

C8D
COMMODORE
8-BIT
DESIGNS

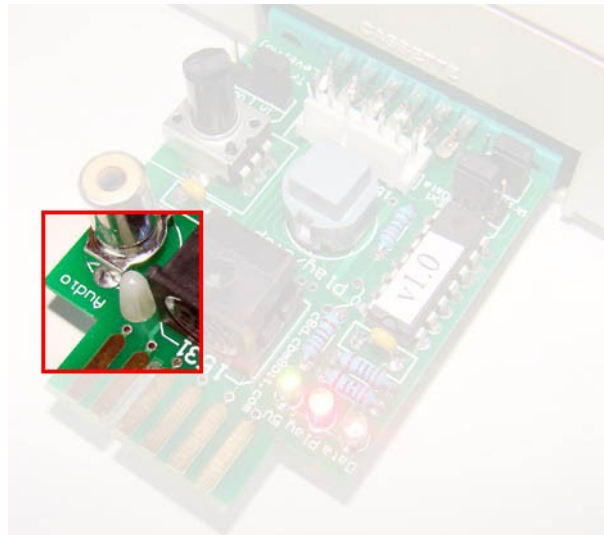
Cassadapt English Instructions v1.2
04-Oct-2010

Table of Contents

1. Introduction	3
2. Connecting Cassadapt up to your C64, C128 or Vic20	4
3. Connecting Cassadapt up to your C16 or Plus/4	5
4. Jumper configurations	6
5. Setting up the threshold trigger voltage (old method – for reference only)	10
6. Setting up the threshold trigger voltage with v1.2 (important)	15
7. Bypassing the "Found x" message on the C64	18
8. Warnings & Acknowledgements	19

Just got your Cassadapt in the post?

Please ensure the plastic standoff is inserted as shown in the picture below, it is not shipped that way.



1. Introduction

The idea behind Cassadapt was to give Commodore computer enthusiasts yet another choice for interfacing their beloved old computers to modern PC's to either record a .tap/.prg file to a Datassette or playback a Datassette to the PC to capture as a .wav file to then convert to a .tap file.

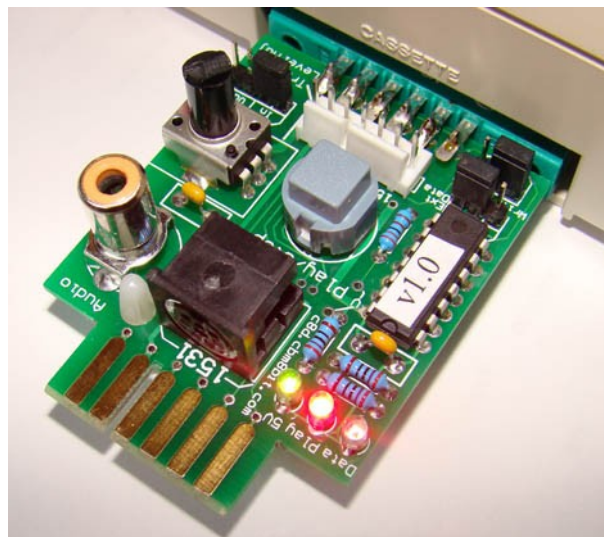
Prior to Cassadapt there had been some interfaces that allowed users to connect the 1530 (C2N) Datassette to a modern PC using an LPT and game port. In 2010 when this device was designed I realised that only one of my PC's actually had an LPT port, not one had a game port. So I set about designing a more modern solution to allow tape enthusiasts to play the thousands of tape games available off the internet (and maybe even preserve a few), with some additions to the existing designs out there.

So just what does Cassadapt do?

Cassadapt converts audio signals from your PC's sound card to digital 0-5V data that can be recorded to a real C2N / 1531 Datassette or played directly in to the C64, C16 etc., even without the need for a real Datassette connected.

With the use of fantastic programs like TapWav, TAPClean and WAV-PRG, Cassadapt is the play-record loop Commodore enthusiasts are looking for.

For the rest of this document, references to 'C64' is also inferring C16, C128, Vic20, Plus/4 etc. unless otherwise noted.



2. Connecting Cassadapt up to your C64, C128 or Vic20

Ensure the C64/C128/Vic20 is turned off prior to connecting anything.

Plug Cassadapt in to the C64/128 Datasette port.

Connect the audio lead RCA plug (yellow plug in the photo below) to the RCA socket on Cassadapt (left or right channel of your lead should be fine). Make sure the Cassadapt plastic PCB stand-off is resting on a solid surface prior to plugging the RCA lead in or you may snap the PCB edge connector off the C64! Or plug the RCA lead into Cassadapt prior to fitting it to the C64.

If you want to also have a Datasette connected at the back, do that prior to turning on the computer.

It is not possible to have a 1531 type Datasette and a C2N Datasette connected to Cassadapt at the same time, use only one.

The other end of your audio lead must now go to the audio source (e.g. PC, Hi-Fi etc.)



3. Connecting Cassadapt up to your C16 or Plus/4

Ensure the C16/Plus4 is turned off prior to connecting anything.

Because the C16, Plus/4 did not use a standard edge connector you will need to find a second Datassette cable to be able to use this on one of these computers.

These cables can only be found in the 1531 Datassette itself, simply open it up and disconnect the harness.

Plug the C16, Plus/4 Datassette harness in to the Datassette connector on the computer. Then plug the other end (with the white connector) in to Cassadapt. There is a key way on the plug, ensure you get it the correct way around.

Connect the audio lead RCA plug (yellow plug in the photo below) to the RCA socket on Cassadapt (left or right channel should be fine).

If you want to also have a Datassette connected, do that prior to turning on the computer.

It is not possible to have a 1531 type Datassette and a C2N Datassette connected to Cassadapt at the same time, use only one.

The other end of your audio lead must now go to the audio source (e.g. PC, Hi-Fi etc.)

At all times make sure the Cassadapt board is not sitting on anything conductive.



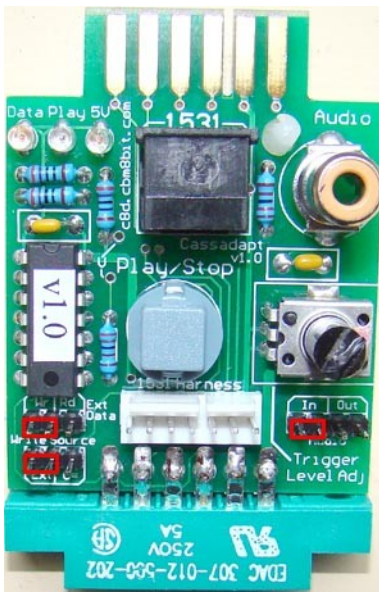
4. Jumper configurations

Ensure the Commodore is off prior to connecting anything.

Because Cassadapt can be used for several purposes, you must configure the jumpers on the board depending on the how you want to use Cassadapt.

Where there is a red square in the pictures you need to put a jumper across those pins.

To Record from PC to a Datasette:



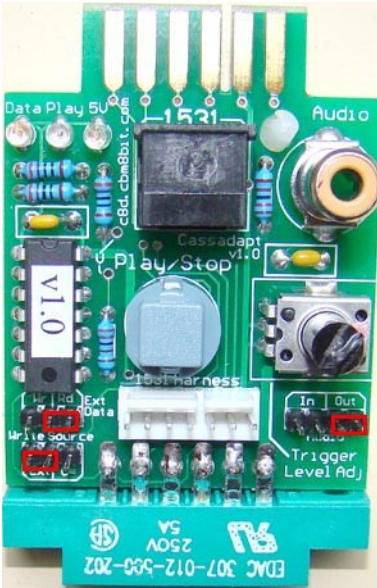
This configuration will allow you to record on to a Datasette from a file playing from the PC (.wav, .tap, .prg etc).

You will need to have the trigger level set up correctly for this to work. This is covered in chapter 5.

Turn the C64 on with the Datasette connected to the rear connector of Cassadapt (or the 1531 connector). Before you press play on the PC to start the .wav/.tap file playing, press play-record on the Datasette to get it going.

Then just press play on the PC to start the recording to tape.

To Play back to the PC from a Datassette:



This mode is used to back up existing tapes to a PC to record it as a .wav file. You will need some audio recording software on the PC to do this.

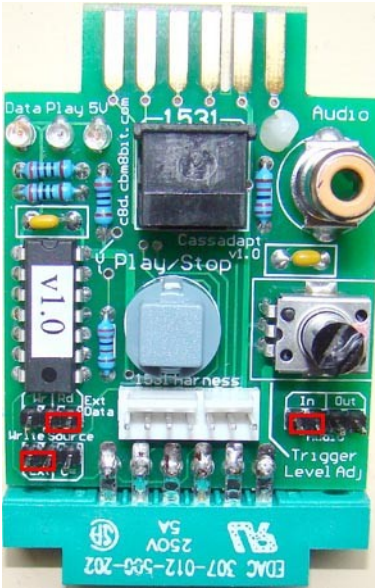
Turn the C64 on with the Datassette connected to the rear connector of Cassadapt (or the 1531 connector).

Start the recording on the PC, then press play on the Datassette. The C64 does not have to be loading the file, just press play on the Datassette.

Tapes recorded this way will need to be run through a program like [WAV-PRG](#) and [TAPClean](#).

This method of backing up tapes is not ideal, but you may find it works well for you.

To load a program from the PC direct to the C64:



This configuration allows you to play files off the PC directly in to the C64 without recording them to tape.

You will need to have the trigger level set up correctly for this to work. This is covered in chapter 5.

Turn the C64 on , there is no need to have a Datassette connected in this mode. In fact, it's probably best not to. On the C64 press “Shift and Run/Stop” to prompt the C64 to ask you to “Press Play On Tape”.

With your PC all set to play back your .wav / .tap file press the Play/Stop button on Cassadapt until the red 'Play' LED turns on. The C64 screen should go blank just like when you press play on a real Datassette.

Now you can press play on the PC to start the loading of your program.

One thing you must be ready for is when the C64 shows “ Found 'xyz' “ , you must hit the space bar very quickly to ensure it doesn't miss any of the incoming data.

I have created a modified Kernal ROM for the C64 that bypasses that notification, see how this was done at the end of this document, the modified ROM files can also be downloaded from my website.

Please Note: Some turbo loaders and multilevel games will not work using this direct from PC method. The reason being is that they will sometimes pause the loading of the Datassette during loading, the PC playing back your file has no way of knowing this is happening and will just continue sending the data and things will get out of sync. In these instances it's best to record the file to a real Datassette.

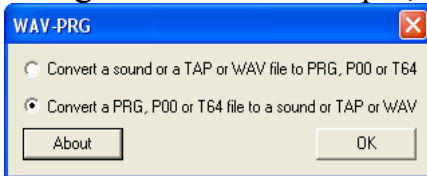
Also, remember to set the 'Ext Data' jumper back to the 'Wr' position if you wish to play tapes off the datassette again otherwise tapes will not load.

Transferring .TAP, .T64, or .PRG files to the C64

For .TAP files, use [Audiotap](#). Or convert the .TAP file to a .WAV and play from WinAmp (or similar).

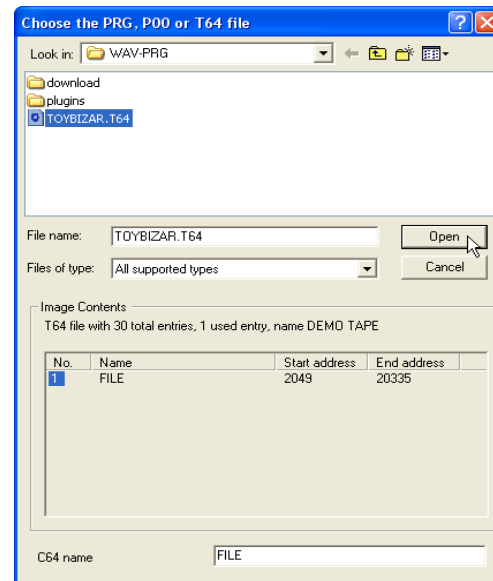
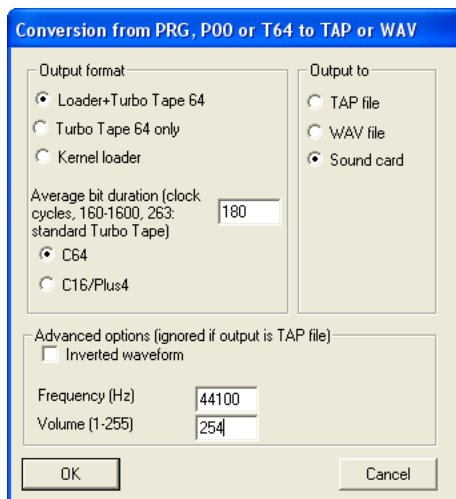
For .T64/.PRG files, use [WAV-PRG](#).

Using WAV-PRG is simple, select the button as shown below, then press ok.



Select the buttons as shown below. Set the bit duration to a minimum of 180. If you are having trouble playing back recordings made at this bit rate increase it to 250 or 300, this will slow the load speed down but it will be more reliable.

Then select the .T64, .PRG file you want to load. But before you press Open.....



Make sure you have the jumpers on Cassadapt set correctly and the steps required for each jumper setting are followed.

5. Setting up the threshold trigger voltage

**** For reference only, see section 6 instead ****

What is the trigger threshold about?

Because audio signals out of most PC's will be about 2V – 3V at maximum output the trigger threshold must be set so Cassadapt converts the incoming audio pulses to the correct digital pulses fed to the Datasette (or C64). This is also why the audio signals cannot be fed directly in to the C64 or C2N as the voltage level is too low.

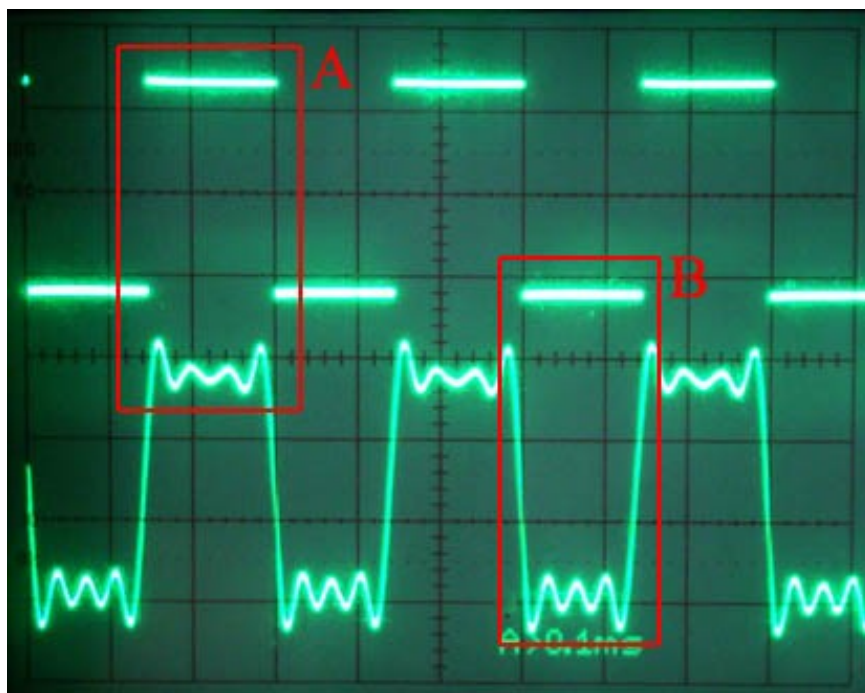
The picture below shows the waveforms on an oscilloscope. This is showing the successful conversion of the incoming audio from the PC to the digital output for the C64.

The lower trace is the incoming audio signal (with the overshoot / ringing on the signal), the upper trace is what is output to the C64.

Please note: the voltage scales were not equal on the oscilloscope.

A = High signal from the sound card converted to a 5V signal for the C64

B = Low signal from the sound card converted to a 0V signal for the C64



This is what you are aiming for, a perfect conversion of the audio signal to the 0-5V digital signal the C64 requires (in this case a .tap file playing out the sound card of the PC).

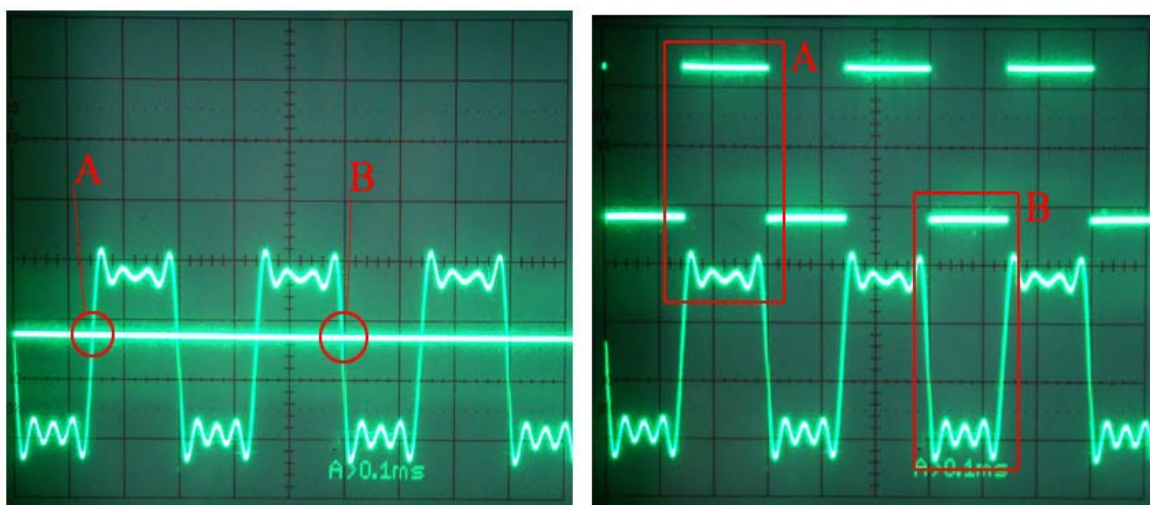
The potentiometer on the Cassadapt PCB is used as the adjustment to ensure the incoming audio signal is converted correctly.

Unfortunately not all sound cards are created equal so there is no given spot this should be set to to make this work for you. Without the aid of an oscilloscope it just takes a little bit of trial and error to get everything set up correctly. But once set, you should never need to adjust it again.

By showing the waveforms below hopefully you will get a clearer picture on what you are trying to achieve with the set up of the trigger threshold. Plugging it in and twisting every dial and hoping for the best is going to give you more frustration than positive results.

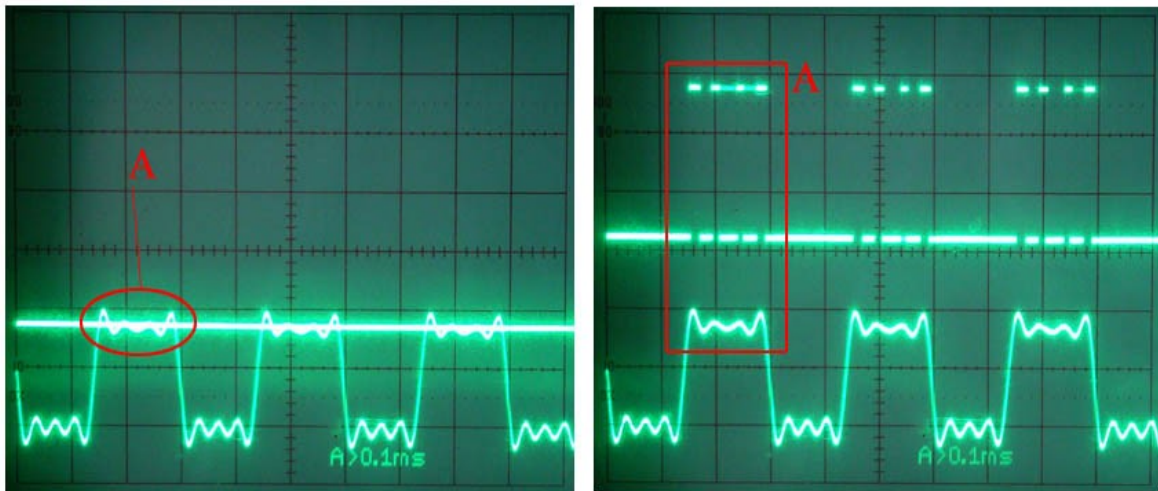
The trigger level is where the Cassadapt detects the signal has gone from a high to low or low to high transition. As it crosses this point the output to the C64 will also transition from 5V to 0V or 0V to 5V.

On the left picture, it shows the solid line is the trigger level point of the incoming audio from the PC. Each time the audio input crosses that solid line the output to the C64 is also changed, as can be seen in the picture on the right with the output to the C64 being shown in the top trace.

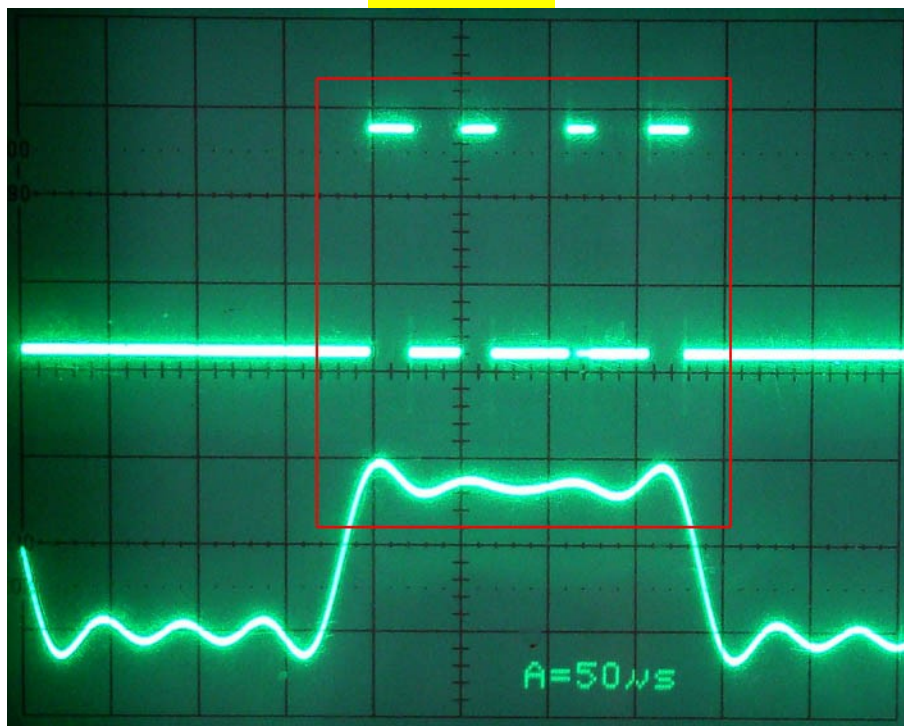


Please continue on to the next page to see some examples of trigger threshold errors.

Below is what happens when the trigger is set too high and it is triggering on the ringing of the incoming audio signal. This of course would not work as far as transferring data to the C64 goes.



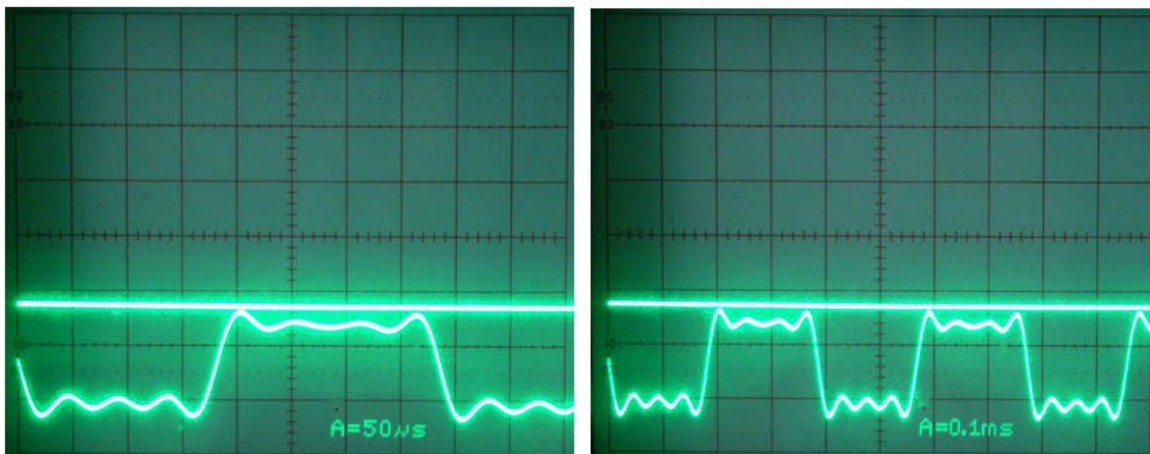
Zoomed in



Here you can see the output to the C64 has transitioned from 0V to 5V several times even though it should have been at 5V the whole time in the red square.

The fix here is to either lower the trigger voltage via the potentiometer on the Cassadapt PCB so it misses those little humps at the top of the waveform, or increase the output level of the audio from the PC which will raise those little humps above the trigger level. If your PC's volume is already at maximum then you would need to lower the trigger level on the Cassadapt PCB.

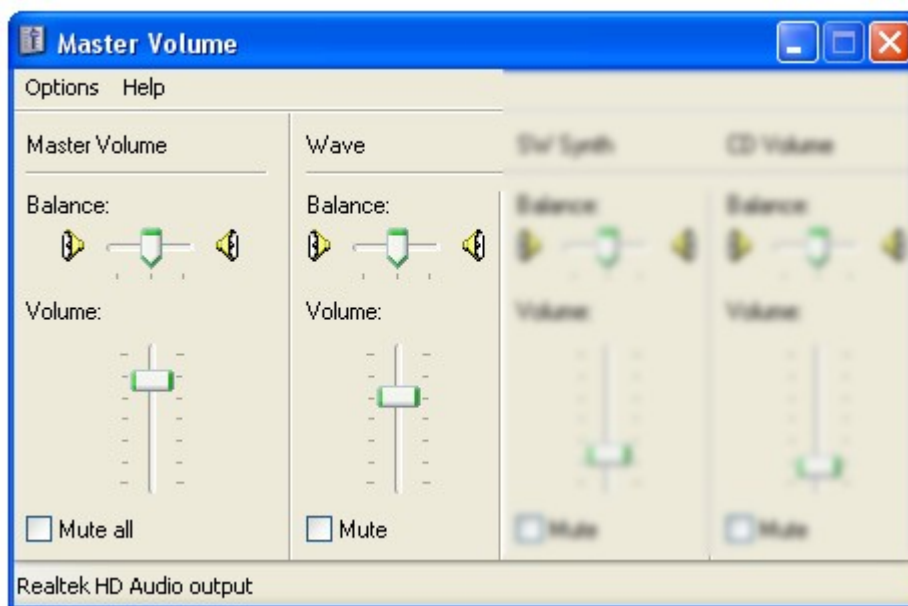
You can also have the situation where the trigger is set so high above the level of the incoming audio signal that there is no output at all to the C64.



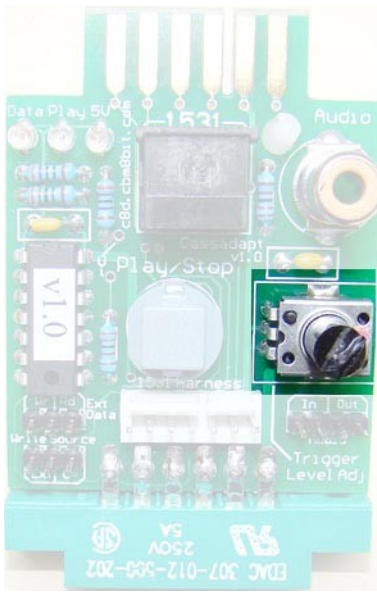
Because the audio never crosses the trigger level there is no output produced for the C64.

You will probably need to set the audio output of your PC quite high to ensure you get a decent output level for the Cassadapt board to trigger from. So make sure you unplug your speakers / headphones first, tape data at 110db isn't the most pleasant sound.

Here is where my PC was set to take the pictures above.

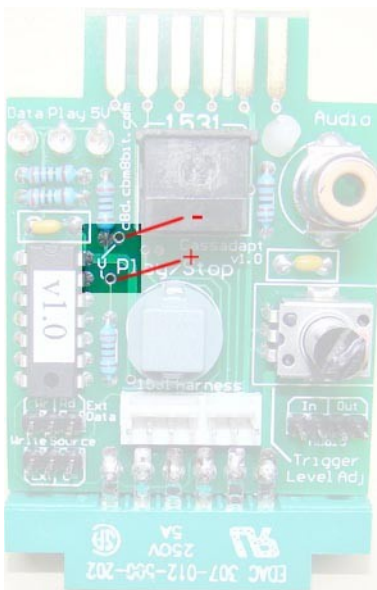


An indication that you are 'close' to the correct trigger threshold is the Data LED on Cassadapt will start to flash rapidly as the PC is outputting the audio signal, during turbo loads it will appear to be on all the time.



The potentiometer is used to adjust the trigger threshold. It is pre-set to 1.5V with a nail polish marker at that position.

Viewed in this position, turning the potentiometer to the right lowers the trigger threshold voltage.



You can measure the trigger threshold voltage with a DC multi-meter, place the negative and positive leads where shown in the picture (careful not to touch the IC pins), aim for about 1.5V to 2.0V, but depending on your sound card this may need to be lower, but generally no higher than 2.0V. For my PC I have this set to 1.6V.

6. Setting up the threshold trigger voltage – v1.2

Cassadapt v1.2 now ships with a built in alignment program that can be launched directly on the C64 (only the C64, not Vic20 etc), this should help simplify the set-up process.

When you power up the C64 with Cassadapt plugged in you will notice the 'Data' LED flashes, this indicates that Cassadapt will not invert the incoming audio signal. You may need to change this setting depending on your PC's sound card.

To change it to invert the incoming audio signal you just hold down the Play/Stop button on Cassadapt when turning the C64 on, you will then see it flashes the 'Play' LED instead. To change it back to non invert repeat the same process, there is a screen shot below that displays when this is set wrong for your equipment.

To launch the built in alignment program press the 'Shift + Run/Stop' keys on the C64 as you normally would to load a tape, then on Cassadapt press the Play/Stop button 7 times long enough so the play LED cycles on and off each time, on the 7th time you should see the 'Data' and 'Play' LED's both stay on and shortly after the C64 should say 'Found Cassadapt v1.2'. You can press the C= key at that stage to continue loading. It takes about 30 seconds to load the alignment program.

Once the head alignment program is running you then feed in the audio signal from the PC and adjust the PC volume and the trigger pot on Cassadapt to make the 'lines' on the screen appear as they do on the right hand side of the screen.

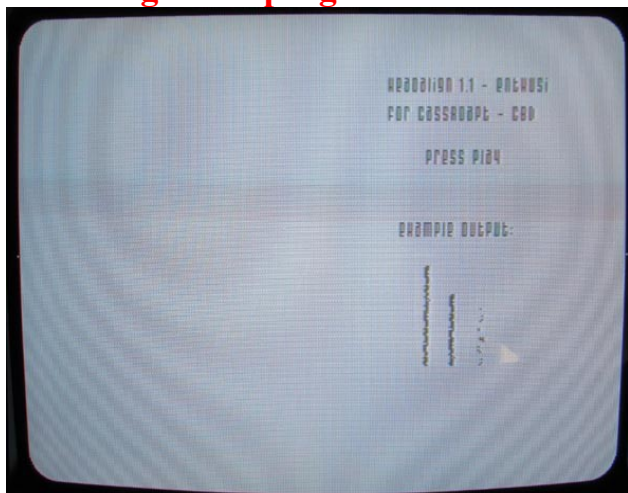
You also have to make sure that Cassadapt is in 'Play' mode (Red LED on) when monitoring the signal in the alignment program, this is very important.

On the following pages are few screen shots to assist.

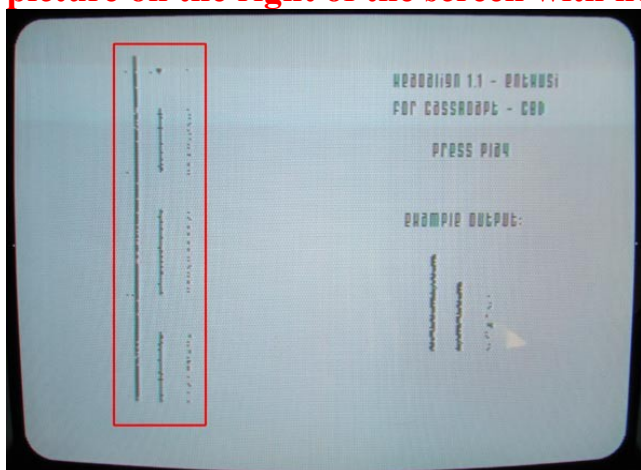
C64 finds the program Cassadapt is sending down the datassette port:



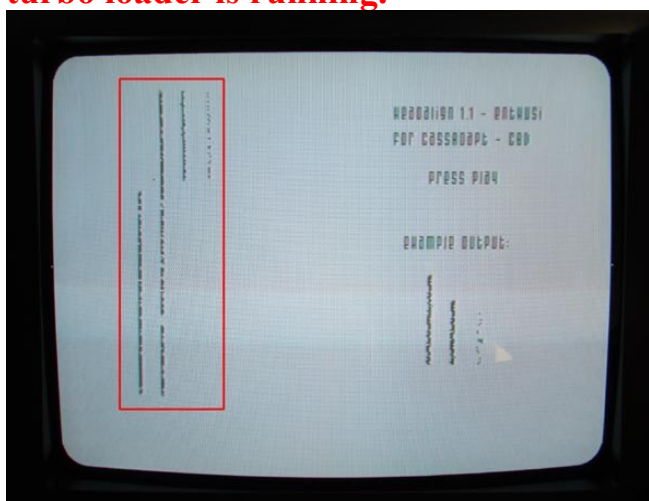
Headalign v1.1 program is loaded:



Below is the pattern we are aiming for when the header or ROM loader is playing in to Cassadapt (using WAV-PRG). Three distinct lines just like the picture on the right of the screen with no (or minimal) noise in between the lines.



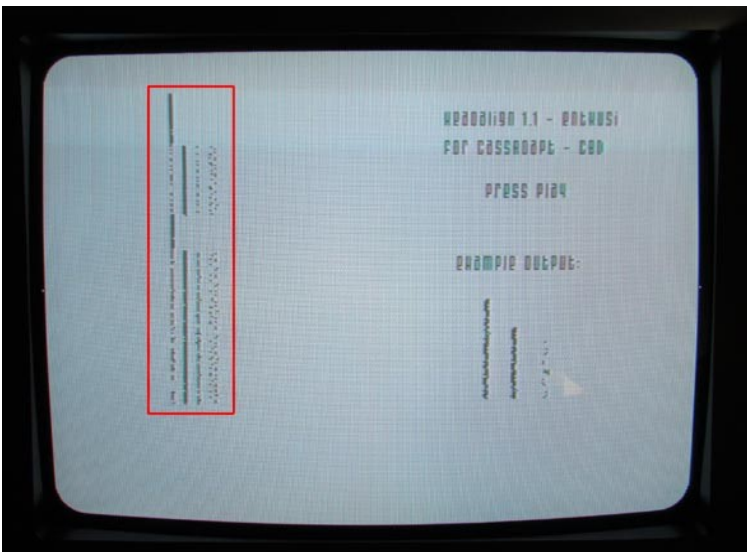
With a Turbo tape the signal will change to just two lines once the WAV-PRG turbo loader is running.



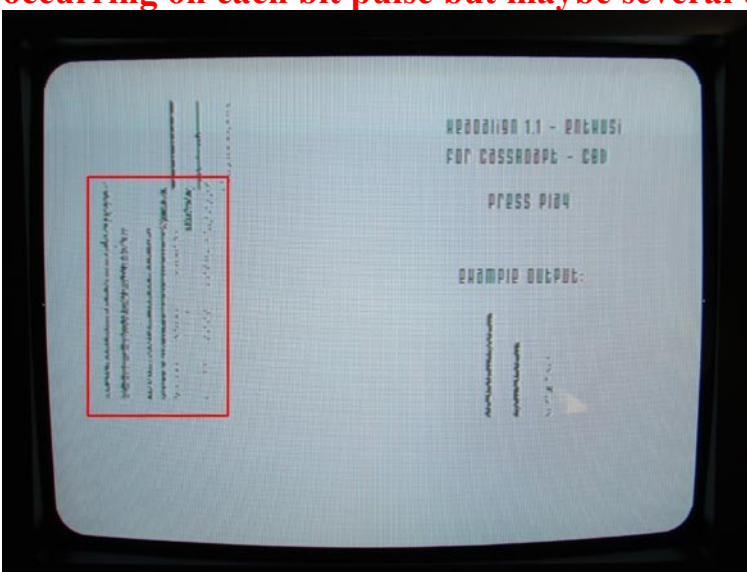
Below are some shots showing the incorrect set-up patterns, either the Cassadapt trigger pot is too low (or high), audio level too low (or high). Or the signal needs to be inverted (remember how you selected this mode at the start).

The first one is when the signal is inverted, in this case if you reboot the C64 and switch the inversion mode on Cassadapt it would probably work out ok (hold the Cassadapt Play/Stop button down at powerup).

The signal is actually triggering well because there is not random points all over the place, but there is more than the three bit time lines which indicates the signal is inverted, compare it to the pictures above.



This one shows when the trigger point is wrong (adjust the trigger pot or audio level). You can see there is numerous random lines indicating the trigger is not occurring on each bit pulse but maybe several times.



7. Bypassing the "Found x" message on the C64.

Thanks to the availability of the Kernal ROM disassembly on the internet this was a pretty easy patch to figure out, this is only shown for interest, it's not necessary to patch the Kernal ROM for Cassadapt to work.

Within the subroutine where the C64 gets the file name from the cassette, there is a jump to a subroutine that pauses the cassette to display to the user the file name it found.

When using Cassadapt to play from the PC directly in to the C64 this causes problems as the .tap, .prg etc file is still playing from the PC yet the C64 has stopped for approx 4 seconds.

So the patch shown below simply bypasses the jump to the routine that shows the found 'x name' by replacing the JSR (Jump to Subroutine) with NOP (No Operation).

**** Of course you can just hold down the Commodore key during the initial load states to do the same thing.**

The start of the subroutine that gets the file header from the cassette is located at \$F72C. Within this subroutine is the jump to the subroutine that displays the name and pauses the cassette, this jump is located at \$F763

Standard:

```
F75F D0 F6 BNE $F757
F761 A5 A1 LDA $A1
F763 20 E0 E4 JSR $E4E0 << This jump is the pause to show file name routine.
F766 EA NOP
F767 18 CLC
```

Modified:

```
F75F D0 F6 BNE $F757
F761 A5 A1 LDA $A1
F763 EA NOP << We replace the jump with 3 NOP commands so the jump is never taken.
F764 EA NOP << We need to insert 3 NOP's as the standard JSR takes 3 bytes of memory.
F765 EA NOP << Third and final NOP added to bypass the jump.
F766 EA NOP
F767 18 CLC
```

If you just have the Kernal BIN file loaded in a Hex editor ignore the \$Fxxx offset shown above, this is as it appears in C64's memory map.

You can download the standard and modified Kernal ROM BIN files from [HERE](#).

Please don't contact me asking how to burn Kernal ROM's for your 64, Google is your guide there.

8. Warnings & Acknowledgements

- **Do not** plug Cassadapt in to the Commodore when it's power is switched on.
- Be careful not to let anything conductive touch the gold pads at the back when a Datasette is not being used and the pads are exposed.
- When inserting the audio RCA plug make sure the Cassadapt board is resting on something solid so it does not break.
- If using stereo RCA leads be careful the unused plug does not touch any exposed electronics on Cassadapt or the computer. Tape up the loose connector if necessary.
- Use this hardware at your own risk. Loss of data, hardware or other failures and any other unwanted effect that occurs during its use is entirely the user's responsibility.

Thanks to the following

Shane at [C64WEB](#) for hosting my website

Luigi Di Fraia for he's excellent tape programs: [LINK](#)

The Lemon64 community: [LINK](#)

The Tape Preservation Project: [LINK](#)

The ULTIMATE C64 Tape Page: [LINK](#)

Enthusi from Onslaught for the alignment program: [LINK](#)