time goes on. You will be advised with a DIS/VAR 80 file on each disk as to what is what.

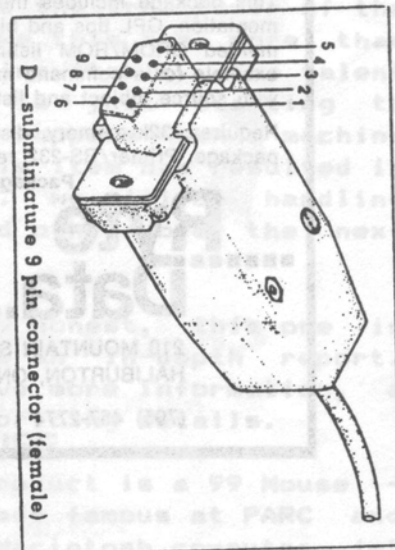
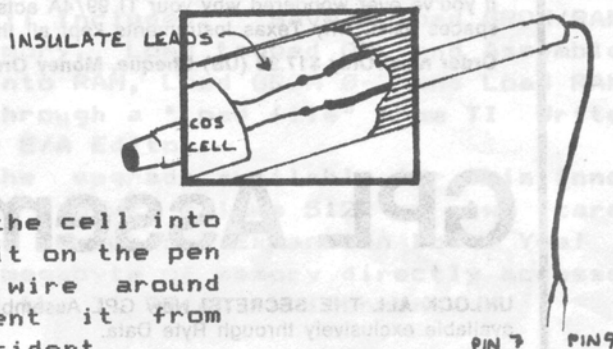
Plans for major expansion continue. THANK YOU for your support! It's true, without you there is no possibility. We are, of course looking for additional subscribers in the US AND WRITERS FOR NEW ARTICLES. Texas Instruments has indeed closed their US mailing list to those who would benefit - and closed one of the few channels the third party has to your mail box! Micropendium published some notes on this two issues ago... Oh well.

CDS cell. Place the cell into the cap and put it on the pen body. Tape the wire around the pen to prevent it from pulling out by accident.

Grab the D-plug and hard wire the leads (pin layout is below) for pen #1 to pin #7 and #9. This corresponds to the RIGHT direction with CALL JOYST. With pen #2 solder it to pins #2 and #5 (LEFT w/ CALL JOYST). You can add up to four more pens using the other moves of the joystick routine. Wrap tape around the plug to protect the wiring.

Now, enter the program included so you can test your new light pens. As you can tell the program name is "DOT" and you just touch the dots on the screen with the pen. Depending on your TV/Monitor, you may need to adjust the contrast/brightness.

One more thing before you get too busy with the pens, I have to give credit to Edwin McFall of Aberdeen, Washington. Thru his work this is possible.





# **NEW!**

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