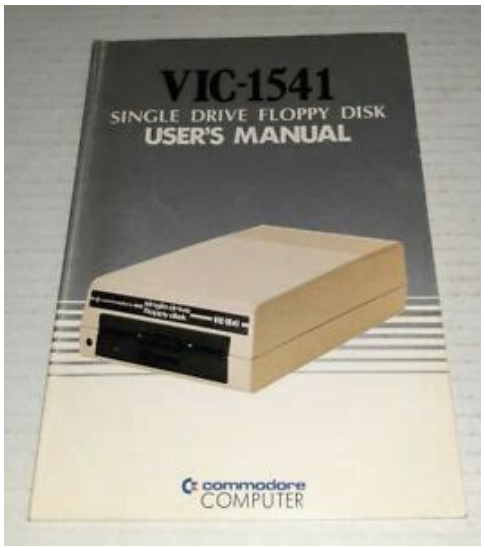
commodore 64 1541 disk drive manual



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Book Descriptions:

commodore 64 1541 disk drive manual

In consequence of the long production time of the C64, the 1541 was produced with various cases, with internal or external power supplies, starting in 1983. Two newer models were introduced later, the 1541C in 1986 and the 1541II in 1988.When the red LED is flashing, it means that an error has occurred.On the 1541II are two DIPswitches to change the device number default 8 to any number in the range from 8 to 11. If using only one disk drive, the drive number should always be kept at 8, as that is what most software is hardwired to use; however, if more than one drive is connected to a computer, each should get its own unique drive number in ascending order.Earlier models came with an internal power supply which generated significant, often fatal amounts of heat. Later models came with an external power supply to eliminate heat damage to the internal circuits and mechanics. The 1541 is a onesided drive, which means that the back side of a disk can only be used by taking it out and manually flipping it over.The limit is different for other Commodore computers used with a 1541. It is writeprotected by software. Although not officially supported by Commodore, the ROM code from the 1541II but not that from the 1541C can be burned into a pair of EPROMs and used in the original 1541 model if you want those bug fixes for that drive too.Outer tracks had more sectors than inner tracks. Some copy protection schemes and nonstandard DOS versions do use them. The 19 sectors on track 18 are reserved to directory sectors 1 through 17 and metadata sector 0. The digit zero after the drive command letter in those commands is not strictly necessary, but its use is highly recommended to avoid triggering an obscure bug under rare circumstances that can lead to junk data being written to a disk rendering its files unusable.http://www.campoalegre.al.gov.br/userfiles/conteudos/carrier-infinity-manual-thermostat.xml

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In Commodores double drives such as the CBM4040, which came before the 1541 and other single drives, you could use either a zero or a one here, to denote which of the two drives is meant. When Commodore ported their DOS to single drives, they didnt really clean up the twodrive handling code, which is what causes the bug.Unless you know for certain that the drive in question will not be an original 1541, the better way is to first to use SCRATCH and after that the BASIC command SAVE. The command string is followed by 3 or 4 characters. The first is the channel number, matching the secondary channel number found in the OPEN command. The following two characters is the record position, least significant digit first. The optional fourth character is the position within the given record. On the postC64 computer models, additional commands and status variables are available. These disk images are used to transmit entire disks for use with emulators and mass storage devices.Content is available under GFDL unless otherwise noted. Privacy policy About C64Wiki Disclaimers Mobile view. This version uses a Newtronics drive mechanism, and the rotating lever is used to engage the drive mechanism with the disk i.e. to engage the hub clamp and load the disk heads and to prevent removal of the disk while the mechanism is mechanically engaged. Manufacturer Commodore Business Machines, Inc.The number of sectors per track varies from 17 to 21 an early implementation of zone bit recording . The drives builtin disk operating system is CBM DOS 2.6.Publications sorely needs additional 1541s for inhouse use, yet we cant find any to buy.This was fixed later when Commodore changed the vendor of the drive mechanism Mitsumi and adopted

the fliplever Newtronics mechanism, greatly improving reliability.http://tuanthang.com.vn/uploads/userfiles/carrier-infinity-heat-pump-owner-s-manual.xml

In addition, Commodore made the drives controller board smaller and reduced its chip count compared to the early 1541s which had a large PCB running the length of the case, with dozens of TTL chips . The beigecase Newtronics 1541 was produced from 1984 to 1986.Visually, the first models, of the VIC1541 denomination, have an offwhite color like the VIC20 and VIC1540. Then, to match the look of the C64, CBM changed the drives color to brownbeige and the name to Commodore 1541.Nevertheless, the 1541 became the first disk drive to see widespread use in the home and Commodore sold millions of the units.Later ROM revisions fixed assorted problems, including a software bug that caused the saveandreplace command to corrupt data.The heat generation was a frequent source of humour. For example, Compute.Accordingly, when a disk is not formatted or a disk error occurs, the unit tries to move the head 40 times in the direction of track zero although the 1541 DOS only uses 35 tracks, the drive mechanism itself is a 40track unit, so this ensured track zero would be reached no matter where the head was before. Once track zero is reached, every further attempt to move the head in that direction would cause it to be rammed against a solid stop for example, if the head happened to be on track 18 where the directory is located before this procedure, the head would be actually moved 18 times, and then rammed against the stop 22 times. What the user would do is remove the drive from its case and then loosen the screws holding the stepper motor that moved the head, then with the calibration disk in the drive gently turn the stepper motor back and forth until the program shows a good alignment. Also, a software solution, which resides in the drive controllers ROM, prevents the rereads from occurring, though this could cause problems when genuine errors did occur.The Newtronics mechanism drives have a lever rather than a pulldown tab to close the drive door.

Up to 48k of RAM can be added; this was mainly useful for defeating copy protection schemes since an entire disk track could be loaded into drive RAM, while the standard 2k only accommodated a few sectors theoretically eight, but some of the RAM was used by CBM DOS as work space.Disk drives and other peripherals such as printers connected to the computer via a daisy chain setup, necessitating only a single connector on the computer itself.With a reasonably fast disk drive and an adequate diskoperating system DOS, the C64 could compete in the business market with the Apple and perhaps with other business computers. With the present disk drive, though, it is hardpressed to lose its image as a toy. However, a hardware bug with this chip prevented the initial design from working as anticipated, and the ROM code was hastily rewritten to handle the entire operation in software. In any case, the C64 normally could not work with a 1540 unless the VICII video output was disabled via a register write, which would stop the halting the CPU during certain video lines which ensured correct serial timing. About 20 minutes are needed to copy one disk—10 minutes of reading time, and 10 minutes of writing time. However, since both the computer and the drive can easily be reprogrammed, third parties quickly wrote more efficient firmware that would speed up drive operations drastically. The popular Commodore computer magazines of the era also entered the arena with typein fastload utilities, with Compute!s Gazette publishing TurboDisk in 1985 and RUN publishing Sizzle in 1987.Originally, to copy from drive to drive, software running on the C64 was needed and it would first read from one drive into computer memory, then write out to the other. Only later when first, Fast Hackem, then other disk backup programs, were released, was true drivetodrive copying possible for a pair of 1541s. The user could, if they wished, unplug the C64 from the drives i.e.

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from the first drive in the daisy chain and do something else with the computer as the drives proceeded to copy the entire disk.The standard CBM DOS format is 170k with 35 tracks and 256byte sectors. The drives will allow writes to occur, but the inconsistent header size will damage the data

in the data portions of each track.The 1541 used 40 track mechanisms, but Commodore intentionally limited the CBM DOS format to 35 tracks because of reliability issues with the early units.And since for normal files, two bytes of each physical sector are used by DOS as a pointer to the next physical track and sector of the file, only 254 out of the 256 bytes of a block are used for file contents.Track 18 is reserved; the remaining tracks are available for data storage. The file interleave is 10 blocks, while the directory interleave is 3 blocks.The general idea was that simple diskcopy programs are incapable of copying the errors. When one of these errors is encountered, the disk drive as do many floppy disk drives will attempt one or more reread attempts after first resetting the head to track zero.Media Single Sided, Single Density The Complete Guide to the 1541 Disk Operating System.The Anatomy of the 1541 Disk Drive. Grand Rapids, MI Abacus Software translated from the original 1983 German edition, Dusseldorf Data Becker GmbH.By using this site, you agree to the Terms of Use and Privacy Policy. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Due to the backwards compatibility of the Commodore 128, most peripherals will work on that system, as well. Theres some compatibility with the VIC20 and PET too.By contrast, in Europe, the C64 was often used with cassette tape drives Datasette, which were much cheaper, but also much slower than floppy drives. The Datasette plugged into a proprietary edge connector on the Commodore 64s motherboard. Standard blank audio cassettes could be used in this drive.

https://gameanglinginstructors.co.uk/images/butterfly-sparkle-papasan-cradle-swing-manual.pdf

Data tapes could be writeprotected in the same way as audio cassettes, by punching out a tab on the cassettes top edge. An adapter for the proprietary connector was available from CARDCO Loading a large program at normal speed could take up to 30 minutes in extreme cases. Many European software developers wrote their own fast tapeloaders which replaced the internal KERNAL code in the C64 and offered loading times more comparable to disk drive speeds. Novaload was perhaps the most popular tapeloader used by British and American software developers. Early versions of Novaload had the ability to play music while a program loaded into memory, and was easily recognizable by its black border and digital bleeping sounds on loading. Other fastloaders included load screens, displaying computer artwork while the program loaded. More advanced fastloaders included minigames for the user to play while the program loaded from cassette. One such minigame fastloader was InvadeaLoad.Also, not too dissimilar to floppy drive users, the Datasettes read head could become dirty or slip out of alignment. A small screwdriver could be used to align the tape heads, and a few companies capitalized by selling various commercial kits for Datasette headalignment tuning. Tape counter speeds varied over different datasette units making recorded counter numbers unreliable on different hardware.Kernal hard drive subsystem see below. They were expensive and few were ever sold.The 1541 was very slow in loading programs because of a poorly implemented serial bus, a legacy of the Commodore VIC20.Due to lack of hardware support for detecting track zero position, Commodore DOS formatting routines and many complex software copyprotection schemes which used data stored on nonstandard tracks on floppies had to rely on moving the head specified number of steps in order to make sure that the desired head position for formatting or reading the data was reached.

http://harjac.com/images/butterfly-playback-rollaway-manual.pdf

Many of the 1541s design problems were eventually rectified in Commodores 1541II disk drive, which was compatible with the older units. The power supply unit was not housed inside the drive case; hence, the 1541II size was significantly smaller and did not overheat.In order to load a file from a commercial disk, the following command must be enteredIn 1984 Epyx released its FastLoad cartridge for the C64, which replaced some of the 1541s slow routines with its own custom code, thus allowing users to load programs in a fraction of the time. Despite being incompatible with many programs copy protection schemes, the cartridge became so popular among grateful C64 owners

likely the mostwidespread thirdparty enhancement for the C64 of all time that many Commodore dealers sold the Epyx cartridge as a standard item when selling a new C64 with the 1541.The best of these turboloaders were able to accelerate the time required for loading a program from the floppy drive by a factor of 20x, demonstrating the default bus implementations inadequacy. As turboloader programs were relatively small, it was common to place one on almost each floppy disk so that it could be quickly loaded to RAM after restart.Since this arrangement was, in effect, a specialized computer, it was possible to write custom controller routines and load them into the drives RAM, thus making the drive work independently of the C64 machine. For example, certain back up software allowed users to make multiple disk copies directly between daisychained drives without a C64.This led to Commodore producing via a third party the Commodore 4015, or VICswitch. This device now rarely seen allowed up to 8 Commodore 64s to be connected to the device along with a string of peripherals, allowing each computer to share the connected hardware.This functionality also worked with a mixed combination of PET, VIC20, and other selected Commodore 8bit computers.

It was compatible with the Commodore 64 as well as other popular home computers of the time, thanks to an operating system stored on an EPROM on an external controller. Up to 20 files could be kept on each side of the doublesided floppy disks.Commercially, very little software was ever released on either 1581 disk format or CMDs native format. However, enthusiasts could use this drive to transfer data between typical PC MSDOS and the Commodore with special software, such as SOGWAP s Big Blue Reader.The floppy disks themselves relied on an MSDOS disk format, and being based on cartridge allowed the Commodore 64 to boot from them automatically at startup. These devices appeared from a company in the United Kingdom, but did not become widespread due to nonexistent thirdparty support. In an article in Zzap!64 of November 1991, several software houses interviewed believed that the device came to the market too late to be worthy of supporting.Kernal hard drive subsystem for the C64. The Lt. Kernal mated a 10 megabyte Seagate ST412 hard drive to an OMTI SASI intelligent controller, creating a high speed bus interface to the C64s expansion port. Connection of the SASI bus to the C64 was accomplished with a custom designed host adapter. The Lt. Kernal shipped with a disk operation system DOS that, among other things, allowed execution of a program by simply typing its name and pressing the Return key. The DOS also included a keyed random access feature that made it possible for a skilled programmer to implement ISAM style databases.Standard drive size had been increased to 20 MB, with 40 MB available as an option, and the system bus was now the industrystandard small computer system interface, better known as SCSI the direct descendant of SASI. Kernal drive to be shared by as many as sixteen C64s or C128s in any combination, using a roundrobin scheduling algorithm that took advantage of the SCSI bus protocols ability to handle multiple initiators and targets. Thus the Lt.

Kernal could be conveniently used in a multicomputer setup, something that was not possible with other C64compatible hard drives.Kernal ceased in 1991. Fortunately, most of the components used in the original design were industry standard parts, making it possible to make limited repairs to the units. In 2010, a recreation of the Lt. Kernal was produced by MyTec Electronics. It was called the Rear Admiral HyperDrive and used an upgraded DOS called RADOS. The Rear Admiral parts could be used to upgrade the older Lt. Kernal, e.g. chips from the Rear Admiral host adapter could be used to upgrade the chips in the Lt. Kernal host adapter; or if the Lt. Kernal is missing its host adapter, the Rear Admiral host adapter could be used in its place.Much like the Commodore 1541 floppy drive, the CMD HD could connect to the Commodore 64s serial bus, and could operate independently of the computer with the help of its onboard hardware. A CMD HD series drive included its own SCSI controller to operate its hard drive mechanism, in addition to hosting a battery powered realtime clock module for the timestamping of files. The stock operating speeds of the CMD HDSeries units were not very much faster than the stock speeds of a 1541 floppy drive, but the units were fully JiffyDOS compatible. Faster parallel transfers were possible with the addition of

another CMD product, the CMD RAMLink and a special parallel transfer cable. CMD ultimately missed opportunities to develop any features for the drives auxiliary port such as a printer spooler feature promised in the CMD HD user manual. However, external SCSI devices such as the iOmega zip 100 drive could be connected to a CMD HD series drives external SCSI port. Using the same utility software diskette shipped with all CMD HD series drives, the external storage could then be easily added to CMD HD series drives existing partition table.

This configuration could add, for example, 100 additional megabytes of external storage to even the 20 megabyte version of a CMD HD series drive. After partitioning and formatting of the added storage, the CMD HD series drive presented the total storage seamlessly to the user, regardless if the data was stored internally or externally.An unavoidable problem was that total 1541 compatibility could not be achieved, which often prevented the use of copyprotected software, software fastloaders, or any software whose operation depended on exact 1541 emulation. Later revisions of the interface board provided an extra compact flash socket. The IDE interfaces performance is comparable to the RAMLink in speed, but lacks the intelligence of SCSI. Its main advantage lies in being able to use inexpensive commodity hard drives instead of the more costly SCSI units. 1541 compatibility is not as good as commercially developed hard drive subsystems, but continues to improve with time.Though using more modern components and a smaller form factor in comparison to the CMD HD, the Thunderdrive maintained full compatibility with the CMD HD.Most Commodorebranded printers were rebranded C. Itoh or Epson models with Commodore serial interface.The DPS1101 was large enough to accept A4 size paper in landscape orientation as well as A3 size paper in portrait orientation.Xetec also released a series of printer interfaces.Commodore produced joystick controllers for the Commodore 64, largely compatible with Atari joysticks, as well as paddles which were not Atari compatible. Commodores paddles were originally intended for the VIC20, and few C64 games could take advantage of them.These were used with GEOS as well as software such as Jane, OCP Art Studio, Arkanoid and Magic Desk. The earlier NEOS mouse worked as a normal analog mouse and came bundled with a graphics package called Cheese. It also supported a joystick emulation mode if the left button was held down during poweron.

The later 1350 was only capable of emulating a digital joystick, by sending rapid 8 directional signals as it was moved, and was the least useful of the 3 mice. Its successor the 1351, like the NEOS Mouse, supported the more traditional analogue mode, known as proportional mode in the documentation, sending signals to the computer that indicate amount and direction of movement. Like the NEOS mouse, it could be put into a 1350esque joystick emulation mode, by holding down the right button at poweron. CMDs SmartMouse was compatible with 1351aware and also included a third button and a builtin realtime clock module as well.Another feature is the onesecondprecision 24hour clock.Vehicle location indication is calculated from distance traveled. The accuracy of the vehicle location is dependent of the digital map construction and the accuracy of the local map used to construct the digital map. The best hope for accuracy is 800 m. But accuracy of one car length in 35 km has been realized. The use of assembly language was necessitated to keep up with sensor input. One advantage with the system is the ability to create ones own digital maps and thus eliminate the need to buy such ones for every trip.Interfaces for all popular home computers at the time were made, including Apple II, Commodore 64 and Acorn, and later for Schneider, Atari ST and IBM PC. Programming languages to drive the models included GWBASIC, Turbo Pascal and in the later kits 1991 an inhouse programming tool Lucky Logic.The 1670 used a modified set of Hayes AT commands.It provided basic Xmodem functionality and contained a 700 line scrollback feature.Later, Quantum Computer Services which became America Online offered an online service called Quantum Link for the C64 that featured chat, downloads, and online games. In the UK, Compunet was a very popular online service for C64 users requiring special Compunet modems from 1984 to the early 1990s.

In Australia, Telecom now Telstra ran an online service called Viatel and sold modems for the C64 for use with the service. In Germany the very restrictive rules of the stateowned telephone system prevented widespread use of inexpensive, nontelco licensed modems, prompting the use of inferior acoustic couplers instead.Other monitors available included the 1802 and 1902.The Sound Expander and Sound Sampler were both expansion cartridges, but had limited use. The Sound Sampler in particular could only record close to two seconds of audio, rendering it largely useless. The External keyboard was an addon which plugged into the Sound Expander. These hardware devices did not sell well, perhaps due to their cost, lack of adequate software, marketing as home consumer devices, and an end result that turned many serious musicians off.The DOS board was optional, but if it was not installed an Apple Disk II or compatible drive would be required to load software. The long delay between announcement and availability, along with heavy promotion including fullpage ads running monthly in the Commodore press, made the Spartan an infamous example of vaporware.This saved Commodore 64 users from needing to modify their computer motherboards to enable it with dual SID chips.Their first commercial product for the C64 was a KERNAL based fast loader and utility chip called JiffyDOS. It was not the first KERNALbased enhancement for the C64 SpeedDOS and DolphinDOS also existed, but was perhaps the best implemented. The benefits of a KERNAL upgrade meant that the cartridge port was free for use which would have normally been taken up by an Epyx FastLoad cartridge or an Action Replay , however the downside meant that one had to manually remove computer chips from the C64s motherboard and associated floppy drives to install it. Aside from the usual 1541 fast load routines, JiffyDOS contained an easy to use DOS and a few other useful utilities.

Commodore officially produced several models of RAM expansion cartridges, referred to collectively as the 17xxseries Commodore REUs. While these devices came in 128, 256, or 512 kB sizes, thirdparty modifications were quickly developed that could extend these devices to 2 MB, although some such modifications could be unstable. Some companies also offered services to professionally upgrade these devices.Very little of the available software was programmed to make use of expansion memory. The cost of the units and the requirement to add a heavyduty power supply also was a factor in the limited usage of RAM expansion cartridges. The volatility of DRAM was also a factor in the limited usage, as the RAM expansion cartridges were normally used for fast RAM disk storage, data stored on them would be lost at any power failure.The RAM in the expansion cartridges was only accessible via a handful of hardware registers, rather than being CPUaddressable memory. This meant that users could not access this RAM without complicated programming techniques. Furthermore, simply adding the RAM expansion did not provide any kind of onboard RAM disk functionality though a utility disk was supplied with some REUs, which provided a loadable RAM disk driver.As GEOS made heavy use of a primitive, softwarecontrolled form of swap space, it tended to be slow when used exclusively with floppy disks or hard drives. With the addition of an REU, along with a small software driver, GEOS would use the expanded memory in place of its usual swap space, increasing GEOS operating speed.This device was purposely designed for use with GEOS, although some REUaware programs were later adapted to be able to use it. Some time later, the GeoRAM was cloned by another company to form the BBGRAM device which also sported a battery backup unit. The GeoRAM used a bankedmemory design where portions of the external SRAM were banked into the Commodore 64s CPU address space.

This method provided substantially slower transfer speeds than the singlecycleperbyte transfer speeds of the Commodore REUs. A benefit of using SRAMs was lower power consumption which did not require upgrading the Commodore 64s power supply.Its primary feature was that the external power supply kept the formatting and contents of the RAM safe and valid while the computer was turned off, in addition to powering the device in any case. A driver was provided on the included utilities disk to allow GEOS to use the RAMdrive as a regular disk drive.It also features a battery backup, thus preserving the RAMs contents. Drivers were provided with the RAMLink to allow GEOS

to use its memory as either a replacement for swap space, or as a regular disk drive.Unfortunately, there was no onboard or diskbased RAM disk functionality offered, nor could any existing software make use of the directly addressable nature of the RAM. The exception is that drivers were included with the unit to explicitly allow GEOS to use that RAM as a replacement for swap space, or as a regular disk drive, as well as to make use of the acceleration offered by the unit.In addition, these cartridges had tools for editing game sprites, machine language monitors, floppy fast loaders, and other development tools. Freezer cartridges were not without controversy however. Despite containing many powerful tools for the programmer, they were also accused of aiding unauthorized distributors to defeat software copy protections. The RAM image was runnable only on the Lt. Kernal system on which it was captured, thus preventing the process from being used to distribute unlicensed software.Some software of note has included the Kawasaki Synthesizer range, Music System notation and MIDI suite, the MIDIcompatible Instant Music idiotproof sequential composer, and the Steinberg Pro16 MIDI sequencer, the precursor to Cubase.

Also noteworthy is the Commodore 64 Orchestra who specialize in rearranging and performing music originally composed and coded for the Commodore 64 games market. Its patron is celebrated Commodore composer Rob Hubbard.Applesoft BASIC was included and very compatible, since it was created by disassembling the binary from the Applesoft ROM and reordering the assembly level instructions such that the binary image would be different. One could set up various debugging and use slave computing to enable fast 3D rendering etc. The box had functionality to switch video between C64 and Apple.Due to timing issues with the VICII video controller, CPU accelerators for the 64 were complex and expensive to implement. So while accelerators based upon the Western Design Center WDC 65C02 —usually running at 4 MHz, and the WDC 65C816 16bit microprocessor running at 4, 8 or 20 MHz, were produced, they appeared too late and were too expensive to gain widespread use. As the VIC video controller can only access the C64s internal DRAM, writes had to be mirrored to the internal memory; write cycles would slow the operation of the processor to accomplish this.It was an expansion port device clocked at 4.09 MHz. It also had a JiffyDOS option. Early Turbo Process circuit boards shipped with PAL chips that did not have their security fuses blown, an oversight which made duplicating the PAL logic and hence the cartridge design trivial. No known litigation took place over the copying of the German companys design. A lot of software would write zeros to this location turning off the highspeed mode on the Turbo Process this was considered a design flaw that was fixed by the Turbo Master.And several revisions and addons have been developed for it to take advantage of extra features.It unites the MMC64 and the Retro Replay in one cartridge, finally built with proper casefit in mind even including the RRnet2 Ethernet addon. It contains many improvements, such as C128 compatibility, a builtin.

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