
-The Front Ranger-



The Newsletter of the Front Range 99er Computer Club

Vol. 6 No. 9

P.O. BOX 9572, COLORADO SPRINGS, CO 80932

Jun, 19E

PRESIDENT.....CLIFF SWANK.....473-1101
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LIBRARIAN.(program).....KEVIN KAPUS.....576-3199
LIBRARIAN.(lending).....GENE FLEMING.....635-8162
GRAPHICS SIG.....BONNIE SNYDER.....578-1583..BY APPOINTMENT
TELECOMMUNICATIONS SIG..KEVIN KAPUS.....576-3199..MEETS THE SECOND THURSDAY
T.I.FORTH.....NATHAN RAKOFF.....598-1098..BY APPOINTMENT
NEW MEMBER ORIENTATION..BONNIE SNYDER.....578-1583..BY APPOINTMENT
VILLA-TI (HUB) BULLETIN BOARD.....574-2567..CALL OFTEN

NEXT MEETING

DATE.....THURSDAY, JUNE 15, 1989

TIME.....6:30 PM

PLACE.....RUSTIC HILLS MALL (COMMUNITY ROOM)
PALMER PARK and ACADEMY BLVD.

PROGRAM.....It'll be our great pleasure to present to you, Steve Funkhouser.
He will be showing us an application he has developed using TI
BASE. He uses it to create his grocery shopping lists! If time
permits he will also show us how he creates graphs and charts
with TI ARTIST. We will have an open question and answer period
for discussion afterwards.

EDITOR'S NOTES

You will notice that Erik Olson has taken over as editor and with my help,
this will be his first issue. Any help from anybody would be appreciated in
these transitions between editors.

Any letter or comment to the Editor should be sent to: Front Range 99er Club
P.O. BOX 9572 COLORADO SPRINGS CO 80932

President's Corner by Cliff Swank

First off, I will let you all know well in advance that the SouthWest Ninety-niners will host the 1990 FestWest in Tucson, Arizona on February 17th and 18th. This advance notice will surely give anybody enough time to plan for this annual event. Wouldn't it be nice to get a caravan together to attend it? Our club has never attended any TI fair. This one is within driving range and could put us on the list of attendees. If there is any interest in doing this, please let me know.

Bryce is off for the Summer in New Mexico, so Erik Olson has volunteered to take over as newsletter editor. Hooray! And I didn't even have to twist his arm! I have also appointed him as our Vice President to take over that vacated office for the remainder of the term. Speaking of which, I guess it is not too early to start thinking about elections in October. Time really flies when we are having fun and it will be election time sooner than we want to think about. Most of the officers will not be seeking re-election this time around so we will need some new leaders! Please start thinking about running for office and what you can do to keep our club going.

Speaking of old timers, as in charter members that started the club, John Williams will be in town this month, visiting here from his present home in California. If you can remember our first club BBS, you will remember that John was the one that started it, donated the bulk of the expense, sysop'ed it, and even left it here in Colorado for us to use for a couple of years. He probably will be able to attend the meeting this month, and here is a big WELCOME for John, from all of us Front Rangers! By the way, John is still a member of our club, one of several out-of-staters that continue to enjoy the benefits.

Another thing that just popped up the other day was that it has been brought to my attention that the U.S. Postal system is pretty rough on handling our newsletters. Since we do mail all newsletters, if you should get yours in poor condition, the club will replace it if you will only let us know. I usually do make a couple extra copies each month and can make more if needed.

Guess that is enough for this month. Lets keep the lines of communication open. The BBS could use some message traffic in the Front Rangers' section too. VILLA is really easy to use once you get on and browse thru it a couple of times. There is plenty of help around to get you acquainted, just leave a message and ask! We usually have a telecommunication demo at the general meeting but at our present location, we have no access to a phone line.

See you all at the meeting...

Notes from Abroad
Erik Olson, Summer Editor

Before sitting down at my machine to write the material for this month's mailing, I meandered through the newsletters received in the mail from other groups. I was so impressed with the Pekin Users Group's publication that I felt like copying one article after another into our newsletter. Then I realized, "How absurd! Then half of our newsletter would be a reprint of someone else's!" Sometimes, it is. But then I looked at the insertions made by the PUG editor: "Bluegrass 99", "R.O.M. of Orange County", "Chicago Users Group". Maybe it's just that their editor (and President) Malcolm Gillies has a faculty in common with this editor (and sudden VP): We both recognize original and interesting material when we see it, and say "This ought to be read by more people." But I'm going to put off pasting re-prints into the pages of our publication until the pieces of locally produced Ninety-Ninum are in place.

There are rumors of both Tenex and Triton dropping TI sales. If you want to cast your vote to keep half of TI mail order in business, well--- Buy something from them! Except that their offerings in the last year or two have not had a great number of new products to buy. Much of their wares has been familiar to the TI world for many years.

The Star NX-1000 printer was favorably reviewed (or was it "praised"? in Micropendium back in March. Tenex offered the unit at the great price of \$164.95, but was unable to deliver a working unit to a local users group member. The model they sent had an obvious problem with its "logic chips" (whatever they meant by that) which had occurred in at least one other unit. Now the printer is on back order for two months. If you wish to pay \$20 more for the Star NX-1000, you can go to Main Street Software here in Colorado Springs-- it's a hot item there, too, but they haven't had any customers return defective units and they have them in stock, in the store.

Karate-Man!

This month your editor has written a game program. It was originally intended as a how-to on writing a game, but I have just got it finished in time for printing. In the spirit of the 99'er Gameware Buffet, then, here is a game for all of you to type in, or you can call the group board and download it instead. It is written in Extended Basic. Here's how to play:

The mean monster Boj has kidnapped Charles Earl because he was angrier than any of the rest of us over Press not being delivered. Ruth O'Neill is wise to Boj's evil plot, however, and has come to you, Karate-Man, for help. If you cannot rescue Charles from Boj's guarded castle, Press will never be finished!

The game begins with Karate-Man at the bottom of the screen. He is wearing black. Pressing S or D or the joystick left or right causes Karate-Man to move. Do NOT move into one of the guards posted about the grounds, or you will be killed. To get past the guards, come up close and press E or up on the joystick. Karate-Man will leap into the air and dispatch the guard. When standing in front of a stair-step, press E to jump onto the next step. If you make it to the top level, Boj will begin throwing Chinese stars at you. You must jump over each one, approach Boj himself, and kick him in the head.

Remember, a lot of the fun with typed-in programs is adding your own features to them. For starters, you could find a way to give Karate-Man three lives. A complicated task would be making the guards move around and kick back. See you all next month! (hint, hint.)

100 REM GAME PROGRAM BY ERIK OLSON

110 CALL CLEAR

120 CALL CHAR(104,"EEEEEE00BBBBBB00",97,"FF888888888888FF",96,"18187E1818FF1900")

130 CALL CHAR(108,"0001010003050931010303060C183000",110,"00808000E0D0C8C8C8D040 6030101808")

140 CALL CHAR(112,"00010100070B13130B02060C0B1B10",114,"00808000C0B0908C80C0C0 6030180C00")

150 CALL CHAR(116,"0001010023150903038FFE0000000000",118,"00803008E4D8C0C08080C0 607C040000")

160 CALL CHAR(120,"00010910271B0303010103063E200000",122,"00808000C4A890C0C0F17F 0000000000")

170 CALL CHAR(128,"41E3444D4F4F4F4C477F4048080F0000",130,"C0E030DSF878F818F0FE80 8080808070")

180 CALL CHAR(132,"010344ED4F4F4F4C4E474B7040404007",134,"C0E090DBF878FA1A3EF0E0 808888FB00")

190 CALL CHAR(136,"00000000030400030404020000000000",138,"00000000209090E0809050 0000000000")

200 CALL COLOR(9,2,11,10,14,16)

210 DISPLAY AT(1,10):"KARATE-MAN!"

220 DISPLAY AT(4,1):"THE MEAN MONSTER 'BOJ' HAS:"BECOME VERY ANGRY OVER THE:"L ONG WAIT FOR HIS COPY OF:"PRESS!
HE HAS CARRIED OUT A"

230 DISPLAY AT(8,1):"FOUL PLOT TO KIDNAP CHARLES:"EARL AND SENTENCE HIM TO A:" LIFETIME OF WRITING:"CHECKBOOK
PROGRAMS! HE DOES"

240 DISPLAY AT(12,1):"NOT REALIZE THAT NOW HE WILL:"NEVER GET HIS COPY OF PRESS ,:"AND NEITHER WILL OTHERS!"

250 DISPLAY AT(17,1):"RUTH O'NEILL HAS HIRED:"YOU, KARATE-MAN, TO ENTER:"BOJ'S GUARDED CASTLE AND:"DEFEAT THE
MEAN MONSTER!"

260 DISPLAY AT(24,1):"PRESS A KEY TO BEGIN"

270 CALL KEY(5,K,S):: IF S<1 THEN 270

280 CALL DELSPRITE(ALL):: CALL CLEAR

290 CALL VCHAR(1,31,104,96)

300 RESTORE :: FOR I=5 TO 24 :: READ A\$:: DISPLAY AT(1,1):A\$:: NEXT I

310 CALL MAGNIFY(3)

320 CALL SPRITE(#2,128,13,17,121,0,0):: BOJ=0

330 RESTORE 940

340 FOR I=3 TO 7 :: READ Y,X,P,C :: CALL SPRITE(#1,P,C,Y,X,0,0):: NEXT I I

350 ST=0 :: CALL DELSPRITE(#8)

360 Y=169 :: X=33 :: P=112 :: CM=0 :: CALL SPRITE(#1,P,2,Y,X,0,0)

370 CALL LOCATE(#1,Y,X)

380 CALL PATTERN(#1,P)

390 CALL MOTION(#1,0,CM):: CALL POSITION(#1,Y,X):: R=INT((Y+7)/8):: C=(X+7)/8

400 CALL COINC(ALL,F):: IF F THEN 590

410 IF R<4 THEN 500

420 IF A1 THEN 540

430 CALL GCHAR(R+2,C,6):: IF 6=32 THEN CALL GCHAR(R+2,C+1,6):: IF 6=32 THEN Y=Y+ 4 :: CM=0 :: GOTO 370

440 CM=0 :: CALL KEY(1,K,S):: CALL JOYST(1,A,B)

450 IF K=5 OR A=4 THEN 520

460 IF K=2 OR B=-4 THEN 570

470 IF K=3 OR B=4 THEN 580

480 BOJ=ABS(BOJ-4):: CALL PATTERN(#2,128+BOJ)

490 GOTO 390

500 IF ST=0 THEN 510 ELSE CALL POSITION(#8,A,B):: IF SGN(B-128)<>SGN(X-8)THEN CALL DELSPRITE(#8)ELSE 420

510 A=SGN(X-128)*4 :: CALL SPRITE(#8,136,9,20,128+A*4,0,A):: ST=1 :: GOTO 420 520 IF P=108 THEN CM=-8 :: C1=-1 ELSE
CM=8 :: C1=2

530 Y=Y-8 :: R=R-1 :: P=P+8 :: CALL LOCATE(#1,Y,X)

540 CALL GCHAR(R+1,C+C1,6):: IF 6<>32 THEN 560

550 A1=A1+1 :: IF A1<5 THEN 380

560 P=P-8 :: A1,CM=0 :: GOTO 380

570 P=108 :: CALL GCHAR(R+1,C-1,6):: IF 6=32 THEN CM=-4 :: GOTO 380 ELSE 380

580 P=112 :: CALL GCHAR(R+1,C+1,6):: IF 6=32 THEN CM=4 :: GOTO 380 ELSE 380

590 CALL MOTION(#1,0,0):: IF A1=0 THEN 670

600 FOR I=2 TO 7 :: CALL COINC(#1,I,16,F):: IF F THEN 620

610 NEXT I :: GOTO 670

620 CALL SOUND(100,-6,0):: IF I>2 THEN CALL DELSPRITE(#1):: GOTO 390

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630 CALL DELSPRITE(8):: DISPLAY AT(1,1):"YAY! THAT IS THE END OF BOJ!"
640 FOR I=220 TO 440 STEP 10 :: CALL SOUND(-100,I,0):: NEXT I
650 FOR I=1 TO 3 :: FOR J=400 TO 440 STEP 10 :: CALL SOUND(-100,J,1*3):: NEXT J :: NEXT I
660 GOTO 950
670 FOR I=440 TO 220 STEP -10 :: CALL SOUND(-100,I,0):: NEXT I :: DISPLAY AT(1,1):"KARATE-MAN HAS LOST! OH NO!"
680 DISPLAY AT(2,5):"TRY AGAIN? (Y OR N)"
690 CALL KEY(3,K,S):: IF K=78 THEN 710 ELSE IF K<>89 THEN 690
700 DISPLAY AT(1,1):"":"BRAVE KARATE-MAN! YAY!" :: FOR I=1 TO 500 :: NEXT I :: GOTO 280
710 CALL DELSPRITE(ALL):: DISPLAY AT(10,3)ERASE ALL:"OH, HOW DE-PRESS-ING!"
720 DISPLAY AT(12,1):"WHO KNOWS HOW LONG WE WILL":"WAIT FOR 'PRESS' NOW?"
730 STOP
735 REM THESE DATA STATEMENTS ARE EXACTLY ONE SCREEN LINE OF DATA
740 DATA h hhhhhhhhaaaahhhhhhhh h
750 DATA hh ' hhaaaahh ' hh
760 DATA hhh hhh 770 DATA hhhh hhhh
780 DATA hhhh hhhh
790 DATA hhhhhhhhhhhh hhhhhhhhhhhh
800 DATA h hh
810 DATA h hh
820 DATA h hh
830 DATA hhh hhhhhhhh hh hhhh
840 DATA hhhh hhhh
850 DATA hhhh hhhh
860 DATA hhhh hhhh
870 DATA hhhhhhhhhhhhhhhhhhhhh h
880 DATA h hh
890 DATA h hhh
900 DATA h hhhh
910 DATA h hhhhhhhhhhhhhh
920 DATA h hhhhhhhhhhhhhh
930 DATA hhhhhhhhhhhhhhhhhhhhhhhh
940 DATA 57,153,108,16,89,209,112,5,121,105,112,14,153,145,108,15,169,65,112,14 950 CALL DELSPRITE(ALL)
960 CALL CHAR(124,"0001010001030707070101010103",126,"0080800080C0A0A0A080 8080808080")
970 CALL CHAR(128,"",129,"DFDF0101010103",130,"",131,"8080808080808080")
980 CALL CHAR(132,"0809090403010101010F080818000000",134,"10909020C08080808080C0 4040406000")
990 CALL SPRITE(1,112,2,17,86,0,0,124,5,17,118,0,0)
1000 FOR I=1 TO 500 :: NEXT I :: CALL PATTERN(128):: FOR I=1 TO 300 :: NEXT I
1005 CALL PATTERN(124):: FOR I=1 TO 500 :: NEXT I
1010 DISPLAY AT(1,1):"":TAB(13):"YAY!"
1020 FOR I=1 TO 4 :: CALL PATTERN(132):: FOR J=1 TO 200 :: NEXT J
1025 CALL PAT 1ERN(124):: FOR J=1 TO 200 :: NEXT J :: NEXT I
1030 CALL DELSPRITE(ALL):: DISPLAY AT(12,14)ERASE ALL:"YAY!"
1040 END

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Having just a console, printer interface and a printer limits you on finding useful programs to run. Sure I could use my console to crash my spaceship into the refueling tunnels of PARSEC or to get my fill of power dots in PAC-MAN. But what if I wanted to do word processing? Or how about word processing in one, two or three column format? Or what if I wanted the ability to change FONT'S through out the text and add GRAPHIC'S !!!!!!!!!!!!!

HELL ONLY ONE PROGRAM THAT I KNOW OF WILL LET ME DO THAT. AND THAT IS "DESK TOP PUBLISHER" by DataBiotics.

Sure if you have an expanded system there are probably a number of programs that will let you do all that. But for me I am limited to this one program. But don't feel to sorry for me because **DESK TOP PUBLISHER** does everything that it is advertised to do. The first thing you want to do when using this program is to first create any graphics that you are going to include in your text. The drawing portion of this program is in a format familiar to most TI users. The center of the screen is the drawing area and around the drawing area are BOX'S with symbols and letters representing the various functions of

the drawing program. Which are:

DRAW, POINT, FRAME, BOX, CIRCLE, DISC, FILL (you can fill with several different patterns or solid and you also have several different "pen" width to draw with) TEXT, CLEAR, LOAD PICTURE, SAVE PICTURE, LINE, CONNECTED LINES, RAYS, HORIZONTAL OR VERTICAL LINES.

As you can see the picture maker portion of the program is a pretty full featured drawing program. But it does have some minuses against it.

First the program doesn't have a ZOOM feature so doing detailed work is harder. Second the ad that I saw for the program in the catalogs of TRITON, TEX-COMP, and TENEX stated that the program comes with some pre-drawn CLIP ART. It does not. And last but probably the biggest drawback of the entire program is the size of the actual drawing area.

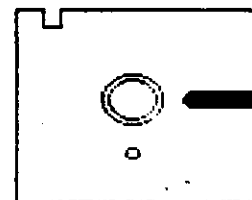
The advertisement I saw for the program showed a full page heart and a second page of half text and the other half devoted to a large bar graph. Sure you could do that but with a drawing area limited to seven rows deep by twenty seven columns wide or roughly the size of the pictures that I have included in this review you are better off limiting your

graphics to small pictures.

The word maker part of the program allows you to format your text in one, two or three columns. After you choose the number of columns you want a graphic representation of your page will appear in the center of your screen with the number of columns that you have chosen. A boxed area representing your picture is also shown on your "page" and you can move it to any location on the page you wish your picture to be located. The top third of your screen above the sample page of your text contained counters and your actual typing area. The counters are used to tell you what column you are in, what row and your position in that row. So not only can you actually see where you are at but the counters tell you exactly where you are.

This would be useful for drawing FULL PAGE GRAPHIC'S. Otherwise how could you ever get all those pictures to match up? (who really would want to go to all that trouble?) On either side of the sample page are "WINDOWS" telling you the row and column of your picture (if your text goes into the picture area a warning comes on in one of the "windows")

(continued)



TOMY CONTROLLERS

by JAMES P. DONOVAN
BLUEGRASS 99 COMPUTER SOCIETY, INC.

The "WINDOWS" also tell you if you have word wrap ON or OFF, the style of the FONT you are currently using (you can choose from ITALICS, BOLD, EMPHASIZED, UNDERLINED or RESET to the style you are currently reading) There is also a "WINDOW" to tell you if you are using a special feature of the word maker such as the "INSERT" function. If fact the functions of the word maker part of the program are: DELETE, INSERT, DELETE LINE, ROLL DOWN CHANGE COLUMN, ROLL UP, INSERT LINE, PREVIOUS MENU, WORD WRAP TOGGLE, PLACE PICTURE MODE, SELECT TEXT STYLE, SAVE TEXT, LOAD TEXT.

The word maker part of DESK TOP PUBLISHER is easy to use and includes enough features to make it not only a useful program but one that is easy to learn and use.

In fact DESK TOP PUBLISHER is in my opinion an excellent program that that lets you mix graphics and text to creat exciting letters, invitations, greeting cards, flyers and YES EVEN NEWSLETTERS!!!!

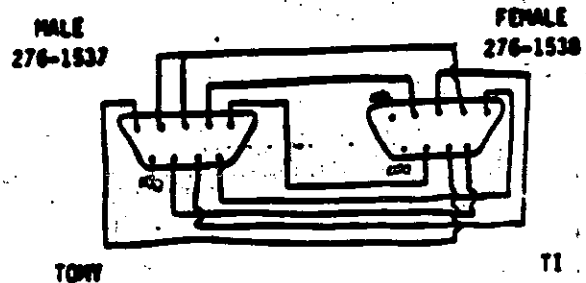
My only real complaint about the program is the size of the drawing area. But for my purposes DESK TOP PUBLISHER does everything I need it to do and until I get a "FULL BLOWN" system or until something better comes alone I give DESK TOP PUBLISHER an "A"

Steve Maupin
pekin users group

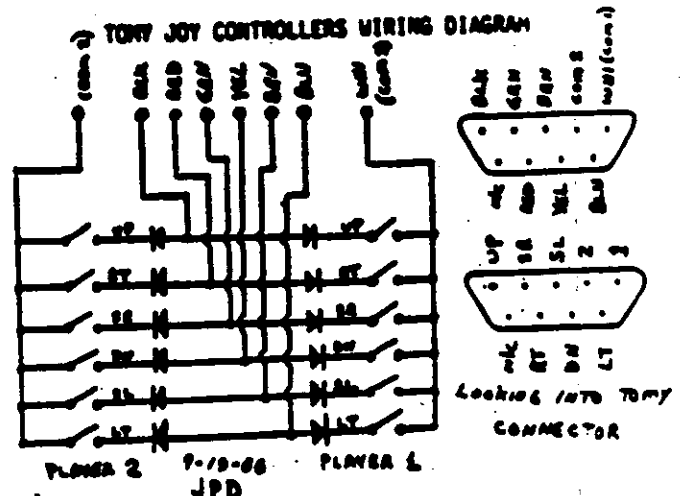


The Tomy Tutor computer was discontinued several years ago. Fortunately this computer used the 9900 microprocessor and was based on TI Extended BASIC. Although not totally compatible, the two systems are very similar. Recently the Zayre stores in Louisville, KY have started selling the Tomy computer, modules, and the Joy Controllers. The modules will not work with the TI directly!

I purchased a set of Joy Controllers for \$4.99 at Zayre, and they are very similar to TI in wiring. These controllers use the control disk operated by your thumb, similar to the Intellivision Games controllers. A male and a female DB-9 connector, and seven small pieces of wire are all that is necessary to convert the Tomy controllers to TI. The wiring is as follows:



The Tomy controllers have two fire buttons, SL and SR, on each controller. I wired the unit so both fire buttons on each controller operate. The controllers actually use snap switches and, like the TI, also have eight positions. The Tomy controllers have a more sensitive feel than controllers, and I think they provide a good replacement for the TI, once one gets accustomed to the thumb control.



From the R.O.M. Newsletter
of the Users Group of Orange County, Ca.

HORIZON P-GRAM CARD by Siles Bazerman

The latest hardware release from Horizon is the P-gram card. For those of you that missed the January meeting, where I demoed it, I will review it here.

If you take a collection of Random Access Memory chips, interface chips and control chips and assemble them into the right configuration you end up with a P Box card that thinks it is a module. This is what the P-Gram is all about.

Using a circuit developed by John Guion, Bud Mills has produced another card which promises to become a winner. The P-Gram is a P box card which allows the saving and loading modules from disk. It also has a memory editor which lets you customize your modules, or even create your own. It is available either in a kit form or assembled and can be obtained with an optional clock.

I ordered my card from Bud Mills Services prior to release after a phone conversation with Bud. I have experienced strong support from Bud and appreciate the excellent quality of his kits. This is the third of his kits I have purchased.

The kit comes complete with a cleanly etched printed circuit board, and all parts needed. You only have to provide solder, a soldering iron, and a screwdriver (1 screw to hold the heat sink in place). You also receive a disk of programs for the DSR, a disk of source code for the DSRs, and either (as advertised) a manual on disk, or in my case two manuals already printed.

The first manual is a construction manual by John Guion, the card designer. This is one of the finest set of instructions I have run across in over 40 years of building and assembling electronic kits. There is no question in what order or where parts go. The text and diagrams (which match the silk screening on the PC Board) eliminate any confusion. The other manual is an operating manual by Robert Jones, who

wrote the software, and John Guion. It is also excellent and contains full instruction for saving and modifying modules, assembly code for producing your own modules, and accessing the DSR in several ways. More code and assembly language than I could handle, and more tech info about the operating system than you really need to run the card.

I received board #005 and three hours after opening the carefully packed parts had the board built and ready for testing. Another half hour had it installed, tested and operational. Admittedly, I have an ideal soldering bench, with cardholder, iron stands, choice of irons, magnifying lens with light, etc. but anyone who can solder can assemble this kit with no difficulty.

The card runs as advertised. You can access the card and the clock separately from X-BASIC or BASIC with a "CALL PG". You then have a menu to 1 Initialize, 2 load, 3 save P-Gram (or module), 4 Memory editor, and 5 Quit.

Using this card you can not modify GROMS 0, 1, or 2. You can however look at them in memory, move them to other locations to save to disk and then study them to see how they work. You can access GROMS 3 to 7 and two 9K banks of RAM to emulate any and all modules. I have loaded TI, Atari, and Navarone modules successfully and following the docs modified several.

I have also used several packs done on a GRAMKRACKER with total compatibility. I believe you can even modify the GK utilities to work on the P-6 if you switch on Write Enable in software.

I would rate this card a straight A for all areas due to the excellent documentation and ease of use.

My eyes caught the following article while scanning the NLEs recently forwarded. It gives a lot of history of our 99 4/A, some technological developments of add-on. As editor of TI-dings I thought of adding it to our NL, Editor.

TECHTALIK by Mike Makinik

Some of you may have followed TI's developments in the time that the 99/4A was at it's childhood. All sorts of plans, marvels, new things for the home computer that "was ahead of it's time." There were several peripherals developed by TI but were only released in tiny quantities, mostly to the TI employees that got the pick of the crop. Some of these never made it to the production lines, but only a few prototypes survived.

The modem card, which essentially was a Movation Cat 300 baud modem, was placed on a peripheral card, and a DSR ROM was given it to control very low-level functions, such as modem-to-vdp RAM interrupt routine, powerup routines, etc. It would work with a command module, like TE II just as the disk manager module works with the low-level routines in the disk controller to perform the DOS functions. Only a very few of these survived. Another little known card was the IEEE 488 bus controller card. It contained the TMS9914 GPIB (general purpose interface bus) that allowed the lab and mechanical equipment that used GPIB to interface to the TI. One could access the GPIB like a file device. This same standard is found in unexpected places. Any of you have a Commodore 64? The communications bus used to convert it's ring-style bus of peripherals is a modified GPIB, one of Commodore's own design. The SCSI interface (small computer systems interface) is essentially a multi-GPIB, allowing very fast buffered serial transfer between storage devices. SCSI also has interrupt lines to alert the host that data is waiting to be read or written. The VCR controller, a \$500.00 range peripheral, along with support software, was introduced as a means to combine video from a VCR and the video from a TI. The card would control playback, hold, framing, and other functions. Digital Research created a similar product to control videodiscs that attached to an Apple or a Commodore 64, although much later than TI's development. The debugger card, a little known device, was in existence when the 99/4A was born. In fact, it's design can be rooted to the support hardware in the 990 minicomputer series. Essentially, the TMS9900 is a minicomputer on a chip. The editor/assembler GROM was a virtual image of the DX10 assembler used on the 990

minicomputer. Some directives one would only find on a minicomputer exist in the editor/assembler package, but were dormant in the 99/4A. The debugger board was designed to bring the 99/4A closer to a minicomputer's environment. The DMS90 program, included with the editor/assembler package, has several features that cannot be used without this piece of hardware. In fact, the editor/assembler looks as if it was taken direct from a 990 itself. The only added features were the GROM utilities, such as VMSW, DSRIMK, LOADER, etc. that didn't support the features that a 990 could handle. It's too bad that TI wishes to keep the plans for this card on ice, it would be a dream to program with. It allowed multiple breakpoints by using the XOP 3 opcode, which would allow you to step your program through and look for errors or miscalculations. Although we can do this through software, the debugger board used a hardware approach. The design of this board, and what it contained, are up for grabs. If anybody knows, I'd appreciate you sharing with the rest of us. Send me a letter. Still another rare peripheral was the GROM library peripheral. It essentially was a super-widget that could access ALL of the GROM in the cartridges. This would be handy for TI BASIC, since TI BASIC searches external GROM for subprograms. TI extended BASIC does this too, but doesn't search DSR ROM when a program is running. Modules like TE II, personal record keeping, and extended BASIC could all be plugged in and the CALL routines could be accessible to BASIC. BASIC could use the commands it wished to whatever, and all you had to do is plug your favorite "flavor" modules into the library peripheral to get the necessary language expansion. Imagine a GROM cartridge giving advanced graphics to TI BASIC, another for print spooling, still another for expansion memory control. Others for high speed cassette routines, etc. so the language could expand by adding cartridges. It's the same technique used with the peripherals: the computer never becomes obsolete, because it automatically responds to any new device attached. This is true of the library peripheral. This is another device I would LOVE to see.

Some of us have the MEX-BUS controller. In the days of the 99/2, the CC40, and the 99/8, the hex-bus controller was introduced for the 99/4A to allow compatibility with these devices. Essentially, they were designed like the Commodore 64's peripheral system, where a slow serial transfer was appropriate for the hex-bus devices, a disk drive wouldn't be feasible. So TI never considered the MEX-BUS disk drive. The Wafertape drive, the CAT modem, the RS232C/parallel interface, and the 4-color printer, were all developed. All were battery operated and could fit in a briefcase, as did the CC40. For the 99/4A, it was an inexpensive means to expand. The hex-bus controller was a small device containing a hex ROM that controlled the I/O drivers which "spoke" to the hex-bus peripherals. Since the main use was for the CC40, it wasn't pushed for the 99/4A. The 99/8 could also

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rely on the PG BOX for it's devices. It had it's own special FLEX CABLE card, which used some special control lines to expand it's own capabilities. Since the 995 used a TMS995, the same as the GENIEVE, it could use the extra 3 address lines in the PG BOX, giving a total address space of 2 to the 19th power, or 512 k of directly addressable memory. Since some of these banks were probably switched, the address space grew to a total of 4096 k, which is sufficient for MOST of my needs. The speed of this processor was greater, and it's throughput was even greater, but more on that later. Some other control lines were used, some to indicate a 990 or a 995 present in the system, some to allow multi-level interrupts, still others to initiate HOLD sequences, which are found on the mainframes, and large multi-user systems as a way to deal with wasteful processing, and interrupt idling. TI had a HARD DISK controller in the plans, probably IVARC's, but the technical date I have is 1982. I own a rare card. Some of you may remember a company called A/D electronics, out of Sacramento, California. They produced a control card which allowed sampling of environmental data through an 8-bit analog-to-digital controller. This device allowed backups of many items, such as temperature probes, light transducers, etc. and was mainly used as a scientific device. Some possible uses included home control, because it also contained a real-time battery backed clock. Plus, there were separate digital inputs and outputs, for switches and relays, respectively. My main use for the A/D card, FIRST ADE, is a mouse. The RADIO SHACK color mouse contains two potentiometers turned by a rolling motion of the mouse. The potentiometers, when interfaced with the ADC0809 chip, (two channels, x and y) gives me mouse control with TI ARTIST. I wrote the DSK myself, and have been using this device for about a year and a half. The KMP clock card is a similar device, although it does not contain a digital input or output array. The ADK card, however, could also switch external relays, or sample data on 16 lines (8 in, 8 out). If timing was correct, an 8-bit parallel interface was possible. I still use this card, and the clock is handy for keeping my p-system master disk up-to date. The PORTI music card was a device which allowed one to produce sound on not one but 4 extra TMS995 sound generators. By arranging the frequencies on the 12 music channels available, different waveforms were possible. Now, with the PORTI, sounds even a c-64 owner could envy were possible. And, there were 4 percussion channels independent of each other. I can imagine "AXEL-P" running on this card!! And of course, we all know of the more common peripherals, the triple tech, the disk controllers, the 32k cards, the RS232 cards. Even these make our computers sophisticated enough to meet TI's long dead expectations. I also own the p-code card, and another article is devoted to THAT!

I mentioned the TMS995 earlier. Just what exactly is a pipeline microprocessor? Well, the 995 is not only fast,

but it has a distinct advantage over others in it's class, even the intel 80386. Those processors rely on expanded address lines and increased instructions to increase throughput. There was a deeper approach, one that TI envisioned in the 995. A pipeline microprocessor is one that incorporates special hardware that allows it to have more than one part of the microprocessor running at the same time. These CONCURRENT functions provide that while one instruction is being decoded inside the chip, another is being fetched from memory. Still another is being executed after it has been decoded. At best, with top-down code, and very little jumps, the microprocessor can achieve a throughput 3 times, or more, depending on the level of pipelining, over a regular processor running at that speed. For example, if we put test code into a 995 and a 990 running at 12 MHz, the worst case is that the two run even. But the 995 can pipeline, and with the pre-fetch and post-store the 995 can LOOK like it's running 16, 20, or even 24 MHz. And with the reduced instruction set in the control ROM, the 995 has a distinct advantage over an 80386, it's MUCH cheaper to produce. The control ROM is a hard-wired design, while the 80386 has to be programmed externally. It is an easy device to interface to a memory system, and with no-wait state static RAM, the memory-995 combination (up to 4 megabytes) can be phenomenal.

Currently, I am working on a software project. It's a new DOS for the TI, somewhat reminiscent of COMMAND DOS that ryte data released some years ago. However, there is no image file required because the DOS I have resides in a E/A supercart, and the utilities that it needs are extracted from the E/A GROM--that way, I can restore the lower memory expansion to a defined state very quickly without reading from a disk drive. The DOS is completely self contained and will provide a choice for you on the master title screen. I am a college student, doing projects to complete my final years of undergraduate study in computer science. This project was inspired by a need for a better operating environment for the TI as well as a need for me to see if it could be done. Well, I have succeeded! The DOS uses the DSALINK utility to attach to the low level device drivers. It gives you the familiar A> DOS prompt, and will mimic DOS to a degree, but with one delightful exception--the DOS is being written by me, and I can have it do whatever I want it to! I will no longer be a slave to incomplete DOS commands or ambiguous and useless syntax, often the product of overpaid software developers. The commands are clear and precise, and the DOS is very short, only about 5k at this writing. Since most of the DOS is already present in our machines, in places like the E/A GROM, the disk controller ROM, the RS232 interrupt routine--all of these put together with the right glue can make a great DOS, and all I did was to provide the necessary glue for the parts, and it works! It has a batch file load and execute, D/F 80 loader (compressed/uncompressed), program file loader, dos

utilities (FORMAT, COPY, RENAME, DELETE, ASSIGN) and screen control commands (WAIT, BEEP, CLS, GOTOXY, PRINT, ECHO ON/OFF) and "smart" control keys, as well as a 255 character input queue for type-ahead. Many of the commands are internal, and they reside only in the supercart. Other commands can be created from object code, which you can create from any one of the compiling languages, or the assembler (I prefer the assembler) and by simply typing the name of the file at the command prompt, the file will be loaded and executed.

I hope to have some sort of language compiler for DOS such as a basic/pascal compiler, to facilitate creation of programs and utilities. My plans include a file transfer utility (terminal emulator), windowing, an 80-column editor, and multiprogramming. If for no other reason, then to gain experience and to enjoy doing it on my \$49.99 T199/4A. Of course, I wouldn't dream of charging anyone for this DOS, and I've had some interesting suggestions for names. Since my "other" hobby is SCUBA DIVING, "XIOS" for extended "P-DOS" by our own editor, DOS DEMETER, for PROGRAM-DOS, Input Output System, and whatever... I am using version 1.24 which is relatively complete. I would just like to add the bells and whistles, plus write a manual on it's use.

Now for some more TechTalk. If you are confused as to why computers like the C-64 and the apple all have DOS commands built in...well, the designers of those computers anticipated a disk system, and available to most users, so the operating system and BASIC language all had the DOS commands either in the disk unit itself, or in a disk BASIC which loaded in on powerup. Since TI did things a little differently, they preferred to make DOS a separate thing, with a disk manager module to handle disk tests and formatting. It seemed a little annoying that in order to rename a file from BASIC, you had to either load the program and save it under another name, or if it was a DATA file, you had to OPEN it and read all of the data, then re-save the data to disk under another OPENED file name. This could be terribly inconvenient to users, but consider what the others have...the C-64 must send all of it's DOS commands through a command channel, and the disk drive will run itself. It essentially is another computer, a 6502 based one, to be exact, that only accepts commands from a serial line and performs all of the disk commands. Imagine... a computer so STUPID that you need TWO computers to run any disk software...and you would be paying for TWO computers also. Commodore doesn't tell the average users that they are essentially using TWO computers instead of one. Apple computers are also based on the 6502 series of microprocessors. Apple used an old method of running it's computers...just write a DOS and put it on disk, and when the computer is powered up, the DOS is loaded. Funny thing, though. Although Apple boasts of 64k of RAM, much of that is used to hold the resident DOS, and BASIC. If you want to load a program which needs the space allocated by DOS, you

are out of luck, since your program might make DOS calls to perform disk functions. And if DOS were overwritten, then when your program is finished, it must go back and load it all over again. And 6502 is not exactly the processor I would waste terribly expensive memory on, since it has a very limited instruction set, and things I take for granted now, like memory-to-memory word moves, multiplication, division, and subroutine branching would be terrible to implement on an apple of commodore 64. I just don't know how they have survived this long...

Our little TI, on the other hand, has a wonderful method for handling new devices. The CMOS header, present on all ROM in the expansion box, and all command modules, is the link between the unknown and the known. It allows us to plug in new devices at any time in the future, and the operating system will immediately recognize the device, as if it were there from the beginning. This is what will keep our TI computers alive. The method of access is very similar to the IBM PC method. Each peripheral card has a certain address in the serial addressing fields. The operating system can turn on a card simply, look at what occupies a pre-defined memory area (>4000 to >5FFF for us) and can determine if the device exists. With the IBM, certain logical names are assigned to a physical device address, such as COM1, TT1, A1, LPT1, and so on, and can be changed according to the user's wishes. This requires a small modification to DOS to accommodate the new device, and from then on, a new sub-version to dos is created. If the device is removed, an error will be issued since DOS can no longer locate the installed device.

The CMOS header in the TI provides a standard table for finding a device quickly and efficiently. All of the devices use a pre-decoded 8k block of memory, and 8k is plenty for most devices. Since we are not limited to 64k of total address space (via memory paging in the MYARC or MYARCII rom cards), larger programs may occupy that memory and give our TI's a greater running capability. The IBM uses a segment register that is pre-decoded to page in banks of memory, which is essentially the same way the HRD or MYARC does it, so memory expansion is no problem. The safe area in the TI is the first ROM bank, which is the invaluable interrupt routine and powerup routines. the SUPERCART is the only save RAM alternative for a kernel or DOS, since it is battery backed and it remembers all the changes you have made to DOS. In the CPU, the only area you could use for your own bit-twiddling is the >400 to >1000 area, which is not decoded presently and could be wired to something (I will let you imagine that). It would not be a difficult task to interface an IBM card to the TI, provided you had the correct cross-wiring, and a ROM to control the new device. A few of us in the Chicago users group will attempt this... the price of IBM cards is falling like a rock, and I don't see any interfacing pitfalls.

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