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THE BIRTH OF A COMPUTER

by Bill Gaskill

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In April 1984 Texas Monthly magazine published an article written by Joseph Nocera entitled "The Death of a Computer". It was among the most comprehensive accounts ever written on the events leading to the demise of the TI-99/4A computer. Perhaps because of this, the article became so popular that only 2,000 copies of the April 1984 issue of Texas Monthly were available for sale a scant month after it hit the news stands.

Mr. Nocera's work was the driving force behind this article because reading it made me realize that more effort has gone into writing about the demise of the TI-99 than has ever been invested in writing about its birth and life. The reasons for such universally poor coverage of the TI-99 are a matter of debate, but my research leads me to believe that TI's policy of a closed architecture on the TI-99 may have been carried over to one of closed mouths when it came to talking about the machine. No matter what the reasons, it appears that a negative and non complimentary relationship between TI and the media cast a cloud over the 99/4 even before it's release.

Nevertheless, there are some choice tidbits lurking around in the printed media of the late '70's and early '80's which help to piece together the days before, during and after the 99/4's birth. Because I have access to so many back issues of Byte, and because it is the oldest computer magazine still in existence, I chose it as the main source of information for this article. The material chosen from the many issues of Byte that I read through is presented in time line format so one can pick up the chronology of events easier. It is the sequence of events like the RF modulator hassle with the FCC and the production problems with the TMS 9900 chip that to some extent explain why Texas Instruments was so late with its entry into the personal computer market.

Lastly, you will notice that I have thrown in a few items not related to the TI-99. Most are what I consider significant developments in the personal computer industry that I thought would add some flavor to the article and perhaps a little perspective for the reader about the world that the TI-99/4 was born into. For other historians of the TI-99 I've also provided notations as to the source/location of the information used in the time line. Although not presented according to Turabian, I think someone might find the references useful. I hope you enjoy the reading.

LIFE BEFORE THE TI-99

1974: Jonathan Titus creates the Mark 8 microcomputer and advertises it for sale as a kit in Radio Electronics magazine. This becomes the first programmable microcomputer made available to the general public. (YOUR OWN COMPUTER, Waite/Pardee, p.15).

1975: The MITS Altair 8800 microcomputer is introduced and it becomes the first company or corporate venture into microcomputers for sale to the general public. (YOUR OWN COMPUTER, Waite/Pardee, p.17).

1976: Explosive growth hits the industry when companies like Apple, Cromeco, Imsai, Digital and others introduce microcomputers. (YOUR OWN COMPUTER, Waite/Pardee, p.19).

1977: The Radio Shack Division of Tandy Corporation and Commodore Business Machines both join the competition for personal computer dollars with the introduction of the TRS-80 and Pet 2001 respectively. The year 1977 also sees the birth of the computer publications industry when a host of new magazines such as Creative Computing, Kilobaud, Personal Computing, Intelligent Machines Journal (now Infoworld) all appear, trying to break in on some of the profits already being realized by Carl Helmers and Virginia Peschke who had created Byte Magazine back in mid-1975.

Aug 1977: The TRS-80 is released on August 3rd. It comes with 4K Ram and carries a retail price of \$599.95. (Byte, Apr 1978, p.49).

Oct 1977: Commodore enters the market with the Pet 2001. It retails for \$495 with 4K of Ram or \$795 with 8K of Ram. (Byte, Feb 1978, p.190).

Jan 1978: The PLATO computer aided instruction system is developed at the University of Illinois. (Byte, p.184).

Feb 1978: UCSD Pascal is introduced by the Regents of the University of California at San Diego. Price is \$200. (Byte, p.46).

Mar 1978: Texas Instruments begins recruiting personal computer specialists by running full-page ads entitled "Your experience with personal computers is going to open an unlimited career at TI." in trade magazines. (Byte, p.13).

Mar 1978: RAMBLING RUMORS ABOUT TI letter to the editor appears in Byte Magazine with a Q and A. Question: "What will TI do to enter the personal computer market?" Answer: TI is a very aggressive company with the desire to make lots of money by filling the needs of the marketplace. When the

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bonafide need for a new product arises, if it is in TI's area of expertise, TI will be there, front and center..." (Webb Simmons in Byte Magazine, Mar 1978, p.133).

Apr 1970: TI releases a recreational Solid State Software Leisure Library module for the T158 and 59 programmable calculators. The module sells for \$35 and includes such applications as golf handicapping, craps, NIMS, Acey-Ducey and 16 other games or recreational programs. Is this perhaps a predecessor to the Solid State Software Command module that would be touted as a reason for buying the TI-99/4? (Byte, p.194).

May 1978: Texas Instruments introduces the TMS3064 charge coupled device memory chip. (No significance to the TI-99/4, but it shows that TI was still involved in other computer developments besides the 99/4 Home Computer. (Byte, p.180).

Oct 1978: The Exidy Sorcerer is released with 8K of Ram, a 64 column by 30 row screen and the ability to use plug in modules which are the size of 8-track tapes. Price is \$895. (The significance of this computer's release is that four years later Texas Instruments would use it as one of the home computers which offered cartridge software, that the 99/4A competed against for market share). (Byte, p.81).

Oct 1978: Technico Inc. of Columbia, MD releases the SS-16, which is based on TI's TMS9900 chip. Here again, no direct impact upon the 99/4, but evidence that TI was trying to push the 16 bit chip in places other than their own home computer. Four months later Byte would offer a look at the success of 16 bit chips industry wide and tell us that it was not well accepted by the industry. (Byte, p.200).

Dec 1978: Over 14 million microprocessors are manufactured during the year, with TI's 4 bit TMS-1000 chip leading the way. Most are used in calculators and games, but sales in the game market appear to be slowing down. (Byte, July 1979, p.99).

** THINGS ARE REALLY HEATING UP **

Feb 1979: TI'S NEW PERSONAL COMPUTER-Rumors are flying about Texas Instruments' impending entry into the personal computing market. The unit will reportedly use the TMS 9900 processor with 40K of read only memory circuits, will generate 20 lines of 40 characters on a standard television, will have provisions for accomodating video disk players and video tape recorders, and will have sophisticated sound production. Sources predict a mid-1979 unveiling. (Byte, p.63).

Feb 1979: Atari enters the personal computer market by announcing (but not yet delivering) the 400 and 800 model home computers. The 400 is a non-expandable 8K Ram computer which sports a touch audio feedback keyboard, a single cartridge slot and a cassette I/O port. It also has 16 color

capability and 8 luminance levels. The suggested retail price is \$500. The Atari 800 is an 8K Ram computer expandable to 48K Ram and it comes with a cassette recorder, it has additional color features, a full keyboard, 1K BASIC built in, high resolution graphics, and it supports two cartridge ports. The 800 carries a suggested retail price of \$1000. Both machines will use the 6502 chip. Limited quantities are scheduled to be available in August, with full availability in the Fall. (Byte, p.63).

Feb 1979: The future of the 16-bit microprocessor comes into question when its lack of acceptance by the industry is pointed out in Byte. The 8-bit 6502 chip used by Apple, Commodore and others is fast becoming the most popular microprocessor of the day. (Byte, p.63).

Although this is supposition on my part, it appears that TI was under a great deal of pressure to join in the personal computer fray. They would probably have done so anyway, but the level of "expectation" seems to have been extremely high and may have driven them to produce and release a product before they were actually ready to do so. The lack of availability of the TI-99/4 even after it's official debut in January 1980 seems to add some credence to this.

Mar 1979: Despite its seemingly unpopular position in the market, Byte Magazine runs an extensive article on mapping the instruction space of the TMS 9900 microprocessor. (Byte, p.14).

Mar 1979: FCC serves a cease-and-desist order on all personal computer manufacturers who fail to receive FCC approval on their products prior to making it available for sale. (Byte, p.108).

Mar 1979: Tandy Corporation begins marketing their TRS line of personal computers through their own direct sales stores. Several other makers of personal computers withdraw their products from the shelves of department stores after meeting with poor results. (Byte, p.108).

Mar 1979: Texas Instruments announces the new Speak and Spell learning aid for children. It is based on the TMS 1000 chip and two 128K dynamic read only memory chips, each with the capacity to store over 100 seconds of speech. (Byte, p.246).

Apr 1979: Publishing giant McGraw-Hill purchases Byte and onComputing magazines, adding further credence to the escalation of the personal computer market. (Byte, p.14).

Jun 1979: TI AND HP PC SYSTEMS RUMORS-Texas Instruments and Hewlett Packard continue to maintain tight lips on their rumored personal computer systems. As TI said, "TI will not discuss products that have not yet been announced." However, information has leaked out on these units which are expected to have a tremendous impact on the personal computer market.

Several rumors have been reported in previous Byte columns. The latest is that TI will introduce their entry at either the NCC (National Computer Conference) show in June or the Consumer Electronics Show in July. In either event, it is expected to be ready for the 1979 Christmas market.

Both HP and TI are expected to have \$500 list prices for the basic unit. Key retailers have already been approached by both TI and HP to set up for selective distribution. It is rumored that they will favor selected personal computing stores that can do justice to software requirements. (Byte, p.129).

Jul 1979: Milton Bradley begins advertising for "Creative Electronic Engineers, Microcomputer Programmers and Technicians" to accommodate their expansion into the personal computer arena. (Byte, p.51).

Jul 1979: FCC asks Apple, Atari, Commodore, Heath, Southwest Technical Products and Radio Shack to submit their personal computer systems for TV interference testing. (Byte, p.99).

Sep 1979: New England Electronics runs a full page ad in Byte Magazine proudly announcing the "Revolutionary TI-99/4 Personal/Educational Computer" and the fact that they have been selected as one of the distributors. Buyers are cautioned that 99/4 product availability is September/October, but is always subject to TI's dealer allocation.

Oct 1979: Rodney Zaks, the author who would give us the book, YOUR FIRST TI-99/4A PROGRAM in 1983, releases 6502 GAMES through Sybex Publishing. Zaks would ultimately write almost a dozen computer books for Z80, 6502 and TMS 9900 machines. (Byte, p.73).

Oct 1979: Atari has received FCC approval for their model 400 and 800 personal computers. This will probably make the FCC less willing to grant the Texas Instruments request for changes in the rules, as the FCC finds that other companies are able to pass the current requirements. (Byte, p.107).

Oct 1979: PERSONAL COMPUTER TIMESHARE NETWORK INAUGURATED-Telecomputing Corporation of America, McLean, VA, has started a Personal Computer Network which may be accessed by home users with terminals or personal computer systems. They have about 2000 programs and data bases on-line for immediate access. Called "The Source", the service will be available in 200 US cities at \$2.75 per hour from 6 PM to 7 AM weekends and holidays. The rate during normal working hours will be higher. (Byte, p.107).

Oct 1979: Texas Instruments releases the TMS 9927 video controller chip. (Byte, p.253).

Nov 1979: TI MICROCOMPUTER PICTURE IN TRANSITION-Although

Texas Instruments finally introduced its 99/4 personal computer system in June, it is expected to be an interim product. TI failed to get FCC approval for the original version (of the computer) and also ran into processor production difficulties which forced the introduction of a high-priced personal computer system (\$1150). TI is still pursuing a rule change request with the FCC and the development of its 9985 stripped down version of its 9940 16-bit processor. TI hopes to then introduce a personal computer system for under \$500 which connects to a standard color-television receiver.

TI has also expanded its small business computer (99/7) marketing efforts. The 99/7, which starts at \$5000, will be marketed by Moore Business Forms, through over 750 sales offices as well as through computer stores and TI's own retail outlets. (Byte, p.81).

Nov 1979: FCC COMPLETES RADIO FREQUENCY RADIATION TESTS-The FCC has completed its tests of six personal computer systems and will release the data soon. Reportedly, the FCC has found that all but one exceed interference levels permitted for devices that connect to television receivers (eg. games). The test included Atari, Apple, Commodore, Southwest Technical Products and Radio Shack systems. Only the Atari passed... (Byte, p.82).

Nov 1979: Computer Shopper releases "Issue No. 1" and offers annual subscriptions for \$10/year, or \$5/year to charter subscribers, whatever they are. (Byte, p.189).

Nov 1979: Milton Bradley announces its Microvision handheld mini video game machine with its own screen. Microvision comes with the game Blockbuster, and six other games are available separately. They are: Bowling, Star Trek, Phaser Strike, Connect Four, Vegas Slots and Mindbuster. Price for Microvision is \$51.25. (Byte, p.252).

Dec 1979: Image Computer Products of Northbrook, IL announces that it will produce the TI Six-Pack, which consists of six TI Basic games on cassette. Aside from Milton Bradley and Scott, Foresman, which TI lined up to produce software for the 99/4, Image Computer Products becomes the first third-party software house to support the new TI computer.

Dec 1979: SubLogic releases its first Flight Simulator dubbed FS1. It is available for the Apple II and TRS-80 computers for \$25. (Byte, p.133).

Jan 1980: TI RF MODULATOR FCC WAIVER GRANTED-The Federal Communications Commission (FCC) has granted Texas Instruments a waiver which permits TI to connect its personal computers to home color television receivers using a radio frequency (RF) modulator. TI Originally petitioned the FCC for approval of the RF modulator system in February 1979. The petition was rejected since the regulations require that the

complete system be submitted for approval: TI submitted only the RF modulator for approval. Subsequently, Texas Instruments applied for a waiver, provided that the modulator unit met the standards.

The FCC asked other personal computer system manufacturers to comment on the TI request. Radio Shack, Apple Computer, Commodore, Mattel, and Atari responded negatively to the request. Apple, Atari and Mattel went to great expense to comply with the FCC regulations. The Radio Shack and Commodore systems, which contain integral displays and do not use RF modulators, do not come under the FCC regulations.

The FCC decision further waives testing by FCC and merely requires that the manufacturer provide the FCC with test results showing compliance. In a related action, the FCC relaxed the standards on RF interference generated by commercial and personal computer systems.

Several personal computer manufacturers that compete with TI have already stated that this waiver will give TI a competitive advantage. Furthermore, several firms publicly questioned the FCC's rule-making methods in making this decision. The likelihood now is that the other personal computer makers will offer systems with RF modulators. It will probably take these manufacturers at least a year to bring out such competing systems. (Byte, p.115).

**** A COMPUTER IS BORN ****

Jan 1980: PERSONAL COMPUTER INTRODUCED BY TEXAS INSTRUMENTS-Texas Instruments has introduced a personal computer featuring easy-to-use computing power for personal finance, home management, family entertainment and education. Designated the Model TI-99/4, the system consists of a console with 16K bytes of programmable memory, a wide range of sound effects, sixteen colors for graphic display, a powerful extended BASIC programming language, and a 13-inch color video monitor.

At the heart of the TI-99/4 is a library of Texas Instruments Solid State Software command modules. These command modules allow users instant program accessibility. Solid State Software command module titles include: Demonstration, Diagnostic, Early Learning Fun, Beginning Grammar, Number Magic, Video Graphs, Home Financial Decisions, Household Budget Management, Video Chess, Football, Physical Fitness, Speech Construction, Investment Analysis, Personal Record Keeping, Statistics, Early Reading and Tax and Investment Record Keeping.

Among peripheral accessories offered is a Solid State Speech Synthesizer with a price of \$150. By building a basic vocabulary into the language system, home programmers can place audible messages in their programs. The speech synthesizer module has a 200-word vocabulary and plugs into

the console. Speech can be written into programs using BASIC programming language. Future command modules will call up spoken words automatically.

TI BASIC is a full floating point, 13-digit expanded version of BASIC that is fully compatible with ASCII and the BASIC specifications of the American National Standards Institute. TI BASIC includes a full complement of 24 BASIC statements, 14 commands, color graphics, and sound and music over four full octaves. A Beginner's BASIC Guide for self-teaching comes with the TI-99/4. For users knowledgeable about programming, McGraw-Hill has published Programming Basic With the TI Home Computer, a book by Herbert Peckham.

Remote controls are offered as accessories to the TI-99/4. Two of these controls may be connected to the computer at the same time. Each includes a multiposition (360 degrees) rotary lever with a side-mounted pushbutton. Other accessories offered by Texas Instruments include: a printer, disk storage, and an RS-232 interface for connecting the computer to other electronic devices.

The price for the TI-99/4 system is \$1150. Solid State Software command modules carry prices ranging from \$19.95 to \$69.95 each. For further information contact Texas Instruments Inc. Consumer Relations, Attn TI-99/4, POB 53, Lubbock, TX 79408. (Byte, p.235).

Despite the fact that the TI-99/4 was "officially" available in January 1980, it was in short supply as evidenced by the following ad in the January 1980 Byte Magazine, page 88.

**AN OPEN LETTER ON THE TEXAS
INSTRUMENTS TI-99/4 HOME COMPUTER**

"It's a fact that the new TI-99/4 is the most sought after home computer on the market today. However the demand far exceeds the factory's ability to produce them, so they will be in short supply, for all dealers, for the foreseeable future..."

In between the excitement of TI's much anticipated entry into the personal computer market in 1979 and its decision to abandon that very same market in October 1983, lies the story of a thousand and one mistakes in corporate strategy, the creation and release of hundreds of exciting new products for the TI Home Computer, the appearance of some of the most talented personalities the community would ever produce and ultimately the heart rending disappointment users felt when the bottom dropped out. But that is another story.

****DONE****

**TI'S "VIDEO CONTROLLER": YEARS AHEAD OF ITS TIME
(and still "Pending FCC Certification")**

described by Charles Good
Lima Ohio User Group

HISTORICAL BACKGROUND:

"MULTIMEDIA" is the hot concept described today in many computer magazines. Today the term usually refers to combining CD ROM text and graphics and digitized sound files and graphic images from various other sources in a managed sight/sound presentation all under computer control. In 1981 CD ROM did not exist, but VCR's and video disk players playing sight/sound disks the size of LP phonographic records did. At the May 1981 Consumer Electronics Show TI exhibited a side car peripheral called the VIDEO CONTROLLER designed to mix VCR and video disk sound and audio with 99/4A sound speech and screen displays, all under the control of a running TI BASIC or Extended Basic program. This first showing of the VIDEO CONTROLLER is described in words and photos in 99er Magazine v1 #2 (July/Aug 1981). The "Video Controller" Bill Conhy video tape we have available in the Lima US library came from this 1981 show. This video shows a cigar smoking Bill asking people to press the number 1,2, or 3 key on the computer next to him in order to see specific video demos of TI software located at specific places on the video tape.

The November 30 and December 7, 1981 issues of INFOWORLD contain announcements about the release of the Video Controller side car peripheral and associated Course Designer software. This side car VIDEO CONTROLLER peripheral was at the Jan 1982 Las Vegas CES show, the same show that TI used to introduce the Peripheral Expansion Box to the world. Vol.1 #4 of 99er MAGAZINE has a good photo and article about the VIDEO CONTROLLER at this show. List price in 1982 was \$699.95 with one set of cables, plus \$99.95 if you needed another set of cables to hook the VIDEO CONTROLLER to a different kind of VCR or video disk player, plus \$199.95 for the "Course Designer Authoring Package". That's a whopping \$1000!

The Course Designer Authoring Package is a two disk Extended Basic package which includes TI's Text-To-Speech. It is designed to aid in using the VIDEO CONTROLLER for Computer Aided Instruction but can also be used to develop CAI lessons that don't use the VIDEO CONTROLLER. CDAP was reviewed in 99er MAGAZINE v1 #6. ^{Very} This very rare software and may review it myself in a future article. The CDAP subprograms are dated in REM statements as late as 5/12/82, so the CDAP could not have been available in late 1981 as TI's publicity states. Thanks to Bill Gaskill, I also have a copy of an official TI brochure dated 1982 showing the VIDEO CONTROLLER side car and a fancy looking video disk player. The brochure suggests business training applications for the VIDEO CONTROLLER.

TI listed the side car peripheral as PHP2300 in its

Jan-June and June-Dec 1982 retail price lists, stating "The Video Controller is intended for industrial and commercial use, it is not intended for use in the home". This statement means that the peripheral DIDN'T have FCC Class B (home use) certification. Some dealers in 1982 advertised the side car VIDEO CONTROLLER (at below list). The earliest example I can find of this is a \$539.95 price quoted in an ad on the inside front cover of 99er MAGAZINE v1#4 (early 1982). Later TI developed the VIDEO CONTROLLER as a PE Box card, PHP1290. This card is listed for "\$399.95 (Pending FCC Certification)" in TI's last official 99/4A price list dated June-Dec 1983.

And yet-- in spite of the press releases, the displays at those computer shows, the listings in official TI price lists over a period of several years, and dealer ads as if the dealer had the item in stock-- TI sold few or no side car video controllers and definitely didn't sell any video controller cards. The card and probably also the side car peripheral are, I believe, "Never Released Peripherals". Also, in spite of being listed as PHD5068 (\$199.95) in TI's last official price list, TI apparently never sold its Course Designer Authoring Package software. CDAP is another "Never Released" product.

Why was the VIDEO CONTROLLER and associated software never released? I suspect the answer has something to do with price, and the initials "FCC". The peripheral was (after the impact printer) the second most expensive 99/4A item in TI's price lists, and connected to VCR's or video disk players costing (in 1982/83) \$1000+. That's a lot of money for the typical "Home" computer owner. Since TI specifically states in my June-Dec 1982 price list that the VIDEO CONTROLLER is for "industrial and commercial use", and since TI's last catalog says "pending FCC certification", I suspect that because of radio frequency interference TI never did obtain FCC permission to sell the VIDEO CONTROLLER. Evidence discussed below supports this hypothesis.

DESCRIPTION OF THE VIDEO CONTROLLER PE BOX CARD:

Thanks to the generosity of Charles Stringer and Mike Wright I have an actual VIDEO CONTROLLER card, its 1982 user guide, and a circuit diagram of the card sitting in front of me as I write this. The card comes in a TI clam shell with an official looking printed label that says "Video Controller Model No. PHP1290". The serial number space on the label is blank and hand written are the words "Qual Unit Not for sale". Sticking out the back of the card is a 26 pin edge flat edge connector and a female mini phono jack like those on a TI cassette program recorder. Once removed from the clam shell you can see lots of chips that say El Salvador, Malaysia, and Korea. Most of these chips have the TI logo, but none say U.S.A. I can see why many TI products are labeled "Assembled in USA with domestic and foreign parts"! The important chips seem to be a PAL1216CN/8237 and an AM18145CDZ/1501392-19. My circuit diagram identifies the AMI chip as a "TMS4732 4k x 8". My circuit board has "VIDEO CONT. 1050217-2" engraved on it, apparently a TI part

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number. My schematics indicate that the "Formal Release" product number would have been 1050218. These schematics from TI's consumer products group have several signatures dated between June and August 1982. Of great significance is the "1-3-84" date of the signature immediately below the words "Final Release" (over two months AFTER TI left the Home Computer market), and the fact that the "FCC APVD" box lacks a date or signature. My unpublished preliminary PHP1290 doc says the card has FCC class A (commercial, not home use) certification, but the lack of a signature on the schematic suggests that even this low level certification was not achieved.

In addition to the RF modulator or video cable we normally use, 5 other cables are needed to hook the VIDEO CONTROLLER to a VCR. One cable goes from the card's edge connector to the VCR's remote control. Other cables go from the VCR, the monitor, and the console's audio/video out jack to a "relay box". This box, under control of the VIDEO CONTROLLER, switches the monitor back and forth between computer audio/video and VCR or video disk audio/video. Unfortunately I don't have a set of cables or the relay box, so I can't make my VIDEO CONTROLLER card do its tricks. When I put the card into my PE box, the Horizon Ramdisk config program tells me that the card has a CRU address of 1C00. From BASIC command mode I can enter OPEN #1:"VC.H",INTERNAL without getting an error message. The docs say this means my card is installed properly.

CAPABILITIES OF THE VIDEO CONTROLLER:

Although I can't test my VIDEO CONTROLLER because I lack the proper cables, my documentation tells me what I should be able to do. What follows is based largely on this documentation.

The VIDEO CONTROLLER hooks up to some 1/2 inch (VHS or Beta) or 3/4 inch ("professional" size) VCRs or a Pioneer video disk player. TI provides a list of 1983 machines known to be compatible, but some other VCRs of that era, not on TI's list, are probably compatible. Even if I had a proper cable set I can't today go out and buy a VCR to use with my VIDEO CONTROLLER card. You need a VCR with a WIRED remote control jack and an audio dub input jack. This is not the same as the "audio in" on the back of most VCR's. Audio dub allows you to add audio to prerecorded video without erasing the video. Such VCRs were sold in retail stores in the early 80's for about \$1000. Most were top loaders. I once owned one and now wish I still had it. The OSU Lima Campus still has a couple of these machines. Few modern VCRs sold for home use have audio dub, and WIRED remotes are unheard of these days.

The VIDEO CONTROLLER allows you to use a VCR as a mass storage device, almost exactly as one would use CS1. "SAVE VC" saves a BASIC (either BASIC) program to video tape starting at the beginning of the tape. "SAVE VCA" saves a

program starting at the current tape position. "OLD VC" automatically moves the video tape to the beginning and OLDS a program from there. "OLD VCA" attempts to load a program starting from the current tape position. You can also store data files on video tape by first OPEN #2:"VC",INTERNAL and PRINT #2:"DUB" to open the VCR dub channel, and then PRINT #1:"DATANAME",FIXED to send computer data to a previously OPENED data file stored on video tape. Just as with cassette tapes, record length must be fixed at 64, 128, or 192, and APPEND, VARIABLE, and RELATIVE are not allowed. You can PRINT, INPUT, and LINPUT to and from such video tape files. Of course you can't use a video disk as mass storage since video disks (like CD ROMs) are read only media.

Another type of OPENED file allows the 99/4A to control the video unit. First you OPEN #1:"VC",INTERNAL and then you PRINT #1 the commands that control the VCR. The following commands are available:

PRINT #1:"ONRL" sends video tape (or video disk) audio and video to the monitor.

PRINT #1:"OFFRL" turns off the relay box and sends computer audio and video to the monitor.

PRINT #1:"INIT" marks the start of the tape. I don't know if this means the current tape position as "start" or whether the tape rewinds to its beginning.

PRINT #1:"GOTO",LOCATION-NUMBER forwards or reverses the tape to a specific location. Each number is 16/30 of a second of tape time on VHS systems.

The following PRINT #1:"COMMAND"'s do the same thing as pushing buttons on the front control panel of the VCR: STOP, PLAY, FWD, REW, REC, and PAUSE. With a video disk player, commands are available to display specific still image frames or chapters. A chapter is a large group of frames. Viewing a chapter is similar to playing a specific track on a modern audio CD.

The VIDEO CONTROLLER's capabilities were all designed to allow interactive computer/video training. These lessons could consist of computer segments with computer text/speech/graphics, video segments, test questions (multiple choice or T/F), and branch points depending on the answers to the questions. Multimedia! A modern example- at Michigan's interstate highway tourist information centers just across the Indiana border you can walk up to a computer terminal displaying a multi color Michigan map with numbers on the map, press a number on the keyboard, and see a short computer AND VIDEO TAPE segment showing the neat tourist stuff at that location. You are then returned to the Michigan map where you can press another location number. Michigan could have done this in 1982 if the 99/4A VIDEO CONTROLLER had been available. This device really was years ahead of its time.



DONE

THE TRONICS SALES CORPORATION:
HOW TO MAKE REALLY BIG MONEY SELLING
99/4A COMPUTERS TO YOUR FRIENDS
 reported by Charles Good
 Lima Ohio User Group

The TRONICS SALES CORPORATION (whose 1982 address and phone were 2563 East Loop 820 North, Fort Worth TX 76118, 817-595-1202) had a deal for you! At least they did in 1982. All you had to do was sell your friends and relatives 99/4A computer systems. If you sell only two systems a month and the value of each sale averages \$450 (about the list price of a 99/4A console back then), and if you could talk your customers into selling two \$450 99/4A systems a month to their friends, then your year's commission on all these sales will be \$852082! This figure is generated by a TRONICS cassette program shown to all potential TRONICS 99/4A "distributors" (door to salespeople), and of course computers never lie!

TRONICS was created by Mike Wilcox and Dave Guardanapo to sell 99/4A's using a pyramid system of distributors and subdistributors, similar to the way ANWAY home care products are sold today. TRONICS produced a set of cassette programs designed to show off the unique features of the 99/4A. These cassettes were part of a distributor's sales kit. They came packaged in a blue plastic hard case that when opened held all the cassettes upright with their titles clearly visible to the user. This blue case is larger than, but closely resembles some plastic hard 10 pack disk cases I have seen which open into a triangular shaped disk holder. One of the

cassettes is an audio commentary on how to open the box of your new 99/4A and assemble the parts. Most of the software is written in TI BASIC. There is one XB demo and one program that uses TEII and speech. TRONICS cassette software includes a spelling game (versions with and without speech), two graphic demos, an all text SALES program that explains how to earn the big bucks, and a TALKWARE tape. These are all dated in REM statements between 7/28/82 and 8/30/82. The SIGHTS AND SOUNDS program says "Copyright Texas Instruments and Tronics Sales Corp 1982", suggesting an official arrangement between TI and TRONICS. Apparently TI knew about and approved of TRONICS pyramid sales scheme.

The TALKWARE cassette is unique. One side contains a TI BASIC program called "Lets Get Technical". This MUST be loaded from cassette with the PE Box shut off and no module plugged into the console. CALL FILES(1) doesn't free up enough memory to allow loading this from disk. When loaded from cassette, you have only 160 bytes of free memory left! When you RUN the TALKWARE program, on screen text instructs you to turn the cassette over, rewind the cassette to the beginning of side two, press cassette PLAY, and then press <ENTER> when the cassette produces an audible beep. The program in the computer then begins to execute in synchrony with the audio commentary on side two of the tape. As computer graphics illustrate the various parts of a (side car) expanded 99/4A system, the voice tells you about what you are looking at. If you leave the tape recorder hooked up to the computer, the voice comes out of the computer's monitor speaker as if the computer and not the tape were generating the words. This sort of audio tape/computer

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synchronization is a neat idea, something I have not encountered before.

As explained in the SALES tape's TI BASIC program, you earn commissions on the computer systems you sell and you earn commissions on sales of people in your "down line". If you talk A into selling TI Home Computer's, and A recruits B, and B gets C to sell then A, B, C are all part of your "down line". There is the theoretical possibility that such a "down line" can grow exponentially to a very large size. The real money is in the commissions earned based on the sales of one's "down line". An "Executive Distributor" earns 10 percent on his own sales, 3 percent on his 1st level "down line", and 2 percent on sales of the 3rd through 5th level "down line" sales. The screen dump from the SALES program reproduced below shows hypothetical data for 12 months if you have 5 levels of "down line" and each individual in your network including yourself makes two \$450 sales each month. The computer says a total of 94448 computer systems would be sold, and your total commission for the year would be \$852084. Only two sales per month-- this should be easy! So why arn't we all millionaires?

And as a Master Distributor you would receive the following:

LEVEL SALES	BONUSES & COMMISSIONS
Sales 24	\$1080
1st 264	\$3564
2nd 1760	\$15840
3rd 7920	\$71280
4th 25344	\$228096
5th 59136	\$532224
Total 94448	\$852084

Bill Gaskill sent me a full color glossy brochure titled TI HOME COMPUTER PROGRAM LIBRARY - TRONICS dated 11/82. The insides are basically identical to the TI brochure of the same name minus the "Tronics", but the last two pages have some interesting quotes:

"Tronics was the first electronics marketing company of its kind. We specialize in distributing home electronics by using a proven direct sales plan. It's a system that has been used successfully by many other companies for decades, but never for products like home computers. Already over 15000 Tronics distributors all over the country have joined us to help serve this fast growing market.

"Tronics Sales Corporation has experienced phenomenal growth. Our business grew by 25% a month during the first year. In the first six months, we sold 405 computers; now we're selling over 1500 a month. Next year we expect to increase that tenfold. It's predicted that by 1986 about 85% of the homes in America will have one or more home computers.

"The relationship between Texas Instruments and Tronics Sales Corporation is solely that of an independent buyer and seller."

*****DONE*****

WHY TI?

(THE HISTORY OF TEXAS INSTRUMENTS)

[BB&P editor's note: The original source of this article is unknown. It was found by Bill Gaskill among his piles of TI stuff.]

1930-- Commercialized its invention, the Reflection seismograph, and revolutionized petroleum exploration. corporate name was "Geophysical Service", abbreviated as GSI.

1946-- Diversified by adding electronic systems manufacturing.

1952-- Entered the transistor business with a new corporate name: "Texas Instruments Incorporated".

1954-- Became the first company to mass produce germanium radio transistors; DEVELOPED THE FIRST COMMERCIAL TRANSISTOR RADIO; Introduced the first commercial silicon transistor - the type required in space and military systems.

1958-- Announced TI INVENTION OF INTEGRATED CIRCUIT, which provides the basis for virtually all modern developments in electronics.

1961-- Invented the semiconductor thermal printer.

1967-- Introduced TI invention: the world's first electronic handheld calculator.

1969-- Announced first data terminal to use thermal printing, The Silent 700.

1970-- Invented the "Single-Chip-Microprocessor" which today is the "brain" of a wide range of products.

1971-- Commercially introduced the microcomputer, or "Miracle Chip", a TI invention that includes all the elements of a complete computer, including memory, in one integrated circuit.

1972-- Entered consumer end-user market with the DATAMATH handheld calculator, initially priced at \$149.95

1973-- Introduced a "4K-Bit Random Access Memory" (RAM), setting new industry standard.

1975-- Introduced first 16-bit microprocessor family to use memory-to-memory architecture, increasing performance. Introduced "3D" seismic data gathering and processing.

1976-- Developed "Solid State Software" plug in modules for pocket calculators.

1977-- Received patents for "Closed-Loop" solar energy system for converting sunlight to electricity.

1978-- Introduced revolutionary SPEAK&SPELL learning aid using synthetic speech chip. [BB&P editor's note: In Sept 1992 you can still buy this product at my local Toys-R-Us.]

1979-- Introduced first "64K Erasable Programmable Random Access memory" (EPROM); It was preceded by TI introduction of first 16K EPROM in 1977 and first 32K EPROM in 1976. Introduced a Home Computer.

1980-- Produced first commercial single-chip, 16 bit microcomputer, the TMS9940.

1981-- Introduced "TI LOGO", the first microcomputer language enabling children to use computer to solve problems. Introduced the TMS 7000 family of 8-bit single-chip microcomputer circuits [BB&P editor's note: These chips are used as CPUs in the CC40 and TI74]. Achieved volume production of leadership 64K bit dynamic RAMs.

*****DONE*****

CRU ADDRESS LIST
by Joseph Cohen
Lima Ohio User Group

It is important, when mixing peripheral expansion equipment from different sources, to keep track of CRU (Communication Register Unit, I/O technique for IMS9900) addresses, since 3rd party cards coming from different sources may sometimes use identical addresses and cause problems. According to the TI technical data documentation, the first 1K of the available 4K of CRU bits (0000-07FE) are used in the console. The second 1K (0800-0FFE) are for future use. The last 1.9K (1000-1FFE) are for peripherals, with a block of 128 CRU bits assigned to each. We are interested here in these latter memory addresses. The address assignments are handy to have around when you plug in a new card, changing the CRU address of a RAM disk, etc.

0000-FFE: Internal use.

1000-10FE: Floppy Disk Controller. All floppy disk drive controllers (TI, Myarc, corComp, Atronic) use this address. If you put your RAM disk here, you will not be able to access the disk controller.

1200-12FE: Reserved. There might have been a Home Security Card planned for this address.

1300-13FE: RS232 primary (ie. RS232, RS232/1, RS232/2, PIO, PIO/1).

1400-14FE: Unassigned. Used by the Mechatronic 128K RAM card with PIO port. I believe this address was also assigned to modem cards. CorComp was once working on a modem card, and I was told there were some built in Cleveland, Ohio, but I have no other information. I am told that most european users of the Mechatronic 80 column card are now using this CRU address with a new DSR software.

1500-15FE: RS232 secondary (ie. RS232/3, RS232/4, PIO/2 using a second RS232 card).

1600-16FE: Unassigned. There might have been a Digital Cassette peripheral planned for this address.

1700-17FE: Hex-Bus Interface.

1800-18FE: TP. The PHP1900 TI Solid State Thermal Printer was, perhaps, the only "smart" peripheral produced for the TI-99/4(A).

1900-19FE: Reserved. There might have been an EPROM card planned for this address.

1A00-1AFE: Unassigned.

1B00-1BFE: Usually marked as "Unassigned". In fact, it was to be used for software expanding the existing GPL interpreter in console ROM.

1C00-1CFE: Video Controller Card. A very rare and expensive peripheral intended for industrial (not home oriented) use, which was price-listed from the early stages by TI but was not widely distributed. There is one known video tape for TI-99/4(A) point-of-sale demos that uses this rare card. A special cable was needed depending on the type of VCR.

1D00-1DFE: IEEE488 Bus Controller Card. This was not officially released by TI though a few working units exist.

this card could control, for example, equipment from HP or Commodore. Most computers at the time, such as Apple or the S-100 bus computers, had provisions for such equipment, but it was not intended for home applications with the exception of Commodore.

1E00-1EFE: Unassigned. Used by the Foundation 128K RAM card.

1F00-1FEE: p-Code Card.

[BB&P Editor's Note: The following CRU address info is taken from an article by Jan Alexandersson published in the August 1992 issue of Micropendium:

Myarc MFDC (16 different).....1000-1F00
Mechatronic 6RAM kart (16 different)..1000-1F00
Horizon Ramdisk (8 different).....1000-1700
P-6RAM (8 different).....1000-1700
CorComp RAMdisk (2 different).....1000,1400
Mechatronic 80 column device.....1000
Myarc RAMdisk.....1000
Mechatronic 128K + printer.....1400
BIJIT AVPC 80 column card.....1400
Mechatronic EPROMer.....1900
CorComp Triple Tech Card.....1D00

***DONE**

End Ancient
News

Begin
Modern News

STOR NOR - REVIEW BY JIM PETERSON

Quite a few years ago, shortly after Texas Instruments abandoned ship, I invested in a P-box with a 32k card.

I had been working on a program that generated a lot of strings internally, and used up more memory than I had available. Now that I had those monstrous megabytes of extra 32k available, I loaded that program, ran it - and got a MEMORY FULL error!

I was immediately on the phone to the Texas Instruments technical people, and learned the sad news - even with the extra 32k available, in Extended Basic the TI-99/4A can only store string data in the console's memory.

To me, that has always been one of the two weaknesses of our favorite computer - the other being that 28-column screen that makes it look like a child's toy.

If you do not have the 32k card, programs are loaded into VDP RAM in the console. Any strings that you load into the program from a cassette or disk file or from DATA statements in the program, or that the program execution generates, must also fit into that memory.

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If you do have the 32k, the program is loaded into the 24k of it called "high memory"; the other 8k of "low memory" is reserved for assembly routines. Strings are still stored in the 12k of VDP RAM or "stack" in the console. If you are not using strings, the VDP RAM is largely unused; if you do not have links to assembly, the low memory is unused; and since most programs are far less than 24k in size, much of the high memory is unused. The TI-99/4A has plenty of memory - it just isn't distributed efficiently. Even a 640k PC has only 64k available for Basic programs. I have never run short of memory when writing a TI program, but I have several times been frustrated by lack of string storage memory.

Finally, Bruce Harrison has done something about this problem, and he has done his usual thorough job. His program checks to see how much high memory remains unused and then pokes strings into it, just as you would load an array. For instance, in Extended Basic after opening a file you might execute FOR J=1 TO 10 :: LINPUT #1:M\$(J):: NEXT J. With Bruce's routine you would use FOR J=1 TO 10 :: LINPUT #1:M\$:: CALL LINK("PUTHI",M\$,J):: NEXT J. In XBasic you could then write PRINT M\$(8); with STOR MOR you write CALL LINK("GETHI",M\$,8):: PRINT M\$.

Before performing those links, you must first tell the computer how many strings to accept, by doing a CALL LINK K("SETHI",X), where X is the number. To find out how many bytes are available, you can CALL LINK("AVHI",X).

Repeating the call to SETHI will wipe out everything you have stored so you can start over.

Just in case you do write such an immense XBasic program that it doesn't leave space in high memory for strings, Bruce has also provided a routine to store strings in low memory. It takes up only 1000 bytes, leaving about 6000 available for storage. It works in the same way except that you link to SETLO, PUTLO, GETLO and AVLO. You can't use both high and low memory for storage in one program - but you still have that 12k available in VDP RAM.

You can also store numeric data, by converting it to strings. There are still other features, including some unique error trapping methods, and routines to save even more memory by pre-loading the assembly. The instruction file explains everything clearly. This program has everything I could have thought of asking for, plus things I would never have thought of.

The disk contains source code, object code and demo programs for both the high memory and low memory storage programs as well both preload programs. It also contains the instruction file, a program to print the instructions, and Tod Kaplan's ALSAVE so that you can imbed the assembly into your program for instant loading.

And for all that, Bruce is asking the princely sum of \$6, which includes S&H. Don't you wish we could buy TI programs at PC prices? The address is Harrison Software, 5705 40th Place, Hyattsville MD 20781.

***DONE**

LETTER TO THE EDITOR ABOUT ASTRO-MANIA

Dear Charlie:

Could you please print this in the newsletter to help a young (age 16) programmer? He is selling "Astro Mania", a well done game with excellent graphics and action. I was impressed from the first moment, even the opening screen is great.

Joseph Cohen

 Timothy C. Bodenmiller
 Bodenmiller Computers
 43 Monroe St.
 Berea, Ohio 44017

Astro-Mania costs \$9.95 plus \$1 S&H.

Description: Astro-Mania is a great new space game for your TI. It features great graphics and 5 levels of action, and is available directly from Bodenmiller computers.

***DONE**

TI-101

Jack Sughrue's next TI-101 article will appear in the November 1991 BB&P. We have in hand four as yet unpublished articles by Jack in the TI-101 series. There just isn't room to include the next article in this ancient history issue of BB&P.

***DONE**

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