CASSIOPEI v2.0

USER MANUAL

this manual is intended for
firmware version: V20190119 or higher

It was the year 1987 when I've got my very first computer, the C64 of which I have many fond memories, mostly playing games and some first steps into assembly programming. Although the C2N Datasette was sufficient at first (it was cheap), I was very happy once I've got my first disk drive. Years later I've bought an Amiga 500 then a 1200 and finally a PC and then another one, and another one, etc. Though all computers fulfilled my needs the C64 will always be the model which is the closest to my heart.

But it was only after I bought an SX-64, in 2004, that I tumbled into the retro scene. It was 2006 and I designed the 1541-III which was the first "fully functional .D64 MMC/SD-card reader emulating a real drive using the IEC-bus, in a case". I learned a lot from that project and it got my retro fire burning. It may be fun to know that the 1541-III was the inspiration for the MMC2IEC, which evolved into the SD2IEC which is now the low cost solid state alternative for a 1541 disk drive in the retro computing scene. Though I haven't worked on or with these devices, I feel slightly proud because my little 1541-III project has sparked the interest in the retro scene for these kind of devices.

I'm no gamer I'm just a technician who loves to build the things that were impossible or "out of reach" (expensive) during the glory days of the C64. Now with today's micro-controller technology things are much easier.

After the success of the 1541-III, it became time for something new, A device that would work on ALL 8-bit commodore computers. Simply because many 8-bit Commodore computers do not have an IEC-bus. That device was the Cassiopei. It was a very successful project, I learned a lot from it, mostly about the history of the technology inside the Commodore computers. Because I needed to program very close to the hardware it forced me to understand why things were done. And while doing so, I noticed why newer Commodore models had things differently or improved over the older models. Then 2 years after the release of the Cassiopei I decided it was time to improve the concept by using the ESP8266. This is a very powerful processor capable of Wifi and lot's of computing power. So this little device is going to power the next generation of Cassiopei's. It uses mass storage SD-card technology and an integrated web interface so you can easily configure the Cassiopei.

I hope you enjoy the use of the Cassiopei and Commodore(s)
Kind regards, Jan Derogee

I would like to thank:

- My family, for allowing me to work on my project during the evenings and weekends.
- The retro community, mainly the HCC "Commodore gebruikers groep"
- Arthur Jordison for making "CBM program studio" (the perfect tool for ASM and BASIC coders.)
- Luigi Di Fraia for sharing his knowledge about TAP files and loaders
- Gideon Zweijtzer for sharing his knowledge about tape related signals and C64 RUN related info
- All the people who worked at/for Commodore and created these machines and their documentation.

In order to honor Commodore this document prefers the spelling of the word kernel as "kernal". The spelling of this word actually started as a simple mistake but it was copied many times before really noticed. From then on this alternative spelling was adopted by other authors in many following Commodore related documents.

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1   The Cassiopei

Cassiopei stands for: CASSette IO Peripheral Expansion Interface. You can use it to load single file games and/or programs. Or to backup restore tapes and disks, however the backup/restore function of for disks is still under development but is mainly software that runs on the CBM computer to transfers the data between the Cassiopei and the disk.

Below you see a picture of how the Cassiopei looks like, there is the edge connector at the side of the Cassiopei, which allows it's to connect to your CBM's cassette port. Because almost all 8-bit CBM computers feature such a port (C16 and plus4 require the CBM tape connector adapter) the Cassiopei becomes a very useful device. The basic idea about the Cassiopei is that it is completely self supporting as it has many ways of configuring it and does not require special software on a PC or other kind of computer system, you can configure it using a browser or by simply removing the card and inserting it in a normal card reader. The Cassiopei is also great for cross development due to it's quick and easy transfer of data to your CBM computer. This functionality is heavily used during the development of the menu programs and other Cassiopei related software.

1.1   Buttons

Play: When the computer says "press play on tape" you press this button (it loads the file as selected previously in the menu program).

Menu: When the computer says "press play on tape", but you want to choose the file you want to load, then you press this button. The computer will now load the menu file.

Sett.:   Press this button when you want to change some settings using the display, without loading anything into your CBM computer.

Reset   The Cassiopei resets when the CBM's power is cycled, but this is not always desirable. Therefore the reset button allows you to reset the Cassiopei manually.

The buttons as described above also function as navigation keys (UP, SELECT, DOWN) when browsing through the menu(s) of the Cassiopei. Or to stop/play, rewind or wind the "tape" during TAP file playback.

1.2 Display

The Cassiopei has an OLED display which is small but very practical. As it allows the user to easily configure the device or to see what he/she is doing when loading TAP files. Below is an image of what the screen would look like configured for a C64 computer (PAL version).

```
Wifi:192.168.002.036
Time:ntp disabled

Comp:C64 PAL
Mode:PRG fast
Path:games/
File:PACMAN.prg
Pow.:5.12 Volt
```

You can see that it is configured for using PRG files (using the fastloader of the Cassiopei) and that it will load the file "PACMAN.prg" which is stored in the games folder. Knowing that the files for a C64 are stored in the folder C64 on the root of the SD-card and that PRG files are located in the folder PRG of the corresponding computer model, the full path for the game will be "C64/PRG/games/PACMAN.prg". But as you might expect, that would never fit onto the small screen.

The top line shows that the Wifi settings are configured and functional, as the IP-address released for the Cassiopei by the network is shown. The values are shown with trailing zeroes to keep the alignment a little easier, these zeroes do not need to be entered into the browser. The next line shows the time as released by the NTP server to which the Cassiopei could connect. The NTP server itself can be configured, so you may choose any server you'd like. However not much program care about the clock inside your Commodore computer, so in most cases it is not really usefull. However if you are a user of GEOS, you might like this option as there is an auto-exec written for GEOS that can read the time from the Cassiopei directly after booting GEOS. This way you'd never need to set the GEOS clock again. All other users could simply disable this option.

The bottom line shows the voltage of the 5V power supply as available on the cassetteport.

1.3   Additional stands

In order to make the Cassiopei fit all computermodels, some additional stands are required. Fortunately, these stand come with your Cassiopei. You'll need these stands for the PET/CBM series of computers and for the C128D (plastic version). These stands prevent the Cassiopei from dangling in mid air while being connected to your computers cassetteport. The stand firmly touches the table and therefore creates a solid and stable situation, allowing you to safely use your Cassiopei.

In order to attach a stand to the Cassiopei, remove the back cover and slide the stand with the smallest slot gently over the cassetteport connector.

The place the back cover back onto the Cassiopei and the Cassiopei is ready for use.

1.4 Frontplate logo differences

The Cassiopei V2.0 has been produced with 2 different logo's. Though this minor change in looks, might confuse some people and therefore some explanation is given here. Though the frontplates slightly differ, the electronics inside are completely identical and therefore the functionality is completely the same!

Cassiopei V2.0 outline style logo

Cassiopei V2.0 filled style logo

On the left the frontplate has the CASSIOPEI logo in an outline style, on the right the Cassiopei logo is more solid and below it the text V2.0 is printed. From the outline style logo only 10 have been made, therefore these models are to be seen as collectors items. If you see somebody with a Cassiopei with this type of frontplate, then respect this person from being one of the first 10 people of owing this great device.

These frontplate changes were made because the filled style text is to be expected to be more durable but also the make it more stand-out on the frontplate. The text V2.0 was added to indicate more clearly that this design of the Cassiopei is not to be confused with the first Cassiopei (shown below). The first Cassiopei has no display, requires USB + PC software to install files, has no WIFI and only has 8MB of storage room, etc.

the first or "original" design of the Cassiopei

The first or Original design of the Cassiopei is simply called, Cassiopei and not Cassiopei V1.0, although that would not be entirely wrong. But you must see it like this: there is the movie "Back to the future", "Back to the future 2" and "Back to the future 3". The movie "Back to the future 1" technically was never made, because at the time nobody knew that there were going to be 2 sequels.

1.5 Wifi network security

1.5.1   Supported protocols

The Cassiopei is based on the ESP8266, this is known to be supporting the WEP or WPA/WPA2 authentication, or open networks.

The Cassiopei has been developed using a WPA2 wifi network and it is suggested that the Cassiopei is only to be used in such a network environment. This because WPA2 is the most modern and secure method of security protocol as supported by the Cassiopei.

1.5.2   Hidden networks

Networks that do not broadcast their name (and are to be considered hidden or invisible) cannot be used by the Cassiopei. This because the Cassiopei searches for their name in the list of available networks, hidden networks will not show up in that list and will therefore be considered unavailable.

2   Configuring the Cassiopei

When using the Cassiopei there are a few settings that are really important, make sure that these are properly configured before you use the Cassiopei. You may configure the most used settings by pressing the "Sett."-button on the Cassiopei. Other settings like the IP-address or virtual file mode settings can only be changed by modifying the contents of the settings file.

When pressing the "Sett."-button on the Cassiopei the menu (shown right) will appear. You may navigate through this menu with the three buttons next to the display.

```
>Wifi:disabled
 NTP :disabled
 Comp:C64 PAL
 Mode:PRG fast
 File:PAC MAN.prg
 Exit
```

"Play"-button moves the cursor up

"Menu"-button select the item under the cursor

"Sett."-button moves the cursor down

It is important that when you are done changing your settings that you store them to the settings file of the SD-card. This can be done by selecting the "Exit" item in the menu. The the screen (shown right) will appear.

```
>Cancel
 Exit
 Exit & save settings
```

The item "Cancel" leaves the exit menu and does nothing.

The item "Exit" leaves the entire menu and does nothing.

The item "Exit & save settings" leaves the entire menu but also saves the settings to the settings file on the SD_card. This is the correct way to exit the menu after you changed one or more settings.

2.1   Wifi (menu item "Wifi")

The Cassiopei has a wifi interface to connect to your home network. With this you can transfer files using a normal webbrowser or you can transfers files for cross-development. It can also be used for uploading new firmware into the device. The network settings like SSID and KEY cannot be changed through the menu, it requires removal of the SD-card and manual change of the settings file. However to quickly enable/disable wifi, this menu can be used.

Because in most cases the wifi functionality is not used or required but it does makes the Cassiopei slower, because it will search for the network upon booting of the device. Meaning that every time you switch on/off your CBM, the Cassiopei will attempt to connect to the network. Now although these actions only take a few seconds, for the die-hard gamer, this is precious gaming time wasted. Keep in mind that changing these settings require the device to be rebooted.

In some special cases the wifi network you are trying to connect to simply does operate properly (for example an overloaded wifi network at a retro computing convention), causing the Cassiopei to infinitely wait… preventing it to boot… preventing you from disabling wifi through the settings menu, leaving you with an unusable device. But fortunately, there is an escape for this very annoying situation. During the wifi connection state the Cassiopei allows the user to press the "Sett."-button, this immediately aborts the wifi network searching loop and also disables the wifi in the settings file. Allowing you to continue gaming.

2.2 Computer model (menu item "Comp")

The computers that Commodore made (from PET to C128) have a tape protocol that is all very similar, however they are not 100% compatible. Therefore it is very important that the Cassiopei knows on what Commodore computer it is being used. Therefor if your are working with a C64 PAL computer, then choose this model from the list of available models.

This computer model setting is also used to allow the Cassiopei to hide all the files intended for other computer models. So when you are working with a C64, you might not want to see the files intended for your VIC20. Therefore on the SD-card there are folders for each computer model. Do not rename these folders and only store files for that specific computer model. This way you'll be having a filesystem that is organized, keep it that way and you'll be fine.

PAL/NTSC or 50/60Hz system compatibility

The Cassiopei is a device that can be connected to many computer models and from all the models that Commodore made there is a PAL or NTSC version. And for the version with a build in monitor, there is a distinction between 50 or 60Hz.

Therefor the Cassiopei settings allow you to select PAL/NTSC or 50/60Hz when you select the computer model. **This setting is very important** as it determines the timing for the .TAP file playback and for the loading of the fastloader program.

2.3 Operating modes (menu item "Mode")

The Cassiopei is more then a TAP file player or cassette emulator. It can operate in different modes, these are the four modes of operation:

PRG slow

This mode will allow the user to load a PRG file with normal speed. This is the most basic mode of operation, it uses no speedloaders of any kind. It uses the normal Commodore kernal loader and is therefore the slowest method of loading from tape. However, it is also the most reliable as it 100% compatible with the Commodore loading methods. This might be of help when working with computers that are modified or are unable to work with the fastloader for whatever reason.

PRG fastloader

This mode will allow the user to load a PRG file with a very high speed, more then 50x faster then normal. This is the preferred mode of operation for working with the Cassiopei.

TAP

This mode will allow the user to playback TAP-files. More information about the use of TAP files further on in this manual.

Virtual file

This mode is useful for cross development, as it allows a programmer to load a PRG file directly from the PC's harddisk instead of loading it from the SD-card. This allows for fast loading and testing without making modifications to the SD-cards filesystem. More information about the use of the virtual file mode further on in this manual.

2.4 File (menu item "File")

This is simply the currently selected file, or in other words, the file that will be loaded when you press play (after you typed LOAD on your CBM computer). This setting needs to be changed when you have changed the computer model and/or operating mode.

The Cassiopei DOES NOT alphabetically sort the file entries. The files entries are shown in the same order as they are stored on the filesystem of the SD-card. Folders (a.k.a. sub-directories) are supported by the Cassiopei therefore you can store your files in a convenient way, making it easier to find your files.

To keep file selection as simple as possible, the files need to be stored in the correct folders. A .TAP file for the C64 needs to be stored in the folder C64/TAP. And a .PRG file for the C64 needs to be stored in the folder C64/PRG. And in these folders you may create new folders. Below the screen of the file selection.

You may navigate through this menu with the three buttons next to the display.

"Play"-button moves the cursor up

"Menu"-button select the item under the cursor

"Sett."-button moves the cursor down

The only way to exit this menu is by selecting a file, if for some reason there are no files stored onto your SD-card then the only way to exit is by pressing the "Reset"-button on the Cassiopei.

Every .PRG file shown is proceeded by it's start and end address. This way you instantly see the size of the file. This information is very important for VIC20 users. Because the VIC20 is very picky regarding it's start address depending on the memory expansion used.

Every folder is indicated by the word "directory" and when selecting this entry the contents of that folder are shown. The entry ".." moves you back one level in the file tree. Meaning that if you've entered a directory (going one level higher into the tree) selecting ".." makes you go back again (a method also used by MS-DOS).

2.5   Settings file

You may configure the most important settings by pressing the "Sett."-button on the Cassiopei. Other settings like the hostname (the name shown in your router), the IP-address or virtual file mode settings, NTP server settings, etc. can only be changed by modifying the contents of the settings file. Below the contents of a settings file. You can modify this textfile using any kind of text editor, for example the application "Wordpad" on MS Windows is very useful. Everything after the character ';' will not be interpreted by the Cassiopei and can be effectively used for comments. Please be aware that there are some size limitations, these are indicated close to the relevant entry.

The settings file is located on the card in the folder "_system_" and is named "SETTINGS.TXT".

```
;Cassiopei settings file
;----------------------
WIFI=1   ;Enable wifi (0=OFF, 1=ON)
;ATTENTION: HOSTNAME, SSID and KEY value may NOT exceed 32 characters
HOSTNAME=CASSIOPEI
;
SSID_1=MYPERSONALNETWORK
KEY_1=0123456789AA
;
SSID_2=MYWORKNETWORK
KEY_2=0123456789AB
;
SSID_3=MYFRIENDSNETWORK
KEY_3=0123456789AC
;----------------------
NTP=0   ;Enable NTP client (0=OFF, 1=ON)
NTPSERVER=time.nist.gov   ;example: time.nist.gov
TIMEZONE=7200   ;deviation from UTC in seconds (add 3600 to correct for DST)
;----------------------
COMPUTERMODEL=0
MODE=1
USERPATH=
FILENAME=pacman.prg
VIRTUALHOST_IP=192.168.2.8
VIRTUALHOST_PORT=80
VIRTUALHOST_FILE=virtual.prg
;----------------------
;
;Note:
;-----
;If you are not certain about a setting and
;want to go back to the default value.
;Then remove the related line from this file,
;the Cassiopei will detect that it is missing
;and will create the missing setting line
;into this file after you enter the menu and
;exit with: exit+save
```

2.6   Determining the IP address of your Cassiopei

The Cassiopei, when properly configured, can connect to a wifi network. In order to reach the cassiopei from your browser, you must know the IP address of the Cassiopei. Fortunately this information is shown on the Cassiopei display. But sometimes it can be useful to know other ways of getting this information.

One way would be to login the wifi-router that hosts the network. There you can see the list of currently connected devices (or recently connected devices). Below is a screenshot of the configuration menu of a router for an ordinary home network. In the list "Wifi settings" (on other routers this may be called "attached devices") there are 2 devices listed, both the IP-addresses are shown. The Cassiopei is indicated by the hostname "CASSIOPEI" and therefore can easily be found. However for those who may encounter a situation where more then one Cassiopei can be on a network, or just to personalize the device, the hostname text can be changed. In the settings file in an entry called HOSTNAME, you may change the default text "CASSIOPEI" into anything you like. And that will be the text that will be shown in your routers list of connected devices.
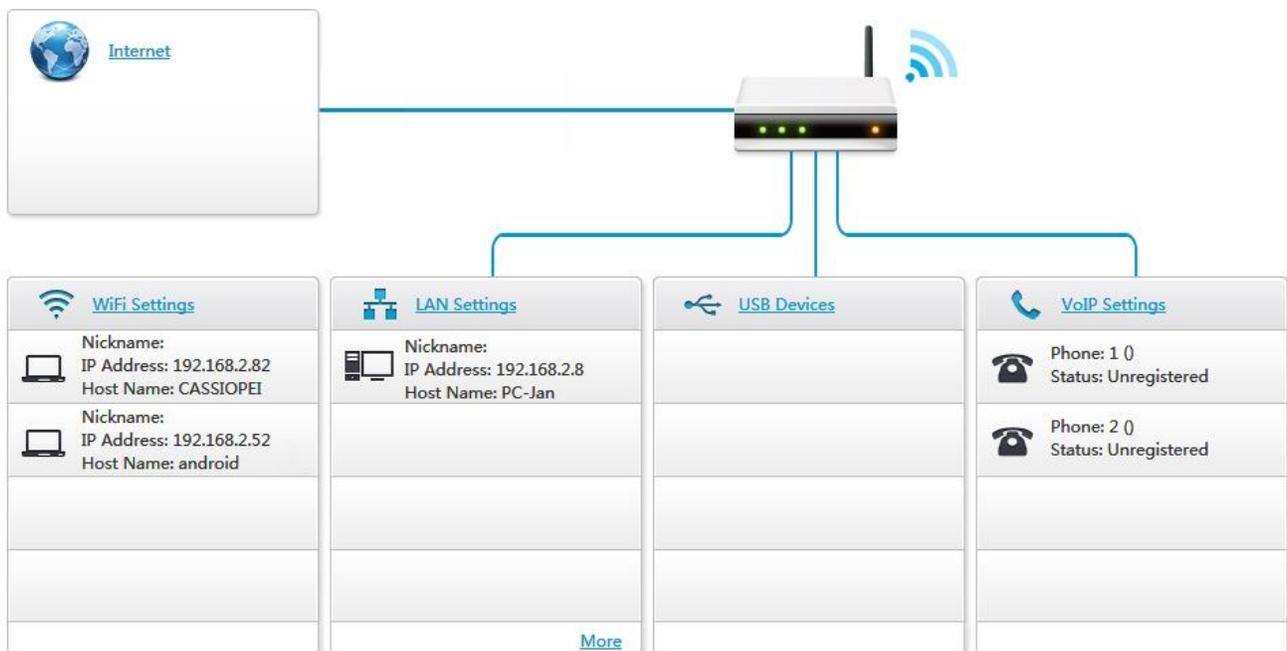
Another way could be by using a special app on your phone. One of those apps is "Fing" but this will not be described I this manual.

However… while using the IP-address always works, there is an easier way. But depending on the hostname you configured, your router and your browser this may not always work. You can connect to your Cassiopei by typing in your devices hostname followed by a / into the URL of your browser. So for the default hostname of CASSIOPEI this would mean that the URL **CASSIOPEI/** must be entered in the browser. This is a lot more convenient then using the IP address method. Unfortunately this functionality cannot be guaranteed for all configurations and has proven difficult for some users. Therefore it is not promoted in this manual other then in this chapter.

3   Configuring the SD-card

In order for the Cassiopei to be functional there has to be an SD-card inserted into the device. The SD-card is to be inserted on the backside of the Cassiopei. The SD-card slot is accessible by removing the back cover. Gently insert the card as shown in the picture, the label is facing upwards and (just like the pictures below) cannot been seen from the rear. The SD-card only fits in one manor in the SD-card slot, so if it doesn't fit, don't force it! After inserting the card into the slot, gently push the card a little bit further until you hear/feel a little click.

In order to remove the card, gently push the card until you hear/feel a little click. Then the card can be removed from the Cassiopei. If you have thick fingers or very short fingernails, then a set of tweezers might come in handy.

Tip: attach a small piece of tape to the rear of the SD-card, this way you can pull on the tape to remove the SD-card a little easier.

This SD-card has to be properly configured, with the right folders and the right files. The Cassiopei uses an SD-card that must be formatted according to the FAT-16 (which is called FAT in MS Windows) or the FAT-32 format. If an SD-card is not supplied with the Cassiopei or if you want to alter the contents of the card, please consider the requirements as described below.

3.1   SD-card requirements

There are mainly 3 types of SD-cards currently (2017) at the market:

SD-card Standard Capacity (SDSC)	1MByte – 2GByte	FAT-16 filesystem
SD-card High Capacity (SDHC)	2GByte – 32GByte	FAT-32 filesystem
SD-card Extended Capacity (SDXC)	32GByte – 2TByte	exFAT filesystem (not supported)

All SD-cards are preformatted by the manufacturer using one of three Windows disk formats of which the exFAT filesystem is not supported by the Cassiopei. Meaning that the Cassiopei cannot interface with SDXC cards. This all means that the maximum size of SD-card you can use with your Cassiopei is limitted to 32GB. Which in practice is more then enough for all your Commodore computing needs.

3.2 Usage and limitations

The filenames used on the filesystem of the cassiopei are limited to a maximum number of 80 characters. When this number is exceeded problems will occur when it is selected by the Cassiopei. Do not worry, your filesystem or Cassiopei will not explode or melt, but what you will experience is perhaps not what you might expect at first. The problem is the storage reserved for filenames. The filesystem allows for filenames of up to 255 characters. But the Cassiopei does not have that much memory available to handle such long filenames. So when you browse through the list of files, the limit is set to a length of 80 characters, and the filename will be truncated to a length of that size. So when the user selects such a file the Cassiopei will eventually not be able to find that file, because it's name is truncated and therefore cannot be loaded, because it will search for the truncated name, which does not exist, so there never will be a filename match. Simply use a filename that is shorter then the max size and you'll be fine.

The Cassiopei does not automatically sort the files in alphabetical order when browsing through the list of files. This simply takes to much memory and processing time. Instead all files are shown in the order that they are put onto the card. If this is undesirable then there is a little trick. Simply place the SD-card into a computer, move the files from the desired folder of your SD-card to a folder on your Windows PC. Then select all the files and move them back to the folder on the SD-card. The computer will copy alphabetically and therefore store the files in the correct order on the filesystem. Making it look like you want.

However keep in mind that when you add a new file that this trick needs to be done again, as the new file will be at the bottom of the list as it is added last to the filesystem.

If for any reason you want to change to a different SD-card then you can simply copy/move all files from your current card, to a temporary folder on your PC. Then move all these files to the new (bigger) card. This way you preserve all the settings and required files that the Cassiopei needs. And you will have no trouble with your new card.

SD-cards are like any other media, not perfect. Some will last a lifetime, other won't or simply get lost. Therefor it is a good thing not to put your entire collection ONLY on your SD-card. Always make sure you have a backup of those precious files!

3.3 Required folders in the root of the SD-card

The SD-card used for the Cassiopei should have the following structure as described in this chapter. The root of the card should hold the following folder:

```
_SYSTEM_          <- contains Cassiopei related files (settingsfile and webserver related files)
C16               <- contains Computer specific (C16) files
C64               <- contains Computer specific (C64) files
C128              <- contains Computer specific (C128) files
PET20XX           <- contains Computer specific (PET/CBM2000) files
PET30XX           <- contains Computer specific (PET/CBM3000) files
PET40XX           <- contains Computer specific (PET/CBM4000) files
PET80XX           <- contains Computer specific (PET/CBM8000) files
PLUS4             <- contains Computer specific (Plus 4) files
VIC20             <- contains Computer specific (VIC20) files
```

The contents of these folders are described in the next chapter.

ATTENTION:
In order for the Cassiopei to function properly it is important that the files should be in the appropriate folders. In other words, store files for a certain computer model only in the folder intended for that model. Do not put your C64 files into the VIC20 folder, because when the Cassiopei is in the C64 mode it will only use the folder named C64. And when the Cassiopei is in the VIC20 mode it will only use the files in the VIC20 folder. This means that if you do want to use a file on multiple computer systems, then you need to copy that file into all required computer models.

Also make sure to store file into the folder that has the same name of the extension of the file. For example: store the PACMAN.PRG file in the PRG folder of the required computer model. Because if you store a .TAP file in the PRG folder then Cassiopei will not be able to find this file when it is operating in the TAP-file mode.

3.4   Required folders inside computer specific folders

The contents of the computer specific folders are all according the following structure:

```
_SYSTEM              :LOADER_1.PRG (cassiopei fastloader using cassette port#1)
                      LOADER_2.PRG (cassiopei fastloader using cassette port#2)
                      MENU.PRG (Cassiopei menu program)

PRG                  :.PRG files (store your games and programs and programs here)
TAP                  :.TAP tape image (store your tape images here)
```

Optional folders are D64 and PETSCII_VIDEO folders. In these folders specific application related files can be stored. D64 files for disk backup/restore purposes and PETSCII_VIDEO for an application that can play back PETSCII video files. For example:

```
D64                  : .D64 disk images for backup/restore of disks
PETSCII_VIDEO        : data files containing a stream of compressed PETSCII images
```

It is allowed for the user to add more folders to store specific filetypes for easy access. One example would be to add sub-folders (in the PRG and TAP folders) in order to category games based on type or on name. This way your collection of games/programs can be easily archived using alphabetical folders. Therefore by storing files that start with an A in a folder named A and so on you can keep you card clean and tidy and browse much quicker through all your files. Which is very practical, because scrolling through a list of hundreds of files (not listed in alphabetical order) just isn't much fun. But don't overdo it and keep the names of your folders as short as possible.

There is another benefit in using sub-folders. Because sometimes a game consists of multiple files. For example: a two sided digitized tape consisting of two .TAP files like PACMAN_SIDE_A.TAP and PACMAN_SIDE_B.TAP. Putting them in a folder named PACMAN and then having two files named SIDE_A and SIDE_B makes it all look a little bit nicer when browsing through your file collection.

3.5   SD-card removal tips

The SD-card is located inside the Cassiopei and removing it can be difficult when you have really short fingernails or relatively thick fingers. Now if you are going to remove the card once or twice a year this is not really a problem. But sometimes, you just need to remove the card more often then you expected at first and for those cases the tips below could be of help.

Tip one:

By using a simple tweezer the SD-card can be easily removed from the Cassiopei. First press the SD-card slightly inwards until you hear a click, then the SD-card pops out a little and it can be grabbed and removed using the tweezer.
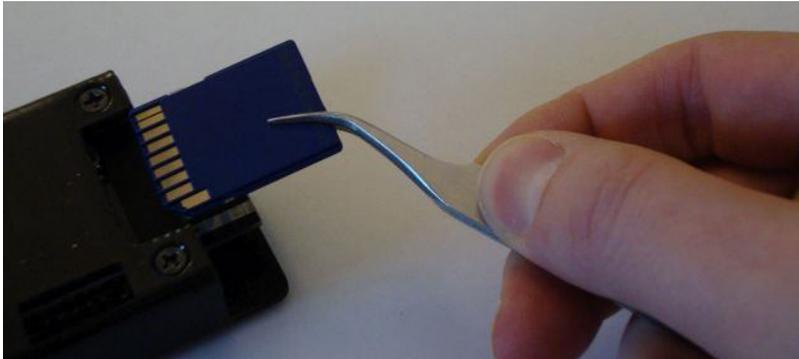
Gently push the SD-card, then pull it out using a tweezer

Tip two:

By attaching some tape to the side of the SD-card, a custom pulling tab is created. From this you can pull on the SD-card much easier. Preferably use a transparent and thin tape that you stick to both sides of the SD-card, the tape that extends beyond the card will form the tab you can pull on, by, because this is effectively two pieces of tape sticking back to back, it is small, but very strong. First press the SD-card slightly inwards until you hear a click, then the SD-card pops out a little and then remove it by gently pulling on the created tab.
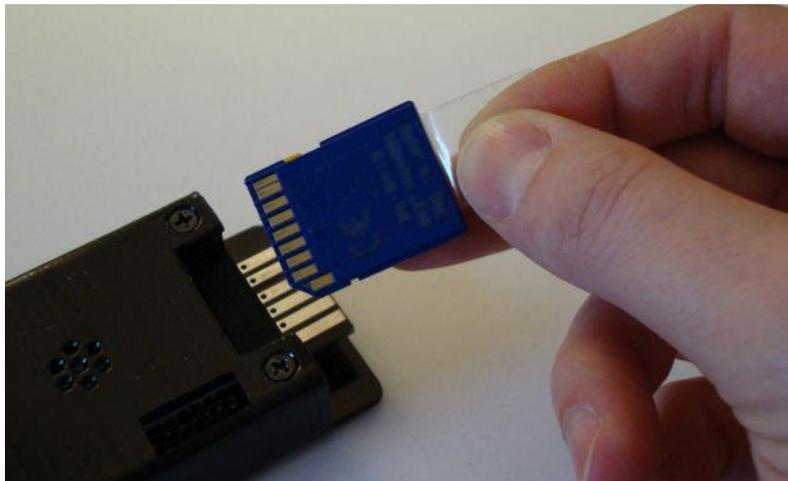
Gently push the card, then pull on the tape sticking out

4   The web-interface

When your Cassiopei has the wifi SSID and KEY settings in the settings file properly set and wifi is enabled, then it will attempt to login onto your wifi network every time it is switched on (or reset). When this is successful the Cassiopei will show the IP-address on the display. Go to the IP-address by typing it into the URL location of your browser. The Cassiopei will respond with a website representing the main menu.
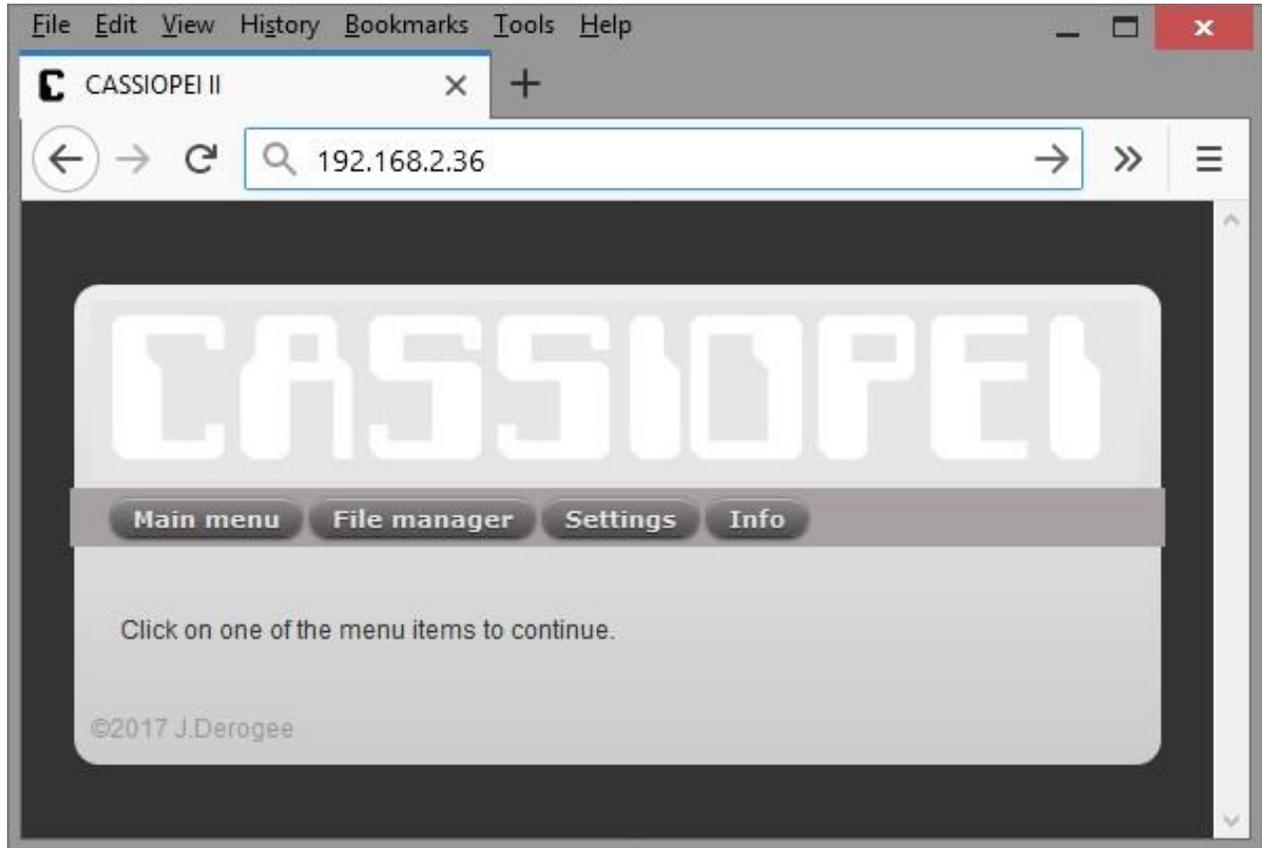
4.1   File manager

The easiest way to add files to the Cassiopei filesystem is by removing the card and inserting it into your PC using an USB SD-card adapter. Another way would be by using the web interface.

When the menu is shown, click onto the "File manager" button and wait a few seconds for it to load. The file manager works but is not really fast. Depending on the number of files added to the filesystem, the file manager may respond even slower. But despite from being slow, it is very practical as it allows you to quickly add a file without having to remove the SD-card from the Cassiopei. It might also come in handy for those situations where the computer you have your .PRG file does not have an SD-card slot or USB card reader.

Below you'll see the file manager, when you click onto the '+' of each folder, it will unfold and show the contents. Then you may click onto a file and "download" or "delete" that file from the card. As shown in the image below.

If you want to add a file, move your mouse over to the desired location and press the right mouse button and choose "upload", now the contents of the upload field changes.

Then press the browse button and select the file from your PC. Again the upload field changes. When you press the "upload" the file will be send to the SD-card

inside the Cassiopei, after a few seconds the screen is refreshed and the file is shown and ready for use.

Advanced user might also directly type the destination path for the uploaded file directly into the upload field, however this is not recommended as typing errors are easily made resulting in all sorts of problems.
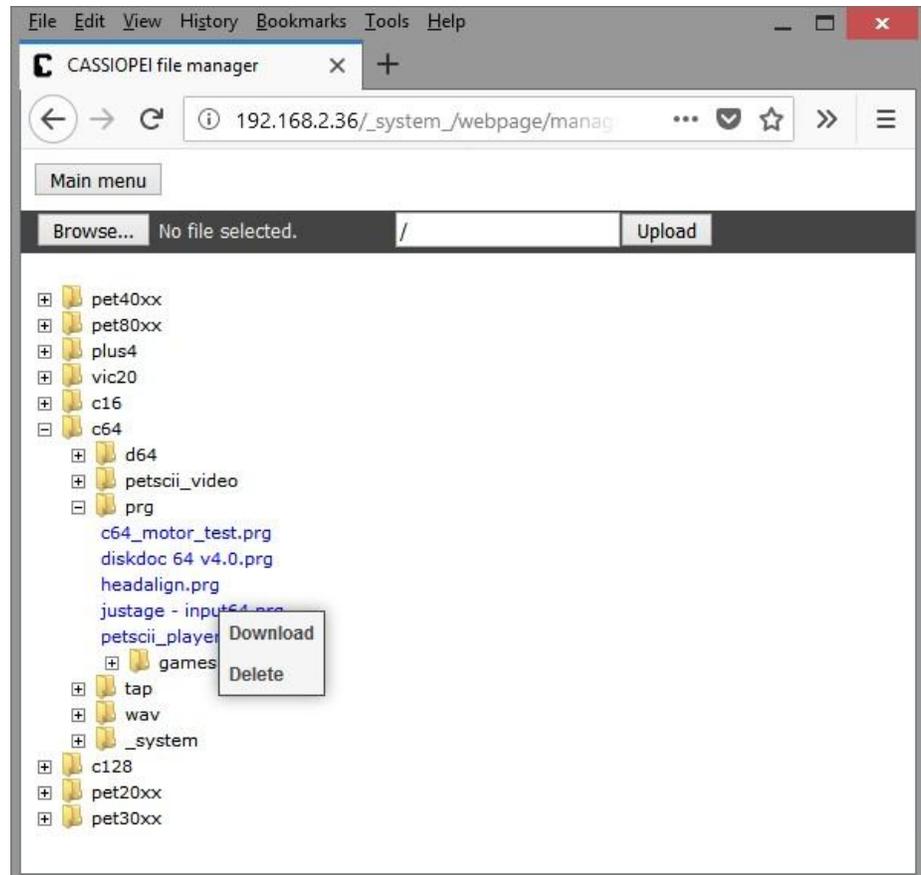
4.2   Settings

The settings page allows you to change the settings in the same way as you could do using the buttons and the OLED display directly on the Cassiopei. Or via the menu program on your CBM computer. Using the web interface allows for easier reading but is slower and therefore not the preferred method for quickly changing the current file or computer model.
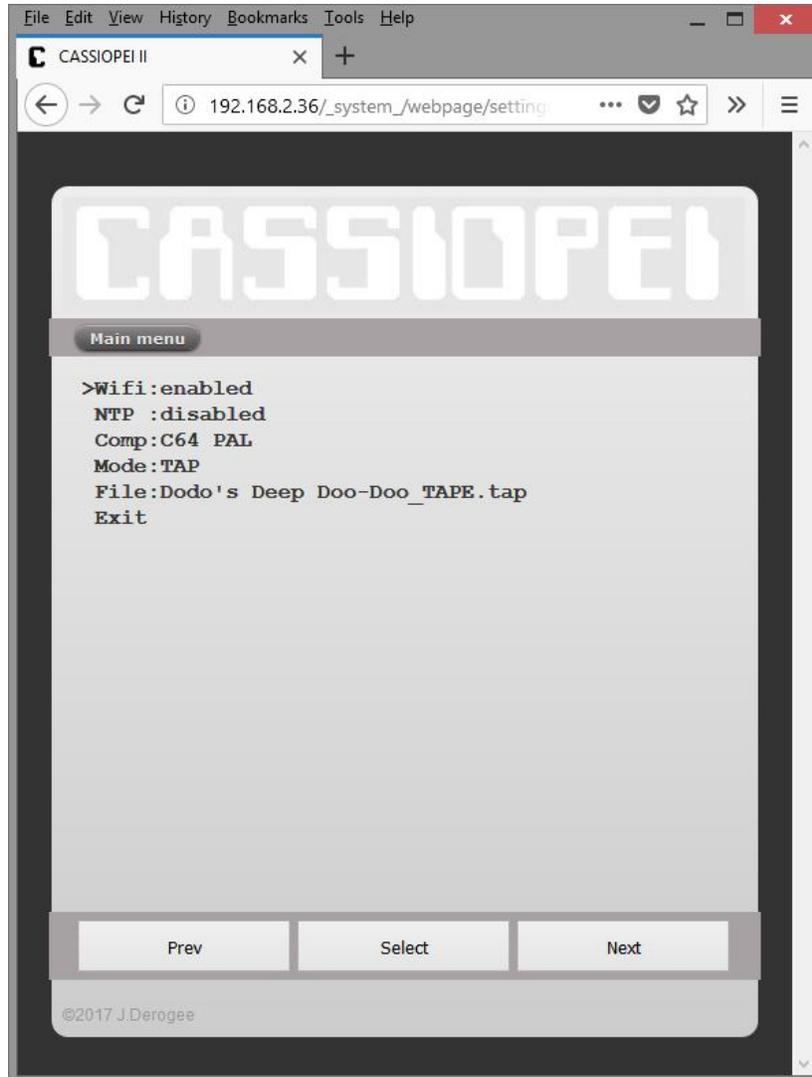
Use the buttons at the bottom of the screen for navigation through the menu. In order to save any changed settings you must use the exit function just like on the display and CBM methods. However after selecting "exit & save settings" nothing seems to happen, but the settings are saved. Simply press the "main menu button" or close the browser to exit this screen.

4.3   Info

This web page shows you some info about the Cassiopei, it tells you nothing you didn't know, but all the way down the screen is a link that allows you to upload new firmware into the Cassiopei. This is a feature that might come in handy when there is a new firmware version available (firmware binaries can be found on the Cassiopei website). Firmware updates include bugfixes and/or new features.

More information about firmware updating can be found further in this manual.
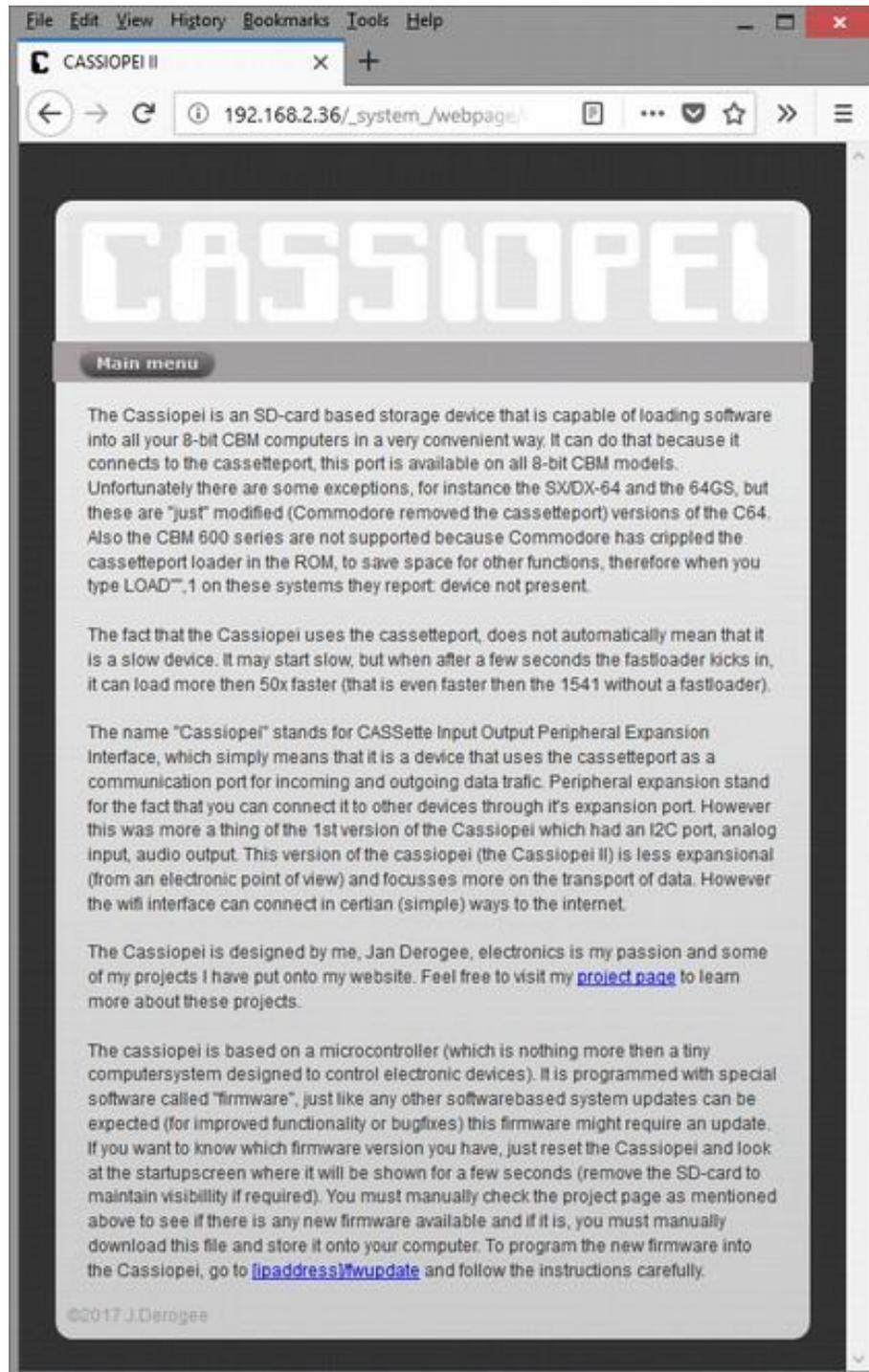
5 Cassiopei menu program

If the Cassiopei has been configured for use with the required computer model (for example, the Cassiopei has the computer model setting set to C64 PAL when working with a C64 PAL machine) then you are able to use the Cassiopei menu program (linked to the MENU button of the Cassiopei). This program can be used to select the game or program that you want to run. Although this program can do the same as the OLED display, it is much more convenient because the screen is much larger (easier readable) and much more fun then fiddling with these tiny buttons.

In the situation where you want to start a game or program that you've runs previously, then the menu program is not required, simply press the "Play"-button when the computer states "press play on tape". In all other cases follow the instructions below.

5.1 Starting the menu program

Starting (loading) the Cassiopei menu program into your CBM computer:
–   Type LOAD
–   When stated "press play on tape", press the "Menu"-button on the Cassiopei
–   The menu program will appear within a few seconds

Below the screen-shot of the Cassiopei menu program on a C64. The layout of this screen is similar for all supported computer types, but also similar to the menu on the OLED screen or web interface of the Cassiopei. Although there are some minor details caused by screen size/color limitations. But in general, but their functionality is completely identical. When the menu program on the CBM is active, the display on the Cassiopei indicates this situation to prevent the user from also accessing the menu on the Cassiopei itself.
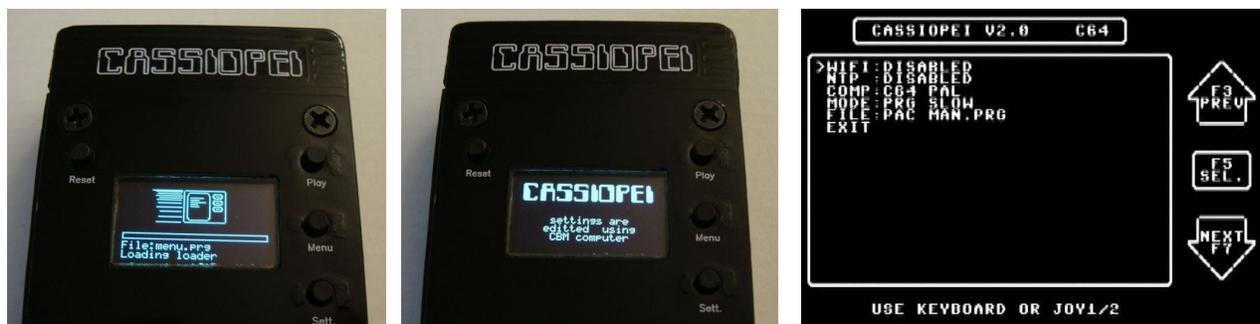
Use the keys as indicated in the screen to browse through the menu. When exit is selected (in combination with exit & save settings) the current selection is saved to the settings file and executed, which saves the user the trouble of typing LOAD again.

ATTENTION:

When configuring the Cassiopei through the menu program on your CBM computer, be aware that changing the computermodel settings could result in a non functional Cassiopei on that machine. Example: if you have you Cassiopei connected to the C64 and you choose a C16 computermodel, then the Cassiopei no longer is able to communicate to the C64, because you have told it should be working with a C16. And the electrical connections are not compatible therefore communication isn't possible. In order to resolve this situation, reset the Cassiopei and configure the device through the OLED display or use the web interface.

If you do need to change the computer model using the menu on a CBM computer then you must be aware that it is only possible if you switch between electrically compatible systems. The C16 and Plus4 are compatible with each other but not with any other model. So you can safely switch from a C64 to a VIC 20, but not from a C64 to a C16 or Plus4 (the C16 and Plus 4 are not compatible with the C64 or any other CBM model). Also you can safely switch from a C16 to a Plus4, but not from a C16 to a C64, VIC20 or any other Commodore computer model.

Therefore, changing the computermodel settings using the menu on a CBM computer is not recommended. And in some cases it is identical to sawing off the branch of tree while sitting on that branch, you must be seated on the correct side of the branch or otherwise unexpected behaviour will be the result. Rest assured that, the Cassiopei (or the Commodore computer connected to it) cannot be damaged by these actions

Some people might ask, why it this possible if it is not recommended. That is a very good question, though the answer is simple. The menu structure for the CBM, the OLED display and the web interface are all based around the same piece of code. It would be very difficult, inefficient and cumbersome to write 3 different types of code for menus structures that can (almost) do the same and look alike. By using only one type of menu structure the code required for this structure is much easier to test and maintain. The result is an interface that looks and feels the same under all 3 conditions but it requires some logical thinking of the end user. Knowing that Commodore computer users are smart people this was a design decision that will be expected to cause no (significant) problems in daily use.

6   Using PRG files

PRG files are files that contain the data in the same form as it should be stored in memory. Therefore these files can be loaded using the (slow) kernal loader or using the (fast) Cassiopei fastloader. The fast method is the recommended method.

Copy the PRG file you want to the PRG-folder of the computer model of your choice. So if you have a PRG file named PACMAN.PRG for a C64, then copy this PRG file to the SD-card in the corresponding folder. This would result in the path: C64/PRG/PACMAN.PRG

It is allowed to save the PRG file in a sub folder of your own choice, for instance the folder named GAMES. This means that you can organize you games making them easier to find if you have more then one PRG file on your SD-card. The path then would be: C64/PRG/GAMES/PACMAN.PRG

Configure the Cassiopei for the use of PRG files. You can do this using the menu program on your CBM computer.

- type LOAD on the CBM

- when the computer says "press play on tape", press the menu-button on the Cassiopei

- wait a few seconds before the menu program is loaded and starts

But you could also use the webinterface or the menu on the Cassiopei display itself (just press the "Sett."-button to enter the menu. All of the 3 menu options gives you a menu with the same functionality. When the PRG mode and PRG file have been selected, you may load it by typing LOAD on your CBM computer and press the "Play"-button on the Cassiopei. The PRG file will be played and the game/program will be loaded. During loading the progress is indicated by a progress bar.

PRG loading (slow mode)   *PRG loading(fast mode)*

<u>Note:</u>
In some very rare situations, it isn't possible to load a .PRG file game directly after selecting it in the via the menu (file selection via the CBM computer). The only way to solve this is to reset the CBM computer and the Cassiopei (simply turn your computer off and on) and then load the file directly. Since the game has already been selected in the menu program, there is no need to select it again and therefore you can just type LOAD on your CBM and then press PLAY on the Cassiopei. The game should now load directly and without the menu program.

7   Using TAP files

.TAP files are images of real cassette tapes. That's the main reason why .TAP files are so big. Each and every signal of the tape is very accurately described in the .TAP file. .TAP files are not to be compared with .PRG files as .PRG files are programs directly interpretable while .TAP files are small programs and lot's of data. The only way to interpret the data is by loading and executing the loader at the beginning of the .TAP file. This is one of the reasons why .TAP files cannot be loaded faster then the speed they were designed for (which is according to today's standard pretty slow...) .TAP files are to be loaded by selecting the .TAP file mode in combination with the selection of a .TAP file using the Cassiopei's menu program (or through the menu on the OLED screen)the Cassiopei manager.

Copy the TAP file you want to the TAP-folder of the computer model of your choice. So if you have a TAP file named PACMAN.TAP for a C64, then copy this TAP file to the SD-card in the corresponding folder. This would result in the path: C64/TAP/PACMAN.TAP

It is allowed to save the TAP file in a sub folder of your own choice, for instance the folder named GAMES. This means that you can organize you games making them easier to find if you have more then one TAP file on your SD-card. The path then would be: C64/TAP/GAMES/PACMAN.TAP

Configure the Cassiopei for the use of TAP files. You can do this using the menu program on your CBM computer.

- type LOAD on the CBM

- when the computer says "press play on tape", press the menu-button on the Cassiopei

- wait a few seconds before the menu program is loaded and starts

But you could also use the webinterface or the menu on the Cassiopei display itself (just press the "Sett."-button to enter the menu. All of the 3 menu options gives you a menu with the same functionality. When the TAP mode and TAP file have been selected, you may load it by typing LOAD on your CBM computer and press the "Play"-button on the Cassiopei. The TAP file will be played and the game/program will be loaded. The display shows you a nice animation of the tape, this way you can see it's status.

"Play"-button STOP/PLAY the TAP file

"Menu"-button rewind the TAP file

"Sett."-button wind the TAP file

When the game allows it you can/must rewind or wind the tape in order to continue. Now you can (by pressing the corresponding buttons) stop/play, wind or rewind the "tape". The tape counter is much more advanced then that of a real datasette, this counter shows the actual byte-position in the file and is therefore not time related. This allows for a more precise positioning.

You can also listen to the sounds coming from the
TAP file by moving the switch for the speaker of the Cassiopei in the 'R' or 'W' position.

Note:

In some very rare situations, it isn't possible to load a .TAP file game directly after selecting it in the via the menu (file selection via the CBM computer). The only way to solve this is to reset the CBM computer and the Cassiopei (simply turn your computer off and on) and then load the file directly. Since the game has already been selected in the menu program, there is no need to select it again and therefore you can just type LOAD on your CBM and then press PLAY on the Cassiopei. The game will now load directly and without the menu program.

You may wonder how this is possible, the answer to that question most likely lies in the fact that the game you are trying to load requires certain memory areas of the CBM computer to contain exactly the CBM computers default values. However, by loading the menu program some memory locations are altered and this may interfere with the .TAP file game loader. Although the Cassiopei menu program does attempt to set the memory to their default values just before exiting the menu program and loading the selected file, it is still possible that some memory locations (as used by some .TAP loaders) remain affected.

7.1 Swapping/flipping the tape (change TAP file during playback)

When you are in a TAP-file game and you must change to a different TAP file, simply because the TAP images of the game you are playing is split up into 2 different TAP files (a TAP-file for side A of the tape and a TAP-file for side B of the tape). Or perhaps you must insert a data cassette, because your application uses a TAP for the program and a TAP for the data. Although writing to TAP files is not possible for various reasons.

One method would be using the Cassiopei menu itself, but this menu isn't available in the TAP playback mode, therefore you must reset the Cassiopei. Then by pressing the settings button entering the menu and selecting the new TAP file followed by pressing play on the Cassiopei to start the TAP file. Unfortunately… some games and programs will keep the motor signal active even if you aren't in play/wind/rewind mode. The active motor signal causes the Cassiopei to think that it is in CPIO command-mode (CPIO the protocol the Cassiopei uses to communicate with the CBM computer), with the direct result that the complete interface almost completely freezes up making it impossible to change a TAP file.

7.2 Stopping the TAP file mode

The TAP file mode can only be stopped by resetting the Cassiopei, which can be done by turning your CBM OFF and ON or by pressing the "Reset"-button on the Cassiopei.

8   Supported computer models

8.1   Commodore VIC-20

The VIC-20 is the predecessor of the C64 and has many limitations. However the Cassiopei opens up a whole new range of possibilities, due to it's large available storage memory.

How to use:

Configure the Cassiopei to be used on a VIC-20 computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode.

LOAD <return>
or
shift + RUN/STOP (this is even better because it saves the user the trouble of typing RUN later)

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.

The Cassiopei menu program is to be used for selecting the file and/or changing the configuration of the Cassiopei Navigating through the menu is possible using the VIC-20 keyboard function keys or by moving the joystick up/down and fire to select. The Cassiopei menu program is a program that can detect the memory configuration and relocate itself without any problems or user interaction. Therefore this program works on all memory configurations of the VIC-20. However, this is not the case for the huge amount of software that was written in the early days of the VIC-20. And therefore some games/programs will simply not run if used in the wrong memory configuration. The next few pages of this manual are intended to explain this in more detail.

When a program is loaded using the Cassiopei's fastloader, the program is executed directly after it has finished loading. However .TAP files do no use the Cassiopei's fastloader and depending on the .TAP file used it may be required to type in RUN.

Note:

Do not press any key on the VIC-20's keyboard while loading as the keyboard of the VIC-20 shares IO-lines with the Cassetteport.

Memory expansion modules may be used but require some knowledge of the VIC-20's memory layout, for more info see the next page. To get an idea of your current memory configuration, the Cassiopei menu shows the BASIC start address and the available memory blocks.

Important note about the loading address of your games/programs:

The VIC-20 can have many different memory configurations. And these configurations affect the value of the BASIC start address. It is preferred to load programs only with the start address as indicated by the file itself unless absolutely certain that the file is a pure BASIC file. Because Commodore allows BASIC files to be reloaded automatically to the correct memory area.

Basically there are 3 types of memory configurations. Unexpanded, 3K expanded and 8K+ expanded. All three situations affect the VIC-20's BASIC start address. Normally the user could order the VIC-20 to allow relocation of basic programs by giving some extra information in the LOAD command. For instance LOAD"",1,1 or LOAD"",1,0 (please refer to you VIC-20 manual for more information about the details, there is no reason to really explain here because the Cassiopei do not require these commands (when using the fast loading mode)). These commands however could be of use in the Cassiopei slow loading modes, but this method of loading is not to be preferred or really required.

The Cassiopei fastloader is an intelligent loader and can figure out by itself where the file should be stored in memory, so all you need to do is type LOAD and nothing more. It can't be easier, can it? This is possible because the Cassiopei can detect if the file to be loaded is a BASIC program or not. When the Cassiopei detects that the file to be loaded is a BASIC file, it will load the file to the current BASIC start location.

Now how does the Cassiopei know if a file is a BASIC or a machine code program. Well, BASIC programs on a VIC-20 (or machine code programs that have a basic stub to start it), will load to address $0401, $1001 or $1201, therefore if the address in the file has one of these 3 addresses then that must be a BASIC file and relocation to the current BASIC start of the VIC-20 might be required.

When the address in the file is a different address then one of the above, the file is considered to be non-BASIC and will be loaded to the address as specified in the file. Therefore if you want to write your own machine language (a.k.a. assembly) program, then make sure that it does not start at one of the addresses as mentioned above, otherwise it will be treated as a BASIC program and might therefore be loaded to an unexpected memory location. Unless you implement a relocation algorithm as shown on the next pages. Which would be the best thing to do, because then the user can start a program with a RUN command instead of a SYS command, however this is only possible for relatively small programs. An example of such a small program are the Cassiopei fastloader and the Cassiopei menu program, which works on all memory configurations of the VIC-20 and still can be started with a simple RUN command.

The only real problem lies in hybrid programs, machine code programs that have a basic start address caused by the basic stub. A simple basic line that allow the program to start with RUN instead of SYS <something>.

And when you attempt to load a machine code program intended for a 3K expanded machine into a 8K+ expanded machine (or any other configuration), it will not work. Because the program is treated as a basic program and the machine code is then accidentally stored to the wrong memory area, causing it to crash the machine when you type RUN.

Now this has nothing to do with the Cassiopei, it was a problem ever since the VIC-20 came out and the only way to solve it is to load these kind of games/programs to the intended loading address as specified in the file. Therefore the Cassiopei menu shows this information, so you can get an idea of the game/program will load or not before you select it in your current VIC-20 memory configuration.

8.1.1 What to do when a VIC-20 program does not run?

Make sure that you are using the right memory configuration. It might be possible that you are trying to load a file larger then the memory of your VIC-20, in that case add some additional memory. But it may also be the case that the program you want to load might be a simple machine language program with a BASIC stub. In those cases it is best to remove/disable the memory expansion and load the file only when the BASIC start address matches the start address of the file. Some memory expansion do not allow you to disable the 3K expansion that causes the BASIC start address to appear at $0401, in order to disable that expansion (instead or removing the cartridge) a simple set of pokes is enough to achieve this: POKE642,16:POKE644,30:SYS64818

A problem with loading files are most likely to be caused by an incorrect setup of the system. A file that is too large to fit into the VIC-20's memory (because the file needs to be loaded on an expanded VIC-20 instead of an unexpanded one), then it cannot work. In case of doubt use an emulator with the same settings as your own VIC-20 in order to test if a program is capable of running on your current VIC-20 memory configuration (see the next page).

The VIC-20 has so many different configurations that it is a little confusing. Below an overview of different memory configurations and how they look like. The only directly visible difference is the available memory for BASIC. But what you can't see is that the BASIC start address and the video (screen and color) memory locations. Using the slow kernal loader, BASIC programs can be easily relocated. But machine language programs require some trickery to make it work. But a clever programmer can do this using his own relocation routines. An example is shown further on in this manual. Be aware of the changing Screen memory locations, this may also cause a relocated program to fail.

8.1.2   VIC20 BASIC start address due to memory configuration

```
**** CBM BASIC V2 ****
3583 BYTES FREE
READY.
```

VIC-20: unexpanded
BASIC:$1001, Screen:$1E00, Color:$9600

```
**** CBM BASIC V2 ****
6655 BYTES FREE
READY.
```

VIC-20: 3K expanded
BASIC: $0401, Screen:$1E00, Color:$9600
(can be disabled by typing: POKE642,16:POKE644,30:SYS64818)

```
**** CBM BASIC V2 ****
6519 BYTES FREE
READY.
```

VIC-20: 3K super expander
BASIC: $0401, Screen:$1E00, Color:$9600

```
**** CBM BASIC V2 ****
11775 BYTES FREE
READY.
```

VIC-20: 8K expanded
BASIC:$1201, Screen:$1000, Color:$9400

```
**** CBM BASIC V2 ****
19967 BYTES FREE
READY.
```

VIC-20: 16K expanded
BASIC:$1201, Screen:$1000, Color:$9400

```
**** CBM BASIC V2 ****
28159 BYTES FREE
READY.
```

VIC-20: 24K expanded
BASIC:$1201, Screen:$1000, Color:$9400

Using the standard loader (slow speed) you can load a file in 2 different way's.

Using LOAD   load the program to the BASIC start address.
Using LOAD"",1,1   load the program to the start address as specified in the file.

When you program a BASIC program on a +3K expanded VIC-20 and want to load that on an unexpanded VIC-20 then you will get into trouble if you load with LOAD"",1,1. Because then you will load your program into $1001 (the BASIC start address of an unexpanded VIC-20). The +3K epanded VIC-20 has BASIC start $0401, so this will not work, because when loading is ready you see nothing when you type list. This is because the BASIC program is not loaded into the proper basic area for the unexpanded machine. Fortunately the good people of Commodore have made an option to compensate for this. Simply load your file using LOAD and it will relocate automatically. This means that during loading all the addresses are correct for the current BASIC start value.

Relocating a BASIC program is possible, as long as it fits into the machine. Relocating a machine language program (not intended to be relocated) is not good. Because the address would change and the program would crash on execution, unless the program has it's own relocation routines.

When loading a file with the Cassiopei's fastloader, you cannot choose how to load the file. But this is not required. The Cassiopei will detect if the file will start at $0401, $1001 or $1201 and if so, it must be a BASIC program and so it will be relocated to the current basic start address. If the program is a machine language program it will not start at one of these 3 locations. If the program is a hybrid program (a machine language program that begins with a BASIC stub then it will be relocated. But for these programs you must be aware if these programs are capable of running on your machine's configuration. Because not all programs will function. This is due to system constraints (or bad programming) and not because of the Cassiopei. However for most of these kind of games it is noted in a readme file or manual on what kind of memory configuration it should be played.

8.1.3   Writing a program that works on all VIC-20 configurations

Technically it is possible to write a small program that has a BASIC stub and a self relocating machine language part. The Cassiopei menu program is such a program and below is shown how it works.

Example of a self relocating machine language program and a basic stub to start it:

```
The program below is written to work on memory address $12XX and further, because this location is
available in all possible memory configurations. When compiled using the address below, it can be
loaded and started with a simple run. No more SYS commands to remember, just RUN. The relocating
routine will copy itself from the current location the correct location, but because these areas
might overlap, the copying routine copies the last byte first. In other words, it copies backwards,
so the loop ends by copying the first byte last.

;zero page variables
;====================
SOURCE_ADR      = $F7   ;pointer for relocation
;SOURCE_ADR+1   = $F8   ;
DEST_ADR        = $F9   ;pointer for relocation
;DEST_ADR+1     = $FA   ;


;BASIC stub
;==========
*=$1201
        ;20 SYS32+256*peek(44)

        ;Start address $1201, end address $1214
        BYTE $13,$10,$14,$00,$9e,$33,$32,$aa,$32,$35,$36,$ac,$c2,$28,$34,$34,$29,$00,$00,$00
```

```
;Code relocater (this code can run from any address)
;===================================================
*=$1220

RELOCATE        LDA $2C                  ;
                CMP #$12                 ;
                BEQ RELOCATE_DONE   ;code already at the correct location
                ;program_size = END_OF_PROGRAM - INIT
                ;first byte in memory = contents of $2C + low byte of label MAIN
                ;last byte in memory = first byte in memory + program_sizeRELOCATE_REQ
                LDA #<END_OF_PROGRAM      ;store destination address in zero-page variable
                STA DEST_ADR             ;================================================
                LDA #>END_OF_PROGRAM      ;

                STA DEST_ADR+1           ;high byte
                LDA #<MAIN               ;calculate first byte of code to be relocated in memory
                STA SOURCE_ADR           ;====================================================
                LDA $2C                  ;
                STA SOURCE_ADR+1         ;high byte
        ;-------------------------------------------------------------------------
        ;ATTENTION: make sure that the option "calc address first then high/low byte"
        ;in CBM program studio is selected. Otherwise the lines below WILL fail!!!!!!!
        ;-------------------------------------------------------------------------
                CLC                      ;add program size to get to the last byte
                LDA SOURCE_ADR           ;======================================
                ADC #<END_OF_PROGRAM-MAIN    ;carry that we be used in the next addition
                STA SOURCE_ADR           ;
                LDA #>END_OF_PROGRAM-MAIN    ;
                ADC SOURCE_ADR+1         ;add carry to high byte (if there was any)
                STA SOURCE_ADR+1         ;
                CLV                      ;clear flag here to keep the loop fast
                LDY #$00                 ;clear reg here keeps the loop fast
RELOCATE_LP     LDA (SOURCE_ADR),Y       ;the actual moving of the program (the copy loop)
                STA (DEST_ADR),Y         ;================================================
                LDA DEST_ADR+1           ;check if last byte reached
                CMP #>MAIN               ;================================
                BNE RELOCATE_00          ;
                LDA DEST_ADR             ;low byte of last written address
                CMP #<MAIN               ;
                BEQ RELOCATE_DONE        ;
RELOCATE_00     DEC SOURCE_ADR           ;calculate next addresses
                LDA SOURCE_ADR           ;
                CMP #$FF                 ;
                BNE RELOCATE_01          ;========================
                DEC SOURCE_ADR+1         ;overflow detected
RELOCATE_01     DEC DEST_ADR             ;decrement low-byte
                LDA DEST_ADR             ;
                CMP #$FF                 ;
                BNE RELOCATE_02          ;check for overflow of low byte
                DEC DEST_ADR+1           ;overflow detected, so we must also decrement high-byte
RELOCATE_02     ;CLV                     ;force conditional branch because
                BVC RELOCATE_LP          ;absolute jumps are impossible
RELOCATE_DONE   JMP MAIN                 ;code is at correct location, so we may start it


;Main program (the code that will be relocated), it may not exceed $1DFF
;This means that your own program may be bigger then approximately 3Kbyte
;========================================================================

MAIN
 ;;;write your own program here;;;

END_OF_PROGRAM        ;this label indicates the absolute end of the program
```

8.2   Commodore 64

The C64 is the computer that inspired the design of the Cassiopei. As you can see it is easily connected to the cassetteport of both C64 models. It cannot be connected to the C64 games system (as this is a cartridge based game console version of the C64) and it cannot be connected to the SX-64 or DX64, which also has no cassetteport.

C64 "old model"

C64 "new model"

How to use:

Configure the Cassiopei to be used on a C64 computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode.

LOAD <return>
or
shift + RUN/STOP

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.

The Cassiopei menu program is to be used for selecting the file (when usage of the Cassiopei manager is not possible or desired). Navigating through the menu is possible using the keyboard or by moving the joystick (port 1 or 2) up/down and fire to select.

When a program is loaded using the Cassiopei's fastloader, the program is executed directly after it has finished loading. However .TAP files do no use the Cassiopei's fastloader and depending on the .TAP file used it may be required to type in RUN.

Note: the Cassiopei will not function when there is a disk drive connected but not switched on. Therefore switch on the disk drive or remove it completely. This is caused by the fact that the cassetteport Read-signal is shared with the SRQ-signal of the serial bus of the C64.

8.3   Commodore C16/Plus4

The C16/Plus4 computers are slightly different due to the fact that their cassetteport uses a slightly different connector. Fortunately this can be easily solved by using the CBM's standard connector adapter.

C16

Plus 4

How to use:

Configure the Cassiopei to be used on a C16/Plus4 computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode.

LOAD <return>

The computer will now ask you to "press play on tape":
– 	press the PLAY button on the Cassiopei to load the currently selected game/program
– 	press the MENU button in order to load the menu program to define your new settings.

The Cassiopei menu program is to be used for selecting the file (when usage of the Cassiopei manager is not possible or desired). Navigating through the menu is possible using the keyboard or by moving the joystick (port 1 or 2) up/down and fire to select.

When a program is loaded using the Cassiopei's fastloader, the program is executed directly after it has finished loading. However . TAP files do no use the Cassiopei's fastloader and depending on the .TAP file used it may be required to type in RUN.

8.4   Commodore 128

The C128 is a great computer with many features. No matter how you want to use your C128 (C128 or C64 mode) always start the C128 computer in the C128 mode, that was the way the machine was intended by the nice people of Commodore.

The Cassiopei must be have the computer model set as described below.
When you want to it in the C128 mode, select: C128 PAL or C128 NTSC
When you want to select a PRG of TAP file it will show you the files that are stored in the folder C128/PRG or C128/TAP.

When you want to it in the C64 mode, select: C128 PAL [C64] or C128 NTSC[C64]
When you want to select a PRG of TAP file it will show you the files that are stored in the folder C64/PRG or C64/TAP.

When you exit the Cassiopei menu program on your C128, using "EXIT & SAVE SETTINGS" the computer will then switch to the C64 mode (if that is required) and starts the games/program.

C128D "metal model"   *C128D "plastic model"*

As the image above demonstrates, the C128D plastic version require the use of an additional stand. You can attach this by removing the back cover of the Cassiopei and then slide the stand gently over the cassetteport connector, then replace the back cover.

Attention: if you start your C128, with a cartridge installed or by pressing the Commodore key during power-on/reset, the C128 will effectively be a C64, therefore the Cassiopei will be required to be configured for a C64 otherwise it won't work as expected.

The C128 models, as shown in the pictures above, have an internal disk drive that can make the use of the Cassiopei even easier thanks to the boot-disk functionality. The Cassiopei menu program allows you to make such a disk. When you have the boot-disk inserted at the moment you switch on your C128, the Cassiopei menu-program will automatically load and within seconds you'll see the Cassiopei menu program without pressing a single key.

Dual screen:
The Cassiopei menu-program supports the use of the C128 in 40 or 80 column mode. So no matter in which mode you work, you can use the menu-program.

How to use:

Configure the Cassiopei to be used on a C128 computer, this is required in order to define all timings and load addresses of the Cassiopei for this type of computer.

The Cassiopei's requires the following sequence of commands independent of it's operating mode.

LOAD <return>

The computer will now ask you to "press play on tape":
–   press the MENU button to load the menu program or to select a file or change your settings.

You could also press the PLAY button to start the currently selected file, however this does not switch the C128 into the C64 mode. Therefore if the current file is a C64 file you must have the C64 mode already active. Type GO 64 before typing LOAD or press the Commodore key on power-on/reset. After that the computer will directly load your currently selected game/program.

Now the Commodore 128 starts looking for a program. When the program is found, the Commodore 128 prints FOUND "filename", the filename is the name of the selected program or the fastloader required to load the selected program or menu. Press the COMMODORE-key to LOAD the this file or wait a few seconds and loading will continue. **However if you press the spacebar the file will be skipped and loading eventually stops. This behavior is different from the behavior of that of other Commodore machines (like for instance on the C64). This different behavior is embedded in the design of the C128 and is not caused in any way by the Cassiopei.**

The Cassiopei menu program is to be used for selecting the file (when usage of the Cassiopei manager is not possible or desired). Navigating through the menu is possible using the keyboard or by moving the joystick (port 1 or 2) up/down and fire to select. When you press the "return" key (or move the joystick left/right) you may switch between C64 and C128 mode. Only the files marked for that type of system will be shown.

When a program is loaded using the Cassiopei's fastloader, the program is executed directly after it has finished loading. However . TAP files do no use the Cassiopei's fastloader and depending on the .TAP file used it may be required to type in RUN.

Note: the Cassiopei will not function when there is a disk drive connected but not switched on. Therefore switch on the disk drive or remove it completely. This is caused by the fact that the cassetteport Read-signal is shared with the SRQ-signal of the serial bus.

On all systems it is possible to directly start the last selected game/program (without use of the menu) by typing LOAD and pressing the play-button on the Cassiopei. However the C128 is a special case...

You can start the last selected C128 game/program on a C128 in C128 mode, by typing LOAD and pressing the play button on the C128. But you cannot start a C64 game (on a C128 in C128 mode) by typing LOAD and pressing the play-button on the Cassiopei. You need to go into the Cassiopei menu to start a C64 game on a C128 in C128 mode.

The only alternative is to start the C128 in C64 mode and to use the Cassiopei configured specifically for C64 use. But that would eliminate all benefits the C128 has to offer and is therefore not recommended.

8.5   Commodore PET/CBM 20XX series (build-in tape drive)

Commodore made a name in the computer industry with the iconic PET computer. With it's adorable (but not so practical) keyboard and the build-in tape recorder this machine made low cost computing possible and started a revolution in the industry. Commodore made this model in different memory configurations (8, 16, 32K). Despite from memory differences, these models all work the same and are therefore referred to as the 20XX series in this manual. The 20XX series are well known for their build in cassette player (cassetteport#1) but it has also a cassetteport #2. Cassetteport#1 is located inside the case and directly connected to the build-in tape drive. Therefore it is not as easily accessible as cassetteport#2, which is conveniently located at the back of the computer. The Cassiopei could function on both cassetteports, but the speedloader software inside the Cassiopei must know to which port it is connected. Therefor the correct port must be chosen in the computer model settings of the Cassiopei settings menu. The computermodel setting for the model as shown in the picture below would be "50Hz PET20XX #2" because the Cassiopei connects to the cassetteport at the rear, which is cassetteport #2.

This model requires the use of an additional stand. You can attach this by removing the back cover of the Cassiopei and then slide the stand gently over the cassetteport connector, then replace the back cover.

Usage:
Configure the Cassiopei to be used on a PET/CBM 20XX (build-in tape drive) computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode. Be aware that there are differences between the various versions of Commodore BASIC.

LOAD"",2<return>   (BASIC 1, startup screen shows *** COMMODORE BASIC ***)
LOAD"",2<return>   (BASIC 2, startup screen shows ### COMMODORE BASIC ###)
LOAD"",2<return>   (BASIC 4, startup screen shows *** COMMODORE BASIC 4.0 ***)

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.
–   depending on method of loading type **RUN** to start the loaded program

Note:

If the cassiopei was to be connected to cassetteport #1 then replace '2' by '1' in the examples above. Or simply type LOAD<return>

BASIC 1 is the first version of BASIC that Commodore released for their PET computers, unfortunately, this BASIC version has many problems and Commodore has quickly responded to this by the release of an upgraded BASIC version, BASIC 2. It is preferred that machines with BASIC 1 are upgraded to BASIC 2. Therefore the use of the Cassiopei in combination with a computer using BASIC 1 might result in unexpected messages after loading and running. Sometimes an error in a BASIC line is reported, but after typing list, the program will run without problems. The easiest way to prevent these strange problems is to use the slow kernal loader (use the mode named "slow", in the menu program).

Note:

The Cassiopei uses a part of the stack and the cassettebuffer#1 to store the fastloader routines. Some programs are loaded into the area of tape buffer#2, although the Cassiopei is connected to cassette-port 2 this does not interfere with the fastloader routines. This because the fastloader moves itself into tape buffer#1 freeing tape buffer#2 for programs.

Some programs cannot be loaded using the Cassiopei fastloader. For instance the game "Wasps" which loads to memory locations $027A - $1400. (this information is visible in the Cassiopei manager). This uses tape buffer#1 (which starts at $027A). However it is still possible to load this game using the Cassiopei, but it requires the kernal loader. By loading the game using the standard kernal loader (also known as the slowest method of loading) the game is loaded exactly as it was designed.

8.6 Commodore PET/CBM 20XX and 30XX series

Commodore has build many variations of the PET 2000 series. Not only did they vary the amount of RAM, they also removed the build-in tape drive. Which is a bit of an issue because the cassette port numbers are different between the different model of the same series. However this is quickly noticed. Because the build-in tape drive is always #1 and the external tape drive is #2, if there is no build-in tape drive then the external tape drive is called #1. The Cassiopei fastloader software needs to know where the tape drive is located (#1 or #2) therefore the proper computermodel must be chosen in the settings screen.

Soon after the release of the 2000 series Commodore came with the 3000 series, which is very similar to the 2000 series that have no build-in tape drive. In fact they are so similar that the Cassiopei can use the same fastloader routines for both series of machines. Regarding the 3000 series, Commodore made this model also in different memory configurations (3008, 3016, 3032). Despite from memory differences, these models all work the same and are therefore referred to as the 30XX series in this manual.

As the image above demonstrates, the PET/CBM 2000 and 3000 series require the use of an additional stand. You can attach this by removing the back cover of the Cassiopei and then slide the stand gently over the cassetteport connector, then replace the back cover.

Usage:

Configure the Cassiopei to be used on a PET/CBM 20XX & 30XX computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode. Be aware that there are differences between the various versions of Commodore BASIC.

<not supported>   (BASIC 1, startup screen shows *** COMMODORE BASIC ***)
Shift + RUNSTOP   (BASIC 2, startup screen shows ### COMMODORE BASIC ###)
<see note>   (BASIC 4, startup screen shows *** COMMODORE BASIC 4.0 ***)

Note: Please note that a 30XX with BASIC 4 functions like a 40XX, so in this case please configure the Cassiopei for use with a 40XX and use the 40XX menu program.

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.
–   depending on method of loading type **RUN** to start the loaded program

Note:

When a program is loaded using the Cassiopei's fastloader, the program is executed directly after it has finished loading. However . TAP files do no use the Cassiopei's fastloader and depending on the .TAP file itself it may be required to type in RUN.

Some programs cannot be loaded using the Cassiopei fastloader. For instance the game "Wasps" which loads to memory locations $027A - $1400, this is a problem because these locations are also used by the fastloader routines of the Cassiopei. As it uses tape buffer#1 (which starts at $027A). However it is still possible to load this game using the Cassiopei, but it requires the kernal loader. By loading the game using the standard kernal loader (also known as the slowest method of loading) the game is as it was designed.

In some occasions when the RUN command is entered, the Cassiopei loads the program, but the computer responds with an error message. Most of the times entering the RUN command again will start the loaded program without any problems. In those occasions it would have been better to use a SYS command to start the fastloader routines. So instead of RUN, type SYS 1040 (Also shown when typed list after loading of the fastloader program).

8.7 Commodore PET/CBM 40XX series

Commodore has build many variations of the PET, one of them is the PET 4032. Commodore made this model in different memory configurations (4008, 4016, 4032). Despite from memory differences, these models all work the same and are therefore referred to as the 40XX series in this manual. The 40XX series do not have a build in cassette player but it has 2 cassetteports. Cassetteport#1 is easily accessible while cassetteport#2 is located inside. Theoretically the Cassiopei could function on both cassetteports, but the speedloader software inside the Cassiopei was designed for use on cassetteport#1 (because this is easily accessible and allows the use of both cassettebuffers for storing the fastloader routines). Therefore it will not fully work on cassetteport#2. Also loading from this port allows the user to type LOAD without specifying the port address as cassetteport#1 is the default cassetteport.

As the image above demonstrates, the PET/CBM 4000 series require the use of an additional stand. You can attach this by removing the back cover of the Cassiopei and then slide the stand gently over the cassetteport connector, then replace the back cover.

Usage:
Configure the Cassiopei to be used on a PET/CBM 40XX computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei's requires the following sequence of commands independent of it's operating mode. Be aware that there are differences between the various versions of Commodore BASIC.

<see note>   (BASIC 1, startup screen shows *** COMMODORE BASIC ***)
<see note>   (BASIC 2, startup screen shows ### COMMODORE BASIC ###)
LOAD <return>   (BASIC 4, startup screen shows *** COMMODORE BASIC 4.0 ***)

Note: Basic version 1 and 2 were never released for the 40XX series, if your computer uses these versions, the system has been downgraded. This practice is not supported by the Cassiopei. For this and for historical reasons it is suggested to restore the computer to it's original state. So that it can function as intended by the nice people of Commodore.

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.
–   when done loading, type **RUN** to start the loaded program

Note:

Some programs cannot be loaded using the Cassiopei fastloader. For instance the game "Wasps" which loads to memory locations $027A - $1400, this is a problem because these locations are also used by the fastloader routines of the Cassiopei. As it uses tape buffer#1 (which starts at $027A). However it is still possible to load this game using the Cassiopei, but it requires the kernal loader. By loading the game using the standard kernal loader (also known as the slowest method of loading) the game is as it was designed.

In some occasions when the RUN command is entered, the Cassiopei loads the program, but the computer responds with an error message. Most of the times entering the RUN command again will start the loaded program without any problems. In those occasions it would have been better to use a SYS command to start the fastloader routines. So instead of RUN, type SYS 1040 (Also shown when typed list after loading of the fastloader program).

8.8   Commodore PET/CBM 80XX series

Commodore has build many variations of the PET, one of them is the PET 8032. Commodore made this model in different memory configurations (8008, 8016, 8032). Despite from memory differences, these models all work the same and are therefore referred to as the 80XX series in this manual.

The 80XX series do not have a build in cassette player but it does have 2 cassette ports, both conveniently located on the outside of the case.
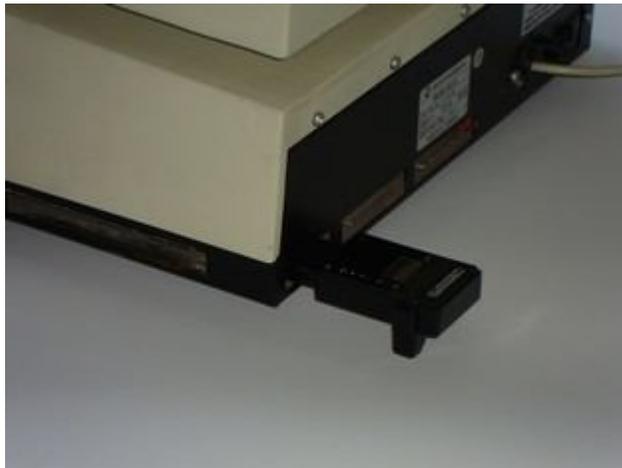
Cassiopei in cassetteport #1

Cassiopei in cassetteport #2

Cassetteport#1 is located at the rear of the computer where cassetteport#2 is located on the side. Although the cassiopei could perfectly function on both cassetteports there are some considerations to be taken into account.

Cassetteport#1 is the least practical location, but requires less typing. Type LOAD<enter>
Cassetteport#2 is at a much better location but requires more typing. Type LOAD"",2<enter>
Depending on what cassette port you intend to use the correct computermodel setting must be chosen. In other words, it only works when the Cassiopei is configured correctly. Use setting:
PET80XX CASS#1 for the situation where the Cassiopei is connected to cassetteport#1
PET80XX CASS#2 for the situation where the Cassiopei is connected to cassetteport#2

As the image above demonstrates, the PET/CBM 8000 series require the use of an additional stand. You can attach this by removing the back cover of the Cassiopei and then slide the stand gently over the cassiopei's cassette port connector, then replace the back cover.

Usage:
Configure the Cassiopei to be used on a PET/CBM 80XX computer, this is required in order to define all timings of the Cassiopei for this type of computer, see the chapter "Configuring the Cassiopei". Do not attempt to use the Cassiopei while it is not configured.

The Cassiopei requires the following sequence of commands independent of it's operating mode. Be aware that there are differences between the various versions of Commodore BASIC.

BASIC 1: startup screen shows *** COMMODORE BASIC ***
BASIC 2: startup screen shows ### COMMODORE BASIC ###

Basic version 1 and 2 were never released for the 80XX series, if your computer uses these versions, the system has been downgraded. This practice is not supported by the Cassiopei. I would kindly advise to restore the computer to it's original state. So that it can function as intended by the nice people of Commodore.

The proper BASIC version for the model PET/CBM 80XX computer is BASIC 4
(BASIC4: startup screen shows *** **COMMODORE BASIC 4.0** ***) and this is how you should use it in combination with the Cassiopei.
When the Cassiopei is connected to cassetteport #1, type:
LOAD <return>

When the Cassiopei is connected to cassetteport #2, type:
LOAD"",2 <return>

The computer will now ask you to "press play on tape":
–   press the PLAY button on the Cassiopei to load the currently selected game/program
–   press the MENU button in order to load the menu program to define your new settings.
–   when done loading, type RUN to start the loaded program

Note:
Some programs cannot be loaded using the Cassiopei fastloader. For instance the game "Wasps" which loads to memory locations $027A - $1400, this is a problem because these locations are also used by the fastloader routines of the Cassiopei. As it uses tape buffer#1 (which starts at $027A). However it is still possible to load this game using the Cassiopei, but it requires the kernal loader. Which is way slower and therefore not the preferred method of loading. But by loading the game using the standard kernal loader the game loaded as it was designed.

In some occasions when the RUN command is entered, the Cassiopei loads the program, but the computer responds with an error message. In many occasions entering the RUN command again will start the loaded program without any problems. In those occasions it would have been better to use a SYS command to start the fastloader routines. So instead of RUN, type SYS 1040 (Also shown when typed list after loading of the fastloader program).

8.9   Commodore CBM 500 series (not supported)

Support for the Commodore 500 series is impossible. Simply because typing the LOAD command instantly returns a "device not present" error. The reasons for this are not clear but are assumed to be similar to that of the CBM 600 series, which are described below.

8.10   Commodore CBM 600 series (not supported)

Support for the Commodore 610, shown below, is impossible.

Although it is possible to connect the Cassiopei to the CBM 600 series, unfortunately, that's about it. You cannot give the command to load, therefore rendering the Cassiopei useless.

It appears that Commodore has removed the routines that access the tape. There were several sets of ROMs around for these machines. Early ones apparently contained the code to run the cassette port though this was dropped to make room for the IPC code to interface with the second processor. Any attempt to load or save to tape on the later versions gives the error '?DEVICE NOT PRESENT'.

This means that the Cassiopei would require a cartridge or disk drive with special software to start it. This however was not the intention of the Cassiopei's design. As the Cassiopei was designed to be a device that would not require other storage devices in order to work. So although technically it is possible to use the Cassiopei in combination with the CBM 600 series, it does requires a disk-drive or cartridge as well. With this in mind I (Jan Derogee, inventor of the Cassiopei) decided that support for this computer model is not really that useful.

9 Backup/restore tapes

Above the SD_card is a datasette connector. This allows you to connect a datasette for backup/restore purposes. The Cassiopei also has a special backup/restore mode. This mode is refered to as the TAP creator. You can enter this mode by attaching a datasette to the datasette port of your Cassiopei and pressing play/wind or rewind during power-on (or reset). When the Cassiopei starts it will detect that a datasette button is pressed and the backup/restore mode is entered.

Using this mode you can digitize your own cassette tapes (backup) or record tapes (restore) directly from the TAP file. But before you can reliably backup or restore, make sure that your datasette is in perfect working order.

9.1 Datasette maintenance and repair

No matter if you want to recreate/record a tape or want to archive/playback a tape the datasette (or any other type of cassetteplayer) must be in perfect order. If not then failure is unavoidable.

There are many things that can be wrong with your datasette, which is to be expected for equipment of this age. Sometimes it is only a matter of good cleaning of the rubber wheel called "pinch roller" and the tape heads. But sometimes it may be required to replace all parts that are "rubber". A lot of times the belts are not a tight as they where when they left the factory and therefore they are slightly loose and cannot transfer the power from the motor to the tape mechanism, causing problems during playback or (re)winding. One of the most common problems with the datasette (and any other kind of tape drive used for home computing in the 80's) is tapehead alignment, also referred to as azimuth. Make sure that your tapeheads are aligned properly.
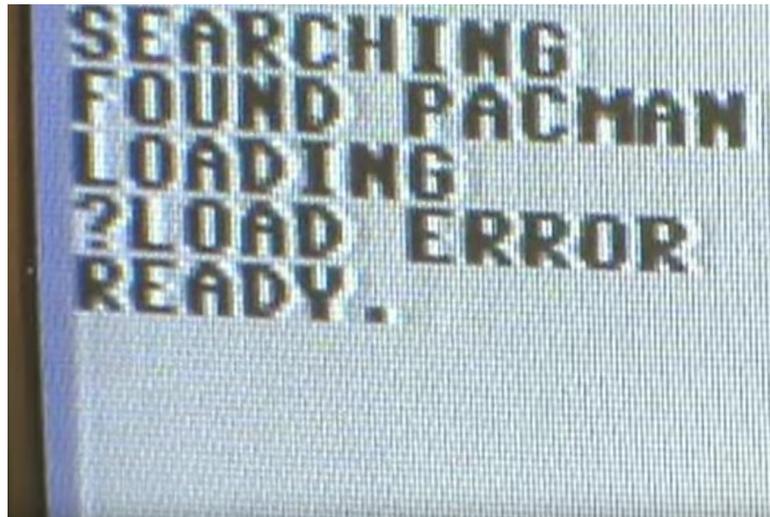
Below an image showing the easy accessible and important parts of your datasette.
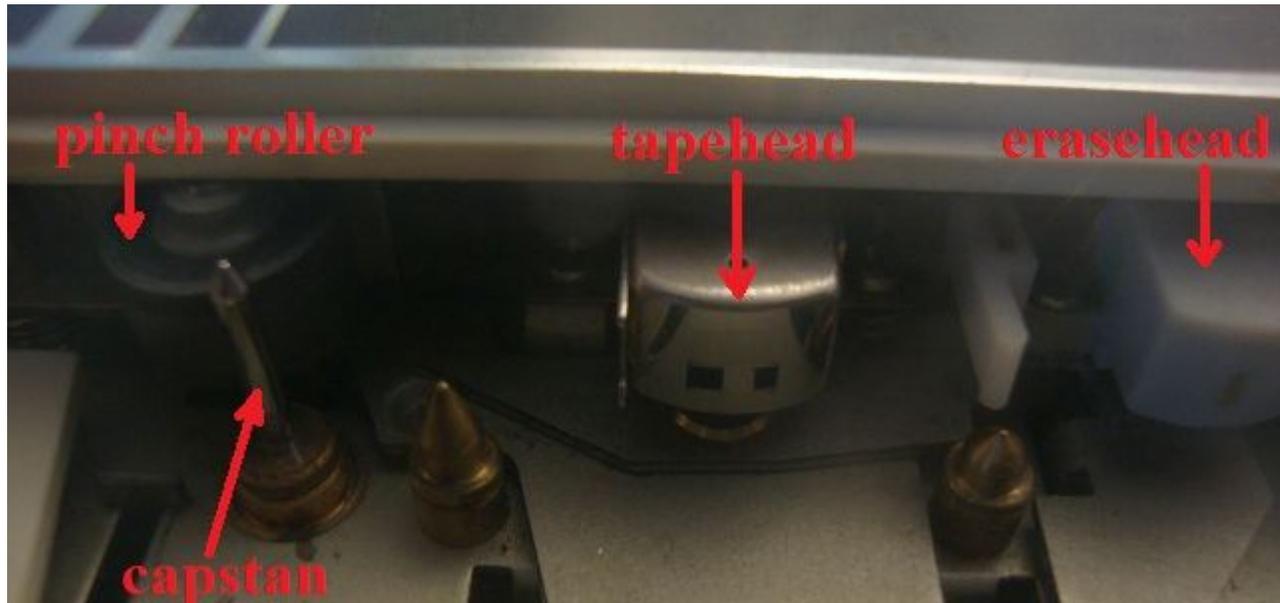
So in other words… always make sure that your datasette (or other kind of tape recorder) is in perfect working condition. A backup or restored tape is only as good as the recorder is was made on. If you use a crappy recorder, you'd get crappy recordings!

Finally there is one thing that should be taken into account, use proper tapes, tapes that are 30 years old and have been subjected to moisture and continuously varying temperatures are not really a good base to be used for restoring your tape archive from .TAP file to real tapes. Therefore make sure you are using tapes that are in top condition.

9.1.1   Belt replacement

Worn out, loose, broken or sticky belts will make it impossible for the tape to be played at a correct or constant speed. Worn out (or loose) belts inside the tape mechanism can create problems with the continuity of the speed of the tape. You will most likely notice this during winding and rewinding, the tape sometimes stops somewhere close to the end or the beginning of the tape. You must fix this in order to continue. Belt problems can be detected (sometimes) by carefully listening to the sound of the leader, the long BEEEEP tone at the beginning of each game/program on the tape. Place the speaker switch of the Cassiopei in the playback position and playback your tape. When the leader sounds like PEEEEEEEEEEEEEEEEEEEEEEEEEEEP, your probably OK.

But when it sounds like BWWWWEEEEEEEWIIIIIWUUUUWEEEEWIIIWEEEWUUP (or something similar) then your are in big trouble. Open up your datasette and inspect the belts. The belts must be perfectly straight, if there is a bump in the belt, then this bump will affect the tape speed. These bumps are caused by the belt being in the same position for many years when exposed to the elements of attics and garages. The high temperatures in the summer and the high humidity of winter simply isn't ideal for any material.

Tip: sometimes, loose belts can be revived (shrunk). Take a pan, add 200ml of water, boil the water, switch of the heater, place the belt in the hot water. Leave it there for a minute, then carefully take it out (best is to dump the contents of the pan into the sink).

9.1.2 Pinch roller problems

The pinch roller pushes the tape against the capstan (the metal pin actually moving the tape) the capstan is directly connected to the flywheel which is driven by belts.

The pinch roller could be dirty, in very severe cases it could be even as dirty in as shown the picture on the right. You can clean it using cue-tip or cotton swaps and rubbing alcohol.

Put the datasette without a tape in the play mode and gently clean the now rotating pinch roller. If you notice that the capstan is dirty too, clean that as well. Keep cleaning until all the dirt has been removed.

After cleaning wait 15 minutes for it to properly dry before you start playing tapes. Otherwise the tape might stick to the capstan and be damaged.

When the pinch roller has hardened (which happens over a period of 30 years) then it won't push against the tape with the correct force. Causing the tape to slip, causing the tape speed to be irregular. When the pinch roller can't be pushed in with your fingernail and bounces back you're OK, if it doesn't, you'll need to replace it.

Another problem might be that there is a dent in the pinch roller. If for some reason the datasette has been stored for a long time with the play button pressed, then the pinch roller has been pressed onto the capstan for a long time, causing an impression in the rubber pinch roller that won't go away. The only option is to replace the pinch roller as it is permanently damaged by the constant pressure of the capstan.

9.1.3 Tapehead cleaning

Sometimes things are just dirty and need a good scrubbing. Your tapehead could be really needing this. You can do this using rubbing alcohol and some cue-tip or cotton swaps. Gently dip the swaps in the alcohol and move them across the tapehead in a gentle but firm sweeping motion. Repeat this as long as there is dirt coming of the tapehead. Don't forget to use new cotton swaps when they are becoming dirty, you don't want to spread the dirt over the head, you want to remove it.

Don't forget to clean the erasehead too, although you don't need it for reading back tapes it is very important for writing. When cleaning of both heads is done, make sure to let it dry for 15 minutes before using it, you don't want your tapes to get wet OR to stick to your wet tape head while playing.

9.1.4 Tapehead (azimuth) alignment

Calibration of the tapeheads regarding the angle of the head relative to the tape (azimuth) is a big problem. An incorrect angle will make a perfect tape impossible to load. But also a tape saved at the wrong angle will be impossible to load.

Tapehead alignment is required to make sure that your tapehead is capable of reading the tape signals correctly. The first thing that suffers from tapehead alignment is the high frequency response. In other words high frequencies on the tape cannot be properly detected, if it was an audio tape then the sound would sound less crisp on a bad alignment. Some would say that the sound would sound muffled. But considering we can't hear what the datasette outputs were slightly in trouble. We can't adjust the tape "by ear".

This problem mainly occurs when using tapes that have their data stored using a fastloader. Fastloaders use smaller pulses (and some other tricks) and therefore can send their data more quickly. However these smaller pulses simply mean higher audio frequencies and that is when the importance of a perfect azimuth becomes clear. Because if your tapehead isn't properly aligned then it can't follow/detect the higher frequencies of the tape correctly, causing data errors leading to the infamous "LOAD ERROR" message. Of simply a game/program being unable to load...

But first, what is azimuth? As the image below shows, a perfect azimuth is when the angle of the tapehead is identical to the angle of the tape. This misalignment can be in 2 directions.

Figure 1. Checking for correct azimuth alignment on tape recorder heads.
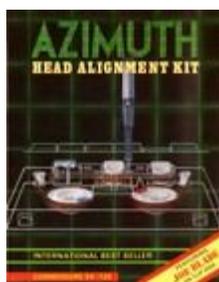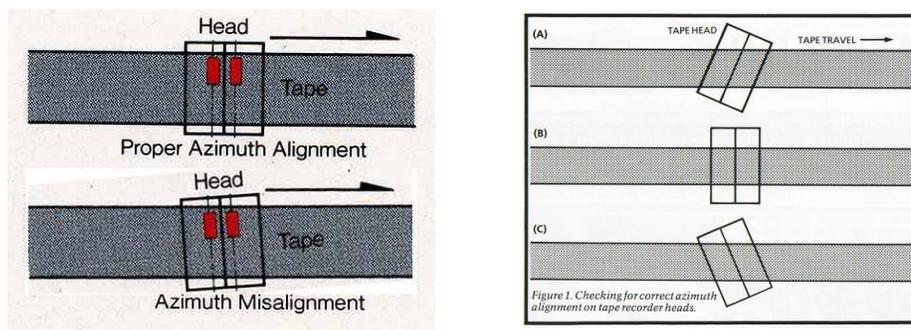
The only way to solve this problem is to make sure that your tapehead is aligned properly, this can be done by adjusting the position of the screw slightly. There were special alignment kids back in the day that would have a tape with a calibrated signal to which you aligned your tapehead to. There was even a special datasette clone, called "LOAD IT", this model had an LED bar display, indicating the audio level, allowing you to visualize what you otherwise can't hear. But chances are that you don't have any of the items shown here.

Fortunately, you are not alone. And in practice there isn't a special calibration tape required. All you need is a tape with a signal on it written in a time where the calibration was still OK. Or written on another device that has a good/perfect alignment. The best you could do is using the tape you intend to load, that way you would get optimal alignment for that tape, which could be better (for that situation) then the perfect azimuth. Regarding a tape to use to adjust your tapehead to the perfect azimuth, you can use most commercial games tapes. Because these tapes were written on machines with a good/perfect head alignment.

On the right, a screenshot is shown of a program for the C64, it is called "recorder justage" (it can be found on the internet on many places, for instance on CommodoreScenDataBase (CSDB.dk)). This tool is perhaps the most used tool for tape adjustment, simply because it was released for free in a magazine, the same program can be found under various names as it has been slightly modified by some or translated. But the essence of all is the same, make sure the shown lines are as thin/clear as possible. The location of the lines may vary, depending on the type speedloaders the tape uses. Although it is not required to use a tape that has a speed loader, in fact the actual data on the tape doesn't really matter, as long as it is there long enough for you to calibrate the tapeheads. If the tape is too short, you'll be constantly rewinding the tape, which could be a bit unpractical.
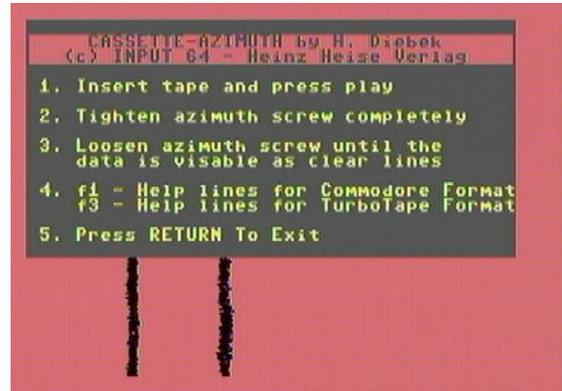
The story behind the program "recorder justage" (according to people on CSDB) goes as follows:

Recorder justage by Harald Diebek, from Input64 06/1985.

Harald owned a computer store, one of the top seller was the C64. He had a lot of returns and complaints from customers who had problems loading tapes (which they obviously copied from a neighbour or friend). Harald got tired of all the complaints and grabbed a "C64 intern" and coded this little tool. Some time later he eventually sold it to the "heise verlag" for publishing on "input 64" for 3000DM. For that money he bought himself a PC-XT. Harald never had his own c64 (at home that is), and he never programmed any c64 stuff again.

How to use the program? All you need to do is play the tape back and observe the signals as a function of the time (you could call it a spectrum of the audio signal or you could call it a waterfall display). But what's important is that the screen showing the signals must show lines that are as sharp as possible which is only the case when head alignment is optimal. Insert a tape into the datasette, fully rewind it and press play, then insert the screwdriver. Therefore watch the screen while gently tightening the screw by turning the screwdriver clock wise until the signals get worse. Mark this position. Turn your screwdriver counter clockwise until the signals get better and keep turning until they get worse. Mark this position, now turn your screwdriver to the position exactly in the middle of the two marked points. This should be the most optimal position. Remove the screwdriver and stop the tape, you are ready to load.

A similar program, but without a fancy screen is written by "Onslaught", it is called "headalign.prg" but it is basically the same thing. It can be downloaded from CommodoreScenDataBase (CSDB.dk)) or typed in (see code below).

The code was kept as small as possible, because the requirement was that user could type it in. Here is the code below, so you could type it in for your C64, which is quite practical if you have no device to load it from.

```
0 REM ***  VISUAL DATASETTE HEAD ALIGN TOOL BY ENTHUSI/ONS ***
1 D=0: FOR B=0 TO 196: READ A: POKE (4*4096+B),A: D=D+A: NEXT:
2 PRINT D:IF D=26242 THEN SYS 4*4096
10 DATA   32,  68, 229, 169,  59, 141,  17, 208, 169,  24, 141
11 DATA   24, 208, 138,  41,   7,  10,  10, 133, 252, 138,  74
12 DATA   74,  74, 133, 253,  74, 102, 252,  74, 102, 252, 101
13 DATA  253,   9,  32, 157,   0, 192, 165, 252, 157,   0, 194
14 DATA  189,   0, 194, 157,   0, 194, 144,   3, 254,   0, 192
15 DATA  232, 224, 200, 208, 209, 169, 128, 133, 252, 162,   0
16 DATA  138,  41, 248, 157,   0, 196, 165, 252, 157,   0, 198
17 DATA   74, 144,   2, 169, 128, 133, 252, 232, 208, 235,  88
18 DATA  160, 254, 204,  18, 208, 208, 251, 173,  17, 208,  48
19 DATA  246, 173
20 DATA  173,  13, 220,  41,  16, 240, 249, 173,  13, 220, 162
21 DATA    0, 169,  16, 232,  44,  13, 220, 240, 250, 120, 165
22 DATA    5, 201,   3, 176,  22, 164,   6, 185,   0, 194, 133
23 DATA   20, 185,   0, 192, 133,  21, 188,   0, 196, 177,  20
24 DATA   29,   0, 198, 145,  20, 198,   5, 208, 203, 169,   6
25 DATA  133,   5, 198,   7, 208, 182, 169,   5, 133,   7, 230
26 DATA    6, 165,   6, 201, 200, 208, 170, 169,   0, 133,   6
27 DATA  133, 195, 162,  32, 134, 196, 168, 145, 195, 200, 208
28 DATA  251, 230, 196, 202, 208, 245, 240, 147
```

Now, what if you don't have a C64, well then you need to find a program for that specific computer model. And if that software can't be found or doesn't exist, well you are in trouble. But no worries… because the Cassiopei can be of help here as there is a tiny calibration program inside the Cassiopei. It shows the waterfall lines on the OLED display. It isn't perfect (as the screen is simply too small) but it can be very helpful.

Switch off your CBM computer, connect the datasette to your Cassiopei, press the play, wind or rewind button and switch on the CBM computer. The Cassiopei will detect the datasette (because the sense line is active caused by the pressed play, wind or rewind button) and will show a different screen. This is the .TAP creator mode (a.k.a. the backup/restore mode).

Press stop on the datasette. Select the calibrate item and press play on tape. The waterfall will move as long as data is being received. When you press the stop button on the datasette, the Cassiopei will return to the menu screen.

It can be helpful to move the Cassiopei's speaker switch in the R-position, this way you hear the sounds from the tape, which could be of help as the lines only appear when the tape produces sounds.

Insert a tape into the datasette, fully rewind it and press play, then insert the screwdriver. Therefore watch the screen while gently tightening the screw (turning your screwdriver clock wise) until the signals get worse. Mark this position. Turn your screwdriver counter clockwise until the signals get better and keep turning until they get worse. Mark this position, now turn your screwdriver to the position exactly in the middle of the two marked points. This should be the most optimal position. Remove the screwdriver and stop the tape, you are ready to load.

9.2   Backup a tape

When your want to save your favorite game from disappearing (due to aging and wear), then you must make a backup to preserve the digital data from the tape. Start the backup/restore mode as described in the beginning of this chapter (connect datasette and press the play/wind/rewind button when the Cassiopei is switched on or reset). As described a few pages back… make sure that your datasette is in perfect working order.

-Select "Backup" from the menu.
-Place the tape in your datasette.
-Rewind the tape (press the menu button when ready).
-Press play on the datasette
-The Cassiopei will now record the tape until the tape ends or stop is pressed on the datasette.
-The data is copied to the final file.
-The generated TAP file is stored in the TAP file folder of the selected computer model.

The file name is automatically generated and looks like TAPE_XX.TAP where the XX is a counter from 00-99. This means that you can generate 100 TAP files before you need to remove or rename some. However, it is best to rename the TAP file directly after making it. Perhaps checking it in an emulator to make sure it does not contain errors.

9.3   Restore a tape

When you have a favorite game and it is stored on tape then you can relive the retro feeling to the max. But if you don't you can always make your own tapes from a TAP file. Start the backup/restore mode as described in the beginning of this chapter (connect datasette and press the play/wind/rewind button when the Cassiopei is switched on or reset). As described a few pages back… make sure that your datasette is in perfect working order.

-Select "Restore" from the menu.
-Select the desired TAP file.
-Insert an empty tape of good quality.
-Select the TAP file from your selection of TAP files stored on your SD-card.
-Press record and play on the datasette
-Press play on the Cassiopei.
-The Cassiopei will now playback the entire TAP file.
-Wait until the TAP file is finished.

Note:
Do not type load or shift+runstop on your CBM computer, if you do this then the game will load into your computer and your computer will stop when enough data is loaded. This means that the recording will also stop. But if you want to make a tape of a game with multiple levels then this creates a problem (as the other levels are not stored to the tape), because the recording has stopped by the computer.

10 Voltmeter function

It is not uncommon that the Commodore computer dies because of a failing power supply, now the Cassiopei cannot avoid that, but it can monitor the main (5V) voltage. Using the build in Voltmeter, the Cassiopei measures the 5V power rail of your precious CBM computer. And shows that value on it's display, if the voltage of the CBM raises above 5.4V (which is more then 8% higher then the ideal voltage) the Cassiopei will indicate this by blinking the voltage indicator. A voltage this high could be an indication that there is something wrong with your power supply and action should be taken. Below (left) an image of what the screen would look like for a system with a normal power supply and a system with a power supply that requires some attention (right).

```
Wifi:192.168.002.036
Time:ntp disabled

Comp:C64 PAL
Mode:PRG fast
Path:games/
File:PAC MAN.prg
Pow.:5.12 Volt
```

```
Wifi:192.168.002.036
Time:ntp disabled

Comp:C64 PAL
Mode:PRG fast
Path:games/
File:PAC MAN.prg
Pow.:5.43 Volt
```

Most (but not all) of the logic chips inside the Commodore computer are able to withstand a voltage of up to 7V according the data sheets of MOS. However this absolute maximum rating should be avoided as the extra voltage directly results in more heat dissipated in the logic devices which greatly reduces it's lifespan. Therefore it is best to stay as close to the 5V as possible for best performance and longest lifespan.

If the voltage is lower then 5V then there is no danger of damage HOWEVER it might be the case that your power supply can't deliver the power your system is requiring. Perhaps you have too much peripherals connected to your system (for example: large external memory or cartridges). It might also be the case that your connectors need some cleaning, after all we are working with 30-year old machines (so clean out those connectors with some gentle abrasive or just wiggle those connectors a few times to scrape off the dirt). You might also check your wiring, cables could be damaged internally, although that is not a very common problem.

Disclaimer:

The Cassiopei voltmeter function does not offer any protection to power supply failure. It is intended as an indicator for the 5V coming from the power supply voltage. Therefore the Cassiopei cannot prevent power failures from happening.

Accuracy:

The accuracy of the voltmeter function is ±2 % (which would result in a maximum error of 0.1V on a 5V scale), which is more then good enough for a good indication of the power supply voltage.

Keep in mind that the 2% error is the theoretical absolute max. error, which isn't very likely to happen. In other words, in practice you will experience much better (more accurate) results. However, for proper measurements a proper volt/multimeter is still required.

11 Virtual file mode

The virtual file mode is intended to be used for cross development. In fact it was heavily used for developing most of the code that runs on the CBM computers. What makes this mode so practical is that it doesn't require you to adding/removing the created program to/from the filesystem (because software is never right the first time). Therefore the eliminate this problem, the file remains on the computer (PC) it is written on and loaded through the virtual file mode into the memory of the CBM computer. This method does require some effort to setup correctly and is not intended for the average user.

The way it works is as follows: the PC has to have a folder where the file virtual.prg is stored, that folder is to be exposed to the local network using a HTTP webserver application like "mongoose". When the cassiopei (configured for the virtual file mode) has loaded it's fastloader routines it will go to the ip-address of the computer and requests the file virtual.prg. Which is then loaded through HTTP into the CBM.

In order to make this work you need a program to act like a local webserver. The program "HFS" is a very simple program that does just that. It (HFS.exe) can be saved into any folder and directly executed from there, it won't install any files onto your computer. It does have some settings as shown below. Here you can specify the folder or add a file to the "root" you want to make available through HTTP.
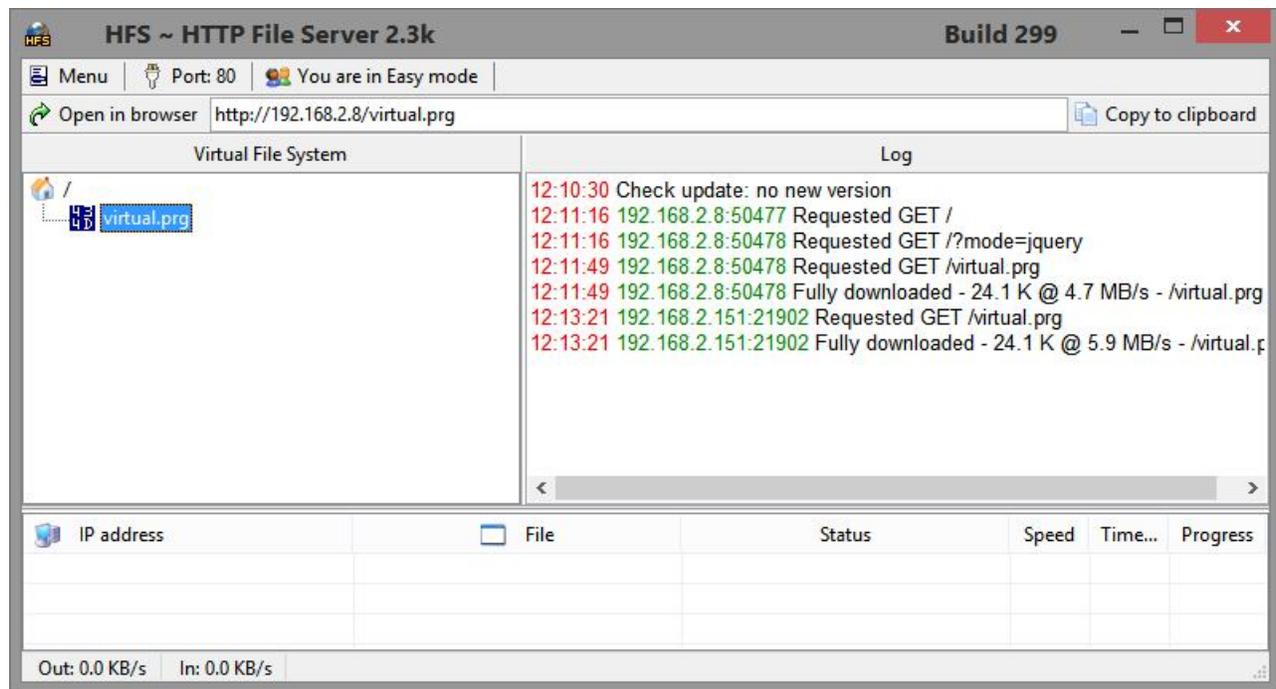
Above you see that the file "virtual.prg" has been added to the "root", it was done using the menu→Add_files… function. The port value is shown on the top of the screen and is default set to 80, a value which I prefer because this way I can quickly test the connection using my webbrowser without having to enter (and remember) the port address.

Ofcourse you can use any other webserver application if you'd like, as long as the file is available through your local network, personally I check this by using my webbrowser and type the IP-address followed by the filename of the virtual file (192.168.2.8/virtual.prg) and if it works it will
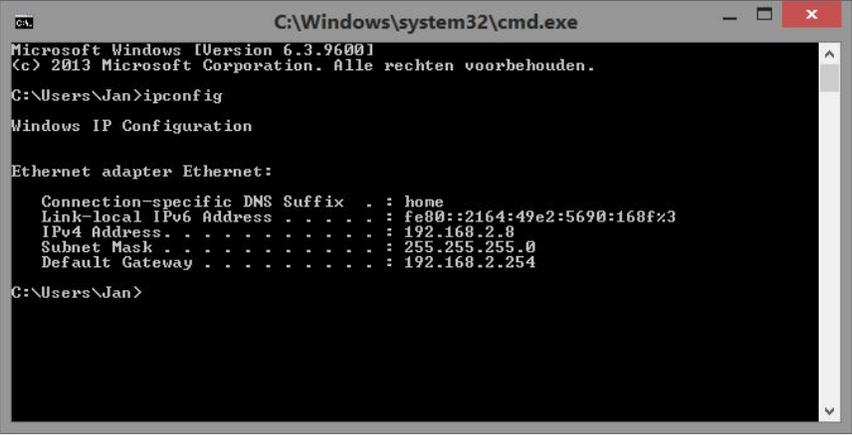
send me the file as if I right clicked on a link and clicked "save link as". Be aware that if you use any other port address then 80 then you need to type a little more then that for example when using port 1234 you need to type the following URL into your browser: 192.168.2.8:1234/virtual.prg
In order to make this work on your CBM you also need to setup the Cassiopei with 3 settings (as stored in the settings file, this needs to be edited manually using a text-editor because these settings cannot be made through the menu.

```
VIRTUALHOST_IP=192.168.2.8
VIRTUALHOST_PORT=80
VIRTUALHOST_FILE=virtual.prg
```

The filename "virtual.prg" is merely used as an example here, it can be any other name is that is more convenient to you.

As shown above the IP-address is a fixed address, you can determine the IP address of your PC using a CMD window and typing the command IPCONFIG.

This will respond the IPv4 address, which is the IP-address of your computer on the local network. Do not use google and ask "what's my IP address" because then they will give you the global IP-address and this is not what we want! Using the local IP-address might cause some problems eventually because most routers will try to change this value everyday (when starting or rebooting your computer). On my router this is defined as lease-time and it is set to 86400seconds (which is exactly 1 day). Fortunately it also has a setting to keep this value fixed for any specific computer, which is just what we want. Otherwise we need to change the VIRTUALHOST_IP setting everyday. How this needs to be configured depends on your router, but when you are somebody who wants to program for the C64 then it is very likely that you gave technical skills that allow you to figure out the routers settings by yourself. These are quite normal settings and should be described in the manual (could be under advanced settings) of your router.

In order to use the virtual file mode on your CBM, just type LOAD and you would normally do to directly load a PRG file from the Cassiopei. After pressing the play button (NOT the menu button) and wait a few seconds. If all goes well this should not be any slower then loading from SD-card (the bottleneck of the data transfer lies mainly in the speed of the CBM processor).

11.1　　　Cross development

The Cassiopei is a great device to use for cross development. Because of the virtual file mode you can very quickly transfer your program from your PC development suite to your CBM computer. Sure, a lot of testing is quicker done using emulators, but many times you just require the real thing for proper/final testing.

A great tool for the actual programming would be CBM program studio from Arthur Jordison (http://www.ajordison.co.uk/index.html), this tool allows you to program in BASIC and Assembly language for a broad range of platforms (PET 2001, VIC-20, C64, C128, C16/Plus4). Almost all Commodore related software for the Cassiopei was written using this tool.
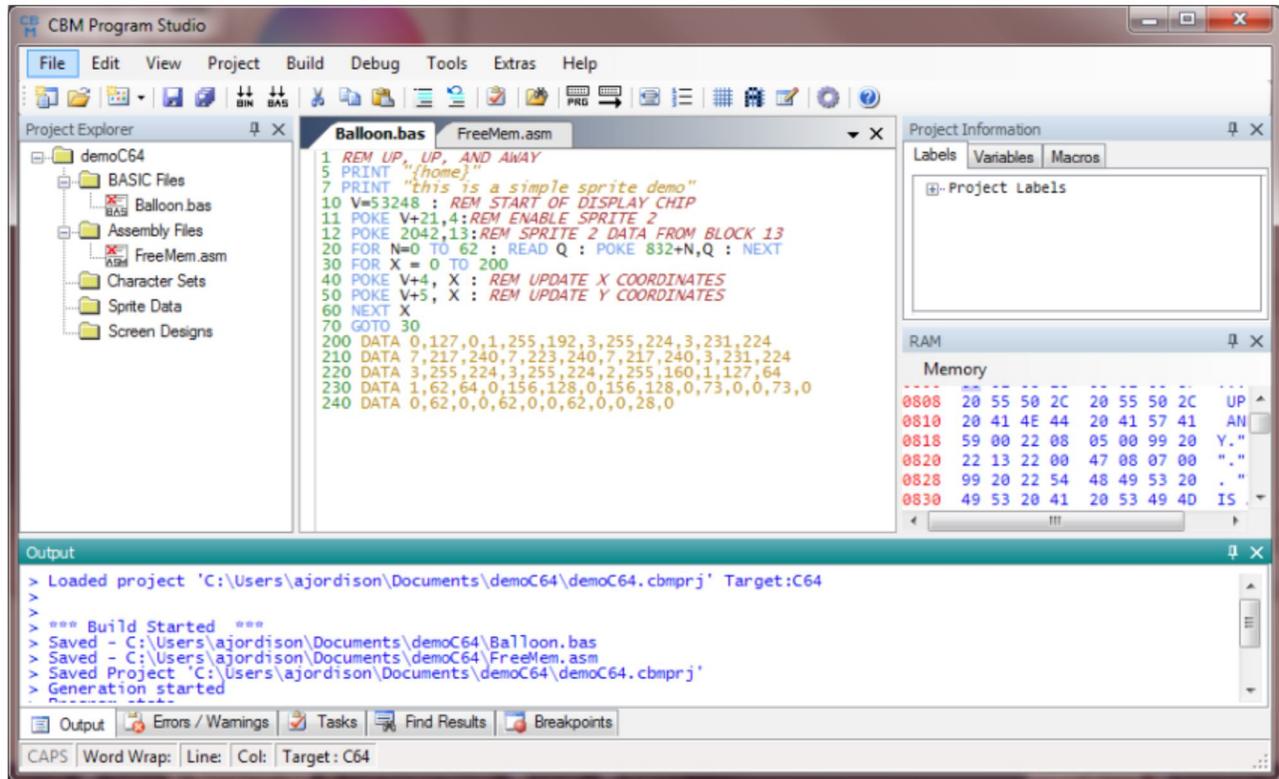
The best (not the easiest) way to learn programming is by taking an existing program and taking it apart... or modifying it until it does what you want it to do.

12 Compatibility of the Cassiopei

The following paragraphs will describe the overall functionality of the Cassiopei, functionality that is similar for all supported computer models.

Cassiopei fastloader

Some programs (and these are very rare) will not load using the Cassiopei fastloader. The reason for this is that if the program that must be loaded needs uses the same memory space as the Cassiopei's fastloader routines then the program that is loaded overwrites the fastloader program and the loading simply stops. The only solution to this problem would be to load the program using the "standard kernel loader" (a.k.a. the "slow" method of loading).

For the VIC-20, C64, C16/+4 the cassette buffer is also used for storing the fastloader code, these computers do not require the use of the stack to store the fastloader code.

For the PET the fastloader stores itself into the cassettebuffer (Cassette buffer#1 and a small portion of the stack). The Cassiopei uses a portion of the stack because the fastloader needs to be stored somewhere and Cassettebuffer#2 would be a nice place BUT this is exactly what the earlier programmers thought as well, so therefore cassette buffer #2 can not be used by the Cassiopei fastloader code, fortunately the stack is large enough to store a part of the fastloader code. The reason why the PET's fastloader is larger then the C64, VIC-20, C16/+4 fastloader code is simply because the IO-lines are much easier to control on the non-PET computers and therefore requires less code.

Jiffy-DOS

The Cassiopei is not compatible with JiffyDOS equipped computers. This because Jiffy-DOS disables the use of the cassette and occupies the cassette buffer in memory. Therefore the Cassiopei cannot function properly. A simple workaround would be to disable JiffyDOS or to load the programs that require the use of the Cassiopei from disk.

Cartridges

The Cassiopei may function with various kind of cartridges, however cartridges that add functionality in the form of speedloaders and BASIC extensions might cause problems as they might occupy important memory locations (BASIC jump vectors). Regarding the "PRG slow loading mode" (standard kernal loader) and the ".TAP file loading mode" there are no incompatibilities to be expected (considering the .TAP and .PRG program itself is compatible with the cartridge).

The Chameleon cartridge, on the C64, is a completely different story, this cartridge takes over the C64's processor. And because the cassetteport is connected to the C64's processor the tape functionality simply does no longer work!

Cassetteport related hardware

The Cassiopei should not be used in combination with other hardware connected to the cassetteport. For instance, the 1541 ultimate tape adapter or a cassetteport splitter allowing to connect more then 1 datasette to the cassetteport. This because the Cassiopei uses the IO-lines of the cassetteport in a more advanced way then then all other existing hardware. When combining other cassetteport hardware with the Cassiopei damage might occur.

13 Upgrading the Cassiopei's firmware

The Cassiopei is based on microcontroller system which can be (re)programmed. The software that makes this microcontroller behave like a Cassiopei is called firmware (sometimes abbreviated with "fw") and is not installed on the SD_card but is embedded on the internal flash memory of the microcontroller. Now if there is one thing we are all accustomed to in this modern time and age, then it is updates. Updates for the Cassiopei are called firmware updates and are released whenever new functionality has been added (or a nasty bug has been found and fixed). Keep checking the Cassiopei website from time to time to see if there is an update available.

Before you start uploading new firmware into your Cassiopei, make sure that you are aware of your current firmware version. This way you know if an update is required. And this way you can easily confirm that a performed update has succeeded. In order to determine the Cassiopei's firmware version you must insert the Cassiopei into your CBM computer and then switch it on while watching the display. For a brief second the firmware version is shown. However, this may be to briefly for some people to read, but fortunately there is a simple way to extend the time this information is shown. Simply remove the SD-card, because when the Cassiopei has no SD-card inserted, the Cassiopei will not continue and the display keeps showing the firmware version until the system is reset or switched off.

There are three methods to program new firmware into the Cassiopei, the first is over the serial port, which is available through the expansion connector), however this method requires additional cables in order to connect to your PC, but it also requires special software. This low level method of programming is mainly used during development and production of the Cassiopei. Therefore this method will not be further discussed here. The second method is through an ordinary web interface. The third method is through the SD-card, by installing a firmware file onto the SD-card the Cassiopei will use it when found (this method is not available on firmware versions lower than v2019XXXX)

ATTENTION: updating the firmware is potentially dangerous! Only update the firmware with a file that comes from the Cassiopei website. You don't want to brick your device, do you?

13.1 FW Update through webinterface

Download the new firmware from the Cassiopei website and store it in a practical location, you will need this later.

Configure the Cassiopei to connect to the desired wifi network, make sure you choose a network that is the same as to which your internet browser will be working on. So on the settings file of the SD-card you must enable wifi and you need to define a wifi network and password (see example below).

```
;Cassiopei settings file
;-----------------------
WIFI=1;Enable wifi (0=OFF, 1=ON)
SSID_1=H123456DE7A
KEY_1=ABCDEFFA524E
SSID_2=your_2nd_network_SSID
KEY_2=your_2nd_network_password
SSID_3=your_3rd_network_SSID
KEY_3=your_3rd_network_password
etc.
```

When configuring the Cassiopei wifi settings it is very important is the same network is selected as is being used by the computer that will be used to upload the new firmware image. The Cassiopei's display will show you the IP-address of the Cassiopei. For instance 192.168.002.024

For example: 192.168.2.24\fwupdate

That brings you straight to the fw update location (be aware of the fact that the IP addres you require is supplied by your wifi router and is most likely to be a different value then in this example, therefore check the display of the Cassiopei to get the real IP-address of your device).

You may also take the long (but easiest) route:

Open a webbrowser, and go that IP-address, you may leave out any trailing zeros from the IP-address.

Then you click on the info button and at the bottom of that page is a link to the fwupdate page.
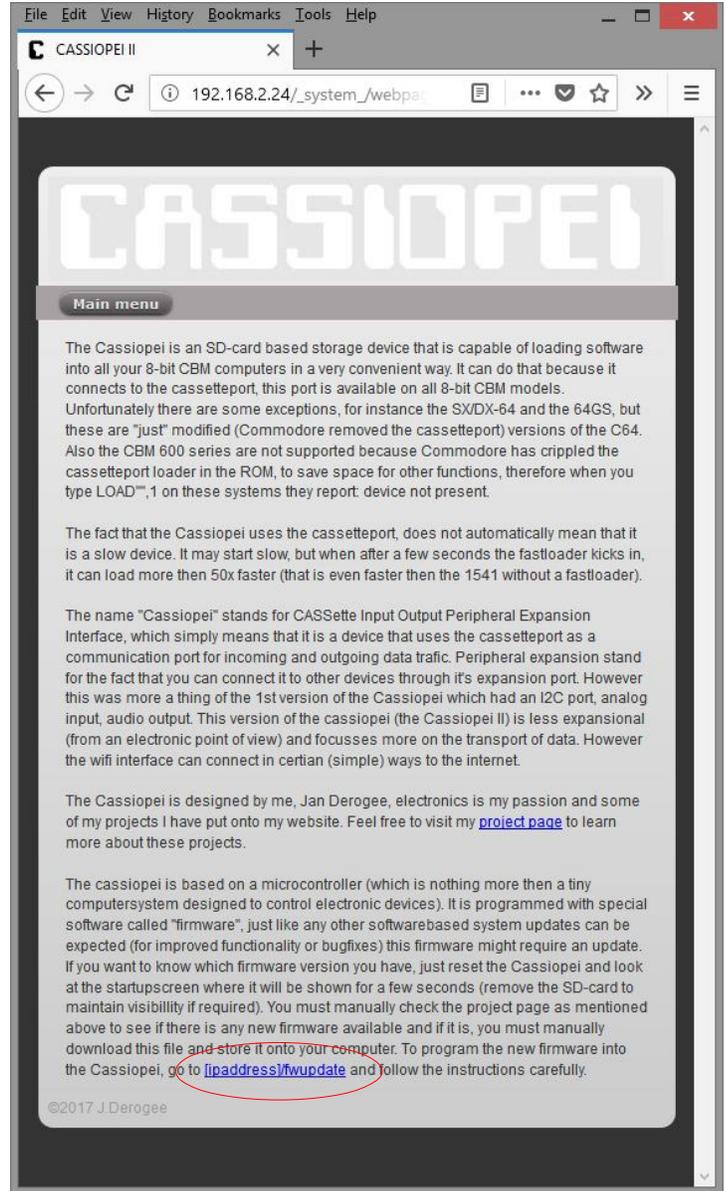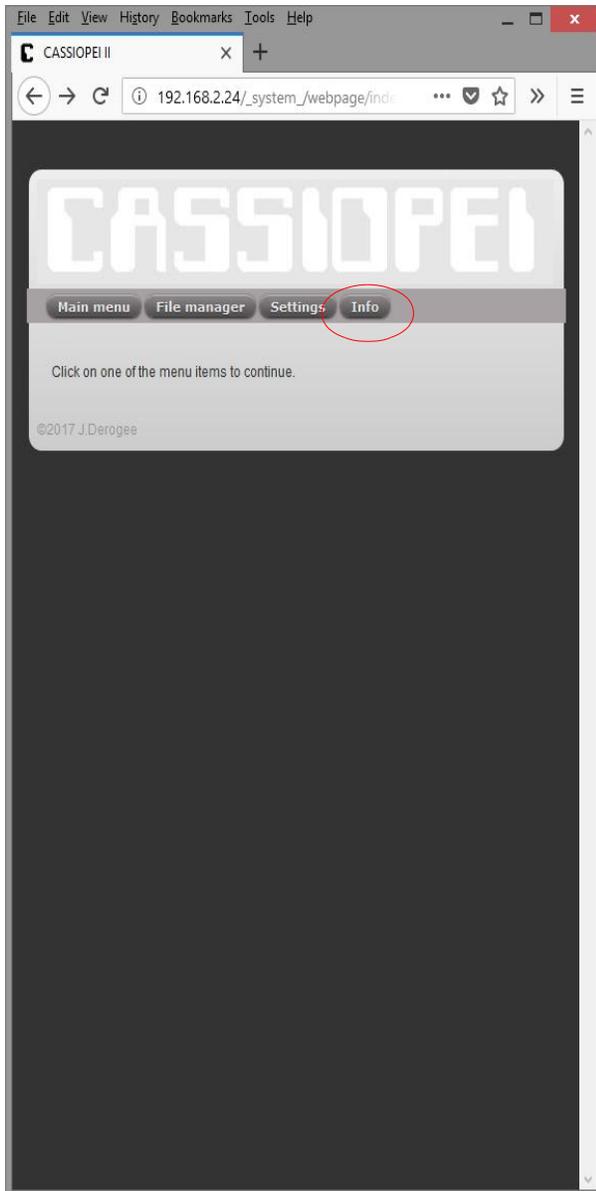
The firmware uploading webpage will be shown, it has 2 buttons. A browse and an update button.
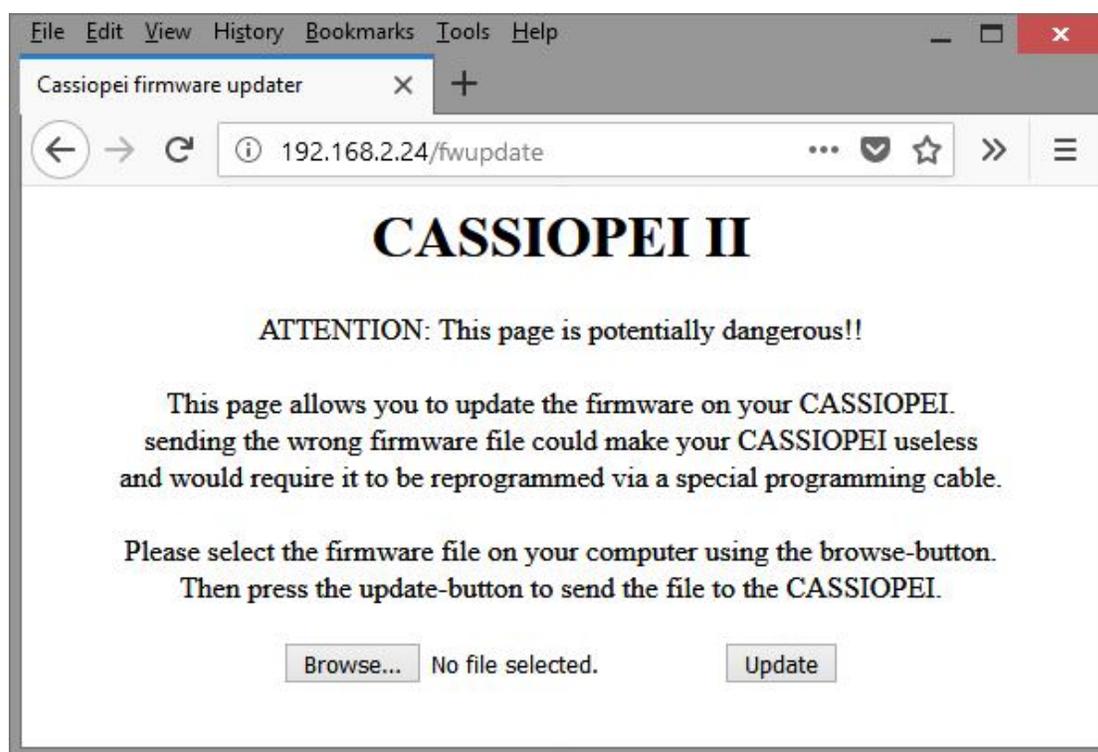
Press then "browse"-button, to select the firmware image file (you know, the one you've downloaded earlier).

Press the "upload"-button. After pressing this button you must wait a few seconds as the request is being processed. When the firmware has been transferred successfully and the file is correct it will automatically reboots the Cassiopei. When the CASSIOPEI is back onto the network the webpage will be refreshed and you will see the page hosted by the new firmware inside the Cassiopei. The Cassiopei is now upgraded with new firmware and ready for use. To confirm if the firmware indeed has been upgraded, reset the Cassiopei and watch the screen, the firmware version shown now must reflect the version of the file you've selected during the upgrade procedure.

In some occasion the upgrading procedure will fail, this may have been caused by packet loss during the file transfer. This may be the case if there is some heavy traffic on the wifi network and/or if the wifi network is unexpectedly interrupted caused by a weak connection and/or interference. This is not a big problem, simply reset the whole system and try again. If this problem persists, try the upgrade procedure at a location closer to the wifi router to exclude bad wifi reception.

13.2   FW Update through SD-card

Download the new firmware from the Cassiopei website and store it on the SD-card, the file must have the following filename in order to be recognized as a firmware file: CASSIOPEI_FW.BIN
Insert the SD-card into the Cassiopei, connect the Cassiopei into your CBM computer, power ON your CBM computer and wait for a few seconds. Progress is shown on the display, the Cassiopei will remove the file when finished and reset. Your Cassiopei is now upgraded.

14 Additional software for the Cassiopei

This chapter is about dedicated software. Software that was specifically written for use with the Cassiopei and nothing else.

14.1 PETSCII_player.prg + CBM PETSCII video converter

The PETSCII player program, which can be used on all Cassiopei supported computer models, is a player that can play highly compressed PETSCII images quickly after each other. You could call it animation, you could call it an extremely fast slide show. These animations files did not exist yet, therefore a special program to generate these kind of files has been written for use with MS Windows. Unfortunately these animations are without sound, simply because the limited throughput of the cassetteport.

Below you see a screenshot of the "CBM PETSCII video converter" program. This program converts a regular video file into a set of image that are converted into images formed by only PETSCII characters. The screen shows: the source image, the image converted into dithered B/W to simulate gray scale and the finale image as it will be shown on your CBM's screen. The program allows you to select different screen sizes and fonts as these slightly differs between the various computer models.
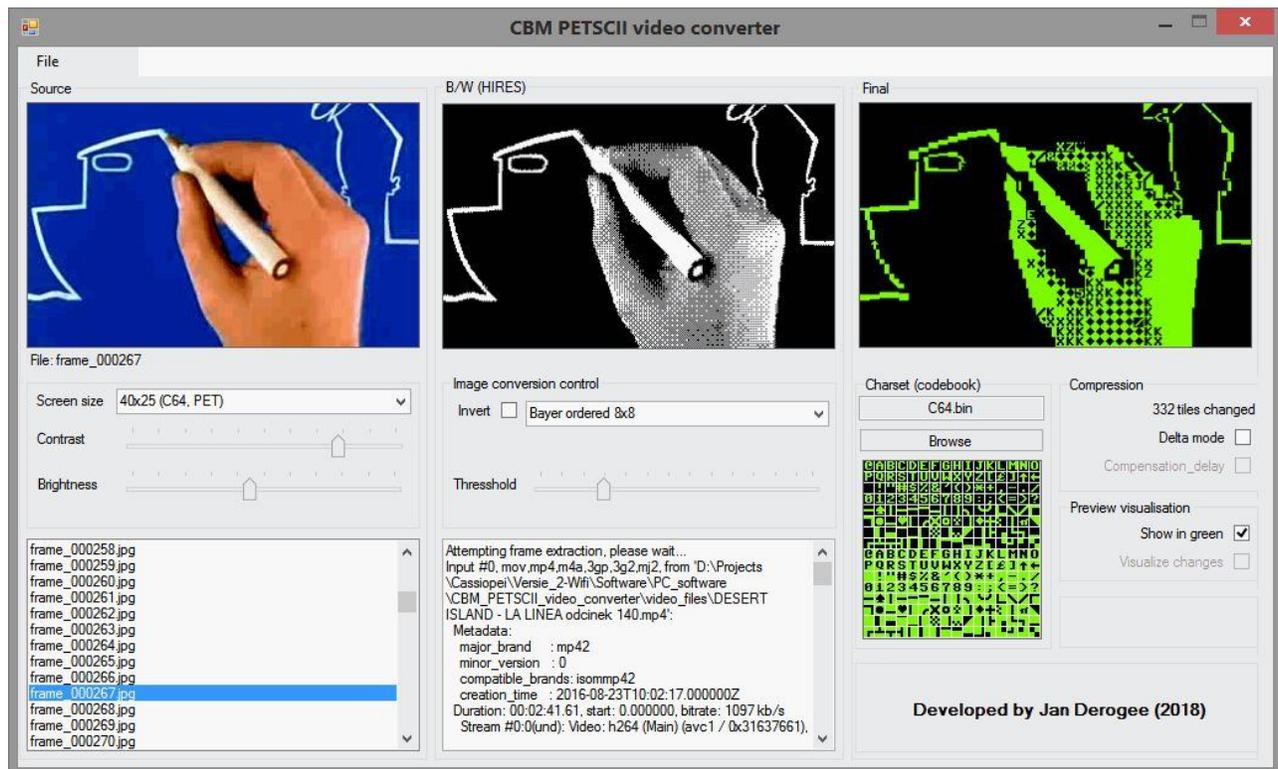

The .DAT files generated with the CBM PETSCII video converter are to be played with the PETSCII video player on your CBM computer. This program is written exclusively for the Cassiopei.

14.2   BBS_terminal.prg

You cannot use this program to dial in to an old-skool dial-up connection using a real phoneline. For that you must use different software and additional modem hardware. However since these old-skool BBS's are mostly replaced by telnet versions, things become interesting. Because the Cassiopei can connect to a telnet server through it wifi connections. Meaning that you can experience the BBS's the way the were in the past but without the use of additional hardware. A Cassiopei and the BBS_terminal.prg program is all you need. Make sure you have you Cassiopei properly configured (make sure that Wifi=enabled and that you are connected to a decent wifi network).

Unfortunately, this program is a work in progress but a beta release for the C64 has been made available. With this you can visit a PETSCII based BBS (or a simple ASCII based BBS). For example the borderline BBS (borderlinebbs.dyndns.org:6400).

Below 2 screenshots of the BBS terminal connected to the borderline BBS.
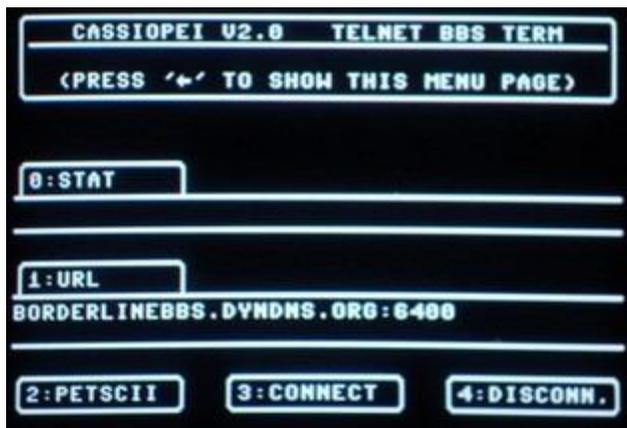
The BBS terminal is very simple to use, all you need to do is to select the operating mode (PETSCII or ASCII) and the URL:PORT of the telnet based BBS. Once these settings are correct the user can press the connect button and the terminal screen will appear (which can be quit with the ← button on the keyboard and the user will return to the menu, from where the connection can be closed and a new one to a different BBS can be opened.

Sometimes a BBS does not recognize the leaving of a user and a connection cannot be made, the BBS reporting that a user is already logged in. This can be the case if you disconnected accidentally and connected again. In that case, simply disconnect again and re-connect, try this a few times. This situation is not unique but sometimes differs depending on the BBS you want to visit.

14.3   To be released in the future: VIC20 full motion video

The VIC20 full motion video functionality is depending on a special hardware add-on. This add-on also connects the Cassiopei to the userport. This add-on in combination with a 3K memory expansion is all you need for a thrilling new VIC20 experience: "full motion video". It really must be a 3K RAM expansion (like the VIC-1210) because this increases the video related memory area. But there are more kind of memory expansions available on the modern market, just check if it is +3K compatible.

Through this userport expansion add-on hardware and the use of very tightly written data transfer routines it is possible to have b/w dithered video with a screensize of 192x160 at 12 frames/sec and audio of 4bit at a sample rate of 12KHz. Although this doesn't seem like much today, it is revolutionary for this system.
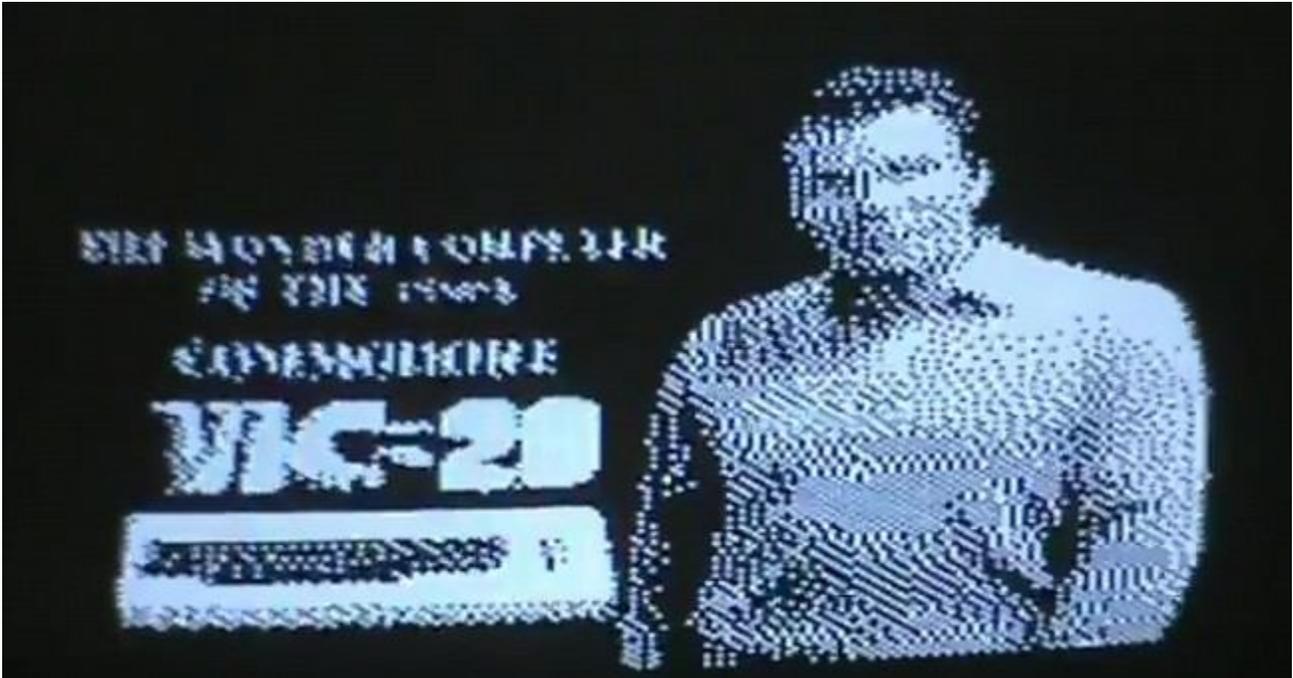
Under development is software to convert regular videos into VIC20 fmv compatible videos. And plans are made to create a simple full motion video game to exploit these revolutionary new functions.

14.4   To be released in the future: Disk_wizard.prg

This program is a work in progress and currently is being developed for the C64 in combination with a 1541 disk drive. The intention of the program is to convert D64 files to a real disk and real disks into D64 files. Allowing you to expand the usability of your Cassiopei. This because, simply said, some programs require disks, therefore wouldn't it be nice to have a simple tool that allows you to create real disks based on D64 files you grabbed from the internet. The disk wizard is intended to fulfill that need.