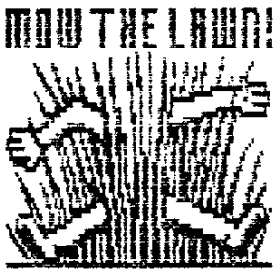
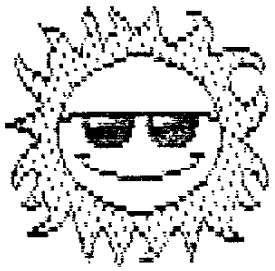
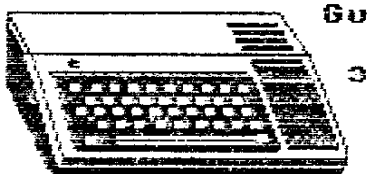
GUILFORD 99'ERS NEWSLETTER





SUPPORTING THE TEXAS INSTRUMENTS TI-99/4A COMPUTER



GUILFORD 99'ERS UG

3282 CANTERBURY DR

GREENSBORO NC

27408

TO:

Bob Carmany. Pres. and Newsletter Editor (855-1538)
Tony Kleen, Sec/Treas (924-6344) Bill Woodruff,Pgm/Library (228-1892)
BBS: (919)621-2623 --ROS

The Guilford 99'er Users' Group Newsletter is free to dues paying members (One copy per family, please). Dues are $12.00 per family, per year. Send check to:Tony Kleen c/o 3202 Canterbury Dr., Greensboro, NC 27408. The Software Library is for dues paying members only. (Bob Carmany Ed)

NEXT THREE MEETINGS

DATE: April 7, 1992 Time: 7:30 PM. Place: Glenwood Recreation
May 5, 1992 Center, 2010 S. Chapman St
June 2, 1992

KANGAROO TALES

As most of you know, I just got back from my second trip to Australia in February. It was a time to relax, drink a cold one now and then and visit with my 'mates'.

I spent the first two weeks in the Newcastle area with the former Hunter Valley UG bunch. As usual, their hospitality was superb!! The 'touristy' stuff was there --- a couple day trip to Canberra (the national capitol) with Brian Woods, the obligatory tour of several vinyards, and a trip to the Watagan Mountains. And, there were friendships to renew and pubs to inspect as well.

One evening, it was off to Tony McGovern's place for dinner. The Funnelweb spiders were asleep but Funnelweb Farm wasn't. Always on the lookout for some interesting material, I inquired if Tony happened to have any DSR's on disk --you know, for the RS232, Disk Controller, et. al. Well, he managed to come up with a few but said that he didn't know exactly where the one for the Disk Controller was at the present. It was too much trouble to look through all of the disks to find it so he reckoned that it would be easier to write a little utility to dump ANY DSR to disk from ANY CRU address. Some 15 minutes later, the program was done! Later, he suggested that, since the University wasn't in session, that we spend a few days at his 'weekender' at Hawk's Nest. I innocently inquired if it might be possible to take a look at the 40-column version of Funnelweb while we were there to see if some improvements and additions could be made to it.

Then, it was off to Hawk's Nest! The bad news was that it rained almost all weekend. The good news is that we got a few days of uninterrupted time on the computer. Watching Tony work in assembly is a real treat! He seems to be at home in either source or object code. Anyway, the changes came fast and furious! When he had finished, F'WEB Vn 5.0 was contrived. The editor had been reworked to a substantial degree. Most of the 80-column features have been incorporated in the new 40-column version. There is marking for a 'temporary' file. So, now you can have two marked files available at the same time and you can toggle between them. Instead of scrolling down 22 lines at a time in one jump, the scroll is now a single line continuous scroll as long as you keep the key depressed. Oh yes, it IS bi-directional! The editor will now save three sets of tabs with each document as well. Everything has been speeded up and the editor code compacted to such a degree that Tony was even able to put the machinery for the European TI-Writer files into the editor. Now, all of the character sets that version uses are available as well --- a letter in German, anyone?

When I left, Tony was tidying up the last few little bugs and tinkering with a couple of other things as well. I expect to have a finished copy in the near future. I can't wait to see the finished product.

From Newcastle, it was up to Urbenville for a few days with Ron Kleinschafer. Urbenville is a tiny place near the New South Wales-Queensland border. The population can't be more than a couple hundred at best. Ron has quit the Opal fields and found a veritable 'gold mine' in TV and small appliance repairs. It seems that he is the only one in the area with the expertise to work on any of that gear. Even a trip to the general store usually leads to a couple of fix-it jobs.

The area around Urbenville is positively prehistoric in appearance. There are huge chunks of rock sticking up everywhere with rainforest as well. It wouldn't be beyond the imagination to see a dinosaur come around the corner of one of those outcroppings!

Anyway, we did manage to spend a few nights on the ol' TI. The first project was to modify Tony's DSR dump program to add the appropriate header so that the files could be directly used with Ron's EPROM program. Then, a bit of slashing with SPELLIT to fix a lurking bug there. The results were impressive on Ron's machine but less so on mine. I think that the problem is hardware-specific after all.

Besides the usual souvenirs, I did manage to bring back something for the computer. I got the Hunter Valley prototype Quest card (without chips) and a Horizon (with chips). The original prototype Quest board is interesting. It originally was designed with an on board clock as well. Although the design never worked out quite right, there is a labeled space for the clock chip on the board. Hmmm! I'll have to write a letter to Neil Quigg about is sometime. Maybe a socket and a chip or two . . .

The Horizon, on the other hand, doesn't seem to like the Quests. I think it is the 8.14B ROS that is causing the problem. At any rate, I doubt that I will use it for the present. I might even pack it up and send it back to Bud Mills for a diagnostic check to see if there is a hardware problem or something gone wrong while in transit.

TI HISTORY

THE ORIGINAL TI HOME COMPUTER SYSTEM
antiques described by Charles Good
Lima Ohio User Group

The "original" TI Home Computer system, released to the public in 1979 and 1980, consisted of the 99/4 computer (without the "A") and a series of stand alone peripherals that plug directly into the side of the 99/4 (or 99/4A) console, or into the side of the previous peripheral (hence the unofficial descriptive term "freight train peripheral"). Each of these freight train peripherals except the speech synthesizer has a base that measures 17x26cm (a bit larger than 6.5x10 inches), a separate power supply rated at 0.2A (23 watts) at 115 volts, and its own separate power cord. I recently purchased a "4" (just to play with) and was later given many of the freight train peripherals. After using these devices for a while I realize how fortunate we are to have the "4A" and its peripheral expansion box.

Components of the "original" TI home computer system are listed below, together with their official TI part numbers and some prices mostly quoted from an ad by CBM INC of Lexington KY published on page 12 of the first edition (May/June 1981) of 99er Magazine. These CBM INC prices are probably below TI's official list price. These peripherals are not the same as those designed to fit in the PE Box. PE box peripherals all have "PHA12xx" part numbers and are described in official TI publications as "cards".

--TI 99/4 console, (PHC004C): $499
--RF (TV) modulator; in 1980 this was an extra cost item, (PHA2100): $41
--Solid State Speech Synthesizer; the same one most of us still use, (PHP1500): $122
--32K RAM memory expansion, (PHP2200): $325
--RS232 Accessories Peripheral, (PHP1700): $183
--Solid State Thermal Printer, (PHP1900): $325
--Disk Drive Controller, (PHP1800): $243
--Disk Memory Drive, (PHP1850): $399
--P Code Peripheral, (PHP 2400): $399.95
--Video Controller, (PHP2300): $699.95

Prices of the last two items are official list prices quoted from TI's suggested retail price list dated June - December 1982 (1049705-1).

You can connect a maximum of three peripherals in series to the right side of the computer. If present, the speech synthesizer has to be first and the 32K second. A "typical" freight train minimum expansion system (99/4 with modulator, 32K, thermal printer, controller and one drive) would be almost four feet wide and cost $1832. Bringing the system up to the maximum of three SSSD drives and buying all the other freight train peripherals would bring the cost up to a total of $4035. Wow! And you can only have simultaneous use of 3 peripherals.

In this article I will describe what I know about these freight train peripherals. I have hands on experience with the Thermal Printer, 32K, and Disk Controller. I will not discuss the Speech Synthesizer since the 1979/80 device is the same one we are all familiar with. In a separate article I will describe my experiences with the 99/4.

--32K EXPANSION MEMORY: This functions exactly like the equivalent PE box card. These days you can, for about $10, buy a 32K RAM chip that measures about 1x3cm and draws very little current. It amazes me that TI's original 32K was so bulky and required a 23 watt power supply. A 12 inch black and white TV only draws 29 watts. But I guess if you compare a 1955 room sized UNIVAC computer in memory, watts of power consumption, and bulk, the vintage 1979 TI 32K looks pretty good.

--RS232: This stand alone box offeres only one RS232 port and no parallel port. The PE Box RS232 card allows connection of TWO RS232 (serial) devices (with a special Y cable) AND one parallel device all to the same card. The PE Box card is obviously superior to the stand alone peripheral.

--DISK DRIVE CONTROLLER: This device used the original DISK MANAGER module (the DMI), and can control up to three SSSD stand alone drives. Double sided is not available with the freight train disk controller. The main difference between the DMI and DMII modules is that the "I" has no provision for double sided disk initialization. A TI stand alone drive plugs directly into the back of the freight train Disk Controller without the need for any special adapter cable other than the cable that comes with the stand alone drive. Other drives plug into the cable of DSK1 using a small adapter board. A special cable that comes with the PE box controller card is needed to plug a stand alone TI drive to the back of the controller card for use as DSK2 or DSK3. An interesting feature of the freight train controller in combination with the DMI module is that they do not recognize the "whole disk protected" byte >10 of sector zero. With the TI PE box controller and the DMII module, if this byte is set for a value of >50 you cannot copy the disk with the DMII.

--THERMAL PRINTER: This is printer device "TP", and was sold to TI users

at a time when cheap dot matrix or daisy wheel printers cost $600+. The 1982 list price for the 99/4A's official dot matrix printer was $750. The TP uses 3.5 inch thermal paper, prints 32 characters per line, and like all thermal printers is both quiet and slow. 3.5 inch thermal paper rolls are a non standard size these days. TP users either have to purchase 10 year old official TI paper from one of the few TI dealers that stock this item, or use a paper cutter to trim 8.5 inch FAX paper rolls down to 3.5 inches. Such 8.5 inch wide FAX rolls are commonly available these days from many stores including SEARS, KMART, and WALMART. On the title page of the TP manual it says that the TP "prints a copy of a TI BASIC program or the screen displays from certain Command Modules." And that is about it! A few modules, such as MUSIC MAKER, allow screen dumps with the TP. You can specify output to the TP with the DMI, DMII, PRK, Statistics, LOGO2, and maybe a few other modules. You can't use the TP with TI Writer, Funnelweb, the EA module, or Microsoft Multiplan. From BASIC you can LIST a program to the TP, a common application. You can also OPEN a file to the TP using any of these file attributes: SEQUENTIAL or RELATIVE, DISPLAY or INTERNAL, OUTPUT or APPEND, FIXED or VARIABLE. I can't imagine what use RELATIVE, INTERNAL, or APPEND have in OPENing a printer file. When opened in INTERNAL, the printer prints a meaningless graphic of the internal representation of each ASCII character. The maximum length of a VARIABLE TP attribute is 32. All printed characters of the TP's built in character set are on a 5x7 dot grid. The TP has a unique graphic set for ASCII 0-31 and the usual alpha/numeric characters for ASCII 32-127. Each printed dot of a character is printed only once and individual dots can be seen with the naked eye. There is no way to make extra dense high quality characters. Emphasized, double strike, and "NLQ" is not available. The user can also, using an 8x8 dot grid, redefine ASCII chars 32-159 in BASIC using CALL CHAR, and then directly print any of these redefined chars to the TP with the appropriate keyboard keypress as in PRINT #1:"⌊" where ⌊ has been redefined, or with PRINT #1:CHR$(xxx). This is a neat trick! It is much harder to print redefined characters with other kinds of dot matrix printers.

--VIDEO CONTROLLER: A photograph and brief description of this peripheral appears as part of an article on page 53 of Volume 1, No. 4 of 99er Magazine (Nov/Dec 1981). The photograph shows a box identical to that of the stand alone 32K or disk controller, with a cable coming out of the right side where the "pass through" expansion bus is found on other stand alone peripherals. The article describes the video controller as allowing "computer controlled interactive video with VCR's and Video Disk Players", whatever that means. As evidenced by the videos we created from the formal presentations at the 1990 Lima MUG Conference, it is possible without this device to mix human voice, computer audio and video output, and video camera footage on the same video tape. Such mixing of various audio and video sources was done by us manually however, not under computer control. An extra cost cable ($99.95 for each of the three available cables in the June - December 1982 TI price list) is needed to interface the video controller to a Sony or Panasonic VCR or a Pioneer video disk player. I really don't understand the need for computer control of a video disk player. If I remember correctly, 1980 video disks resembled phonograph records in that you could only PLAY them from the beginning, not record onto them.

--P CODE PERIPHERAL: My June - December 1982 TI price list states that this device is "available only until replaced by peripheral card", with such a card "available in second quarter 1982." The freight train P Code peripheral is apparently exactly equivalent to the PE Box P Code card.

There you have it folks, the original TI Home Computer expansion "system". Now you know why the expansion port on the 99/4 and 99/4A is on the SIDE of the

console, rather than on the back where it should have been placed. You can only use three of these freight train peripherals at once, and they take up huge amounts of desktop space. Aren't you glad we now have the PE Box!

I want to acknowledge the generous gift of Mr. E.T. Breer of the St. Louis Missouri User Group who gave me several of the freight train peripherals described in this review.

[This article/item comes from the January 1991 issue of BITS, BYTES PIXELS (Charles Good, editor)]

ARCHIVING

A lot of people are puzzled by archiving and how to use Barry Boone's Archiver. What follows is both a reference guide and explanation of Archiver III. It is not meant to totally replace the documentation for this program. Actually, I haven't seen a distribution copy that comes with a set of instructions. There may be hidden features of ArcIII that aren't obvious to me (for example, Disk Utilities by John Birdwell has a feature to figure decimal-to-hex conversions).

What exactly is archiving? Putting it simply, when you archive you take a file or a set of files, and group them as one file then compress them so they take up less disk space. Some software comes archived. These ALMOST always include the archiving program. Examples are Jack Oughrue's PLUG! and the Complete Adventure disk set.

What is the purpose of archiving? Well it started out as a money saver for modem users. It is faster, and thus cheaper, to send 90 archived sectors as 1 file, than 120 sectors for 3 programs. Now it is also a means of backing up disks. You can save each of your disks as a one file, squashed archive. You can specify whether you want compressed files or not. The reason you have a choice is that some unusual files actually take up more space when they are compressed. Another useful application of archiving is when you have programs you want to keep, but don't need ready to use. You can keep archives of all these files instead of taking up disk space.

OK, now that you have the "what", here's the "how". As far as I know, the only archiver is Barry Boone's program. Its operation is completely different from Archiver II. Rather than add new features to past versions, Archiver was completely re-written. It usually contains an XB LOAD program, but may be loaded from E/A. The program's filename is usually ARC1. It can be found on almost all of the bulletin boards, as a commercial version with Geneve utilities, in user group libraries, with other Fairware programs or from the author. Chances are, you can definitely get a copy.

First things first, so get the program loaded. After that, you should see a Fairware notice. Press any key to pass this. You then see a menu. Each menu option is described in detail below.

1) Archive Files - These options are largely self-explanatory. As you may have guessed, this option archives files. Pressing one will deliver a set of prompts. These are "Source Drive (1-Z)". Yes, you can have drive numbered from 1-9 and A-Z. Then comes, "Output Drive (1-Z)". You may use one drive. Archiver will prompt you to change disks when needed. It is highly recommended that you use a blank output disk, since archives may fill or almost fill a disk. Next comes "Output Filename". This is usually the name of the disk you are archiving, or some related heading. For example, a set of D/V 80 articles may be named "ARTICLES". The following prompt is "Pack all Files? (Y/N)". If

you answer "Y" then all the files on the source disk are archived. If you answer "N", then when Archiver is working, you are asked "Include filename? (Y/N)" If you answer "Y" then that file is archived, otherwise it is ignored. This is a handy feature if you have programs and files for example, and need them seperated. This process repeats for each of the files on the source disk. The final prompt is "Compress? (Y/N)". Saying "Y" and Archiver attempts to squash each file so it takes up less space. Remember that some unusual file types will actually get LARGER if compression is attempted. When all the prompts are answered, press REDO to correct an error in your answers, BACK to return to the menu, or any other key to continue. When Archiver is done performing any operation, pressing a key goes back to the main menu.

2) Extract Files - This is the opposite of archiving. It will let you pull (extract) files from an ARC file. You are first asked for the source drive. Next you input the source filename. After that, you are asked for the output drive. It must be stressed that the output drive for ALL operations of Archiver should be different than the input drive. You may run out of space or overwrite a file accidently. Output disks should be blank.

The next prompt asks, "Extract all files?" If you answer "Y" then every file stored in the ARC file will be taken out. If you answer "N" then when extracting starts, the program asks, "Include filename?" for every separate file in the archive. Again, press REDO (to restart this option), BACK (returns to main menu), or any other key to continue.

3) Catalog Disk - This is fairly self explanatory. Simply input the source drive name. The program will ask if you want a printout. If you answer yes, then you are asked for the printer name. If there are more files than can be displayed, then [more] is printed on the screen and pressing a key advances the screen.

4) Catalog ARC File - If you aren't sure what files are contained in an archive file, than this option tells you. You are asked for the source drive, source filename, and whether or not you want a printout of the list of files.

5) File Copy - This option will copy a file (obviously). Simply supply the source drive and filename, and the output drive and filename.

6) File Rename - Again, this option should explain itself. Give the source drive and filename, then the output filename.

7) File Delete - Supply the source drive and filename.

8) File Un/Protect - You first supply the source drive and filename. You are then asked "Protect?" If you answer "Y" the file is protected. Otherwise, file protection is lifted.

9) List Text File - This will display or print a D/V 80 file. Give the source drive and filename. You are then asked if you want the file printed or not.

10) Load FW - This returns to Funnelweb. Simply give the drive number on which the UTIL1 file is located.

NOTE: When an I/O error occurs, pressing a key returns to the main menu. If you have a Geneve, this is for you. Using a sector editor, find the string 04E08C00 and replace it with D8018C00.

I think that this should get people on the road to understanding archiver. Remember that it is fairware, so if you find it very useful, send the author (Barry Boone) a donation.

[This article/item comes from the January 1991 issue of BITS, BYTES PIXELS (Charles Good, editor)]

HORIZON MODS

Here are a couple of unpublished modifications that you can make to your Horizon RAMdisk to improve its performance. You make these modifications at your own risk but they come directly from Bud Mills.

The first 600 serial #'s have two red LEDs. The top LED should be green or yellow to protect the U11 chip during powerup. The first 1200 serial #'s may have too high a resistance value in series in the battery circuit. It should be approximately 66 ohms total or two 33 ohm resisters --one at each end of the battery string to ensure a proper charge rate for the NICADs.

The first modification replaces the powerup circuit on the card by wiring it into the console RESET line. The mod consists of removing one diode, one resistor, and one capacitor and wiring pin 6 on the card edge to the positive side of the capacitor connection. Edge pin 6 is the third connector from the right on the component side of the card (with the edge connector toward you).

On HORIZON serial numbers below 100 remove C8, CR2, and R2 and connect the wire from pin 6 to the front (or left) hole of the R8 location.

On HORIZON serial numbers above 100 remove C1, CR3, and R5 and connect the wire from pin 6 to the positive side of the C1 location.

The second modification is a card disable switch to hide the card from the rest of the system. The switch allows you to turn off the RAMdisk in the event of a system crash or whenever the computer locks up. It preserves the contents of the card and eliminates the need to remove the batteries to regain control of the card.

The modification is simple. On serial #'s 1999 and below we remove the voltage from pin 6 of U20 (U20A on HRD+ serial #'s above 1999) and reconnect it via a resistor (1-10K) though a SPST switch to ground. Closing the switch pulls the pin low and shuts off the CRU access at U20. With 32K memory modification use U20C.

Bend pin 6 of the chip out and attach enough wire to reach the switch and connect the resistor from pin 6 to pin 16 of the same chip. Run the wire to the switch that you have mounted at the top edge of the card. Run a lead from the other pole to a nearby ground and you are finished.

HRD+ circuit boards below 1999 required the stacking of chips at U20. Attach the wire and resistor to the top chip's pin 6 and cut off the bottom end.

PICS OF PIXELS

There might be times when you would like to take a picture of your monitor or TV screen, be it to capture your stunning graphics creation or the super Parsec score that junior ran up in his twelve hour joystick workout. Whatever the occasion might be, following are some pointers to make your photographs more successful:

1) Use a slow shutter speed (1/10 sec) to avoid video scan lines. Unlike a soap opera there is no fast moving action on your monitor that needs to be stopped thus a slow shutter speed is just fine.

2) Your monitor or TV screen picks up more reflections than you are aware of, but your photo will show. Be sure that all room lights are off and the room is otherwise dark.

3) Turn the brightness control on your TV or monitor way down, since you are working with long exposures anyway, there will still be plenty of light for your film, but the characters on your screen will "bleed" less and thus look sharper in the picture.

4) Any commercially available black and white or color film will do. Film with a higher speed will allow you to stop down more for added depth-of-field which is needed since the surface of the screen is curved and not flat.

5) Move in close so that that which you want to show fills up the frame of your picture. The proportions of the TV screen and 35mm film do not match, thus unless you move in close there will be dark bands at the top and bottom. A single lens reflex camera is best to assure good framing. If you use a view finder camera, read up on parallax correction in the instruction manual that came with your camera (on close distances the axis of your viewfinder and the camera lens are no longer in alignment).

6) The center of the camera lens should be aligned with the center of the screen to avoid distortion. Hint: Use a rubber tipped toy dart as an alignment aid. Attach it to the exact center of the screen and then line up your camera such that no part of the dart shaft is visible when looking through the camera finder! A sturdy tripod helps.

MULTIPLAN

MICROSOFT MULTIPLAN (tm)
an Electronic Spreadsheet
by Tom Kennedy

ELECTRONIC SPREADSHEETS...CELLULAR ANALYSIS...FORMULAS...
CELLULAR REFERENCING... WORKSHEETS...ABSOLUTE REFERENCING...

These are buzzwords of a form of Data Processing that on the surface appears to be incomprehensible to all but accountants and the bridge crew of the Star-Ship Enterprise. As Word Processing is to writing a letter, Data Processing is to using a multiplication table.

Many people have a hard time using spreadsheets, because working with data in this format is similar to learning a new language. But once you learn to use the commands, and the procedure of working with data in a two-dimensional row/ column format instead of a one-dimensional equation, you'll find many ways in which Multiplan will allow you to "crunch numbers" faster and easier than using a calculator and notebook. More than that, Multiplan is flexible enough to be used anytime you want to display, or use, numbers or words in a row/column format. In fact, you could even adapt Multiplan to use it as a Word Processor!

What is a spreadsheet? In business, you often hear reference to "our books". The "books" that the businessmen, and you & I, keep are a pen & paper record showing the Debits and Credits of various bills paid and assets gained, plotted against a scale of time. Each intersection of row and column contains an entry for a value. The last column and/or last row contain a summation of all previous columns or rows. In an electronic spreadsheet, you recreate the printed form with the addition that each "cell" (a row/column intersection) can also contain a mathematical equation, or "formula", that automatically acts upon pre-defined cells and displays the result accordingly. If any value in any cell is changed, the formula instantly updates displayed results. This self-maintenance ability is what pays off in using an electronic spreadsheet, such as Multiplan.

To operate the Multiplan software on the TI, you must have 32K memory expansion, and at least one disk drive. An RS232 card and a printer are also handy, but not mandatory because unlike word processing, where the end result is a printed piece of paper, the end result with a spreadsheet is useful data, which may be used many ways. Most worksheets are well over 80 characters in width, (up to 2016!) and this requires a cut-and-paste job, so a wide-carriage printer is preferable.

To load Multiplan, you insert the cartridge and program disk, select Multiplan from the menu, and press <ENTER> to load. Before pressing <ENTER> you can select one of eight screen color combinations by pressing the space bar.

The first thing you will see is a grid across the top and left side of the screen. These numbers are the row and column locations in the top left, or "HOME" position. There are 255 possible rows and 63 possible columns, with the screen framing a small section. Each "CELL" is referred to by its row/column location, such as: R1C1, R10C22, etc. In R1C1, The Home position, there is a solid rectangle, as large as the width of the cell. This is your cursor, or "CELL POINTER", which is where any entry will appear. Below the cell grid is the COMMAND LINE, which shows the primary commands you will use. There are a number of sub-commands related to each of these, but you must type the first letter of the primary command first, or place the cursor over the command and hit <ENTER>.Below the command line is the MESSAGE LINE, which prompts you for further information when needed. In the bottom left corner is the current cell pointer location, and to the right of that is the contents of the current cell. Lastly, in the bottom right corner is the available memory space remaining.

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Appendix A is a list of the twenty commands shown in the Command Line, with the forty sub-commands that apply to each.

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ALPHA The first command given before entering text into the current cell location. All alpha-numerics can be used, but numbers will be treated as text, and can't be used as values for calculations.

BLANK Used to erase the contents of a specified cell or range of cells. Blanked cells retain their location and format.

COPY	Allows you to duplicate any cell or cells in any number, including both cell format and content.
DELETE	Completely erases a row or column.
EDIT	Allows you to edit the contents of a cell, or the formula in that cell, without re-entering the data. Requires careful use of the EDIT keys.
FORMAT	Defines all of the various parameters of cell width, content, and display of data.
GOTO	Moves your cell pointer immediately to any cell, by giving the row/column or pre-defined name. Also used to move from one window to another.
HELP	Calls up a detailed HelpFile (from disk) that covers the whole Multiplan software, including a command summary.
INSERT	Inserts a blank row or column, formatted to DEFAULT settings.
LOCK	Protects the cell, or formula, from accidental overwrite.
MOVE	Moves a cell, or group of cells, to specified row/column, deleting the original.
NAME	Allows you to give a name to a cell to aid in future references to that cell. "Total" or "Sales" are examples.
OPTIONS	Covers global options such as RECALC, MUTE, & ITERATION. The most important of which is canceling RECALC, to avoid waiting for each entry to recalculate the entire worksheet.
PRINT	Used to print the worksheet. Before printing, you must first define the extent of the field to be printed with MARGINS and OPTIONS, then select PRINTER to start output. PRINT FILE outputs to disk instead of the printer to be included into a Word Processor file, or other cases where you need the worksheet stored in ASCII format.
QUIT	Self explanatory, provides a "safe" exit.
SORT	Sorts entries in cells in a specified column, in either ascending or descending order.
TRANSFER	Includes six sub commands which are used: to LOAD, SAVE, RENAME, or CLEAR an active worksheet. Also, to DELETE a file from a disk, and an OPTIONS command to define disk filename and format.
VALUE	Used to enter a numerical value or formula into a cell. This must be used for numbers that will be used in calculations.
WINDOW	A window is used to overlay one or more portions of a worksheet with another. As an example, to hold the titles of columns fixed while the data scrolls underneath. The sub-commands define how the windows are opened, closed, or linked together. A border can be defined to offset it from the worksheet.

eXTERNAL Allows related worksheets on disk to be linked as a source of data for the active sheet. Any range of cells can be drawn up for reuse. Multiple worksheets can be linked relative to each other so as to work together.

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Appendix B is a list of the Key Functions used in the TI Multiplan version. Most functions have two optional keystrokes choices. This is to allow flexibility as to how you prefer to access them.

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CELL POINTER CONTROL KEYS:

F-E
F-X
F-S
F-D
: Typical cursor keys, scroll the sheet up, down, left, & right. As in BASIC.

C-E
C-X
C-S
C-D
: Page scroll. Similar to cursor scroll, except moves in one screen-width or -height blocks.

C-6 (C-W) Moves cursor to the next window as defined with the WINDOW command

C-3 (C-F) Jumps to the next unlocked, unblank cell to the right, skipping over cells protected with the LOCK command.

C-1 (C-Q) Jumps to the "HOME" position, ROW 1/COLUMN 1, which is the view seen when first starting up Multiplan.

F-1 (C-2) Opposite of C-1 ("HOME"), except stops at the lower right corner

ACTION KEYS:

<SPACE> In Command mode, (when command choices are displayed) skips through the commands, highlighting each with the cursor. Hitting <ENTER> selects the highlighted command. In the command menu tabs through each response field.

C-H (F-9) (When not editing) Backspaces through the response field, opposite of <SPACE>, to make selections of options.

C-A (C-I& C-2) TAB key. Tabs over a response field to the next selection.

C-C (C-=) Cancels current operation. A failsafe "escape" to abort command selection.

F-4 (When printing file) Aborts printing operation.

<ENTER> Activates a menu selection or command.

F-7 (F-I) Activates and displays the helpfile, which must be on the default disk drive (see TRANSFER OPTIONS)

F-8 Recalculates the entire worksheet when the RECALC feature has

been cancelled with the OPTIONS command.

<-, +,& 0-9) Invokes the VALUE option of data entry, as opposed to ALPHA, for text entry.

EDIT KEYS:

C-H (F-9) Backspaces through data entry for editing

F-0 (C-Y) Single-character delete.

C-4 (C-L) Skips to the next character right (like "F-D" in BASIC)

F-4 (C-K) Skips to the next character left (like "F-S" in BASIC)

C-5 (C-P) Skips to the next word right.

F-5 (C-O) Skips to the next word left.

C-7 Changes all relative references to cell locations (I.E. R[1C[2) to absolute references. (I.E. R2C5)

==========

Upon selecting a command, a command menu appears with a number of response fields shown. In each response field is a proposed response, which is the default selection unless you change it. To use a command, type it's key letter and fill in the response fields. To move through the fields, use the tab key until the cursor is highlighting the correct area. Type in your response, and either tab to the next field or hit <ENTER> to activate the command.

When the necessary response is a row/column cell reference, there are two ways to respond: Absolute and Relative. Absolute referencing is a numerical definition of the cell location, such as R5C10 (the intersection of ROW 5 and COLUMN 10). A group of cells, a RANGE, is called by giving the boundary intersections separated by a colon(:), such as: R2C1:R4C10 defines a 3-by-10 cell grid consisting of columns 1 through 10 on rows 2 through 4.

Relative referencing involves identifying the desired cell by displacement from another cell, usually the one the cell pointer is currently on. As an example, if you are on row 5, column 10, (R5C10) and you wish to refer to a cell two rows up and three columns over, (R3C13) you could type in R-2C+3 or use the cursor keys to move the cursor over R3C13. The relative address will automatically update as you move. When the cursor is in place, hit <ENTER> (or tab to the next field) and the reference is defined.

So far, I have covered what you see on the screen and in response to the various commands: what the commands and key functions are; and how to fill in response fields where needed. Before going on to building a worksheet, you'll need to know how to save what you're working on, and how to load it back in. Besides the fact that you'll want to take a break occasionally, it's nice to be able to experiment with the commands, "messing up" the worksheet, and then loading the "clean" version back in to continue.

The LOAD and SAVE commands are under the command TRANSFER (a lousy name).

Hit "T" and the menu will be displayed. Since the first option is LOAD, hitting <ENTER> now will prompt for a filename. To select SAVE, (or another option) hit the first letter and <ENTER>, or tab through to the desired item and hit <ENTER>. When loading or saving, you'll be prompted for a filename the first time, which will become the default response.

Multiplan also incorporates an extensive helpfile contained on disk. When the command line is displayed, you select HELP with either the Help action key (<AID> or "?") or by typing "H". The worksheet will be replaced by the beginning of the helpfile. If a command has been selected, hitting the help key will display the specific section of the helpfile that pertains to the command you are using. The help menu allows you to RESUME (return to command menu), START at the top of the helpfile, or move to NEXT or PREVIOUS page of information.

The first step to creating a worksheet is to decide how many rows and columns you'll need, and how the data will be displayed. It is best to sketch this out on paper to get a feel for how it will look. Also, you'll need to decide what formulas will have to be created that use the data contained in the worksheet. Lastly, you will probably want to change the format of many of the cells, usually by rows or columns. Most often, the formatting required is for display purposes. Cell width, alignment of the data within the cells, etc.

Now that you know how everything will look, begin by formatting the cells. Upon start-up, the cells are set with a number of defaults. You may want to change the widths of some columns, to between 3 and 32 characters, to show all of the entry for the cells. If the data in a cell is too large to fit the width of the cell, it will be truncated to fit, unless it is a numerical entry, where it will be replaced by a sting of "#"'s.

FORMAT CELLS is used to set cell alignment and display format. A cell can be aligned to either center text for columnar headers, etc., or to align data displayed in tables. For instance, a table of dollar values could be shown with a "$" in front and decimal points aligned.

The display formats are used to show how the data appears in a cell. CONTinuous allows the text in a cell to run over the right boundary to the next cell. If all cells are made continuous, you have a word processor-type format. EXP displays numbers in scientific notation. Fixed Point rounds off decimals to a defined number. GENeral is as you see when starting up, values displayed as entered. INTeger rounds off all numbers to integers. "$" (Dollar) adds a dollar sign to numbers and rounds to two decimals. "*" Replaces the number with an equivalent number of asterisks, to use like a bar graph. "%" displays the number in percent form. Lastly, the "-" just leaves the setting at the previous option.

Now that the cell formats are defined, it's time to start entering data. Begin by labeling your rows and columns, as necessary. To enter data, either text or values, move the cursor to the desired cell and hit either "A" or "V", depending on the type. The command line will disappear and you'll be prompted for either text or value. Type in your entry and hit enter either <ENTER> to return to the command line, or use the appropriate FCTN-ARROW key to move to the next cell. With the FCTN key, when you land on the next cell, you are prompted only for text/value entry. In this case, you do not hit A or V to declare type, but when you begin entering data, Multiplan decides what style the data is, and responds accordingly. The only disadvantage is that there's a slight delay between the first

character of your entry and the remainder, so if you type in, for instance, the word "TOTALS" too quickly, all you'll see in the cell is "TTOLS". After a bit of use, a "stutter" habit is developed in how you enter data, so this becomes less apparent. When entering data, if an error is made, do not use the FCTN-S key to backspace for correction (as programmers are used to), the backspace key is CTRL-H (as telecommunication folks are used to).

If, after creating part of a worksheet, you need to add or delete rows or columns, three commands apply. DELETE completely removes any number of rows or columns. BLANK just removes the data in the cells, the row/columns remain and retain their formats. INSERT creates a new row or column set to the default settings.

Formulas are used to perform a mathematical computation upon the data in a cell or group of cells. One example is in a sales order form, where you have a column of data that is totaled at the bottom, multiplied by a tax percentage, and the tax added to the result. The cell in which the sub-total is to appear would contain a formula describing a sum of the data in the columns, expressed as either a chain addition problem, (R3C5+R4C5+...+R10C5) or using the SUM() function and a range of cells. (SUM(R3C5:R10C5)). The formulas can become quite complex, depending on the work performed. Appendix C contains a list of the mathematical functions that can be used in building formulas.

Formulas can also consist of names of cells as the operand , as in "SUBTOTAL x .079", to calculate the entry for a cell named TAX. Names are assigned with the name command. Names can be any continuous string of alpha- numeric characters, but must begin with a letter. Simply place the cursor over the cell to name and press N. Type in the desired name to the response field, and TAB to the next field. The current cell will be shown as the proposed response. If a range of cells is desired, hit the FCTN key, at the cell response, to move the cursor from the current location to the end point, then hit <ENTER>. In this manner, a whole row or column can be named. Names can also be used in the GOTO command to aid in moving quickly to a location. "GOTO TOTALS" for example.

```
* Program to dump SINGLE 8K
 ROM DSRs to disk
*----------------------------
-----------------
* Object file is auto-run
* Raw dump - no EA 6 word f
ile header
* Change DSRLEN EQU as need
ed eg >1000 for 4K
* Change CRU address as nee
ded       <<<<<<<<<<<<<
* Then reassemble



* FUNNELWEB EQUS

DSRLNK EQU  >FFD4
FILENT EQU  >FFCC
FWREGS EQU  >FF7C
CMSRET EQU  >FF5C
HEXDIG EQU  >FF24

VDPPAB EQU  >1000
VDPBUF EQU  >1050

* Set length of DSR to be s
aved

DSRLEN EQU  >2000
  For full 8K DSR


* Use FW workspace

       AORG >A050

START  EQU  $
       LWPI FWREGS
       LI   R0,>2000
       BLWP *R8
       DATA 0,>300
       BLWP *R9
       DATA >64
       DATA QUERY,QUELEN

       BLWP *R9
       DATA >A4
       DATA PROMPT,PRMLEN

* Set CRU base
```

```
       SETO @HEXDIG
  Allow only hex dihits
       BLWP @FILENT
       DATA >A4+2,1
       CLR  R12
       MOVB @>8322,R12
  >8322 is first byte of FIL
ENT buffer
       ORI  R12,>1000
     (else use VMBR from scr
een)

* Get dump file name

DDNAM  EQU  >144

       BLWP *R9
       DATA >104
       DATA DSAVN,DSAVL
       BLWP *R9
       DATA DDNAM
       DATA DNAME,12
       BLWP @FILENT
       DATA DDNAM+3,1
       MOVB @>8322,@DNAME+3

       BLWP @FILENT
       DATA DDNAM+11,1
       MOVB @>8322,@DNAME+11


* Dump DSR to VDP     <<<<<
<<<<<<<<<<<<<

       LI   R0,>0100
  >0001 for 16 bit HRDs   >0
100 for 8
       LDCR R0,8
  <<<<<<<<<<<<<<  8 or 0 fo
r 16
       BLWP *R9
  VMBWD
       DATA VDPBUF
       DATA >4000,DSRLEN
  Assume no problems in read
ing memory mapped adr
       CLR  R0
       LDCR R0,8
  <<<<<<<<<<<<<<  8 or 0 fo
r 16

* Save file to disk
```

```
*----------------------------
---
* Error return to title scr
een

       LI   R0,DSRLEN
       MOV  R0,@FILLEN
       BLWP *R9
  Load PAB data to VDP
       DATA VDPPAB
       DATA PABDAT,PABLEN

       LI   R0,VDPPAB+9
  Set SCNAME pointer
       MOV  R0,@>8356
       BLWP @DSRLNK
  FW DSRLNK (no data)
       JEQ  ERROR
  Immediate error

       MOV  @CMSRET,R11
  Fetch FW central menu retu
rn
       RT



ERROR  BLWP @>0


* Various PAB data

PABDAT DATA >0600,VDPBUF,>0
FILLEN DATA >2000
       DATA >0C
DNAME  TEXT 'DSK5.DSRDMP1'
NXFILE EQU  $-1
PABLEN EQU  $-PABDAT


QUERY  TEXT 'Which DSR CRU-b
ase ?'
QUELEN EQU  $-QUERY
PROMPT TEXT '>1000'
PRMLEN EQU  $-PROMPT
DSAVN  TEXT 'Dump to File'
DSAVL  EQU  $-DSAVN


       EVEN

       END  START
```