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Chapter 1 : trs80gp - A TRS Model 1,2,3,4 Emulator

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Of course, the renumbered program should have line numbers far above the line numbers of the original program to ensure that there is no interference between them. Otherwise some lines from the renumbered program might be inserted between lines in the original program, or worse, replace those lines. Not all DOS programs have both. Well, for one, Omni Resources Corp. For another, Nashua Corp. One such company spoke only of the "contamination factor. Omni Resources, which runs ads in these pages, has no problems with spinning floppies in both directions. Omni has a network of dealers in the U. Yes, but not without some alterations. You have to cut a write-protect notch in the opposite edge of the disk jacket, otherwise you will never be able to write on the second side. Also, you must cut another index hole thru the jacket, so the photocell can detect the light from the LED for sector timing when the disk is turned over. The head of a software company gave me the details, "You can take floppies and notch them yourself. School Newsletter For several years, a computer newsletter was published for teachers in the Cleveland public school system, which had started to use the TRS computers throughout the secondary schools, and for the educational computer organizations in the area. Havenhill, who edited the newsletter, tried to publish it monthly, but had to suspend it due to lack of time. He hoped to start it up again, last time we talked. The first issue, published in September , provided three graphics programs graphing functions, drawing line segments, and line graphs with program lines explained; a merge program; and five pages of basic TRS tutorial with simple programs for hands-on use. Later issues included information about computer courses given by local Radio Shack stores, tutorials on TRS graphics, a glossary of computer terms, and details of an upcoming computer programming contest. In his most recent letter, the newsletter editor noted that although the schools had several dozen of the Model I connected to TV sets with 23 screens and had ordered a dozen of the Model III, he suspected that "the Color Computer will be a better general purpose educational computer than the Model III or Model I. Hopefully the newsletter was or will be resumed but, having published the first personal computer newsletter in the world from to , I know all too well the problems of trying to find time, as well as money. I was once trying to solve a very complex puzzle on the computer, but I gave it up it would have taken about 30 hours. Instead, I made a screen editor and solved it easily. The cursor can be moved, without harming whatever it passes over, by using an arrow in conjunction with SHIFT. Things may be typed as normally done. Typing in three-number sequences will produce the corresponding character. If it is, then the program moves to line 70, which puts a G in the lower-right corner. Line 80 counts three key depressions, and lines turn the three numbers if they are between and into a graphics character and display it on the screen. As written, this program, which does a great deal for such a short one, can create text or graphics on the screen but can neither save them nor edit previously written programs. So I wrote Alex to ask what he used the program for. What I did was this: I set up a chart like this:

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Chapter 2 : IBM Deskmate : Tandy : Free Download, Borrow, and Streaming : Internet Archive

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May not work on modern, fast PCs. Does not work with. DSK files full disk images , only with individual files. The XLR8er was a hardware product from Misosys. End of copyrighted software listing. Contributors The material here comes from a variety of sources. Much of it was supplied directly by Roy Soltoff himself. Many thanks to Roy for digging through his basement to find copies and send them to me. Many thanks to them all! A few items came from my own collection. Some of the material not received directly from Roy may not have been the final version. Art McAninch supplied much Misosys software from original distribution disks. Irwin Burton supplied four additional Misosys programs and scanned in the documentation for three of them. Gary Shanafelt supplied a small but nice modification to Super Utility 4. Finally, he converted several manuals to Word 97 format, so you can make reprints that look better than the originals! Kim actually did not work on SU 3. Rich Deglin co-author of Misosys C and several other Misosys products has given me a pile of interesting stuff from his collection, including a complete hardcopy set of Misosys Quarterlies, hardcopy documentation for nearly every Misosys product ever released, a hardcopy of The Source, original source code for Misosys C on diskette, and a few other items. It would take many hours to scan in all the hardcopy, a daunting task. Of course, the people who originally wrote all this software deserve the most recognition! Misosys obtained products from a variety of sources. Some were written entirely in-house, some were written with outside collaborators, and some were purchased. The early contributors to LDOS are listed in the front of the manual, and you can also read about the early history of LDOS from my personal point of view on another of my Web pages.

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Chapter 3 : Steven L Mandell: used books, rare books and new books @ calendrierdelascience.com

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It is generally easier to refer to them as the Model 1, Model 2, Model 3 and Model 4. The Model 1, 3 and 4 are a line of compatible computers. The Model 2 has its own line of compatibles including the Model 12, 16 and which are not yet emulated by trs80gp. It should run well on any machine produced in the past 7 or 8 years. The source code is fully organic and hand-crafted by myself and my brother Peter. Emulates floppy disk, cassette, hires graphics, orchestra 80 and printer. Window scalable to any size with realistic phosphor-dot rendering. Near perfect video emulation including beam drop-outs, wait states and various other subtle effects. Can visually indicate Z video memory conflicts. Cycle perfect sub-instruction Z and video timing. Built-in Z debugger with source level debugging using zmac. Switchable turbo mode for high speed yet still accurate operation. Auto-turbo modes to go fast during slow operations e. Audio capture to WAV file. Load programs directly from command line for fast development and testing. Keyboard selectable between normal and game mode. Software keyboard to get around limits of PC keyboards. Brightness, contrast and display colour controls. Batch mode and command line input to automate tasks. Can open files and disk images within. Optional emulator extensions provide memory protection and timing to the Z Bus tracing, disassembling, profiling, memory dumping and other features for reverse engineering and debugging.

Chapter 4 : Documentation â€" TRS Model 4 Emulator for MS-DOS

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The screen is reflective, not backlit. These last 12 are tactile "button"-style keys. Almost all keys other than the 12 function keys are capable of rollover without phantom keys appearing depressed , so multi-key combinations can be used. The basic unit includes: System bus interface DIP socket under a cover on the bottom of the machine. It could not run from the rechargeable nickel-cadmium batteries available at the time, but a hardware modification was available that made this possible. Many times several attempts to read a tape were required, along with much adjustment of the volume setting. This allowed the Model to display 40 or 80 column video on an external television set or video monitor. One empty drive bay permitted the installation of a second disk drive which proved handy for backing up disks. A bar code reader wand was also offered. ROM firmware[edit] When first switched on, the Model displays a menu of applications and files and the date and time. Cursor keys are used to navigate the menu and select one of the internal or added application programs, or any data file to be worked upon. This is similar to other Microsoft BASICs of the time and includes good support for the hardware features of the machine: Like previous Microsoft BASIC interpreters, variable names were restricted to two characters and all program lines and subroutines were numbered and not named. However, the default for floating point numbers is double-precision. Often after speed-typing a sentence or two, the user would have to wait several seconds for the computer to "catch up". As a small compensation, many users found it somewhat amusing watching the text appearing on the display, particularly text inserted into the body of a paragraph. A perhaps not well-known but documented feature of TEXT was that it partially supported the WordStar command interface. Another invisible deleted file named "RickY" refers to Rick Yamashita. According to Gates, "part of my nostalgia about this machine is this was the last machine where I wrote a very high percentage of the code in the product". Optional ROMs can be installed in the Model , providing a range of customized application software. Some commercial software applications for the Model were also distributed on cassette. Workarounds exist for this problem. Since the century of the date is not important for any of the software functions, and the real-time clock hardware in the Model does not have a calendar and requires the day of the week to be set independently of the date, the flaw does not at all impair the usability of the computer; it is cosmetic. Applications[edit] When introduced, the portability and simplicity of the Model made it attractive to journalists, [14] [15] [16] who could type about 11 pages of text and then transmit it for electronic editing and production using the built-in modem and TELCOM program. Data is protected by a built-in rechargeable Ni-Cd battery when the AA batteries discharge or are removed for replacement. There are several simple programs available on the Internet for transferring files between a Model and a modern personal computer or a vintage one. The Model was also used for industrial applications and in science laboratories as a programming terminal for configuration of control systems and instruments. Its compactness ease of handling and small space requirements , low maintenance needs, lack of air vents a plus for dusty or dirty environments , full complement of ports, and easy portability made it very well suited for these applications. Third-party peripherals for the Model extended its battery life and file storage capacity. Software was designed, and is still available, to extend the display capabilities to 60 columns and 10 rows of text using smaller characters and to provide more advanced word-processing or calculation software than the supplied programs. To this day, hobbyists continue to design games, applications, and hardware for this device. Simple drawing programs and games using the pixel-addressable display were favorites among users. As with virtually all other contemporary home computers, users are able to create their own applications using the included BASIC programming language. There are no built-in facilities for assembler programming, but the thoroughly-documented BASIC interpreter by Microsoft offered the clever coder tricks for accessing machine code subroutines. These tricks usually involved packing the raw object code into strings or integer

arrays, and would be familiar to veteran programmers for the older TRS Models I and III. Peers and successors[edit] The Tandy [17] was introduced in as a more capable sister product of the Model Rather than the "button" style keys of the Model , its four arrow keys are a cluster of keys of the same size and shape as those comprising the keyboard, though the function and command "keys" are still of the button type. The Tandy includes Multiplan , a spreadsheet application. It also added DTMF tone dialing for the internal modem, whereas the Model only supports pulse dialing. The last new model that could be considered part of this line was the Tandy , introduced in October Similar to the Tandy , it features a flip-up screen, but with 80 columns rather than Built-in features include a 3. This reduction in size and weight was made possible by the substitution of surface-mount chip packaging. The earlier and smaller Epson HX of used a much smaller LCD display, four lines of twenty characters, and had an internal cassette tape drive for program and file storage. GRiD was later acquired by Tandy. It was released in The Zenith ZP , also of , was introduced prior to the Tandy The two computers were notably similar, although the ZP did include BASIC and could be configured with more memory, but did not have a built-in diskette drive. Computers from two other British companies were similar in form and functionality to the Model The Cambridge Z88 of , developed by British inventor Sir Clive Sinclair , had greater expansion capacity due to its built-in cartridge slots. It had a far more sophisticated operating system called OZ that could run multiple applications in a task-switched environment. The firmware contained a powerful application called Pipedream that was a spreadsheet that could also serve capably as a word processor and database. Many modern laptop computers are larger and heavier than the Model However, practically none of them run 20 hours on batteries without a battery change. The Laser 50 educationa l computer is in the same size and form factor as the Model , and was sold by Video Technology. It concluded that the computer "is an ingenious, capable device Radio Shack Catalogs dot com. Retrieved April 10, Radio Shack Catalog. Retrieved January 8,

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Chapter 5 : TRS Emulators | Ira Goldklang's TRS Revived Site

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It will also come up automatically when a breakpoint is hit. They also can be set on the command line by the -b option. The debugger will also activate if the Emulator Extensions are used and the Z tries to access a protected area of memory. All values are displayed in hexadecimal. There is also a view of the top of the stack and a T-state counter which can be changed as desired to measure intervals interactively. The Step button move execution forward a single instruction. Step Over sets a breakpoint after the current instruction and resumes execution. This is useful for CALLs to run quickly though a subroutine. The "Bus Fault Enabled" checkbox may be turned off to disable protection checks. When single stepping the display will turn gray to give an indication where the CRT beam is at that moment in execution. The debugger is still operational when the TRS is running. Since the screen shows the contents of the previous frame and the drawing of the current frame you will not usually see an immediate change when writing to screen memory. It only shows up when the CRT beam reads and draws it. The debugger memory view gives you the ability to see immediate changes to the various different RAM systems. You can also select just the RAM to focus on the 48K or memory. But keep in mind these other view uses their own addressing. In a clunky way RAM can be changed. The easiest approach to to select a memory byte and write a new hexadecimal value for it. The emulator simply reads back the memory dump so you can also delete a line and enter any address followed by a colon and a series of space-separated hexadecimal bytes to change memory locations without having to look at them. A few pseudo-memory regions are viewable but not changeable. They are intended to give a partial view of the TRS hardware state. Z Port Writes The last value written by the Z to a port. At the bottom of the window are line of check boxes and drop-downs to control bus tracing which is dicussed later. Source Level Debugging My zmac cross assembler will output machine language programs in. It is a text format so by looking at it and the zmac source code you can probably figure out how to generate it yourself. But the important part here is that loading. It will look a bit like an assembler listing file. The current program location will be highlighted and follow the execution of the Z The format also defines symbolic labels so you can type these labels in to the breakpoint or register windows instead of having to look up the hexadecimal values yourself. You can also use labels for the -b command line option to set breakpoints. Advanced Recording Sometimes examining memory in the debugger is too cumbersome. The normal recording options can assist debugging. It may be helpful to step through a video a frame at a time to see some graphical glitch in detail. The "MHz Audio" option takes this to the extreme by recording audio output a sample rate equal to the speed of the Z In effect this lets you see exactly when the audio changes. The other options attempt to self-document in their output. When they do their final output the use whatever value is in RAM at the time for the disassembly. If the program changes you may seen confusing output. This gets even worse if the memory mapping changes. All these recording options can be activated and stopped at any time. It is useful and often desirable to start them when the program is stopped in the debugger and then stop them at the next breakpoint after an interesting subroutine or full step of a game simulation has run. It is intended to help measure where your program spends its time to be used as a guide for optimization. It can also be used to simply track what a program as done during an interval. However, "Bus Use" is better for that task and Trace will show every instruction in order. In theory you can use this to respond to a crash. The output is much like a disassembler but with markup indicating how memory was accessed: The intent here is to distinguish the loaded program from the ROM or operating system routines it uses. If the program is sufficiently put through its paces the result should be a good disassembly that can be assembled to produce the original code. However, this is a problem if the program relocates itself. At least "Bus Use" will help understand the relocator code. Emulator Extensions These are enabled by the -ee command line option. Here is a brief overview: Function is typically used to end a test in batch mode. The bus

permissions are very helpful in tracking down nasty bugs. For example, you can set your code section to execute-only. The emulator will trap into the debugger the instant something tries to overwrite over your code. Or even read it. Another useful technique is turning off stack permissions at the bottom and top of your stack to detect stack overflow or underflow. For function 0 the lower 6 bits in B are set to indicate what Z operation is allowed on that memory location. It also places markers in the output file to indicate when a frame has ended and when one second of execution has finished. It can be activated a program start with the -trace option. The full log is recorded in the output file. The output can be voluminous. The "Tracing" checkpoint in the Z Debugger is a convenient shortcut. This is handled by the device drop-down. The interface is awkward. As you select each device in the drop-down the checkmark to the right changes to indicate if that device is being logged. Obviously these controls should be in some other window but the debugger happened to be handy at the time. The actual logging looks something like this: The second is the PC of the Z when the operation occurred. The type of access follows. Most are "ex" for instruction execution with a disassembly of the instruction following. Other possible operations are: Some devices are very simple in that any byte read or written can only have one meaning. But for the CRTC a write to a register depends on which register was previously selected. Without the annotation you would have to search backwards for the last register selection. Not all devices provide annotations. If they do then you can bet they were giving us trouble in developing the emulator. Most of the Model 2 devices have annotations. By the way, the underscore and signs in front of addresses are intentional and useful. But searching the word ffb2 will find instructions that reference the address. Or you can search for ffb2 explicitly to restrict your search to only instructions executed at that address. George Phillips, August 27,

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Chapter 6 : System 80 System 80 - Site Map

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One way around this is to use the TRS keyboard layout described later , but another is to use the numeric keypad. For instance, pressing SHIFT and 8 on the numeric keypad will generate a left parenthesis [ ], just like it would on a real Model 4. Delay Menu F5 The Model 4 emulator automatically adjusts itself to as close to true Model 4 speed as possible. However, there are times when this adjustment is not quite right, or when you want to run your emulated Model 4 faster or slower than normal. This is where the delay menu comes in. To invoke the delay menu, press F5. You will see a menu with a list of saved delays. To select an existing delay, use the up and down arrow keys to highlight the appropriate name, then press ENTER. To modify an existing delay, use the up and down arrow keys to highlight the appropriate name, then use the left and right arrow keys to adjust the delay value. To delete the highlighted delay, press D. To create a new delay, press N. Now you can change the delay value using the left and right arrow keys. Snapshot Menu F6 Note: Snapshot support is included in the registered version of the emulator only. A snapshot is a saved image of the emulated Model 4 at a particular point in time. You can be in the middle of an application or a game , save a snapshot, exit the emulator, and turn off the computer. At some later time, when you re-enter the emulator and load that snapshot, you will be right back where you were, as though you had never left the machine. To invoke the snapshot menu, press F6. You will see a directory of snapshot files they have a. To save a snapshot, press S. You now have three options: Press ESC to exit without saving a snapshot. You do not need to include the. Press TAB to switch to directory mode, then use the arrow keys to highlight the snapshot filename you want to use. Note that if you save a snapshot under the same filename as a previous snapshot, the previous snapshot will be erased. To load a snapshot, press L. Again, you now have three options: Press ESC to exit without loading a snapshot. Press TAB to switch to directory mode, then use the arrow keys to highlight the snapshot you want to load. You will see a menu with a directory display of virtual disk files at the top and a listing of virtual drives at the bottom. To place a virtual disk file in a virtual drive, press the number of the virtual drive zero to three. If the virtual disk file does not exist, you will be asked if you want to create it. If you do want to create a new virtual disk file, remember that the new file is like a new, unformatted floppy disk. You will have to format it with the operating system of your choice before you can use it with the emulator. Press TAB to select a virtual disk file from the directory display. Use the arrow keys to highlight your selection. To map a virtual drive to an actual PC drive, press the number of the virtual drive. To write protect a virtual drive, hold down the SHIFT key, then press the number of the virtual drive. To reboot the emulator from within the virtual disk menu, press R. Remember to treat virtual disk files with the same care as you would treat real TRS disks. Also, be aware that the emulator will not allow the same virtual disk file to be mounted in more than one virtual drive at a time. LS-DOS requires that you turn on support for drives 2 and 3 before you can use them. You will see a list of options described below. To select an option, press its first letter except for the Volume option â€" see below. Sound â€" This option controls how sound sent to the Model 4 speaker and cassette port is handled. It controls how loud the Sound Blaster sound will be played. Higher numbers represent louder sound. To decrease the volume, press the minus sign -. Printer port â€" This option controls where Model 4 printer output is sent. LF after CR â€" This option is important only if printer output is being sent to an actual device. RS port â€" This option is supported in the registered version of the emulator only. Keyboard â€" This option controls which keyboard layout to use. The first five options map keys on the PC keyboard to appropriate equivalents on the Model 4 keyboard.

Chapter 7 : TRS Model - Wikipedia

Working With Application Software TRS 80 B Version. Steven L. Mandell. from: N/A. Sg, Computers & Information Processing. Working With Application Software.

The SAM is a multifunction device that performs the following functions: Its main purpose is to control the DRAM but, as outlined above, it integrates several other functions as well. It is connected to a crystal at 4 times the television colorburst frequency This is divided by 4 internally and is fed to the VDG for its own internal timing 3. Switching the SAM into 1. As such, the display shows garbage; this mode was seldom used. Writing even bytes sets that register bit to 0, Writing to odd bytes sets it to 1. However, this is not required and results in the creation of some new display modes not possible when the VDG is used in a system alone. There are two versions of the SAM. There are some minor timing differences, but the major difference is the support of an 8-bit refresh counter in the version. Some third party bank-switching memory upgrades that used K DRAMs needed this 8-bit refresh counter to work. VDG[edit] Power-on screen of a CoCo 2 The MC is display generator capable of displaying text and graphics contained within a roughly square display matrix pixels wide by lines high. It can display 9 colors: In alphanumeric mode, each character is a 5 dot wide by 7 dot high character in a box 8 dots wide and 12 lines high. This display mode consumes bytes of memory and is a 32 character wide screen with 16 lines. The internal ROM character generator only holds 64 characters, so no lower case characters are provided. Lower case characters were rendered as upper case characters with inverted color. Although simulated screen shots would show this as green on black, on most CoCo generations it was actually green on very dark green. Semigraphics is a hybrid display mode where alphanumerics and chunky block graphics can be mixed together on the same screen. If the 8th bit of the character is set, it is a semigraphics character. If cleared, it is an alphanumeric. When the 8th bit is set, the next three bits determine the color and last 4 bits determine which "quadrant" of the character box is either the selected color or black. This is the only mode where it is possible without sneaky tricks to display all 9 colors on the screen simultaneously. The alphanumeric display has two colorsets. The one used by default on the CoCo has black characters on a green background. The alternate has black characters on an orange background. The colorset selection does not affect semigraphics characters. The border in this mode is always black. In this mode only 4 colors are possible but the Colorset bit of the VDG can select two different groups of the 4 colors. Due to a peculiarity of its hardware, only two colors are available in graphics blocks when using Semigraphics 6 on the CoCo. This creates the "virtual" modes Semigraphics 8, 12, and These modes were an interesting curiosity but not widely used, as the Semigraphics screen consumed bytes of memory. These modes were not implemented on the CoCo 3. CoCo enthusiasts created experimental programs to try to reverse engineer the modes, and were able to reconstruct the missing documentation. In resolution modes, each pixel is addressable as either on or off. There are two colorsets available, the first was black dots on a green background and green border, the second, more commonly used one has white dots on a black background with a white border. In color modes, each pixel was two bits, selecting one of four colors. Again the colorset input to the VDG determined which colors were used. The first colorset has a green border, and the colors green, yellow, red, and blue were available. The second colorset has a white border and the colors white, cyan, magenta and orange were available. The maximum size of a graphics screen is bytes. It is not possible to reliably display dots across the screen due to the limitations of the NTSC signal and the phase relationship between the VDG clock and colorburst frequency. In the first colorset, where green and black dots are available, alternating columns of green and black are not distinct and appear as a muddy green color. However, when one switches to the white and black colorset, instead of a muddy gray as expected, the result is either orange or blue. Reversing the order of the alternating dots will give the opposite color. Most CoCo games used this mode as the colors available are more useful than the ones provided in the hardware 4 color modes. Unfortunately the VDG internally can power up on either the rising or falling edge of the clock, so the bit patterns that represent

orange and blue are not predictable. Most CoCo games would start up with a title screen and invited the user to press the reset button until the colors were correct. The CoCo 3 fixed the clock-edge problem so it was always the same; a user would hold the F1 key during reset to choose the other color set. Users in PAL countries saw green and purple stripes instead of solid red and blue colors. Thus, the entire set of Extended Color Basic graphics commands could be used with the artifact colors. Some users went on to develop a set of 16 artifact colors[how? Use of POKE commands also made these colors available to the graphics commands, although the colors had to be drawn one horizontal line at a time. Some interesting artworks were produced from these effects, especially since the CoCo Max art package provided them in its palette of colors. Lower case and the T1[edit] Sample character set display of T1 VDG in true lowercase mode The is capable of using an external character generator. Several third party add-on adapter boards would allow the CoCo to display real lowercase characters. Its other changes were mainly to reduce parts count by incorporating an internal data latch. The lower case capability of this VDG is not enabled by default on this system and is not even mentioned in the manual. Only through some tinkering and research was this feature discovered by intrepid CoCo users. The T1 may also carry the part number XCP; these may have been pre-release parts. The earliest CoCo models had two standard chips. Functionally the and are identical and one can put a in place of the if that part is bad. Some external pull-up resistors may be needed to use a to replace a in a CoCo for normal keyboard operation. This means that precise software controlled timing loops are easily implemented. This reduces hardware cost, but reduces system performance as the MPU is unavailable during these operations. They must wait until an error occurs or all the data needed is read. CoCo 3 hardware changes[edit] The hardware in the CoCo 1 and CoCo 2 models was functionally the same; the only differences were in packaging and integration of some functions into small ASICs. The CoCo 3 radically changed this. Aside from the graphics enhancements outlined above, the CoCo 3 offered true lower case, 40 and 80 column text display capability, and the ability to run at 1. While the CoCo sported perhaps the most advanced 8-bit processor ever made, that processing power came at a significant price premium. In order to sell the CoCo at a competitive price, its relatively expensive processor was not tied to any specialized video or sound hardware. In comparison, the derived processor in the Commodore, Apple and Atari systems was much less expensive. Both Commodore and Atari had invested in advanced graphics and sound chip designed for arcade games and home game consoles. By tying these specialized circuits with an inexpensive processor, Atari and Commodore systems were able to play sophisticated games with high quality graphics and sound. The trade-off is between a system with an expensive CPU that does a lot of work, or an inexpensive CPU that controls the registers of its sound and video hardware. The CoCo video hardware was derived from a chip designed as display for a character based terminal, and is a completely "dumb" device. Similarly, the sound hardware is little more than a 6-bit DAC under software control. All graphics and sound require direct CPU intervention, and while this allows for great flexibility, its performance is much lower than dedicated hardware. Games drove system sales then as they do now, and with its poor gameplay performance, the CoCo attracted little interest in officially licensed ports of popular games. The CoCo 3 did improve graphics capability and doubled CPU performance, but still contained no hardware graphics or sound acceleration. Drawing was performed by the CPU, and most of the new graphics modes required at least twice as much processor time due to increased display resolution and color depth. The sound hardware was not changed at all. Every computer platform is a compromise, and despite the significant graphics and sound handicap the CoCo may have had, it still had a sophisticated CPU under its hood with extremely high performance. There were many independent clones of popular games available, but far more important was the availability of " killer apps " for the CoCo. Even the BASIC interpreter was one of the most powerful available, and provided the user with a rich set of easy-to-use commands for manipulating on-screen graphics and playing sounds. Some of the hardware limitations were overcome with external add-ons, particularly expansion cartridges. Some were made by Tandy, some by other manufacturers. OS-9 applications communicate with OS-9 and its drivers. This allows for a degree of hardware independence. In order to support such programs or at least, those that bypassed BASIC and

addressed hardware directly , any future CoCo version would have to be hardware-compatible with the CoCo, or perfectly emulate every aspect of the CoCo. In contrast, OS-9 programs relied only on OS-9 functions, and its drivers could be rewritten to work with different hardware. OS-9 was an additional product that had to be loaded manually each time the computer was started. Writing an OS-9 program meant appealing to a smaller subset of the CoCo community; this discouraged development of OS-9 products. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. December Learn how and when to remove this template message On October 26, , Ed Juge of Tandy announced that the CoCo 3 would be dropped from its computer line. With no apparent successor mentioned, the announcement was disheartening to many[who? To this day, current and former CoCo owners agree [21] that Tandy did not take the CoCo very seriously, despite it having been their best-selling computer for several years. Radio Shack fliers and stores typically depicted the CoCo 3 running CoCo 2 games, and offered a very limited selection of CoCo 3 specific software.

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It used a Zilog Z80 processor clocked at 1. Performing a read from the keyboard area of the memory would return the state of a particular set of keys. Many users complained about the TRS Model I keyboards, which used mechanical switches and suffered from " keyboard bounce ", resulting in multiple letters being typed per keystroke. The change was subsequently added to a firmware ROM revision. The keyboard hardware was also modified to minimize bounce. The root cause of the key bounce was found to be dust, dirt, etc. This problem was most common among heavy smokers smoke and ash particles. The key switches could be cleaned, rectifying the problem, but the bounce would be back again when the keyboard was re-exposed to the contaminating environment. Later production runs of the Model I computer replaced the nameplate with a numeric keypad. Older versions could be upgraded with a numeric keypad add-on by keyboard replacement, which also remedied the key bounce problem because other parts of the system would be updated by the service technician during installation. The color of the screen text is faintly blue the standard P4 phosphor used in black-and white televisions. Green and amber filters, or replacement tubes to reduce eye fatigue were popular aftermarket items. Later models came with a green-on-black display. Complaints about the video display quality were common. As Green wrote, "hells bells, [the monitor] is a cheap black and white television set with a bit of conversion for computer use". This had little effect on normal BASIC programs, but fast programs made with assembly language could be affected. Software authors worked to minimize the effect. Notwithstanding the primitive display hardware, many arcade-style games were available for the Tandy TRS A simple half-hour hardware fix could correct that. By installing a seventh done by piggybacking it onto chip 6 , it was possible to display all characters which includes lowercase letters. The manual for the popular word processor Electric Pencil came with instructions for modifying the computer. Although the modification needed to be disabled for Level II BASIC, its design became the industry standard and was widely sold in kit form, [37] along with an eighth chip with descenders for the lowercase letters. Later models came with the hardware for the lowercase character set to be displayed with descenders. Both 64x16 and 32x16 video modes are supported, which is in contrast to 40x25 used by Apple and 80x24 used by some dumb terminals. The choice of 64x16 was part in economics, part in physics and part in usability. To support 80x24, twice as much static ram would be required 7 additional RAM chips, 9 chips total with the extra address decoding needed , plus there was no room on the board to put any extra chips. The Model I was originally intended to be used with a user supplied black and white television, what could physically be displayed on a s black-and-white TV. With 1K of RAM address space, a maximum of 16 lines are possible. With higher density RAM chips and dedicated purpose build monitors, higher resolution crisp displays are obtainableâ€”80x24 character displays were available in the Model II, Model 4, and later systems. The Model I has no built-in speaker. Square wave tones can be produced by outputting data to the cassette port and plugging an amplifier into the cassette "Mic" line. Most games used this ability for sound effects. An adapter was available to use Atari joysticks. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. July Learn how and when to remove this template message Cassette tape drive[edit] User data was originally stored on cassette tape. To find the correct volume at first use, the load was started and the volume was adjusted until the TRS picked up the data. Then it was halted to rewind the tape and restart the load. Users were instructed to save multiple copies of a software program file, especially if audio tape cassettes instead of certified data tape was used. A special program was loaded using the conventional tape interface. Then the radio broadcast was connected to the cassette tape interface. This helped the situation, but tape operation was still unreliable. Some programmers wrote machine-language programs that would increase the speed to up to 2, bits per second without a loss of reliability on their tape recorders. With the Model III and improved electronics in the cassette interface, the standard speed was increased to 1, baud that worked quite reliably on

most tape recorders. For loading and storing data from tape, the CPU created the sound by switching the output voltage between three states, creating crude sine wave audio. The first version of the Model I also had a hardware problem that complicated loading programs from cassette recorders. Tandy offered a small board which was installed at a service center to correct the issue. The ROMs in later models were modified to correct this. Model I Expansion interface[edit] Only the Model I used an Expansion interface; all later models had everything integrated in the same housing. It went through several revisions. This demanded periodic cleaning with a pencil eraser in order to avoid spontaneous reboots, which contributed to its "Trash" sobriquet. Aftermarket connectors plated with gold solved this problem permanently. Software developers also responded by devising a recovery method which became a standard feature of many commercial programs. They accepted an "asterisk parameter", an asterisk star character typed following the program name when the program is run from the TRSDOS Ready prompt. When used following a spontaneous reboot or an accidental reset or program crash , the program loaded without initializing its data area s , preserving any program data present from the pre-reboot session. The power button on the EI was also somewhat difficult to operate as it was recessed so as to guard against the user accidentally hitting it and turning it off while in use. A pencil eraser or similar object would be used to depress the power button and the EI had no power LED, making it difficult to determine if it was running or not. The expansion unit required a second power supply, identical to the base unit power supply. An interior recess held both supplies. The user was instructed to power on and power off all peripherals in proper order to avoid corrupting data or potentially damaging hardware components. The manuals for the TRS stipulated turning on the monitor first, then any peripherals attached to the EI if multiple disk drives were attached, the last drive on the chain was to be powered on first and work down from there , the EI, and the computer last. When powering down, the computer was to be turned off first, followed by the monitor, EI, and peripherals. Due to the above-mentioned problems with potentially corrupting disks, it was recommended to power up to the garbage screen with the disk drives empty, insert a system disk, and then hit Reset. It could accommodate the complete computer system plus up to four floppy drives and the Quick Printer. Since the cable connecting the expansion interface carried the system bus, it was kept short about 6 inches. The user had no choice but to place it directly behind the computer with the monitor on top of it. This caused problems for a non-Tandy monitor whose case did not fit the mounting holes. Also, the friction fit of the edge connector on the already short interconnect cable made it possible to disconnect the system bus from the CPU if either unit was inadvertently moved during operation. Floppy disk drives[edit] Radio Shack introduced floppy drives in July , about six months after the Model I went on sale. The first version released to the public was a buggy v2. The industry standard Shugart Associates SA minifloppy disk drive was used. Four floppy drives could be daisy-chained to the Model I. The last drive in the chain was supposed to have a termination resistor installed but often it was not needed as it was integrated into later cables. A common method of handling the delay was to issue a command to the , perform several "NOP" instructions, then query the for the result. Early TRS-DOS neglected the required yet undocumented wait period, and thus false status was often returned to the OS, generating random errors and crashes. Once the delay was implemented, it was fairly reliable. The disk drives offered on the Model I were Shugart SAs which supported 35 tracks and was the sole 5. By , other manufacturers began offering drives. The combination of 40 tracks and double-density gave a capacity of kilobytes per single-sided floppy disk. The use of index-sync meant that a " flippy disk " required a second index hole and write-enable notch. One could purchase factory-made "flippies". Some software publishers formatted one side for Apple systems and the other for the TRS The usual method of connecting floppy drives involved setting the drive letter via jumper blocks on the drive controller board, however Tandy opted for a slightly more user-friendly technique where all four select pins on the drives were jumpered and the ribbon cable was missing the Drive Select line, thus the user did not need to worry about moving jumpers around depending on which position on the chain a drive was in. A standard flat floppy ribbon cable was perfectly usable on the Model I, in which case the drives would have to be jumpered to their number on the chain, or even an IBM PC "twist" cable, which required setting each drive

number to 1, but would only permit two drives on the chain. Although third party DOSes allowed the user to define virtually any floppy format he wanted, the "lowest common denominator" format for TRSs was the baseline single density, single sided, track format of the Model I. These new drives were all half-height and therefore required different or modified drive housings. Exatron Stringy Floppy[edit] An alternative to cassette tape and floppy disk storage was provided by a company called Exatron. The device was a continuous loop tape drive, dubbed the "stringy floppy" or ESF. Exatron tape cartridges stored over 64 kB of data. It was popular with TRS enthusiasts, selling over units by Up to four hard disks could be daisychained for 20 MB of storage. The LDOS operating system by Logical Systems was bundled, which provided utilities for managing the storage space and flexible backup. Later, a 15MB hard disk was offered in a white case, which could be daisychained for up to 60 MB. Like most hard disks used on 8-bit machines, there was no provision for subdirectories, but the DiskDISK utility was a useful alternative that could create virtual hard disk ". DSK" files that could be mounted as another disk drive, and used like a subdirectory would. Printers[edit] The "Quick Printer", [49] was an unusual electrostatic rotary printer that scanned the video memory through the bus connector, and printed an image of the screen onto aluminum-coated paper in about one second. Unfortunately, it was incompatible with both the final, buffered version of the expansion interface, and with the "heartbeat" interrupt used for the real-time clock under Disk BASIC. This could be overcome by using special cabling, and by doing a "dummy" write to the cassette port while triggering the printer. It had only 7 pins, so letters with descenders such as lowercase "g" did not reach under the baseline, but were elevated within the normal line.

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Misosys Software and Documents. On this page: File formats | Viewers | Download | Contributors Misosys is Roy Soltoff's old TRS software company. Roy has been out of the business for some years, and he has given me permission to put his TRS software and documentation up for free dissemination on the Web.

Li-Chen Wang wrote in It should be available on ROM soon. It was introduced in by Aerocomp Inc. Aerocomp also sold the Aerocomp DDC bundled with a choice of operating systems: They were sold directly through Big Five and were resold by many other companies. As the packaging stated: WordStar, introduced in by MicroPro International, became the best selling word processor soon after it was introduced. MicroPro began shipping the first version of WordStar in mid Much like a modern solid state drive, the Interstellar Drive had no moving parts. It provided non-volatile data storage at speeds far greater than a hard drive then commonly known as a Winchester drive or a floppy drive. Graphics of Tulsa, Oklahoma. Rather than use this approach, the FPS-3 was hardware that made copies of the data that a protected program loaded from disk or tape. It could create an exact snapshot of a program immediately after it had loaded into memory. As long as the protected program loaded completely from disk or tape with no overlays as most did , the FPS-3 could be used to create an unprotected copy. It was published by Radio Shack with at least eight volumes from to A listing could only mention one program and there were no discounts for multiple listings. The Compactor II was introduced in late It also provided a real-time clock with battery backup. I have never seen a reliable price for the Compactor II. It also included a serial port to replace the one normally provided by the stock RS board.