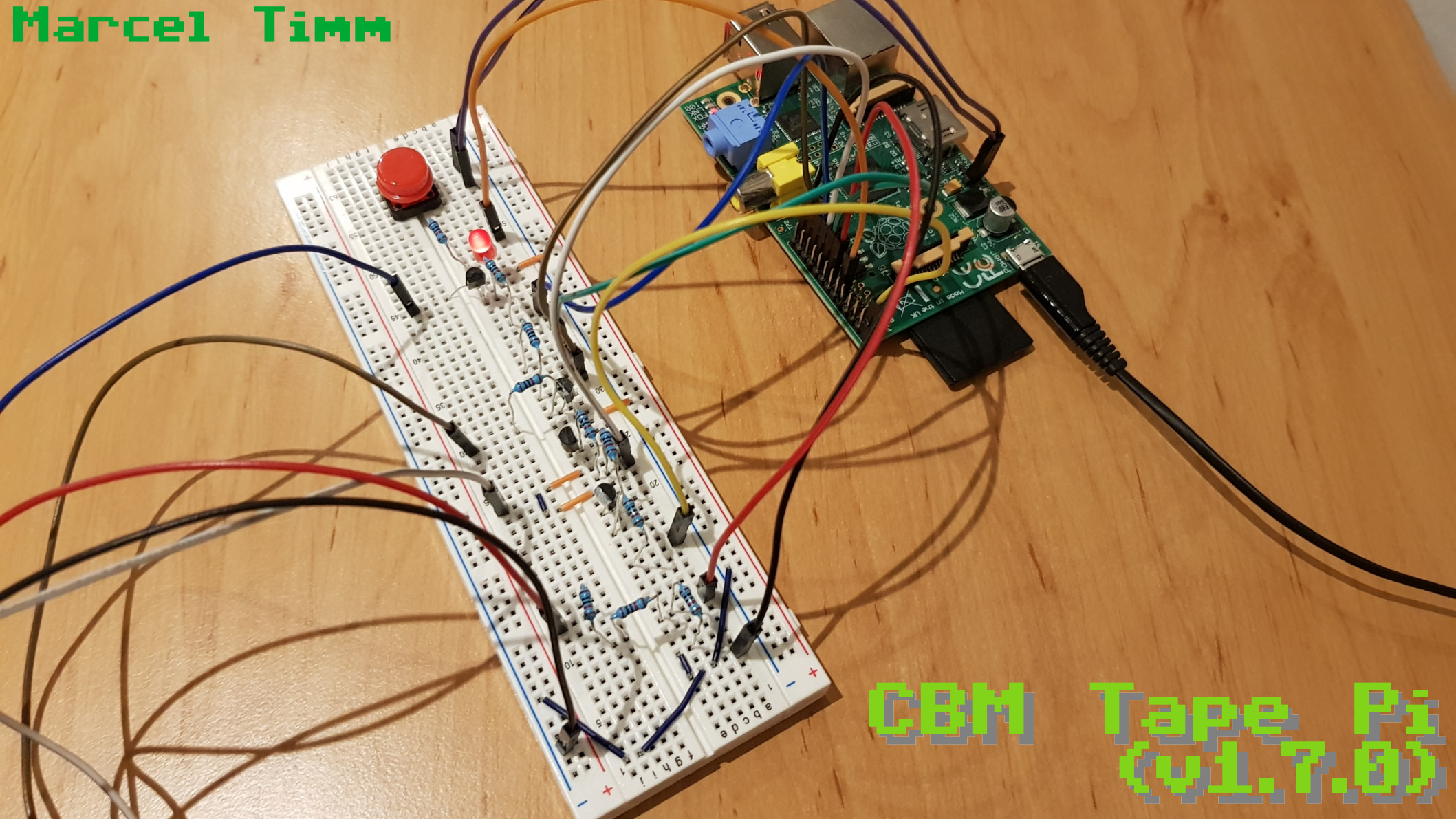
Marcel Timm
CBM Tape Pi
(v1.7.0)

INTRODUCTION

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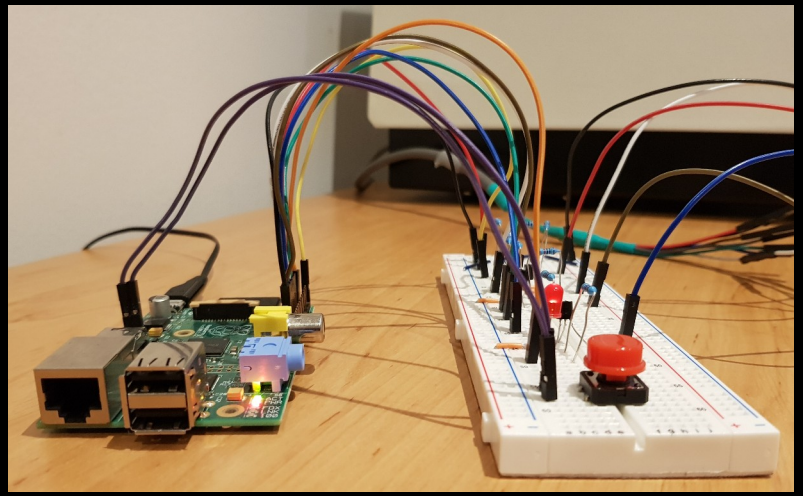

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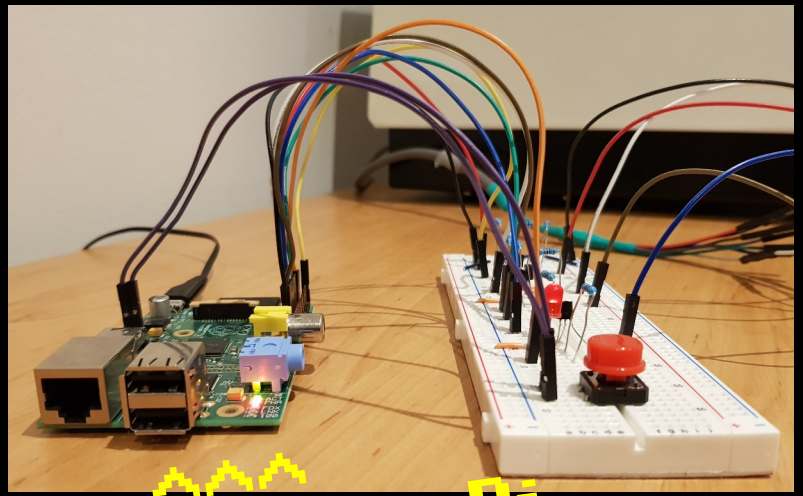
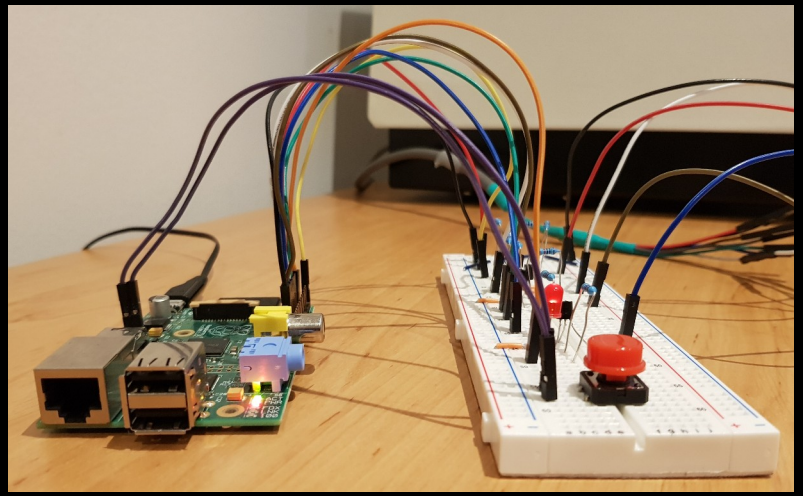


Raspberry Pi

INTRODUCTION

Marcel Timm



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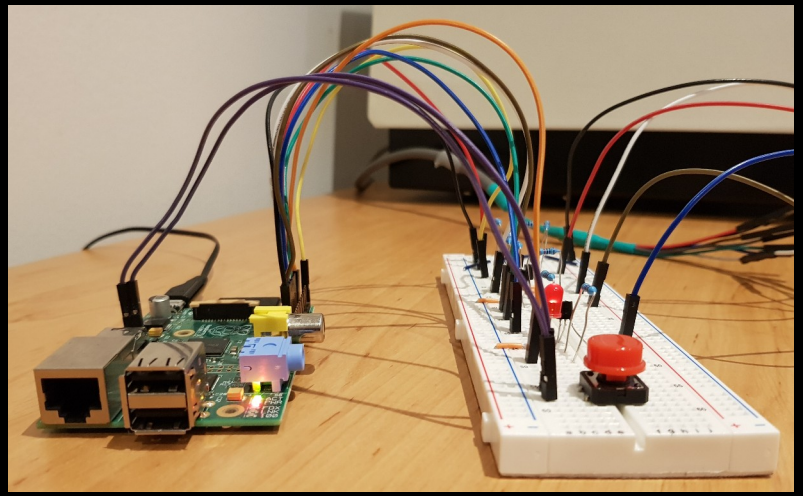

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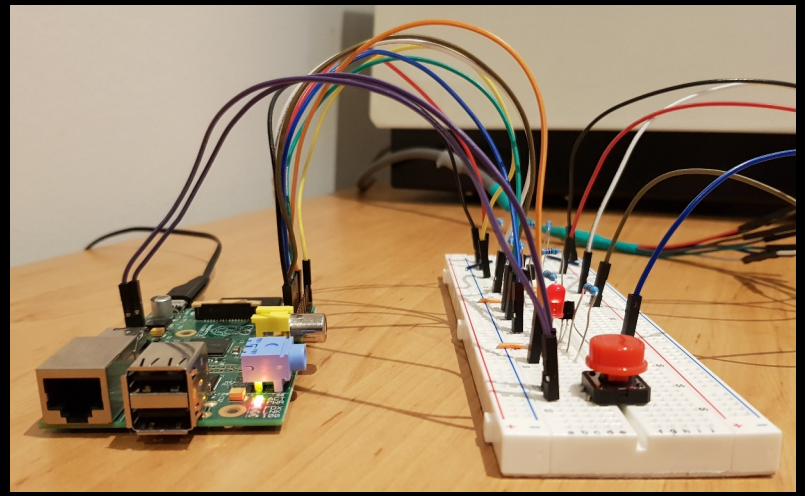

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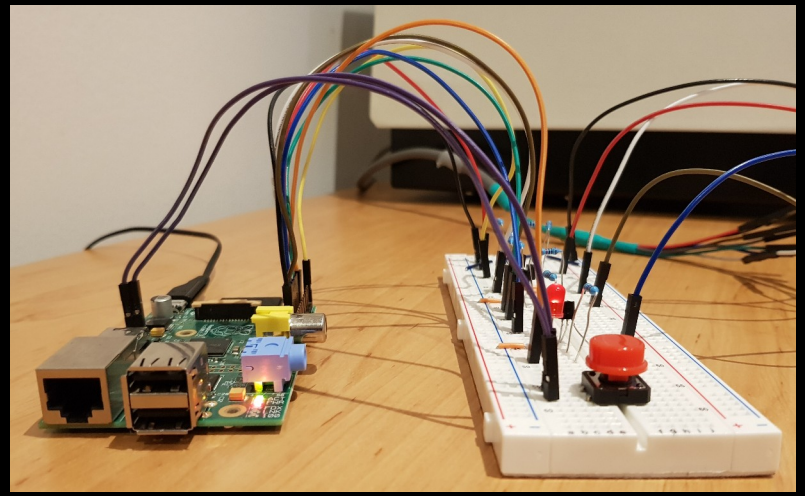

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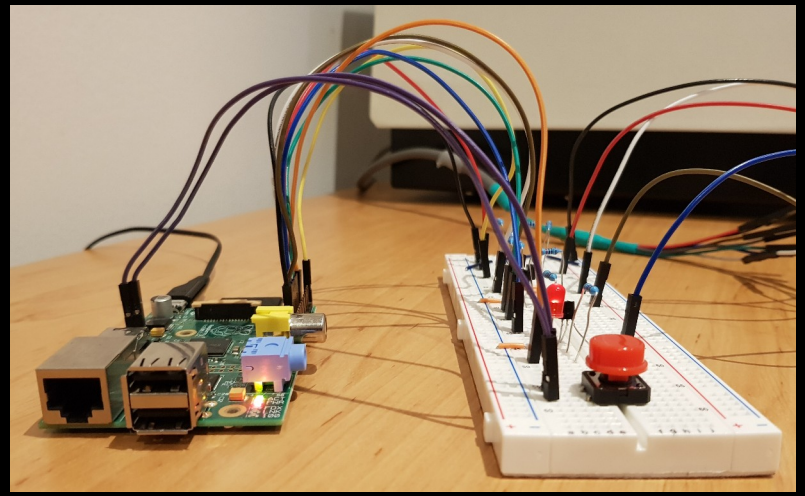

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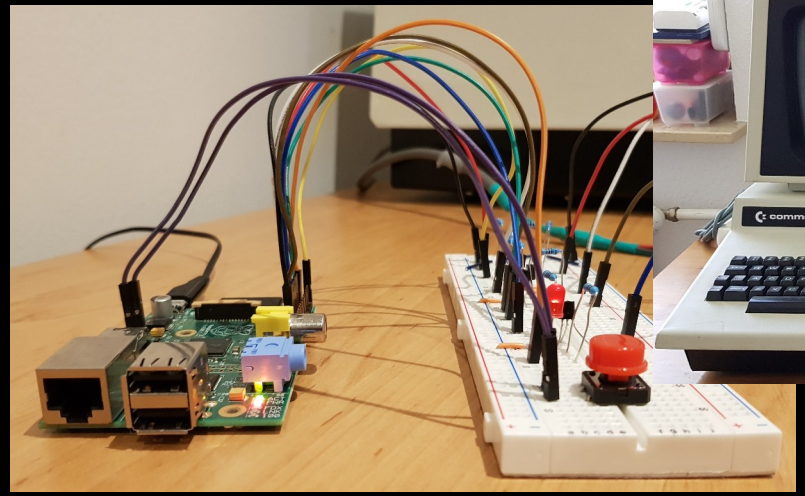

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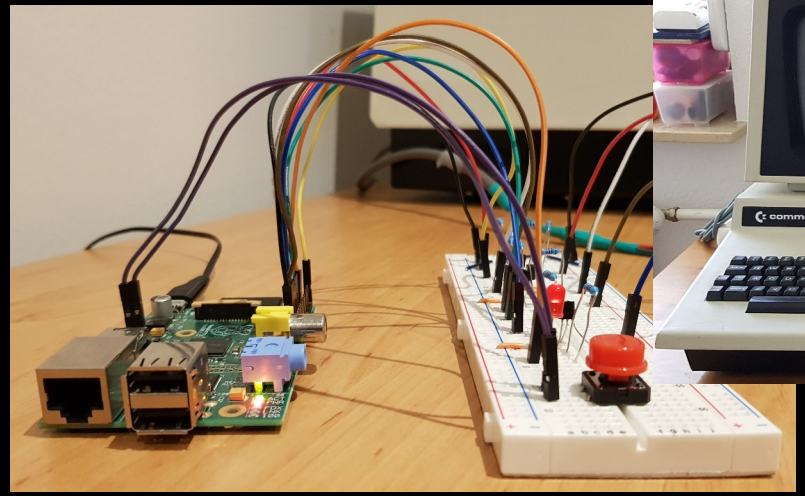

Use an SD card!

"ALTERNATIVES"

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* SD2IEC
* 1541 Ultimate II+
* EasyFlash 3
* petSD
* Tapuino
* Tapecart
* …

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> WHY CBM TAPE PI? <

WHY CBM TAPE PI?

WHY CBM TAPE PI?

Reasons for me:

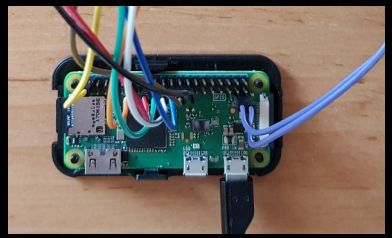
- send own cross-developed PRGs to PET/CBM fast
- creating something closer to the hardware than C# and JavaScript
- learning Bare Metal C
- improving my 6502 assembler and Commodore knowledge
- creating a small circuit

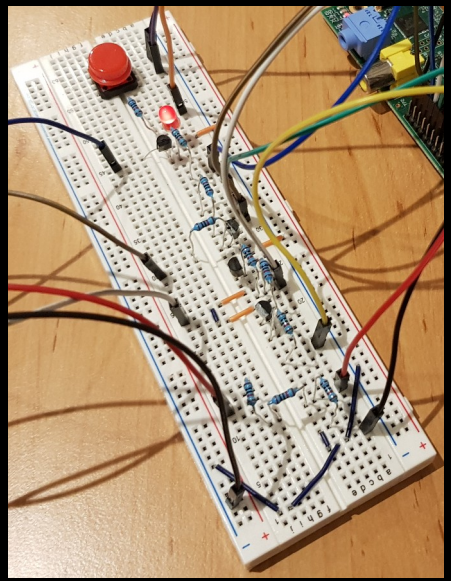
WHY CBM TAPE PI?

Reasons for YOU (hopefully):

- cheap solution
- parts readily available
- easy to build & set up
- occupies tape port, only
- high compatibility
- fast
- open source

PARTS, COSTS, AVAILABILITY





- Raspberry Pi 1, 2, 3, 0
- simple interfacing circuit
- discrete components, only

=>

- no ordering from far away
- no taxes
- no long waiting

BUILDING CBM TAPE PI

- datassette port in use, all other ports free
- you can use a breadboard for the interface circuit

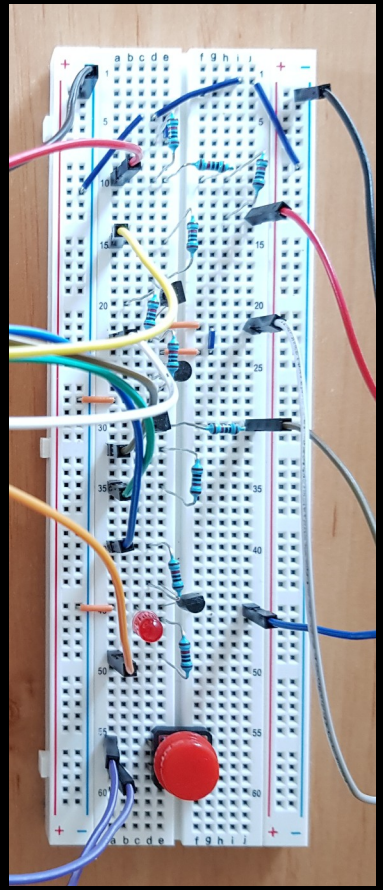
  => only 5 wires to solder
- less error prone:

  * solder on stripboard

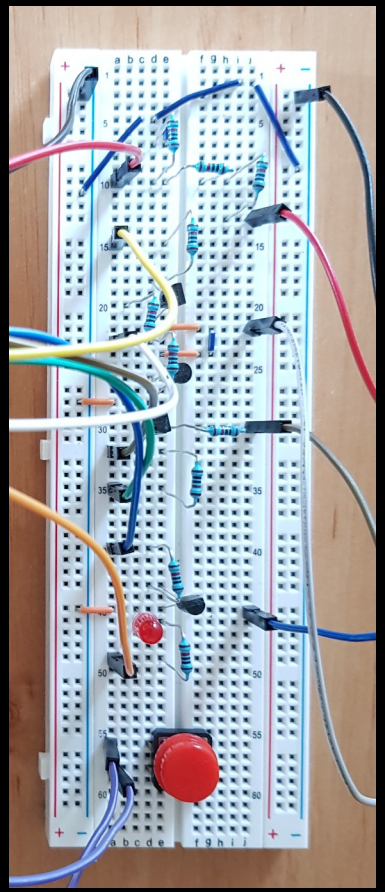
  * or use PCB

				N.C.	
6/F	5/E	4/D	3/C	2/B	1/A
Sense	Write	Read	Motor		GND

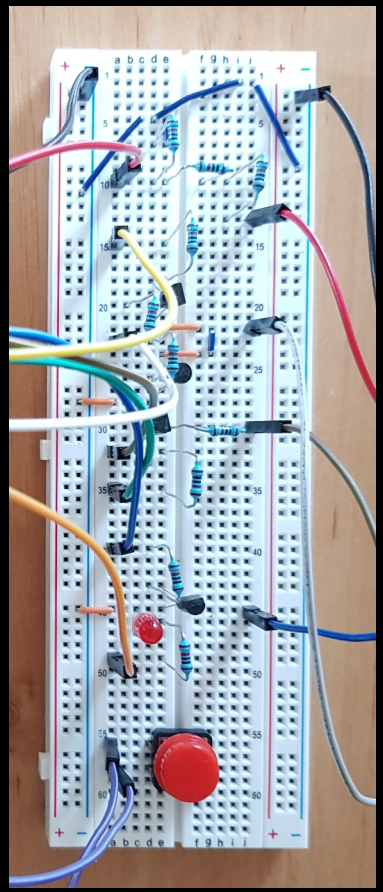
BUILDING CBM TAPE PI



BUILDING CBM TAPE PI



BUILDING CBM TAPE PI



COMPATIBILITY

COMPATIBILITY

- C64

COMPATIBILITY

- C64
- VIC 20

COMPATIBILITY

- C64
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- PET/CBM 2001, 3032, 4032, 8032, …

COMPATIBILITY

- C64
- VIC 20
- PET/CBM 2001, 3032, 4032, 8032, …
    * BASIC v4

COMPATIBILITY

- C64
- VIC 20
- PET/CBM 2001, 3032, 4032, 8032, …
    * BASIC v4
    * BASIC v2

COMPATIBILITY

- C64
- VIC 20
- PET/CBM 2001, 3032, 4032, 8032, …
    - * BASIC v4
    - * BASIC v2
    - * BASIC v1

OPERATION MODES

* COMPATIBILITY MODE:

* FAST MODE:

OPERATION MODES

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- no extra software on Commodore needed, uses Kernal routines

* FAST MODE:

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* FAST MODE:

- needs PRG file to be installed

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OPERATION MODES

* COMPATIBILITY MODE:

- no extra software on Commodore needed, uses Kernal routines
- controlled via SAVE & LOAD
- just as slow as the real datassette

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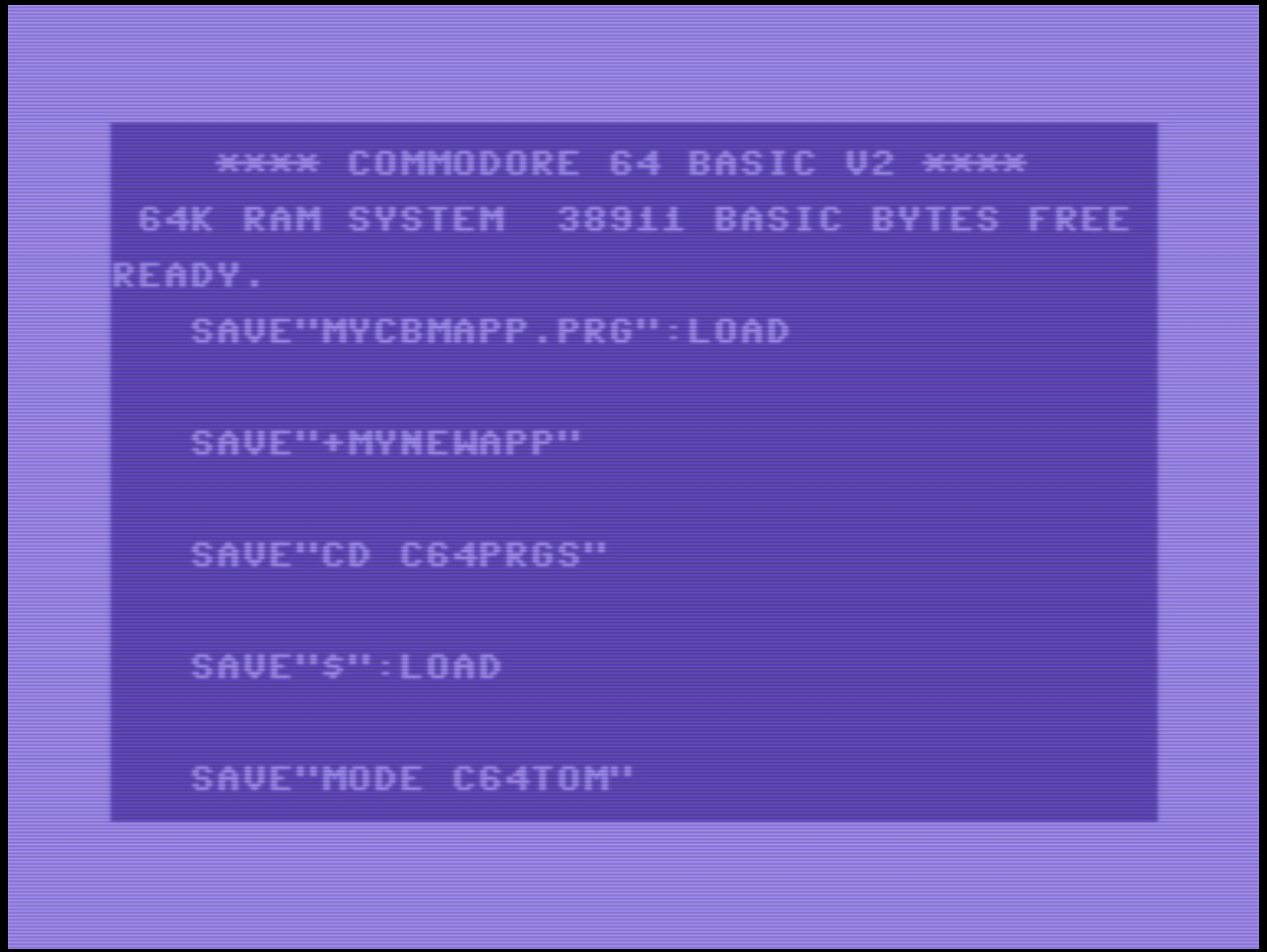
- needs PRG file to be installed
- controlled via extra commands (wedge)
- ~2.5kB/s (e.g. faster than tape or 1541)

OPERATION MODES

* COMPATIBILITY MODE:
  - Not tested: Might work with C16, etc.
- no extra software on Commodore needed, uses Kernal routines
- controlled via SAVE & LOAD
- just as slow as the real datassette

* FAST MODE:
- needs PRG file to be installed
- controlled via extra commands (wedge)
- ~2.5kB/s (e.g. faster than tape or 1541)

EXAMPLES: COMPATIBILITY MODE



EXAMPLES: COMPATIBILITY MODE

Loading a PRG from SD card:

EXAMPLES: COMPATIBILITY MODE

Loading a PRG from SD card:

Saving from RAM to SD card:

EXAMPLES: COMPATIBILITY MODE

Loading a PRG from SD card:

```
SAVE"MYCBMAPP.PRG":LOAD
```

Saving from RAM to SD card:

```
SAVE"+MYNEWAPP"
```

Changing current directory:

```
SAVE"CD C64PRGS"

SAVE"$":LOAD

SAVE"MODE C64TOM"
```

EXAMPLES: COMPATIBILITY MODE

Loading a PRG from SD card:

Saving from RAM to SD card:

Changing current directory:

Loading directory listing:

EXAMPLES: COMPATIBILITY MODE

Loading a PRG from SD card:

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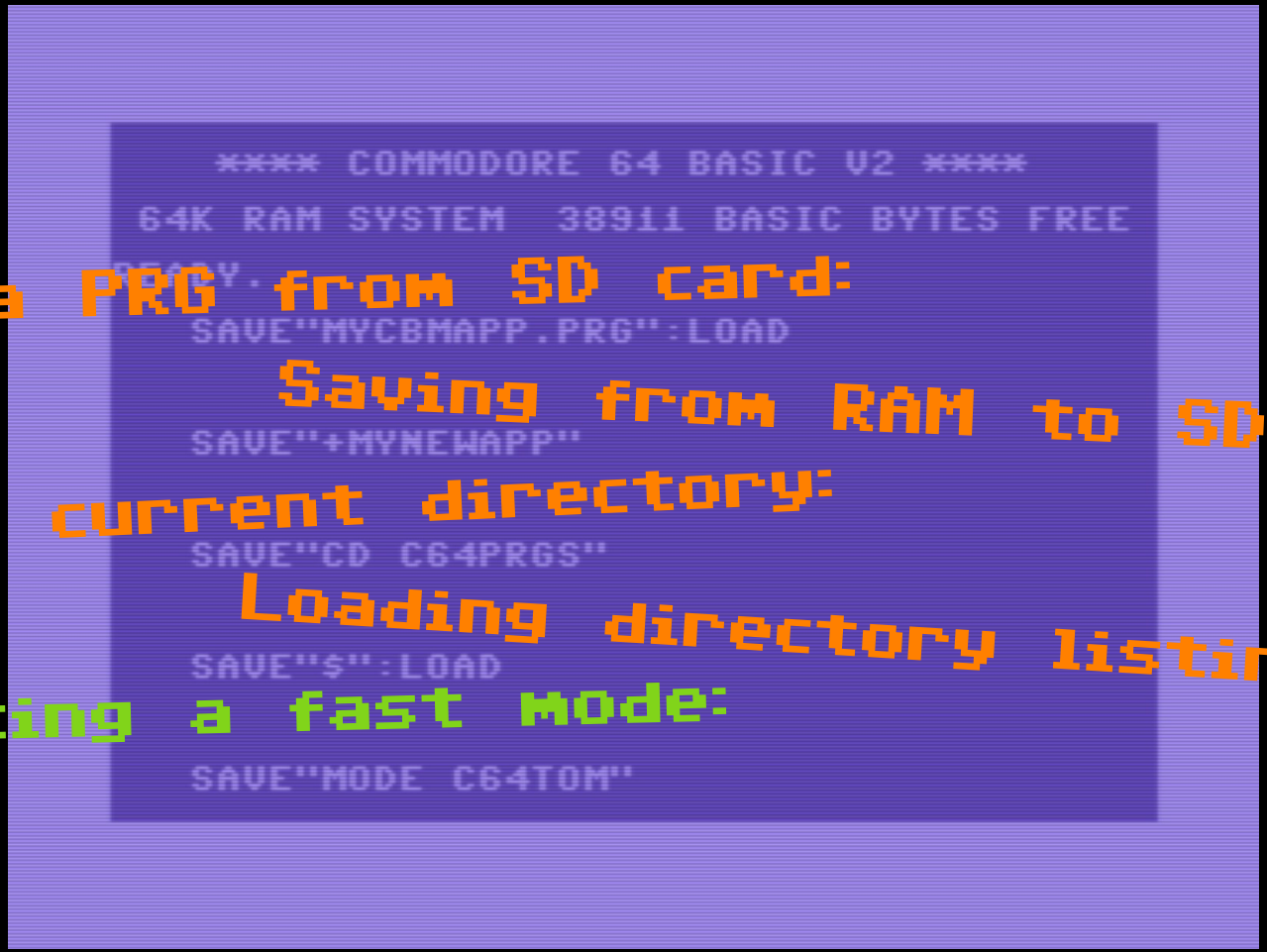
Changing current directory:

Loading directory listing:

Selecting a fast mode:

EXAMPLES: COMPATIBILITY MODE



Loading a PRG from SD card:

Saving from RAM to SD card:

Changing current directory:

Loading directory listing:

Selecting a fast mode:

ENABLING (A) FAST MODE: Options:

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Enter in compatibility mode:

SAVE"MODE <put mode title, here>"

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CBM/PET:
* selects BASIC version (1, 2, 4)

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* installs wedge to tape buffers or TOM (top of BASIC memory)

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VIC 20:

* always installs to TOM

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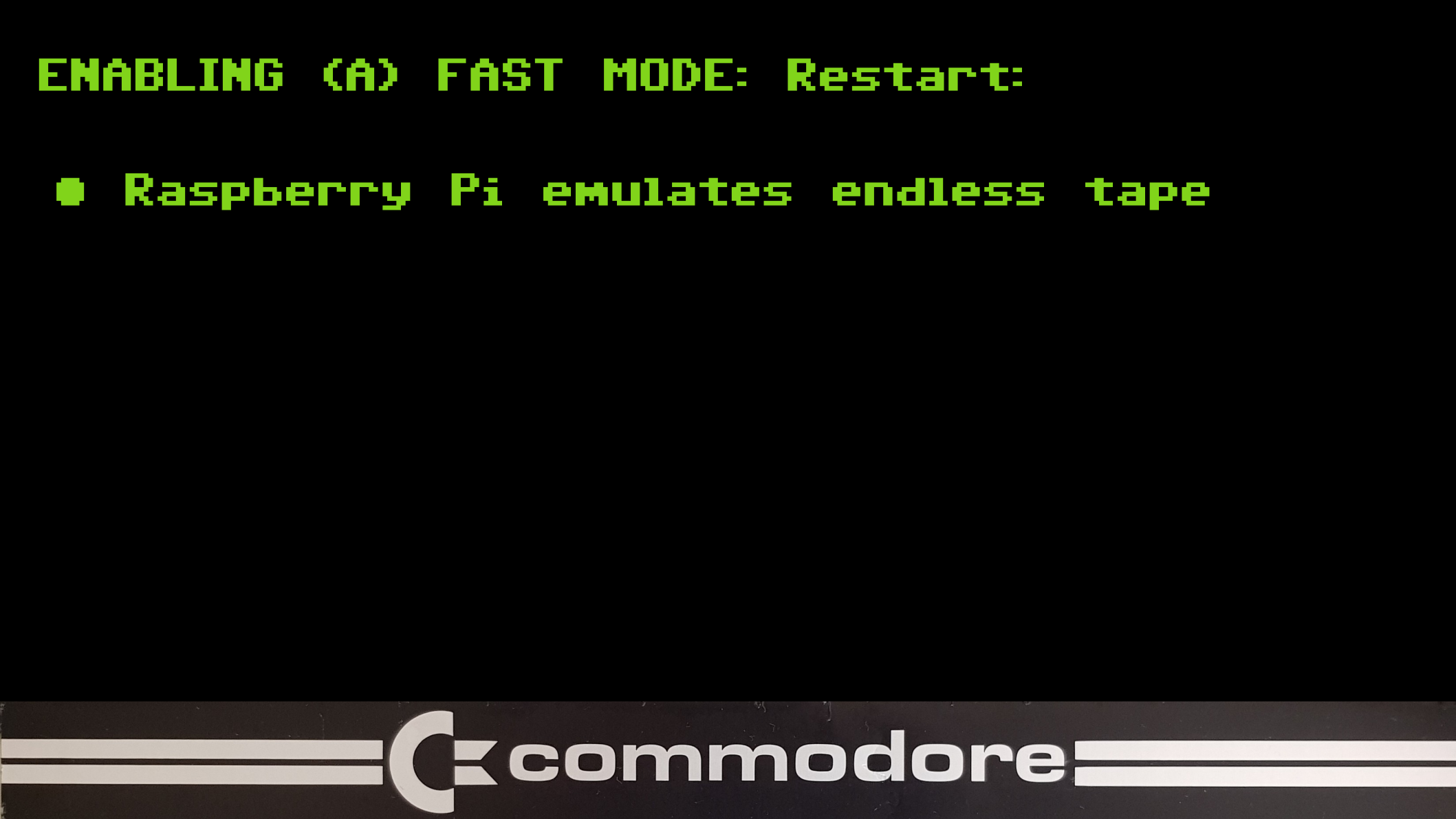
CBM/PET:
* selects BASIC version (1, 2, 4)

* installs wedge to tape buffers or TOM (top of BASIC memory)

VIC 20:
* always installs to TOM

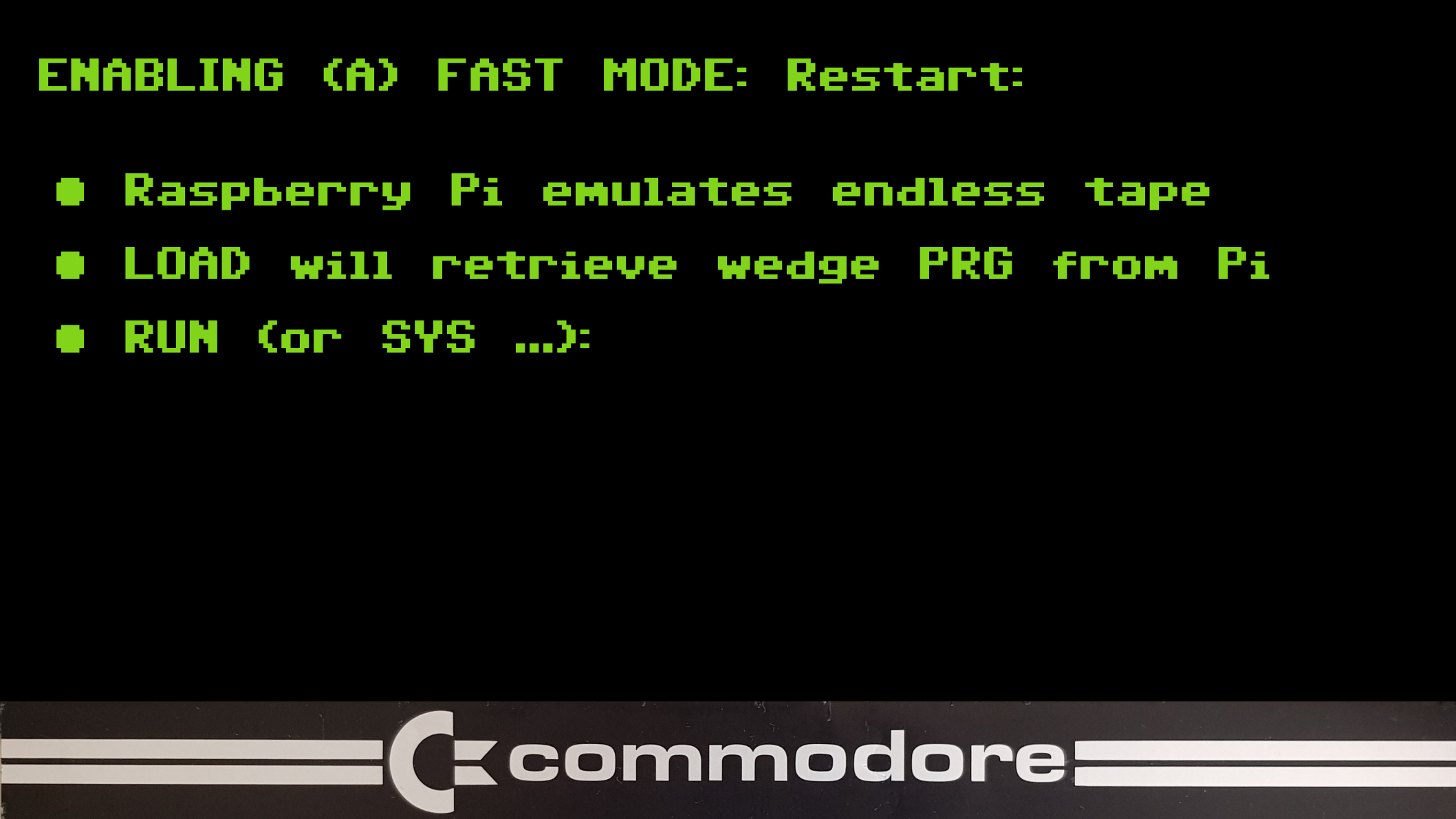
C64:
* installs command extension to TOM or to top of free high memory (right before address $D000)


ENABLING (A) FAST MODE: Restart:
commodore


ENABLING (A) FAST MODE: Restart:
● Raspberry Pi emulates endless tape
commodore

ENABLING (A) FAST MODE: Restart:

- Raspberry Pi emulates endless tape
- LOAD will retrieve wedge PRG from Pi


ENABLING (A) FAST MODE: Restart:
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● LOAD will retrieve wedge PRG from Pi
● RUN (or SYS ...):
commodore

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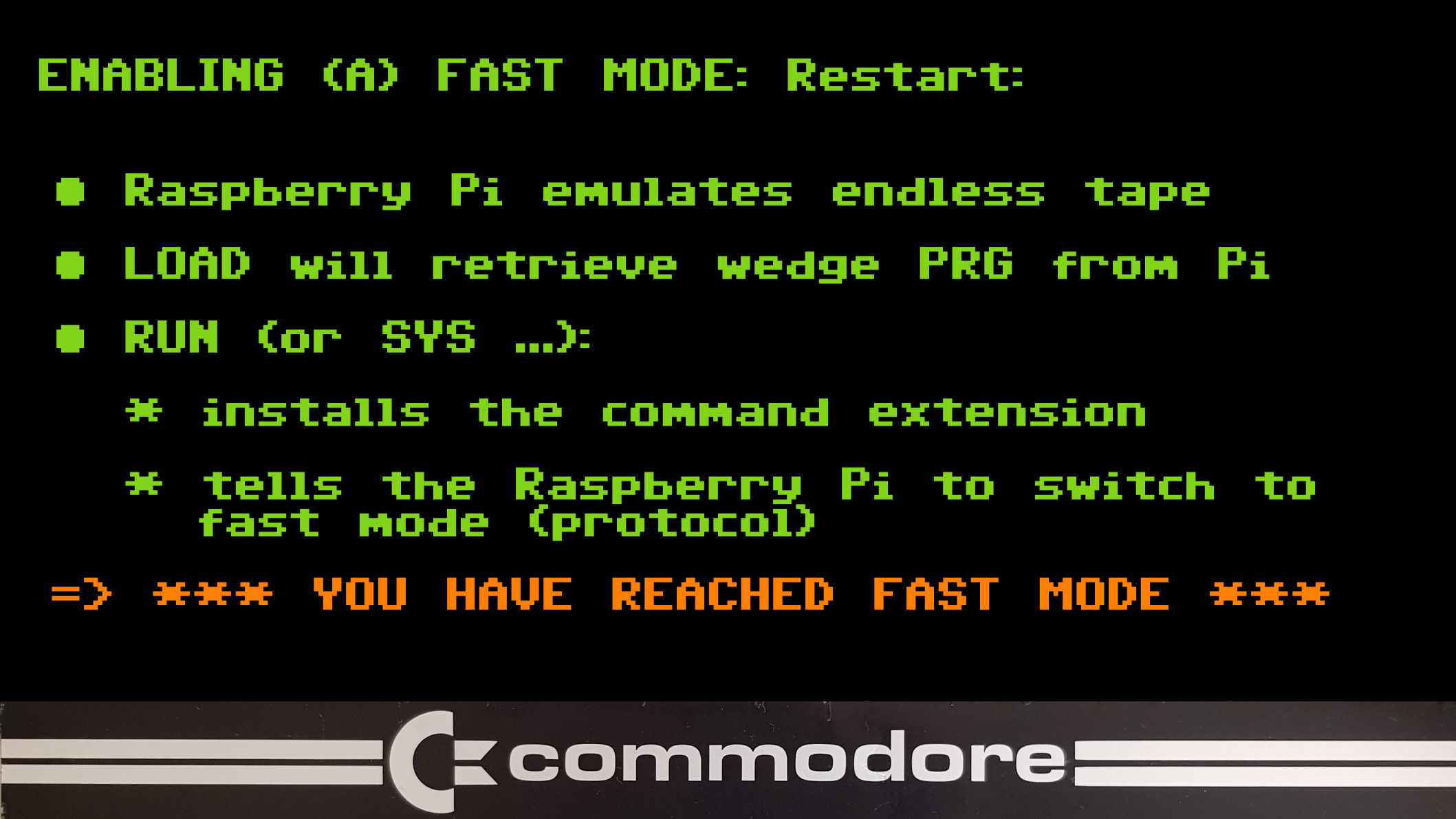
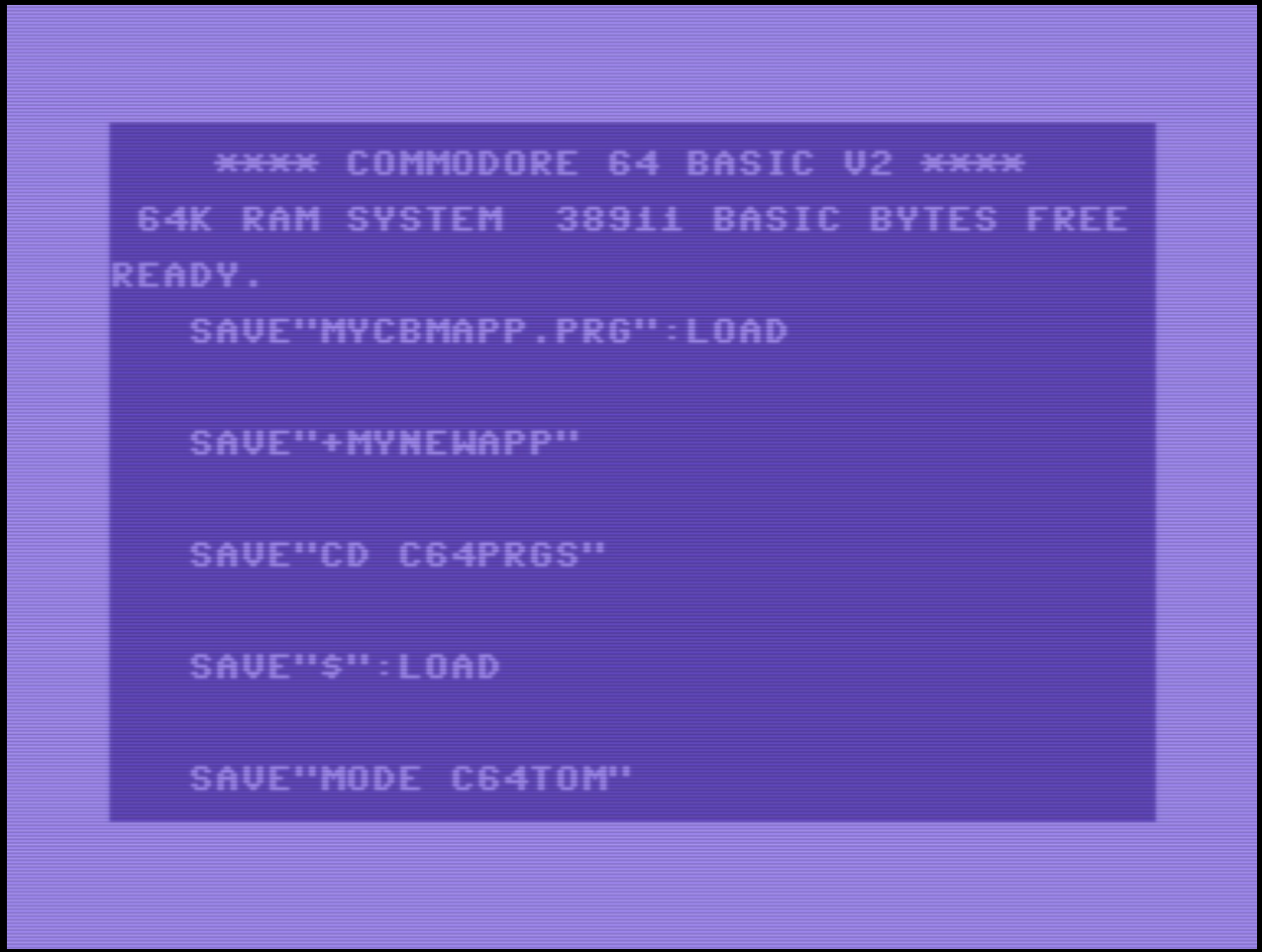
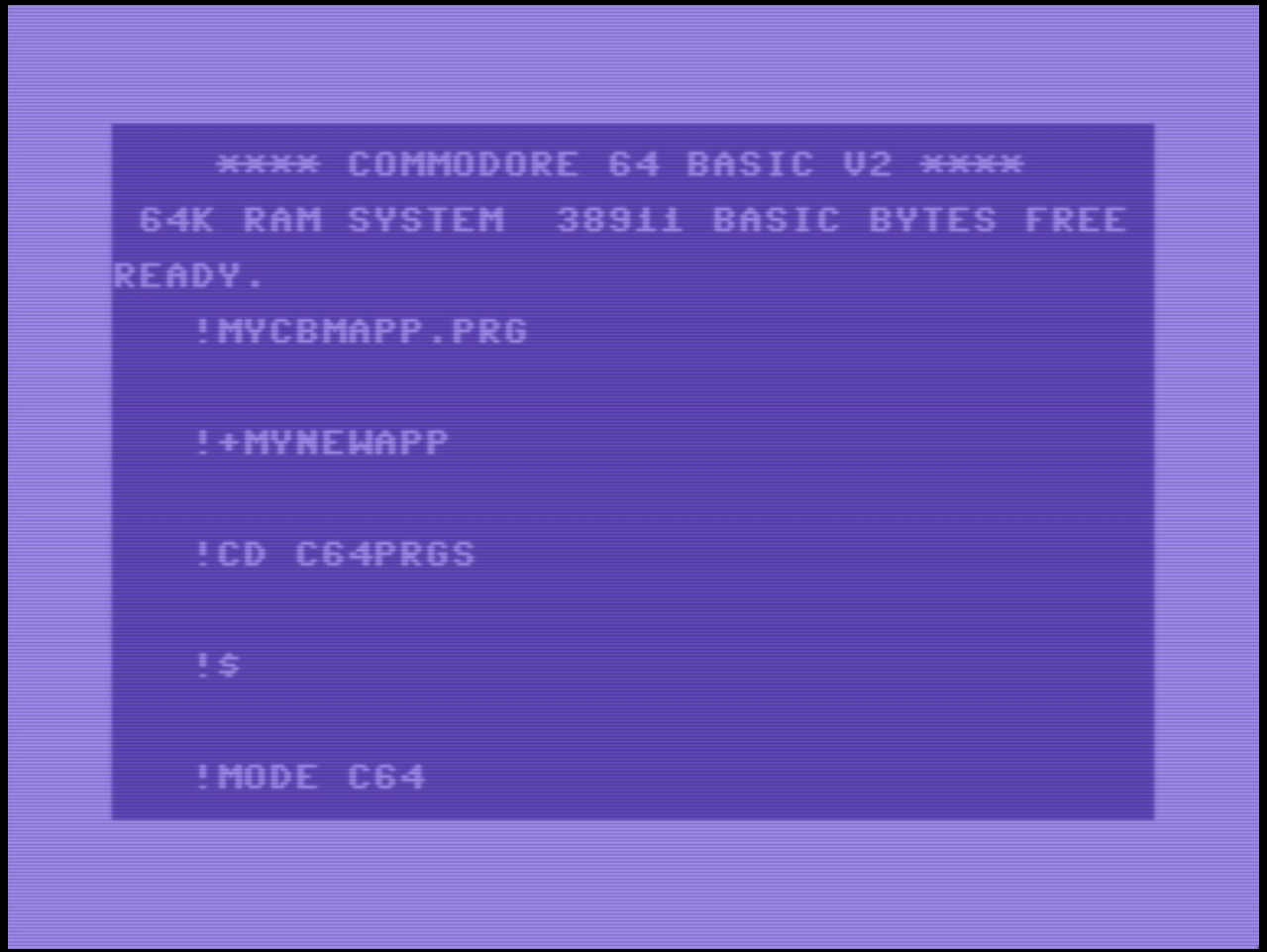
  - * tells the Raspberry Pi to switch to fast mode (protocol)


ENABLING (A) FAST MODE: Restart:
● Raspberry Pi emulates endless tape
● LOAD will retrieve wedge PRG from Pi
● RUN (or SYS ...):
* installs the command extension
* tells the Raspberry Pi to switch to fast mode (protocol)
=> *** YOU HAVE REACHED FAST MODE ***
commodore

EXAMPLES: FAST MODE



EXAMPLES: FAST MODE



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Changing current directory:

EXAMPLES: FAST MODE

EXAMPLES: FAST MODE

Loading a PRG from SD card:

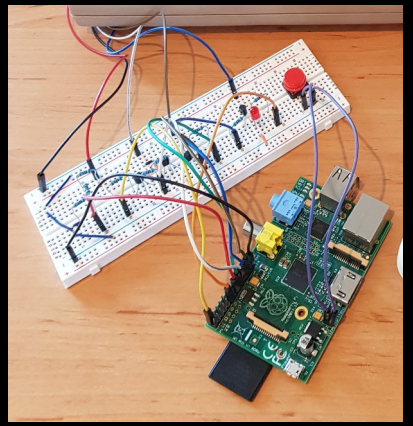
Saving from RAM to SD card:

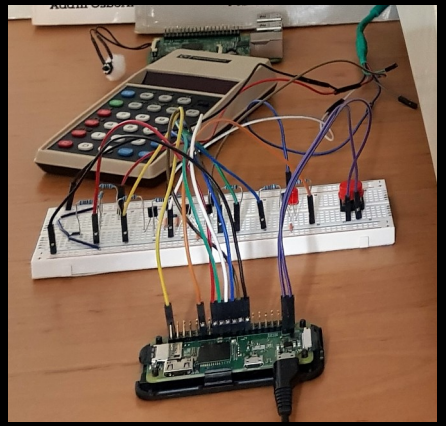
Changing current directory:

Loading directory listing:

Selecting another mode:

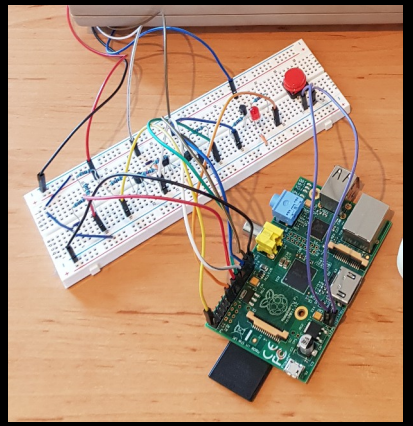
THE FUTURE

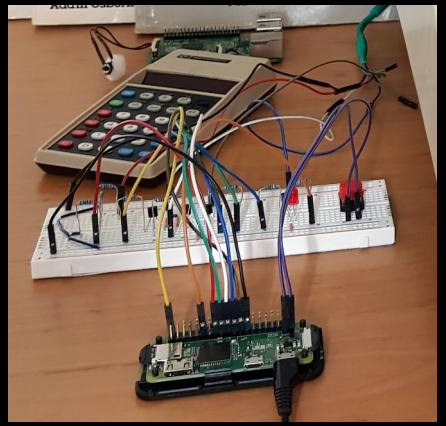




THE FUTURE

Small enhancements:

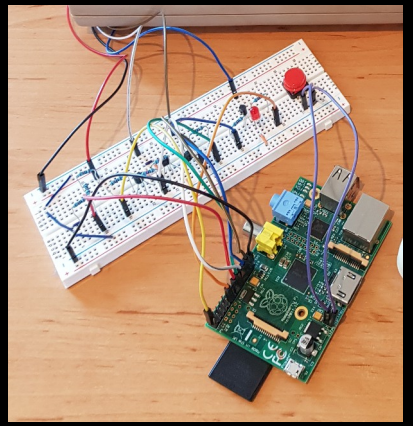


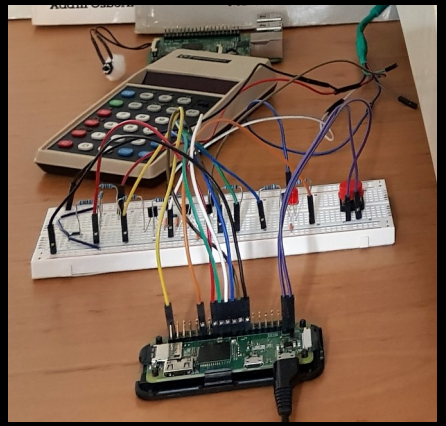


THE FUTURE

Small enhancements:

- remove 8+3 limitation

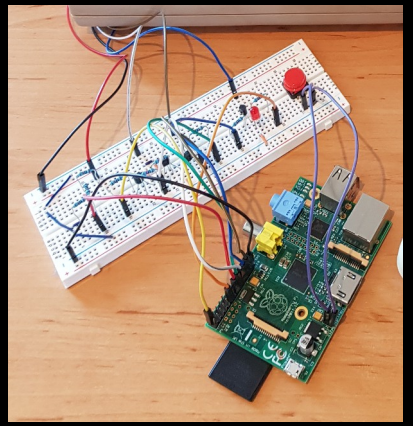


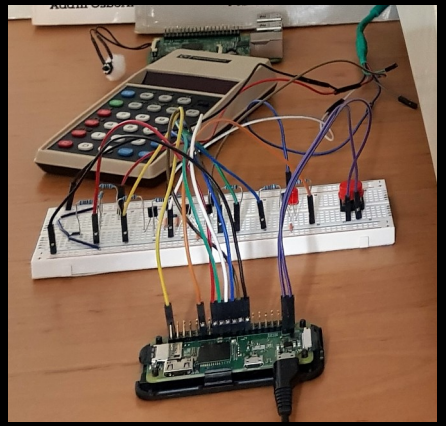


THE FUTURE

Small enhancements:

- remove 8+3 limitation
- !$ without overwrite

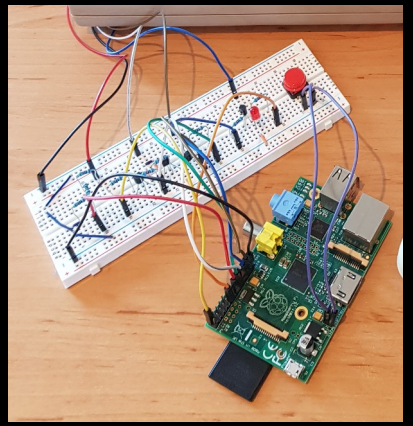


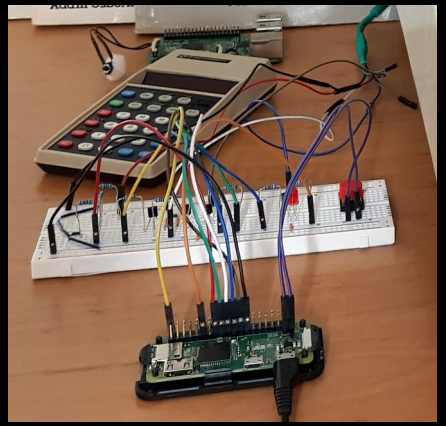


THE FUTURE

Small enhancements:

- remove 8+3 limitation
- !$ without overwrite
- let !$ show address & size of PRGs





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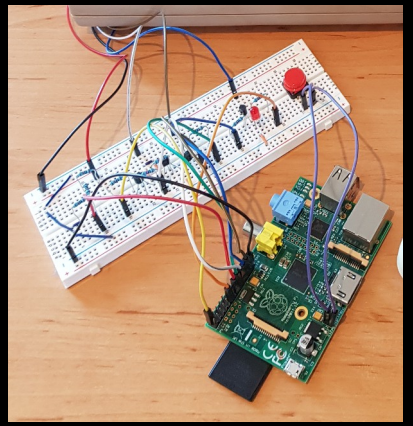
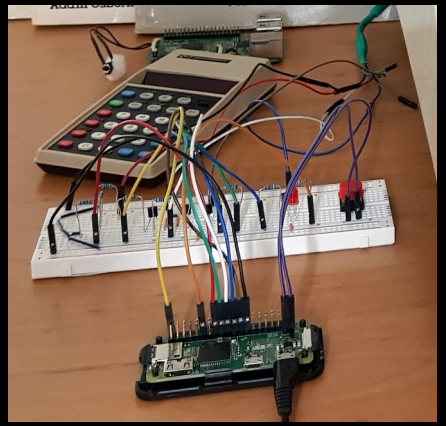
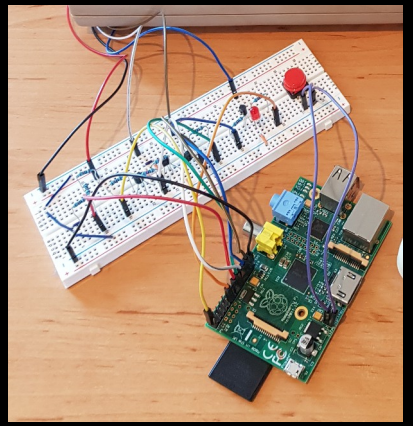


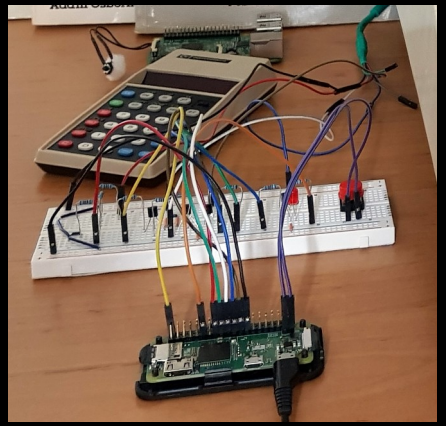


Small enhancements:

- remove 8+3 limitation
- !$ without overwrite
- let !$ show address & size of PRGs
- increase loading speed of wedge PRGs
  (by making them smaller)

THE FUTURE

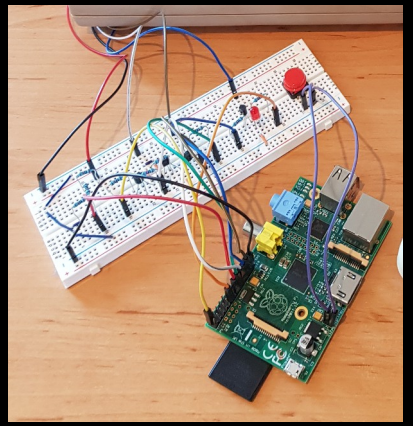


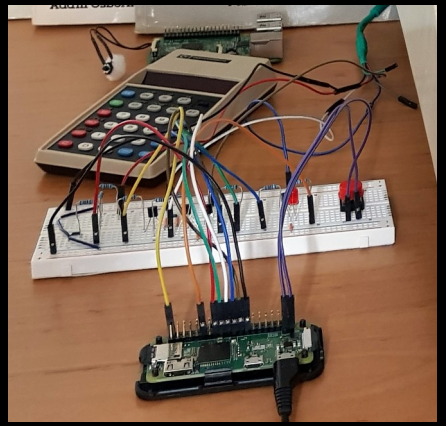


Small enhancements:

- remove 8+3 limitation
- !$ without overwrite
- let !$ show address & size of PRGs
- increase loading speed of wedge PRGs (by making them smaller)
- show some response on Commodore for some commands

THE FUTURE





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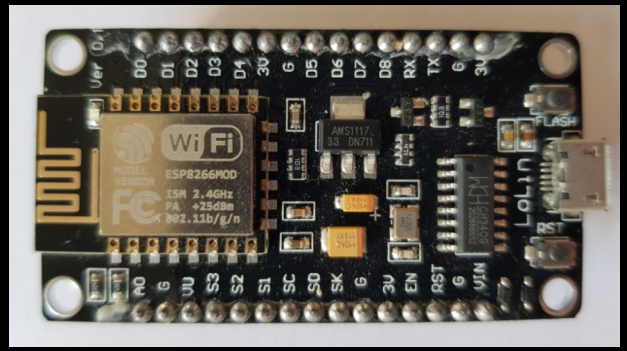
THE FUTURE

Ports:

THE FUTURE

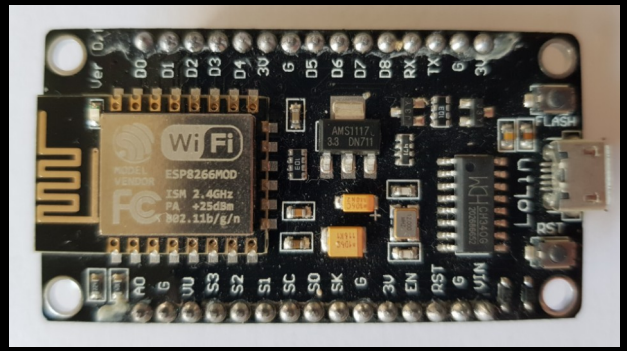
Ports: ESP8266



THE FUTURE

Ports: ESP8266

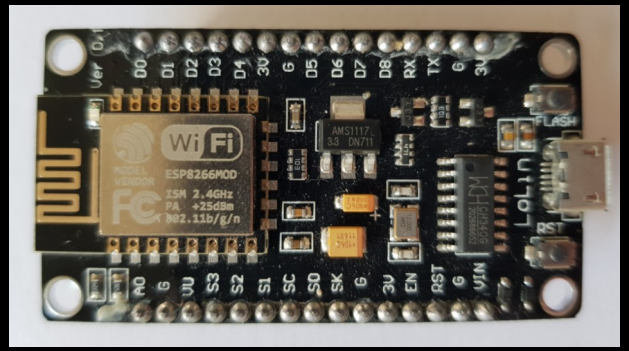
– using Arduino via PlatformIO



THE FUTURE

Ports: ESP8266

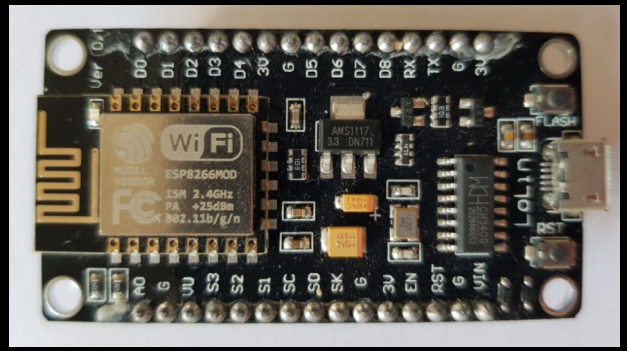
- using Arduino via PlatformIO
- next step: Compatibility mode LOAD



THE FUTURE

Ports: ESP8266

- using Arduino via PlatformIO
- next step: Compatibility mode LOAD
- SD card "reader" must be built



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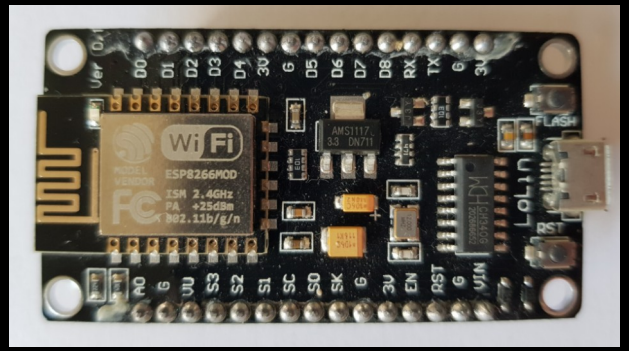

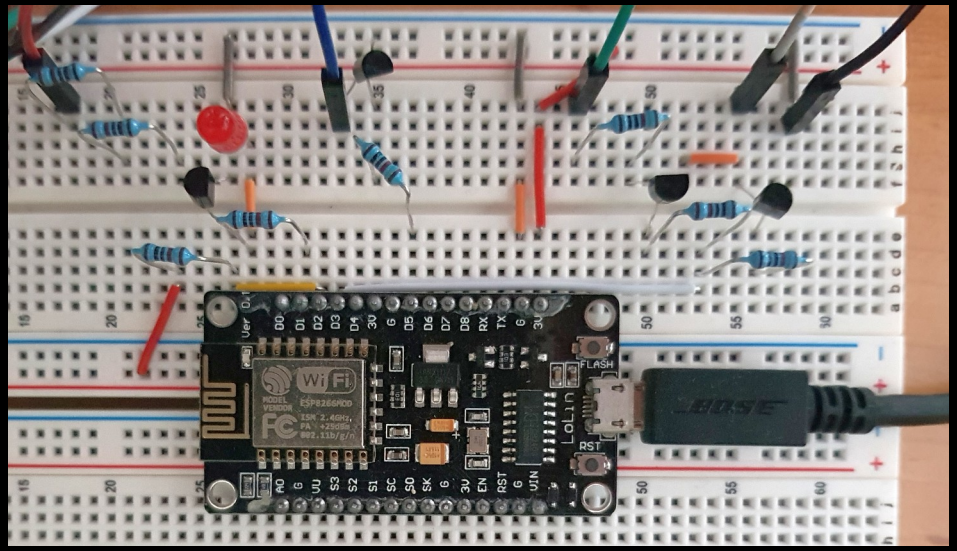

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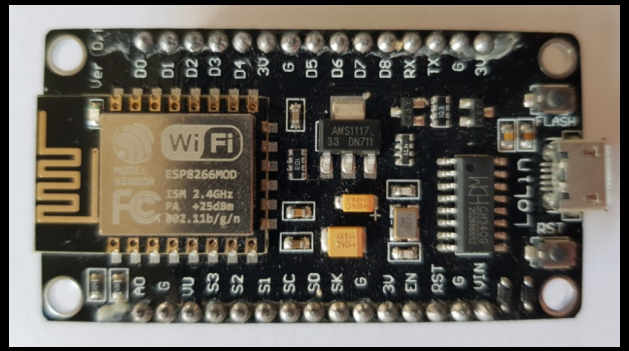

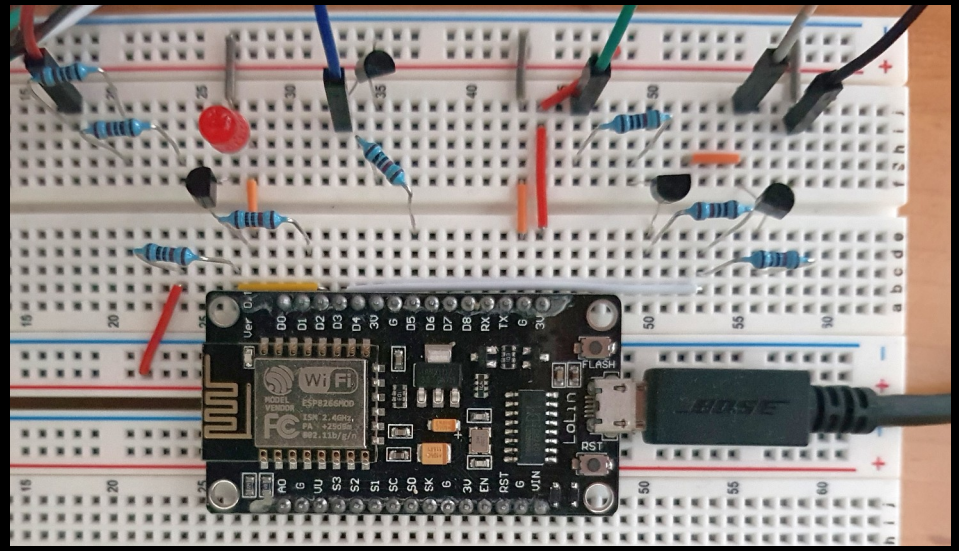

=> Super simple WiFi!

THE FUTURE

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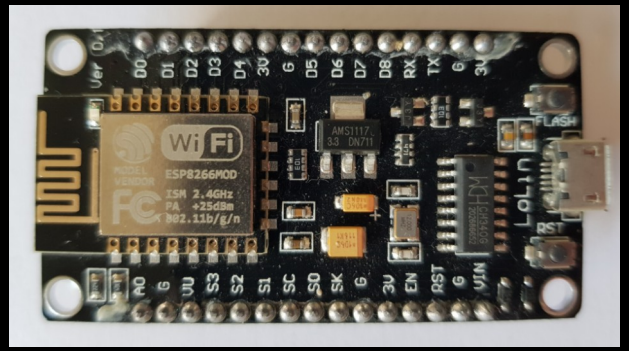

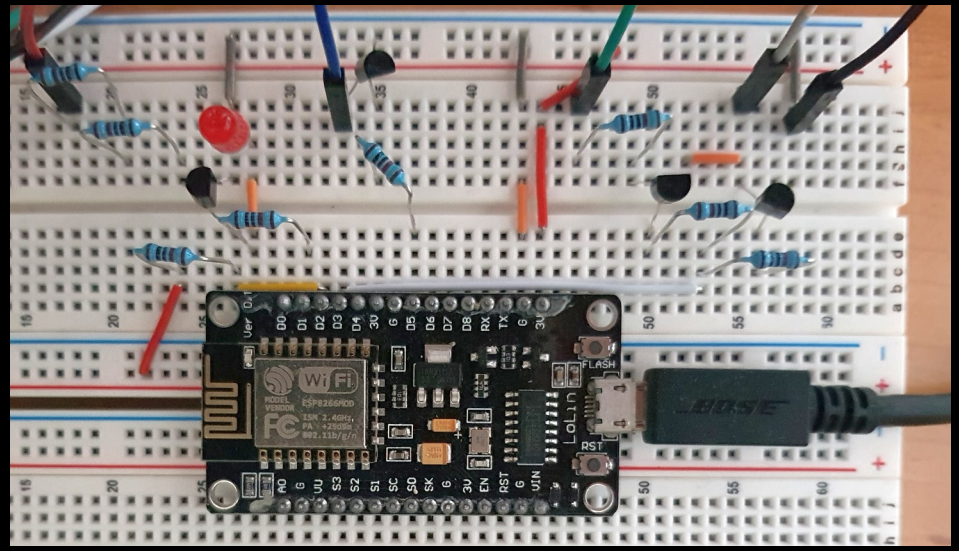

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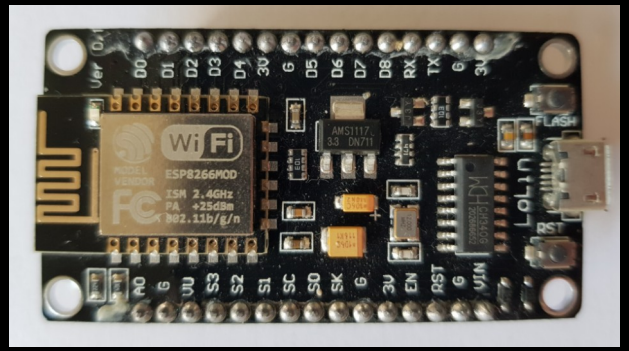
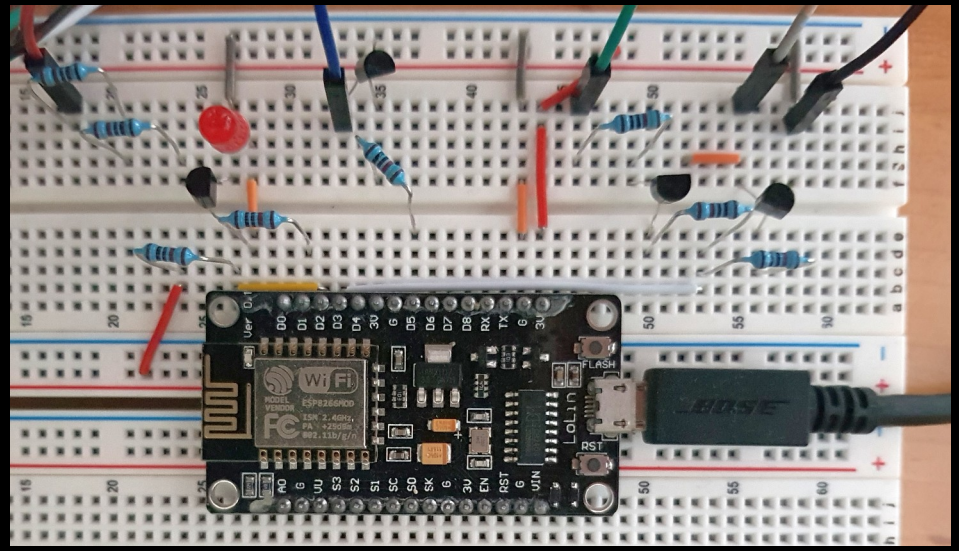




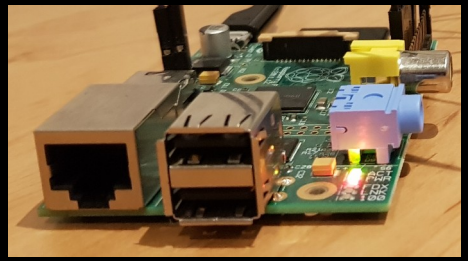
=> Super simple WiFi!

=>=> Internet!

=>=>=> World Domination!

THE FUTURE

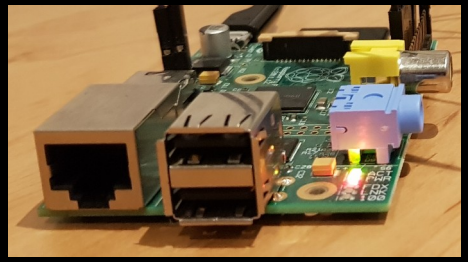
Ports: Raspbian/Linux



THE FUTURE

Ports: Raspbian/Linux

- problem: Scheduler vs. compatibility mode



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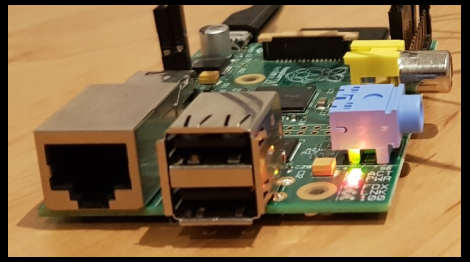
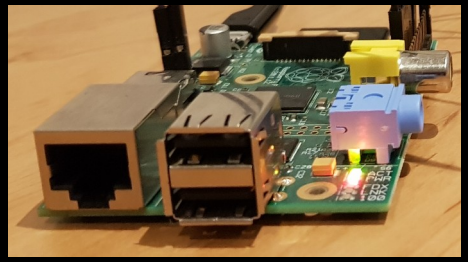


Ports: Raspbian/Linux

- problem: Scheduler vs. compatibility mode
- initial wedge transfer needs comp. mode

THE FUTURE



Ports: Raspbian/Linux

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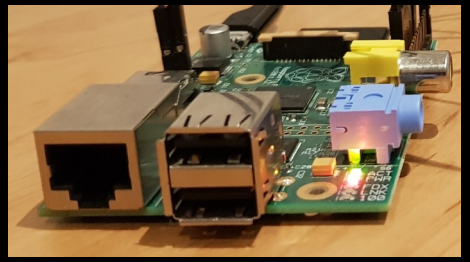

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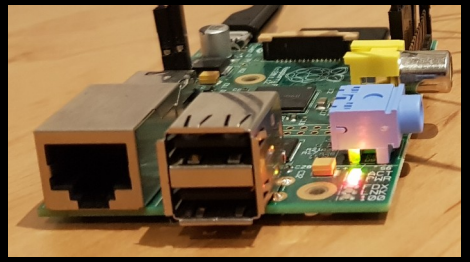

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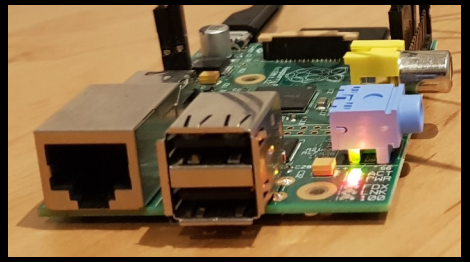

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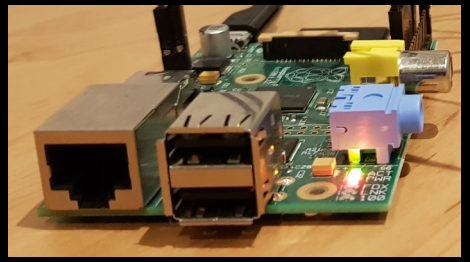
- next step:

  First LOAD test with own DMA implementation

THE FUTURE



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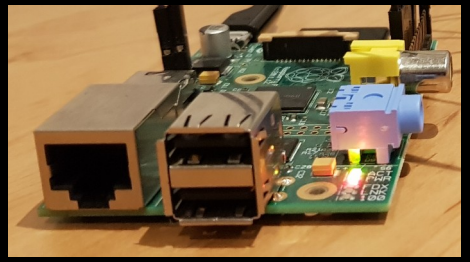

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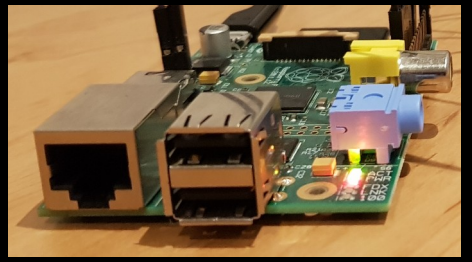

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- next step: => => Internet!

  First LOAD test with own DMA implementation => => => World Domination (again..)!

SOURCE CODE & DOCUMENTATION

github.com/RhinoDevel/cbmtapepi

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*** THANKS FOR WATCHING ***

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