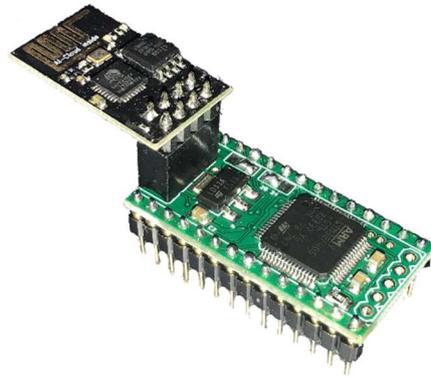


# SuperKernal

Commodore 64



36 in 1 Kernal Replacement Chip with WLAN / FTP Client

## Content:

- C64 or C64G – Difference between 24 or 28 Pin
- Parts of the SuperKernal Kit
- Tips & Tricks before you assemble
- Assembly C64 – 24 Pin Kernal Chip
- Assembly C64G / C128 – 28 Pin Kernal Chip
- First run
- Options
- GPIO Setup
- Storage Management
- Firmware Update
- WiFi Setup
- Slot Management
- File Browser
- Misc

# Difference between C64 (24) and C64G (28)

## Pin Kernal ROM Chip:

**WARNING:** There are two different possibilities to assemble the SuperKernal: If you have an old / original C64 or an SX-64 then you have a **Kernal ROM Chip with 24 Pins** – Chip Part Number: **901227-0X** for C64 or **251104-X** for SX-64. **You have to use the instructions for the 24 PIN assembly !**

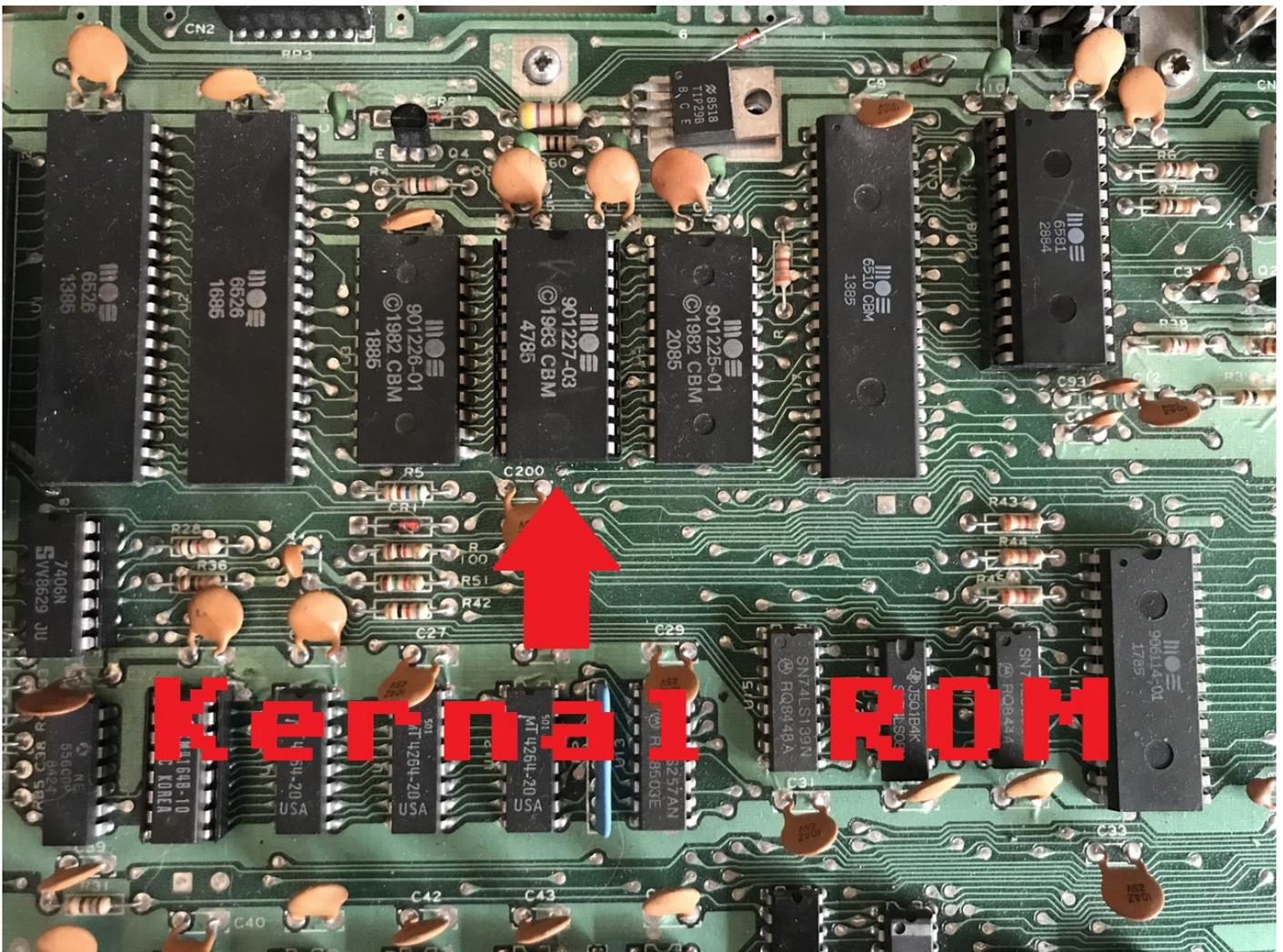


Figure 1: Kernal ROM with 24 Pin in old/normal C64

If you own an C64C (C64-II) then your system has a **Kernal ROM Chip with 28 Pins** – Chip Part Number: **251913-0X**. You have to use the instructions for the 28 PIN assembly!

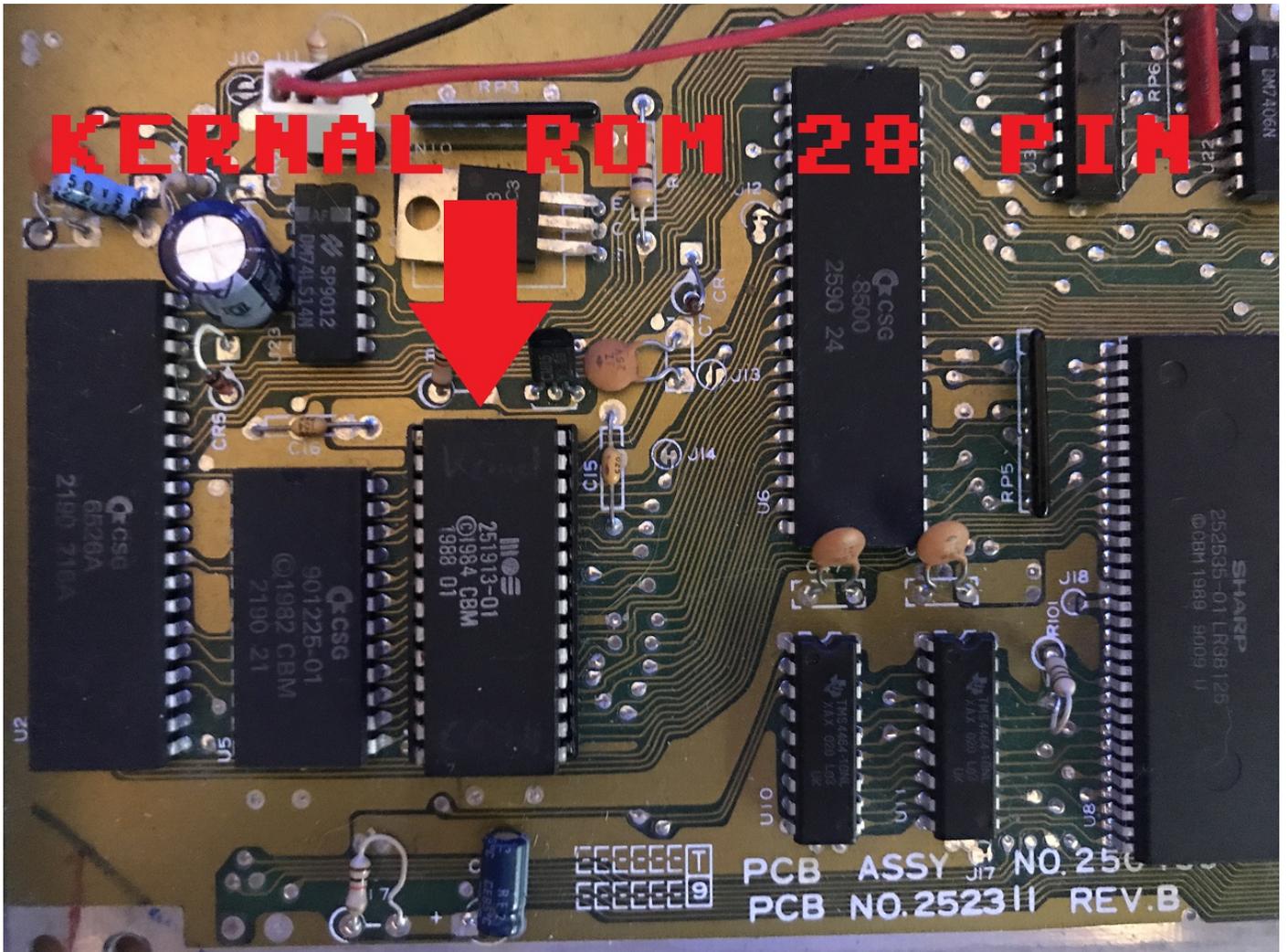
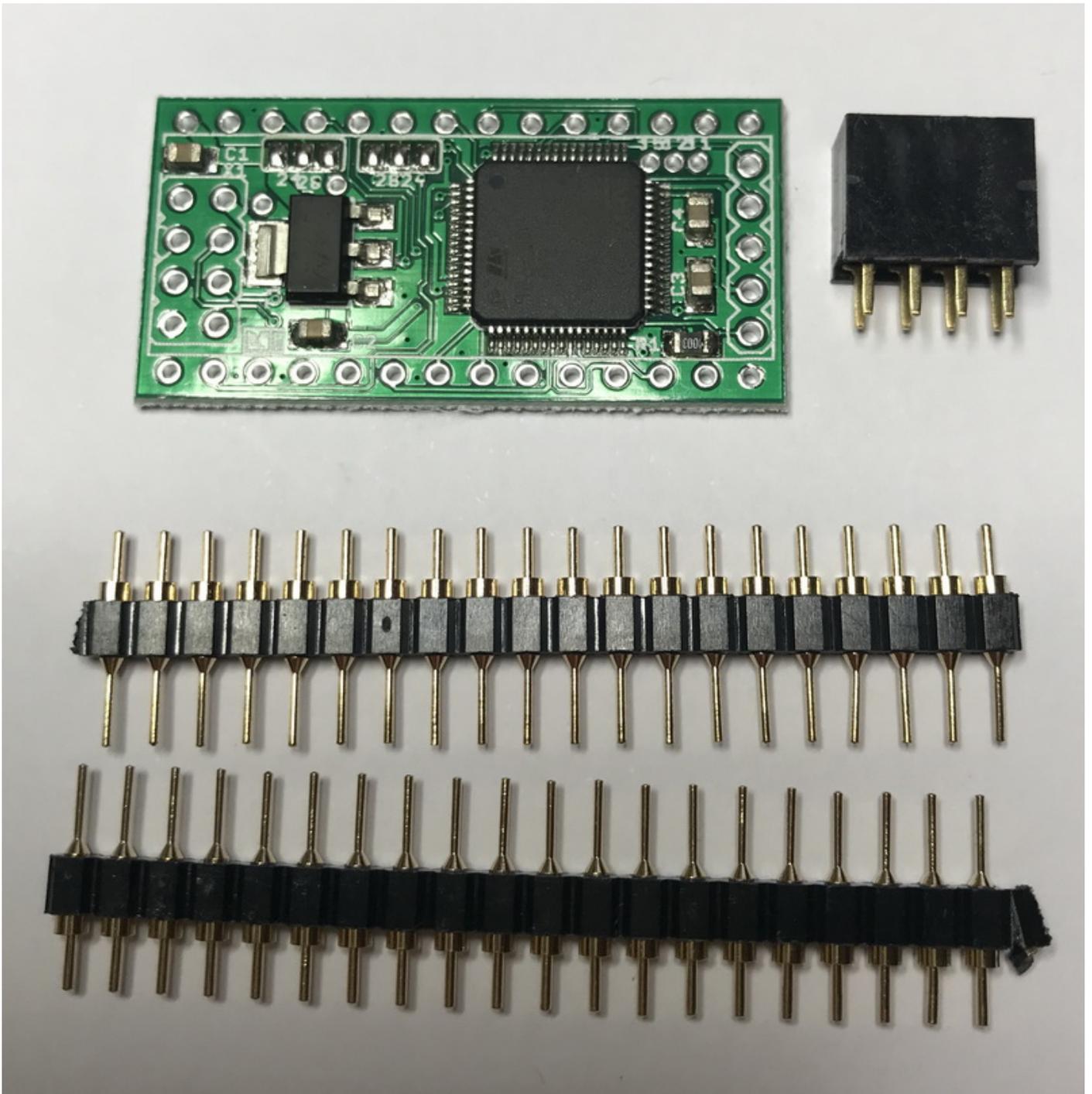


Figure 2: Kernal ROM with 28 Pin in C64 (C64II).

## Parts of the SuperKernal Kit:



*Figure 3: 1x SuperKernal PCB, 1x WLAN Connector, 2x Pin Header*

## Assembly Tips & Tricks:

The kit contains a 2 x 20 Pin-Header. For the assembly you have to cut them to the right length / number of pins. Sometimes the pins at the edges are miss-formed or damaged. Simply remove one of these edge pins. At the end you need for the C64 assembly 12 pins and for the C64C (C64II) 14 pins.

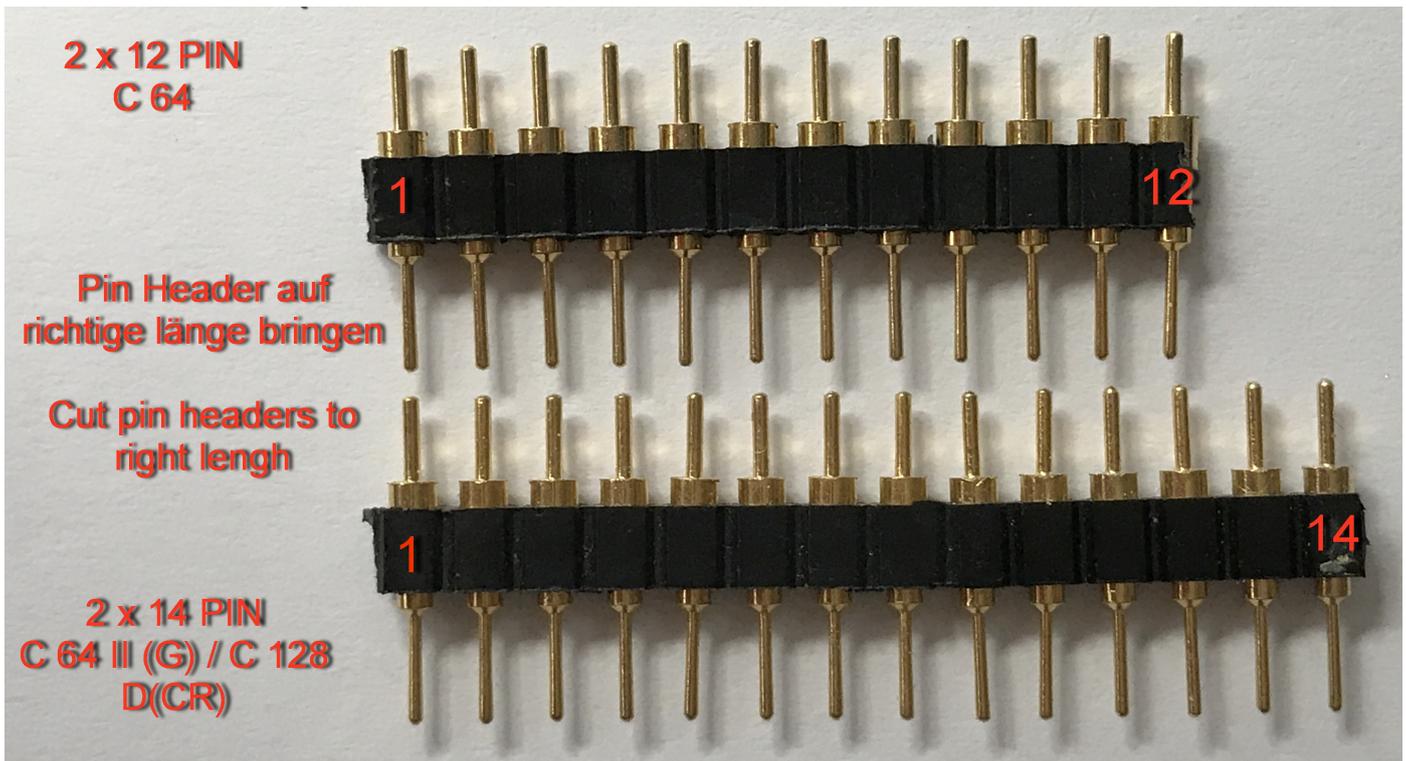
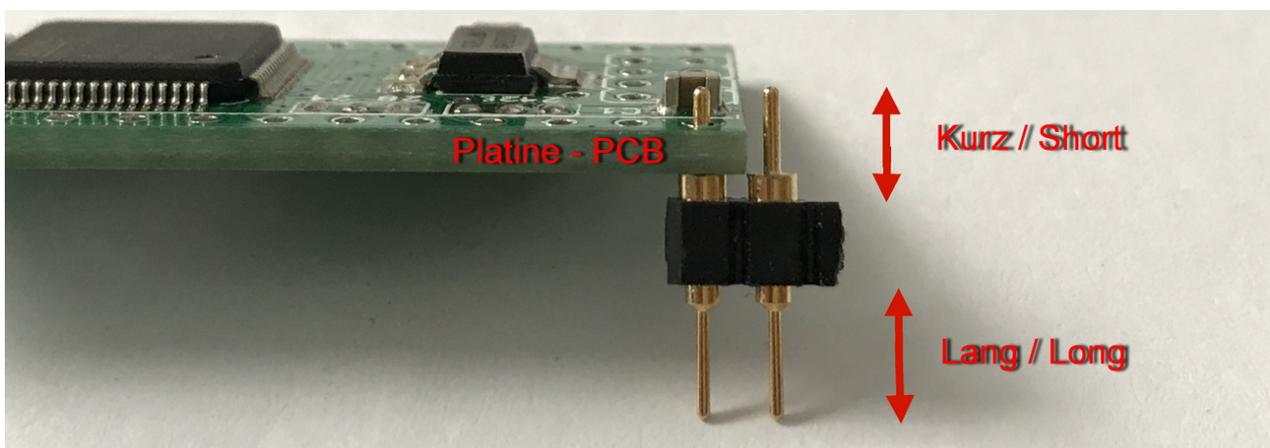
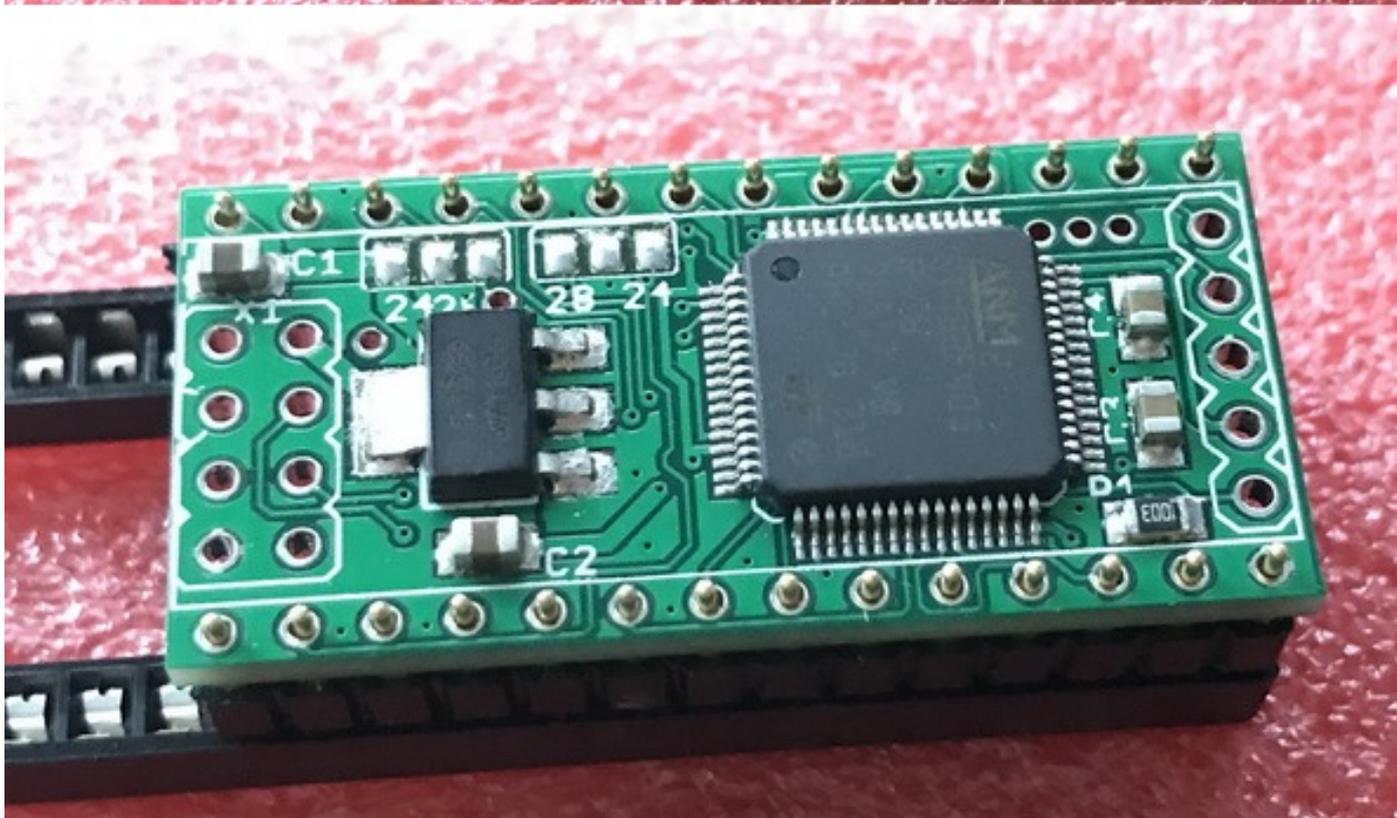
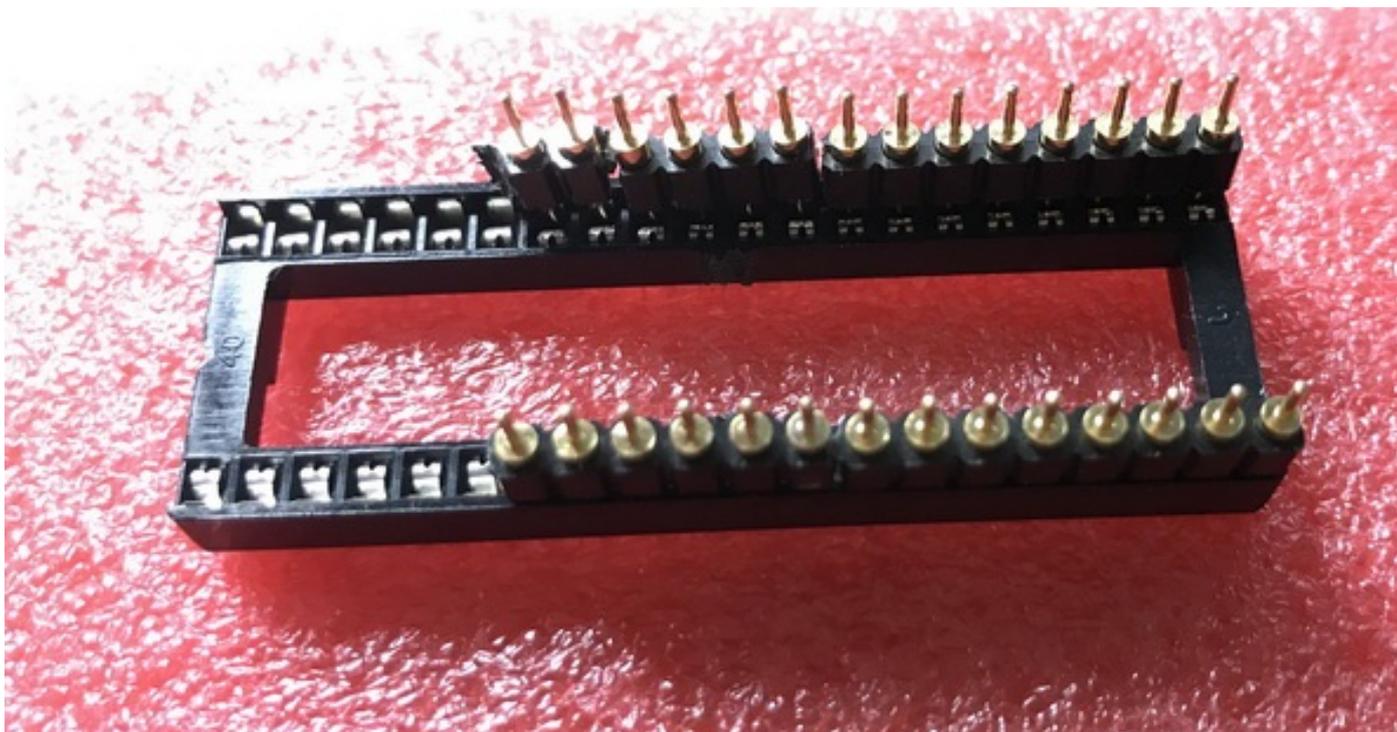


Figure 4: Upper part: C64 Pin header with 12 Pin – Lower part: C64G with 14 Pin



Attention: Put the short legs into the PCB and the long legs into the socket

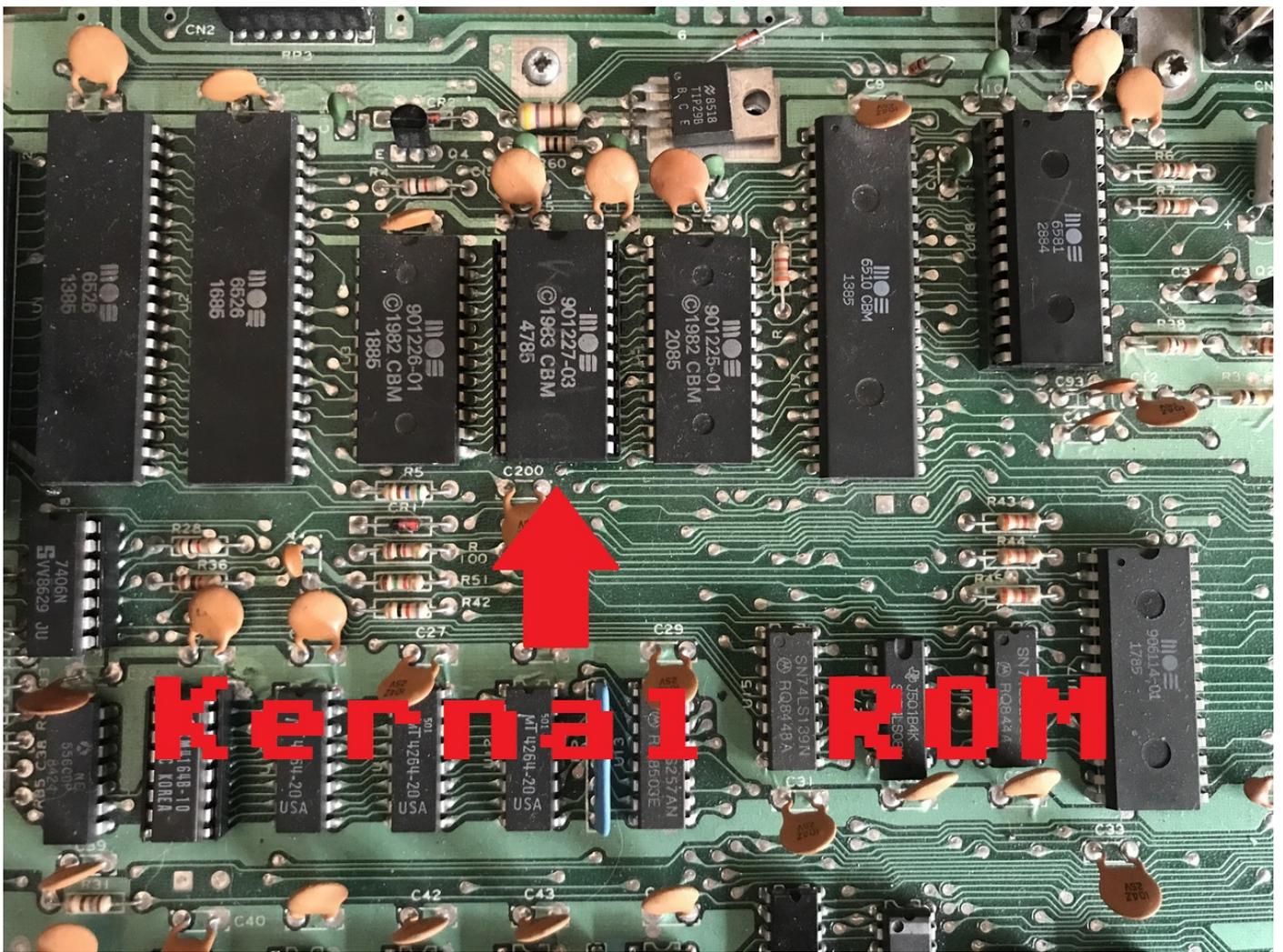
To verify that everything fits perfect and is in the right angle you should place the pin headers into an old socket before soldering everything together. That simplifies the soldering.



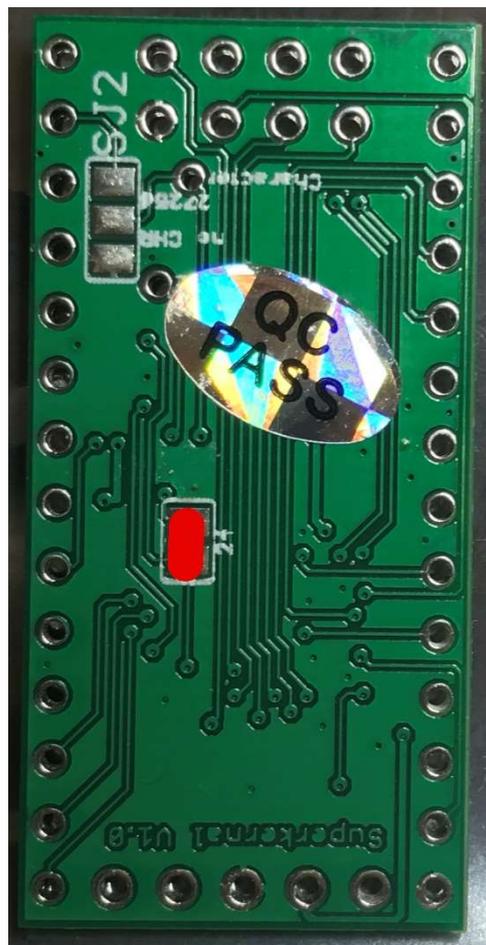
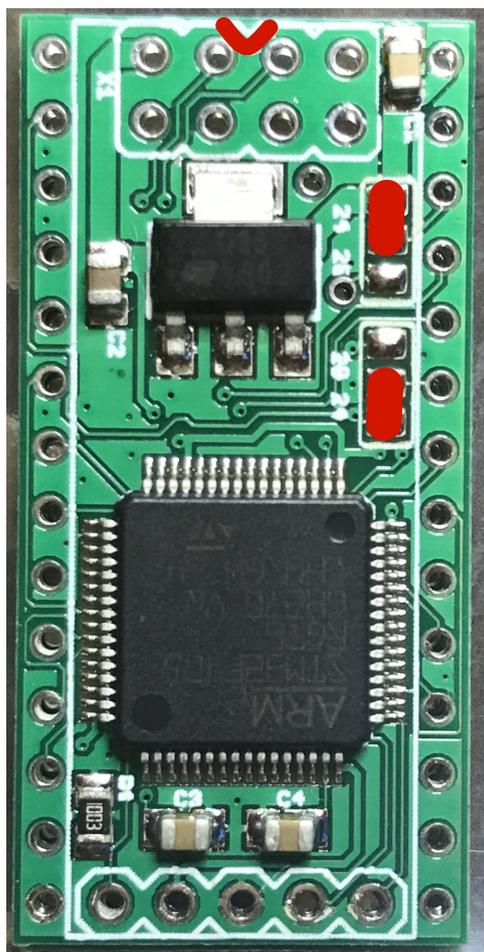
Example: C64II/G

You can also solder it directly at your C64 Mainboard Kernal socket, but that's dangerous. If a little piece of solder drops onto the board you maybe have a short circuit and destroy your C64. So please don't do that.

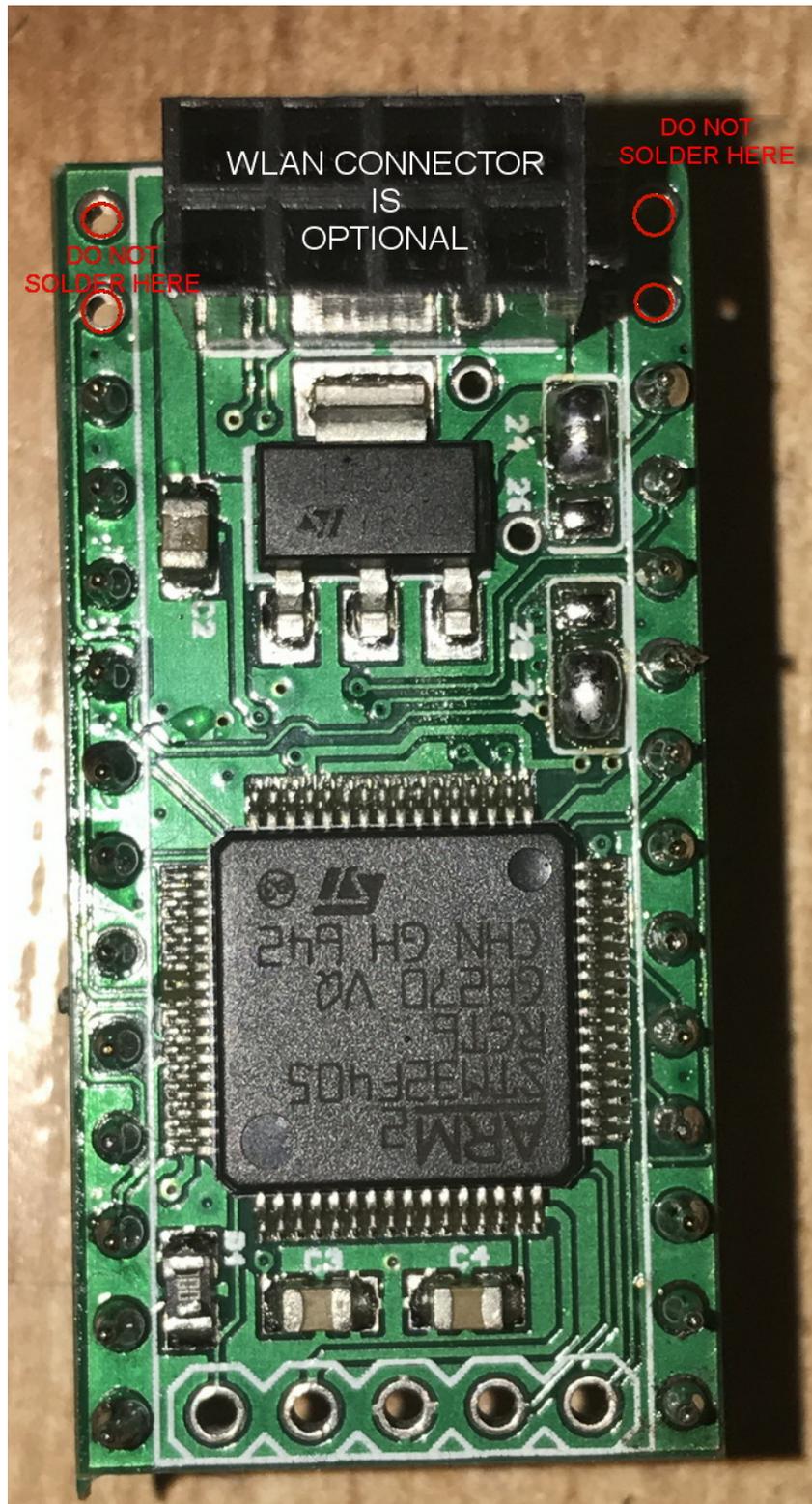
Assembly instructions for C-64 / SX-64 with 24 pins:



For using it at the C-64 / SX-64 you have to bridge both "24" jumpers on the upper side and the "24" jumper on the lower side. The red marker / notch shows in which direction the SuperKernal PCB must be placed in your C64 Kernal socket.



Now solder the 2 x 12 Pin Headers. **The upper FOUR holes are UNUSED.**  
These holes are on the left and the right side of the black connector.

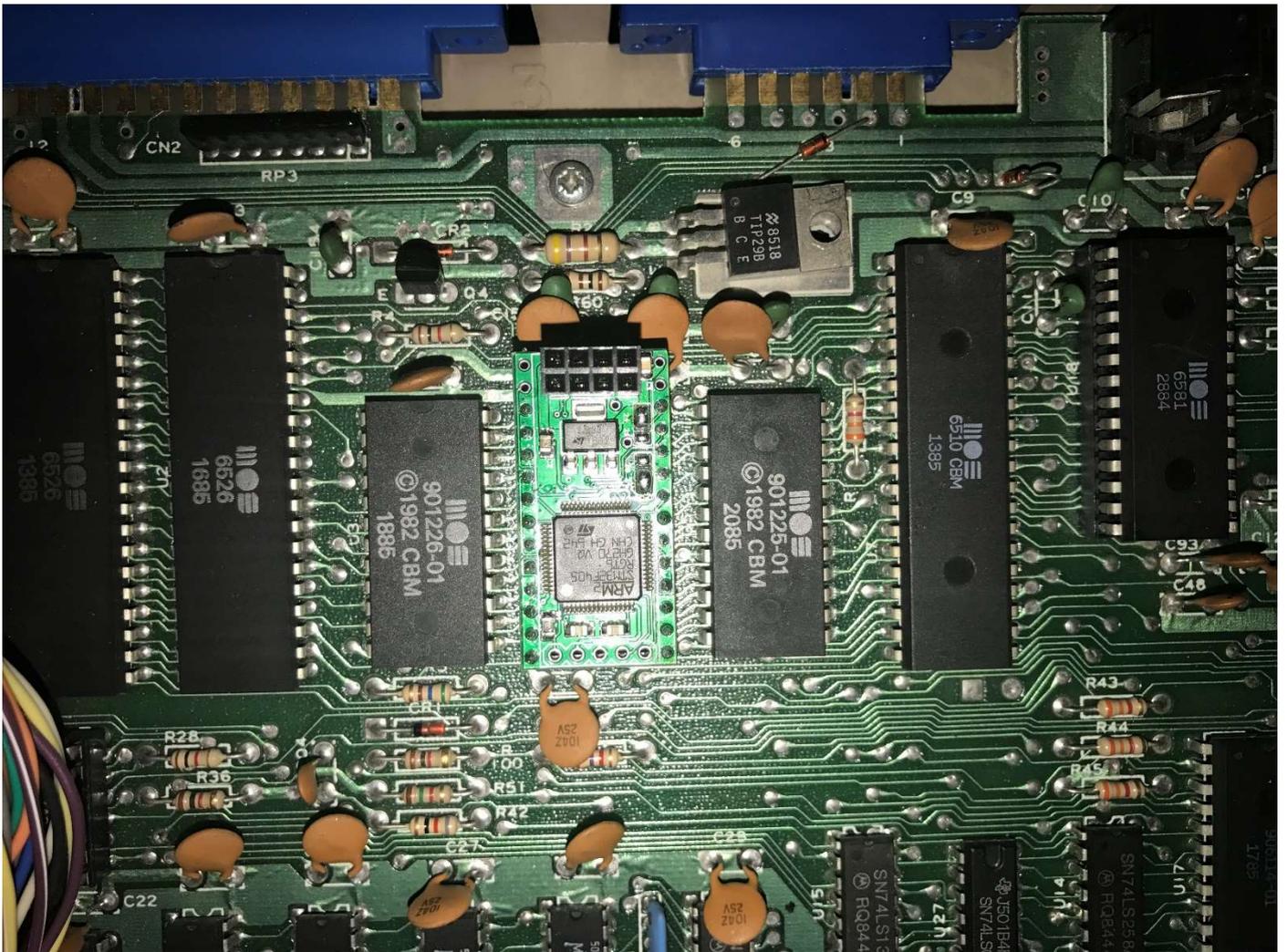


If you've done everything well, it should look like this:

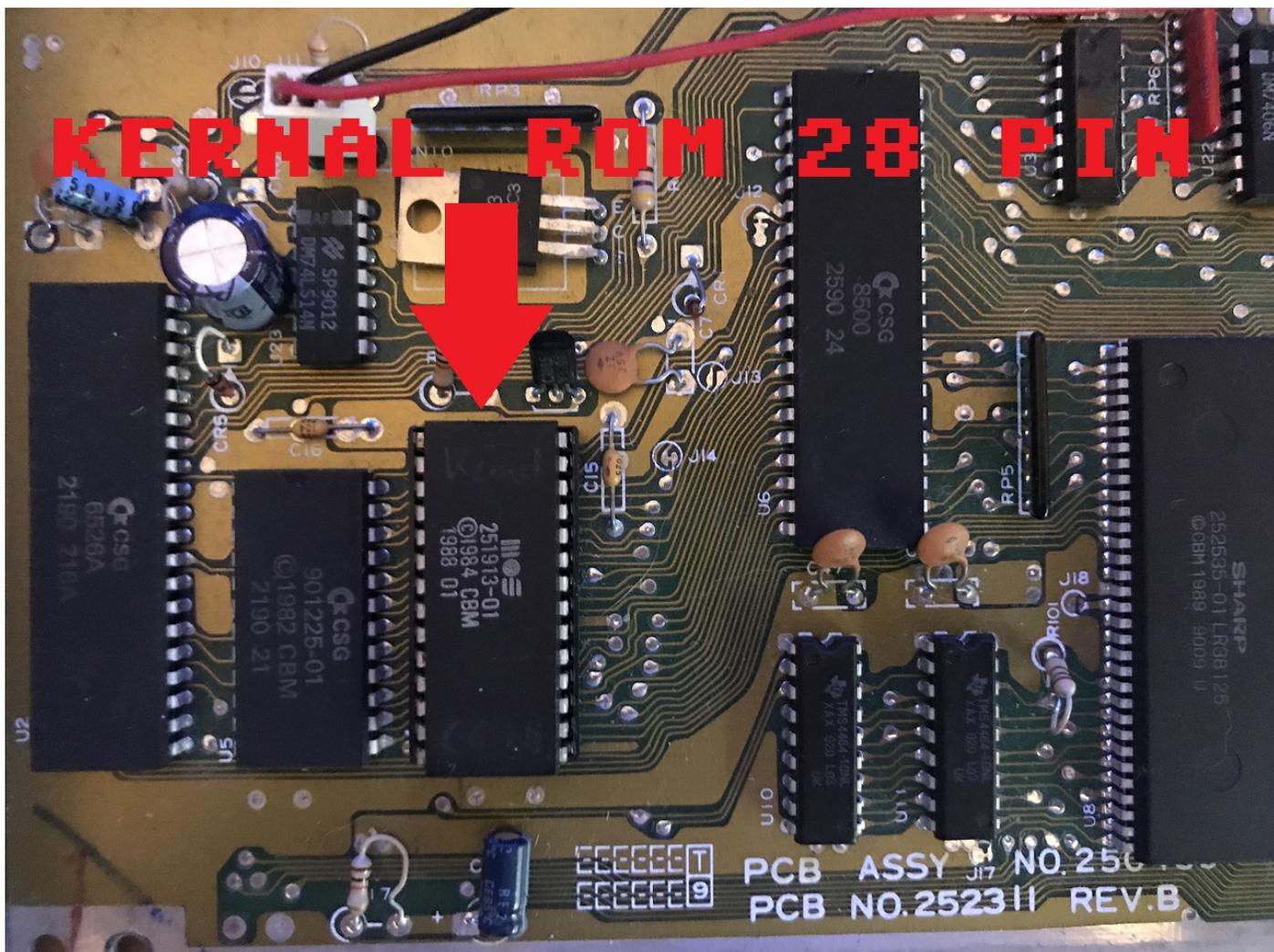


Soldering the WLAN Connector is Optional. The SuperKernal will work without using it.  
AGAIN: **DON'T USE THE FOUR UPPER HOLES.**

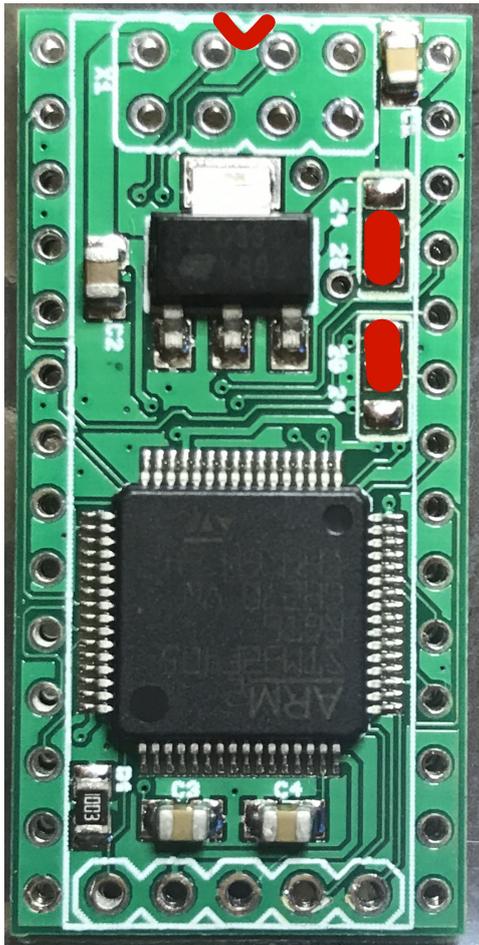
Now plug the SuperKernal into your C64 Kernal socket and power it on. That's all.



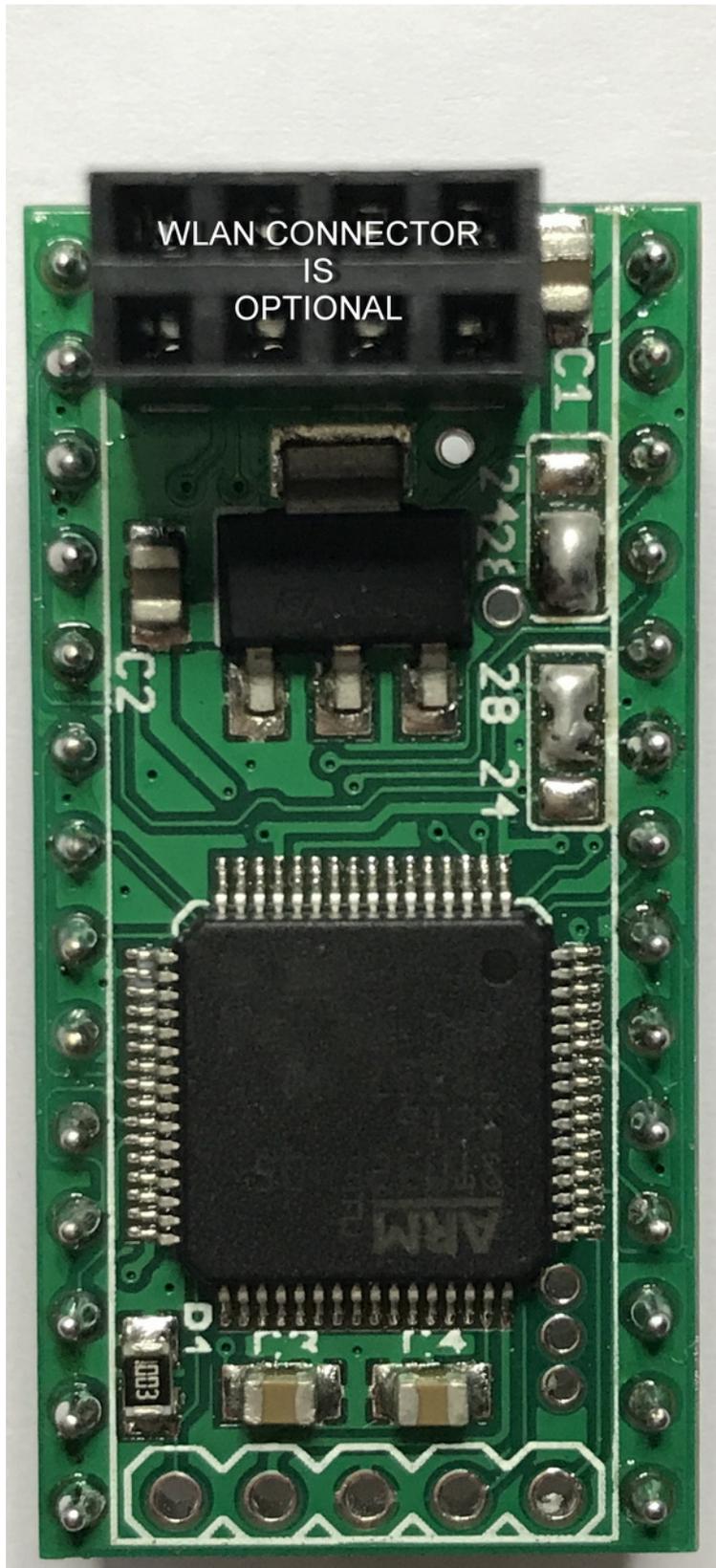
# Assembly instructions for C-64C (C64II) with 28 Pin:



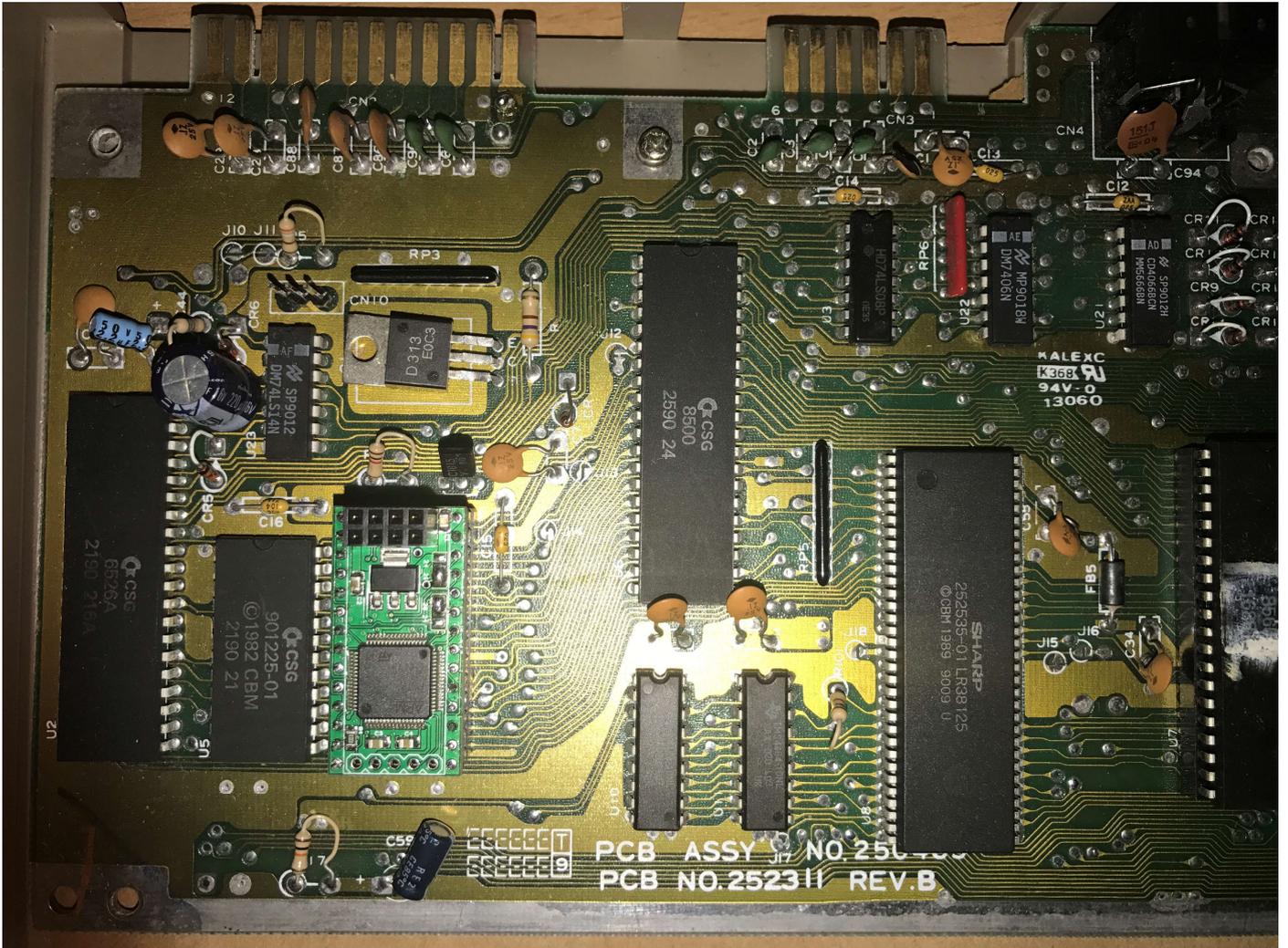
For using it at the C-64C (C64II) you have to bridge both "28" jumpers on the upper side. No soldering is required on the lower side. The red marker / notch shows in which direction the SuperKernal PCB must be placed in your C64 Kernal socket.



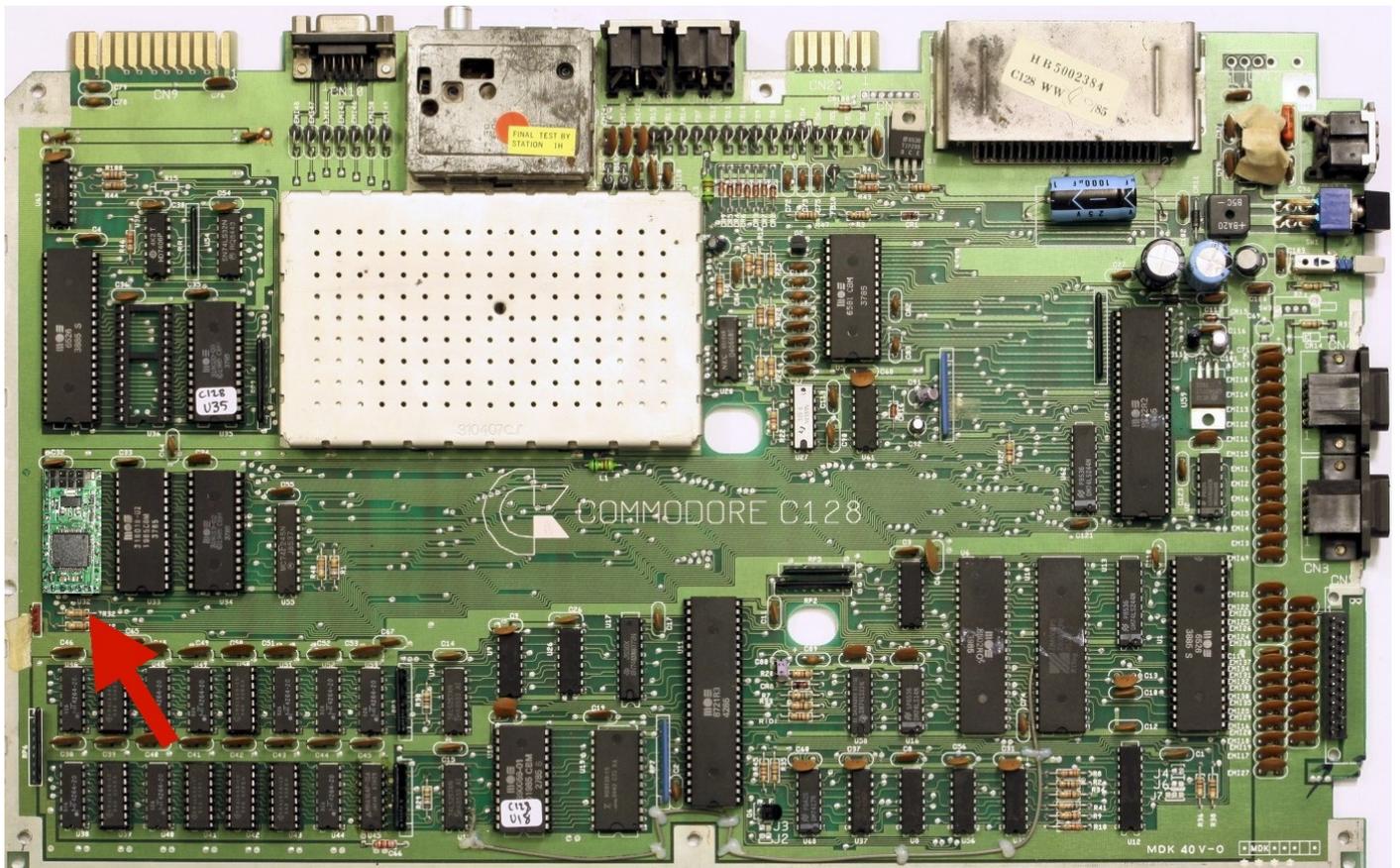
Now solder the 2 x 14 Pin Headers.



Now plug the SuperKernal into your C64C (C64II) Kernal socket and power it on. That's all.

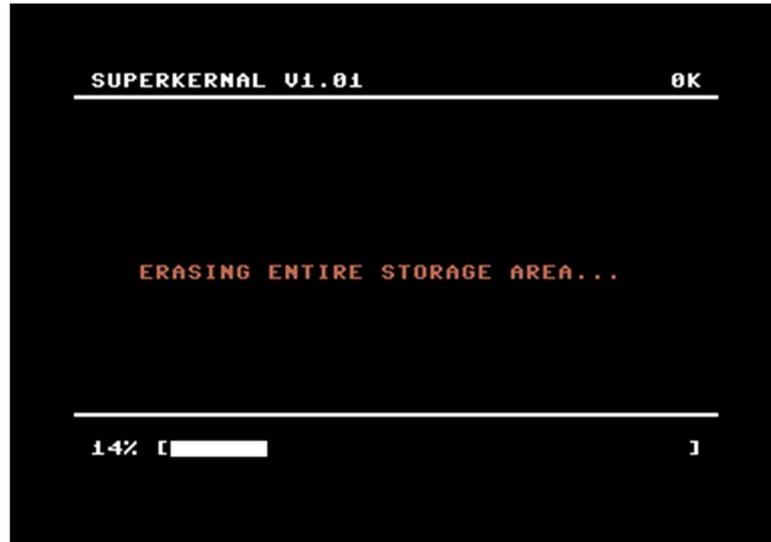


You also can plug the SuperKernal Chip (C64II) into a Commodore C128 – it uses the same Kernal Chip. The functionality is exact the same as in the C64. Special functions that are available in the SuperKernal128 cannot be used (80 char mode – run C128 programs). We suggest to use the **SuperKernal128** for C128 / C128D / C128DCR. This kit will be sold separately.



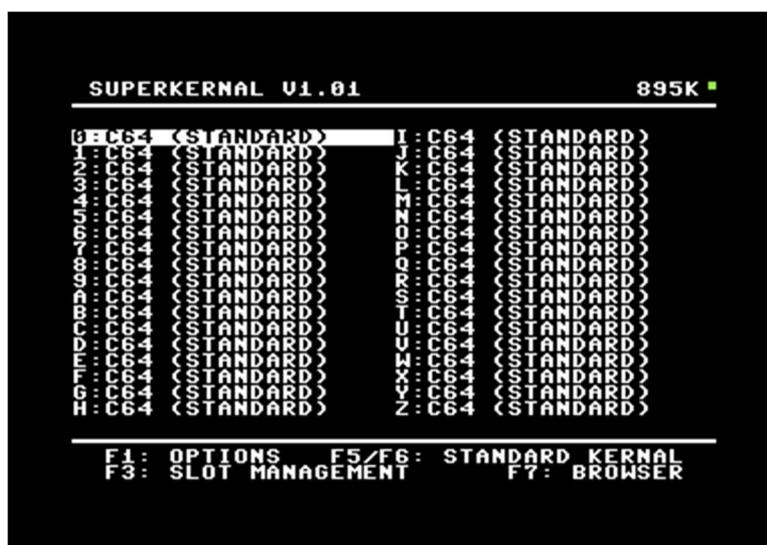
## First run:

When you're assembled was successful, your first power on screen should look like this:



The SuperKernal "detects" that the internal Flash memory is empty or corrupt and starts a new initialisation. This can also happen when you power cycle your machine while flashing full backups (.SKS) or single files. So, no worries – everything is fine!

The SuperKernal initializes himself and shows a fresh and clean menu:



## Main menu:

```

SUPERKERNAL V1.01                               147K/1024K ■
-----
0: Jiffy Dos 6.01                               I: Jaffy Dos 1.2
1: Prof Dos Userport                            J: PROFDOS L2.BIN
2: SMON SL000                                  K: SID Play 1.10
3: Airwolf                                       L: M.U.L.E.
4: Archon                                       M: Nebulus
5: Monsterbuster                              N: Impossible Mission
6: Aztec Challenge                            O: Riley's Mine
7: Bagitman                                    P: Paradroid
8: Bailblazer                                 Q: Pitfall II
9: Blue Max                                   R: Raid over Moscow
A: Bruce Lee                                 S: Spy vs Spy
B: Bungeling Bay                             T: Scramble
C: C-2048                                    U: Uridium
D: Dropzone                                  V: Quasimodo
E: Forbidden Forest                          W: Toy Bizarre
F: Fort Apocalypse                           X: Shamus
G: Grog's revenge                            Y: Wizard of Wor
H: Hard Hat Mack                             Z: Zenji
-----
F1: OPTIONS      F5/F6: STANDARD KERNAL
F3: SLOT MANAGEMENT      F7: BROWSER
```

In the left upper column, you see the firmware version of the SuperKernal.

In the right upper corner, you see the free memory and the total memory of the SuperKernal. In this example we have 4 Slots (0,1,I,J) used by Kernals and the rest is filled with programs. So, there is only 147kb left from 1024kb total memory.

In the upper right corner is also a little green or red dot. If the dot is red, the WLAN module does not respond – is the dot green you know that the link between the SuperKernal and the WLAN is working fine. But green does not mean: You're connected to a wireless network or an ftp server – this can only be checked in the wireless test menu!

With **F1** key you enter the **OPTIONS** menu.

**F3** key is for **SLOT MANAGEMENT** – here you can maintain the 36 slots.

**F5** runs the original C64 Kernal. **F6** does the same, but skips the memory test – so your C64 will start much faster. (Fast Reset Kernal Patch).

**F7** runs the SD2IEC / FTP Browser.

# F1 - Options:

```
SUPERKERNAL V1.01          363K/729K ■
-----
>GPIO SETUP
>STORAGE MANAGEMENT
>UPDATE FIRMWARE
>WIFI SETUP

SCREENSAVER                - ENABLED
COLD BOOT BEHAVIOUR       - MENU
ENTRY FOR KERNAL          - 2X RESET
ENTRY FOR PRG/CRT         - 1X RESET
IEC DELAY AFTER RESET    - ENABLED
DEFAULT DRIVE             - 15
PLA TIMING                 - FAST
CBM88 KERNAL              - SELECTED

MENU KERNAL - C64 (STANDARD)

-----
                RETURN
-----
'S' DURING COLD BOOT ENTERS MENU
```

**GPIO SETUP:** This is for the configuration of the WLAN module. You also can use some pins for the internal 15xx drive id change of SX-64 and C128 D systems.

**STORAGE MANAGEMENT:** Here you can backup and restore the full memory of the SuperKernal.

**UPDATE FIRMWARE:** For updating the SuperKernal Firmware via SD2IC or via WLAN MODULE/FTP.

**WLAN SETUP:** Wireless LAN configuration and FTP server setup.

**SCREENSAVER:** The SuperKernal has a built-in screensaver to protect CRT monitors. You can ENABLE or DISABLE the screensaver here.

**COLD BOOT BEHAVIOR:** Behaviour of the SuperKernal when powering on your system.

MENU = The C64 starts with the SuperKernal Menu (Default)

KERNAL The C64 starts with the last chosen Kernal

LAST SLOT = The C64 starts with the last program chosen on the menu.

**ENTRY FOR KERNAL:** How to enter the menu of the SuperKernal.

2 X RESET - Double-Reset within 1 second (Default).

1 X RESET – Single RESET for SuperKernal menu.

DISABLED – The SuperKernal menu will be disabled. **Menu will only appear when you power on the machine and hold the “S” key or RESET + “S” key**

**ENTRY FOR PRG/CRT:** After loading a PRG / CRT from SuperKernal or File Browser:

2 X RESET – Double-Reset brings you back to the File Browser

1 X RESET – Single Reset brings you back to the File Browser

DISABLED – No Return to File Browser – Start with Root-Menu.

**IEC DELAY AFTER RESET:** How fast the SuperKernal tries to access attached IEC devices – slower ones can maybe send a timeout error.

**DEFAULT DRIVE:** Default drive for accessing the File Browser when F7 is pressed.

IEC Drives 8 9 10 11 till 15 = FTP Server. If you have attached the WLAN Module 15 will be a good choice, if you prefer to work with floppies / SDIEC then choose 8.

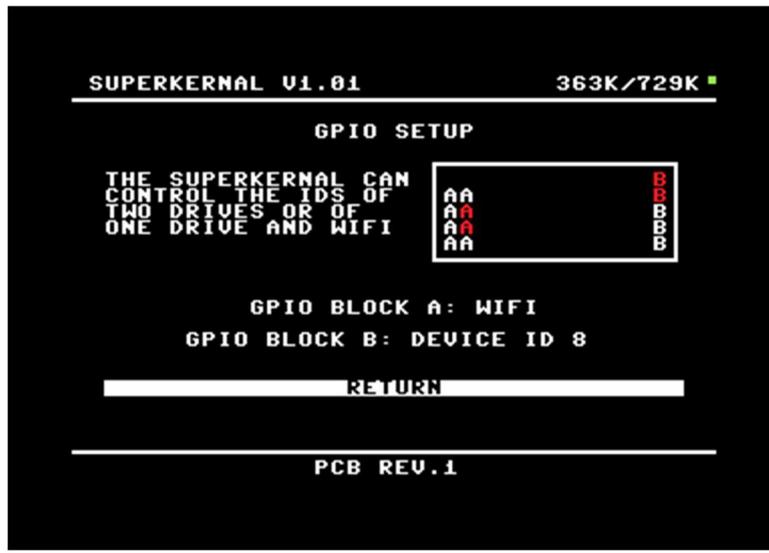
**PLA TIMING:** The SuperKernal automatically tries to achieve the best compatibility for all boards. Unfortunately, due to component tolerances of these over 30 years old computers, there is no 100% guarantee that the SuperKernal will run perfectly on every board. Therefore, you can try to adjust the timing manually for some boards. Old C64 computers of the first series run almost all on SLOW, SLOW and FAST and new computers like the C64G(C64II) almost exclusively on FAST. If you play around with this menu item you might theoretically end up with a crash when starting Kernals or programs. In an emergency you can always return to the SuperKernal menu with several resets + holding the "S" key.

**CBM80 KERNAL:** Here you can decide if you want to start modules with an original C64 Kernal or with the selected one. With some Kernals the module start-up has been changed and therefore you will either not start at all or crash. Therefore, better leave it on ORIGINAL. SELECTED selects the Kernal you have chosen yourself (e.g. Professional DOS / SpeedDOS)

**MENU KERNAL:** Here you can choose which load/save routines the SuperKernal should use in the background. If you have e.g. JiffyDOS stored in one of the slots, you can select it to load or save faster from SD2IEC.

With RETURN the settings are saved, with RUN/STOP they are discarded!

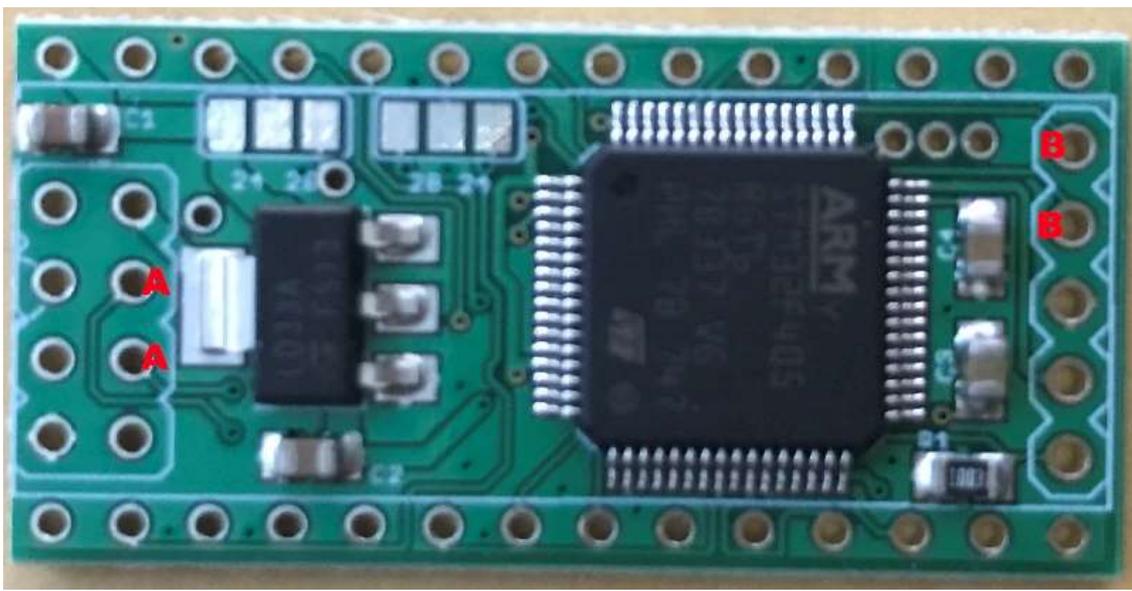
# GPIO SETUP:



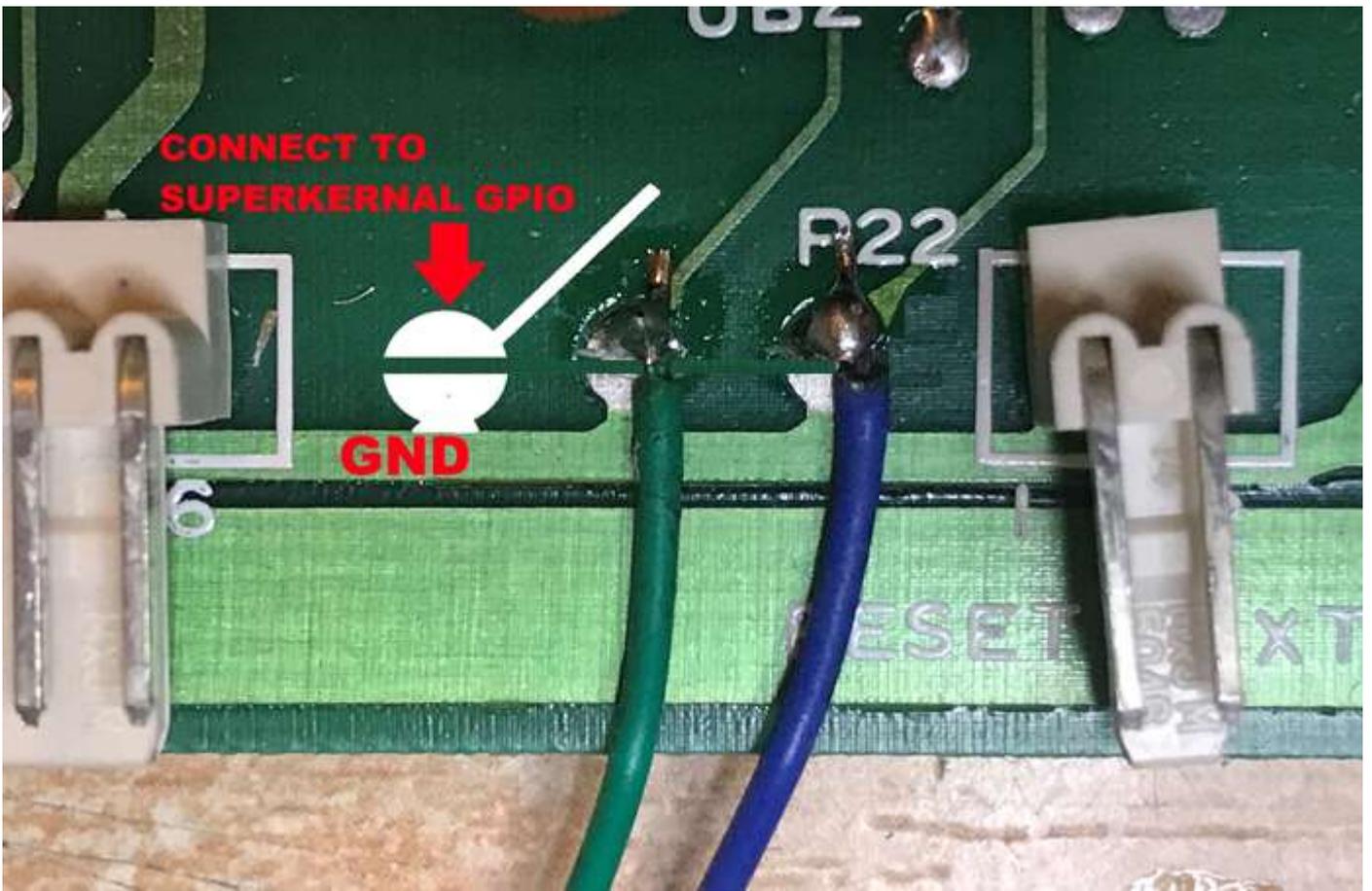
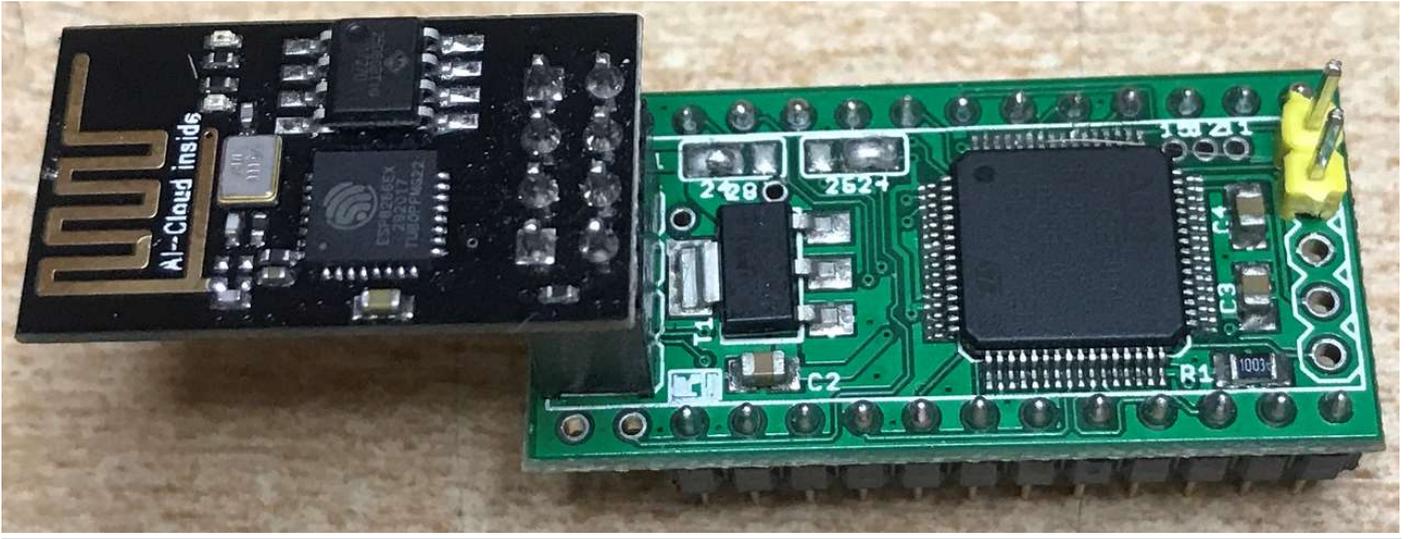
**GPIO BLOCK A:** Here you can choose if the SuperKernal should control the WLAN module or if the IO Pins should be used to control the drive ID of a floppy.

Normal here: WIFI for the WLAN module.

**GPIO BLOCK B:** Here you can choose if the SuperKernal hardware should change the drive ID of a floppy. For this purpose, 1-2 cables must be soldered from the SuperKernal to the ID jumper of the floppy. This is only used in the SX-64 or the C128D where both are in one housing. The SuperKernal connects these pins to ground to switch the ID.



## EXAMPLE SX-64:



# STORAGE MANAGEMENT:

```
SUPERKERNAL V1.01          363K/729K ■
-----
                STORAGE MANAGEMENT

USED OVERALL          : 1013 KB
USED OVERALL (COMPRESSED) : 729 KB
USED BY SLOTS          : 729 KB
TO USE IMMEDIATELY     : 166 KB
AFTER CLEANUP         : 363 KB
ERASE CYCLES - DIRECTORY : 0
ERASE CYCLES - STORAGE  : 2

GLOBAL STORAGE CLEANUP
IMPORT STORAGE
EXPORT STORAGE
SORT SLOTS
RETURN
```

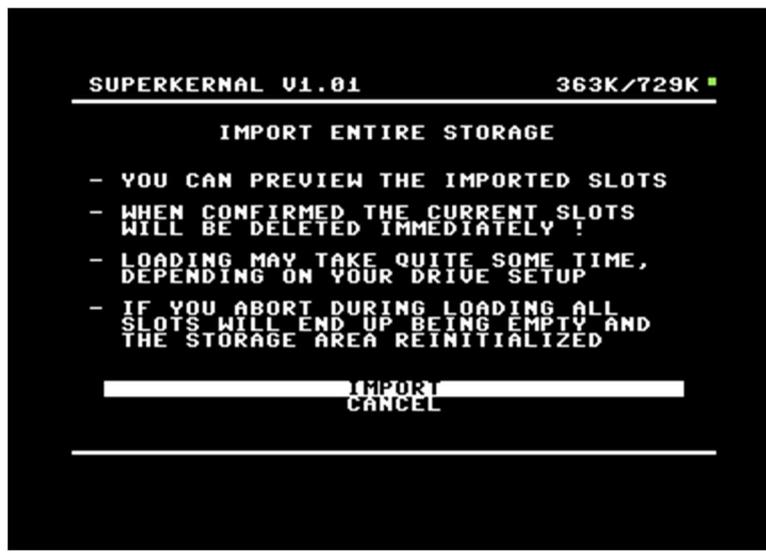
**GLOBAL STORAGE CLEANUP:** If programs are often loaded or deleted, the memory can fragment - then less memory is available than actually exists. The SuperKernal cleans up its internal memory and makes room for new programs if necessary.

**IMPORT STORAGE:** Here the complete memory of the SuperKernal can be loaded from a backup in one go. The .SKS storage files can be up to 1024kb in size - so they usually do not fit on a floppy disk. The best way is to export and import on SD2IEC or with the WLAN module on an FTP server (fastest !).

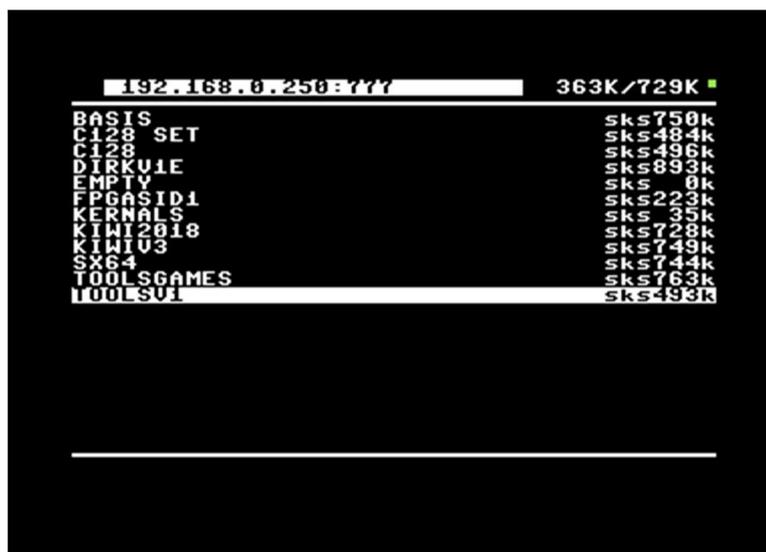
**EXPORT STORAGE:** Here you can save the complete memory of the SuperKernal in one go to a .SKS file. The .SKS storage files can be up to 1024kb in size - so they usually do not fit on a floppy disk. The best way is to export and import on SD2IEC or with the WLAN module on an FTP server (fastest !).

**SORT SLOTS:** Here you can have the entries of the main menu sorted automatically: First Kernals - then the programs.

# Example: STORAGE IMPORT



Start choosing IMPORT STORAGE:



Select the corresponding drive in the file browser with the keys 8 - 9 - 0 - 1 - 5

(Floppy 8 9 10 11) or 5 = FTP.

Browse to the SKS file and confirm with ENTER: The SuperKernal now shows you a preview of the import - what kind of kernels and games are in the backup.

With IMPORT the file is imported into the SuperKernal - ALL OLD DATA GETS LOST !

With BACK TO BROWSER you can select another backup or cancel it completely.

0::SD2IEC Kernal 1.0	I::Dolphin DOS 2.0
1::ProfDOS Userport	J::ProfDOS Expansion
2::SX-64 Kernal	K::Turbo Tape Kernal
3::Digi DOS 1.0	L::Magnum Load
4::Power Load	M::Servant 64
5::Star DOS	N::Turbo Drive
6::Turbo Trans	O::Turbo Disk
7::C64 (STANDARD)	P::C64 (STANDARD)
8::C64 (STANDARD)	Q::C64 (STANDARD)
9::C64 (STANDARD)	R::C64 (STANDARD)
A::C64 (STANDARD)	S::C64 (STANDARD)
B::C64 (STANDARD)	T::C64 (STANDARD)
C::C64 (STANDARD)	U::C64 (STANDARD)
D::C64 (STANDARD)	V::C64 (STANDARD)
E::C64 (STANDARD)	W::C64 (STANDARD)
F::C64 (STANDARD)	X::C64 (STANDARD)
G::C64 (STANDARD)	Y::C64 (STANDARD)
H::C64 (STANDARD)	Z::C64 (STANDARD)

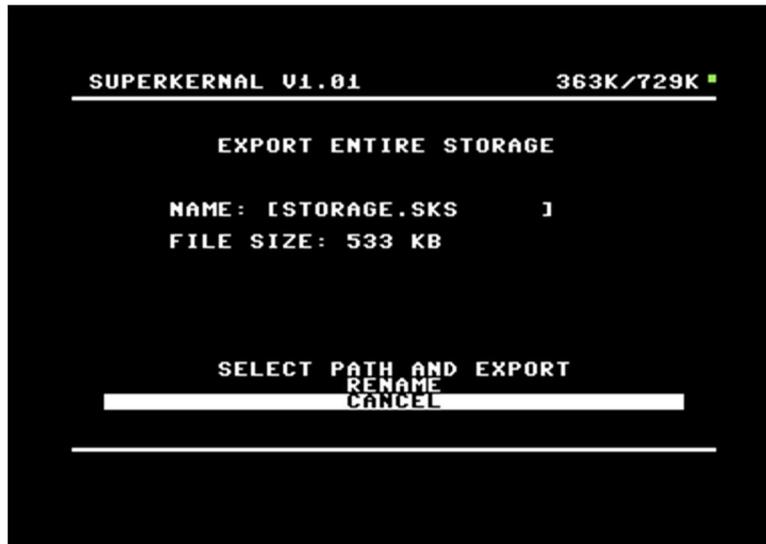
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IMPORT  
BACK TO BROWSER

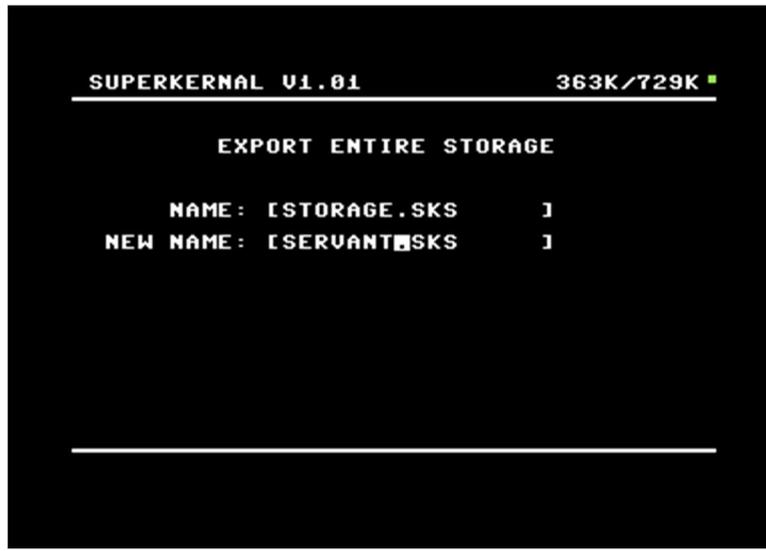
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# Example: STORAGE EXPORT

You start with menu entry EXPORT STORAGE.



As first you have to set the name for the export file. Default is always STORAGE.SKS



After changing the export filename select SELECT PATH AND EXPORT. The file browser opens – so now choose a path where you would save your backup. If you have found a place for your file then push F1 – The full SuperKernal memory will be exported.

# FIRMWARE UPDATE:

```
192.168.0.250:777 363K/729K
ESP8266 dir
old dir
skfw128 1 01 skf 87k
skfwc64 1 01 skf 63k
```

If you select FIRMWARE UPDATE the file browser opens.

Select the corresponding drive in the file browser with the keys 8 - 9 - 0 - 1 - 5

(Floppy 8 9 10 11) or 5 = FTP.

Browse to the SKF file and confirm with ENTER: The SuperKernal will now show you a version info of the firmware update. If you now go to PROGRAM DATA the update will be executed. It takes about 5 seconds.

**Do not switch off the computer during this time - otherwise the SuperKernal will be maybe destroyed.**

```
SUPERKERNAL V0.99 147K/1024K
FIRMWARE UPDATE INFORMATION
CURRENT VERSION: 0.99
FILE VERSION: 1.01
FILE FIRMWARE TYPE: C64 & C64-II
DO YOU WANT TO FLASH THE DATA ?
PROGRAM DATA
CANCEL
```

# WIFI SETUP:

```
SUPERKERNAL V1.01          363K/729K ■
-----
                        WIFI SETUP
SSID      : C64
PASSWORD  : ***

                        FTP SETUP
SERVER    : 192.168.0.250:777
USER NAME : superkernal
PASSWORD  : ***

                        FTP SERVER: 2
HIGH SPEED: ON
POWER SAVING: OFF
TEST CONNECTION
-----
                        RETURN
-----
FTP BROWSER ACCESS VIA DEVICE ID 15
```

If you have a WLAN module connected to the SuperKernal, you can load programs, Kernals and SKS files from up to 3 different FTP servers. To configure the WLAN module the following options are provided:

**SSID:** Here you enter the name of your WLAN.

**PASSWORD:** Here you enter the password of your WLAN.

# FTP SETUP:

**SERVERNAME:** Here you enter the address and port of the FTP server. The port is separated by a colon.

Example: 192.168.0.1:21            or            sk.sx-64.de:777

**USERNAME:** Here you enter the username from the FTP server.

**PASSWORD:** Here you enter the password from the FTP server.

**FTP SERVER:** 1 -3

Here you have the possibility to save the login data from up to 3 different servers.

## HIGH SPEED: ON / OFF

At ON the WLAN module communicates with the SuperKernal with 1.000.000 Baud. Some people put the WLAN module in a different place and solder longer cables. This can lead to transmission errors. Then switch to HIGH SPEED OFF - then the module will only load with 230.000 Baud.

## POWER SAVING: ON / OFF

On some C64G boards the WLAN module causes cracking noises in the sound. With POWER SAVING OFF the WLAN module is completely deactivated after loading. Then the interferences are gone, but a new connection to the FTP server might take a little longer because the WLAN connection has to be re-established first.

## TEST CONNECTION:

Here you can see if the WLAN module works correctly and if WLAN settings have been changed you can transfer them into the module with F1 and then test with F3 if the network connection works.

With F8 - not shown on the screen - you can update the WLAN module. For this the WLAN module must have a connection to the internet.

```

SUPERKERNAL V1.01                               363K/729K ■
----- SUPERKERNAL WLAN STATUS -----
MAC: SuperKernal-80:7D:3A:4D:9F:3D
Server: 192.168.0.250
Port: 777
FTP Username: superkernal
FTP Password: co*****
FTP root dir:
WLAN SSID: C64
WLAN Password: 08*****
WLAN Status: WL_CONNECTED
Client IP: 192.168.0.131
FTP status: Connection established.
ESP Kernal Uptime: 0:00:08:52
Serial baud: 1000000

Debuginfo : 1 - Sep 16 2019 20:27:26
-----
WLAN Firmware Ver.: 1.00
-----
F1: WIFI CONNECT      F3: FTP CONNECT
```

# SLOT MANAGEMENT:

Here you have the possibility to assign Kernals and programs to the SLOTS 0-9 A-Z:

```

SUPERKERNAL V1.01                               876K/30K
-----
                SETUP FOR SLOT 0:

NAME: [Aztec Challenge (1]
SIZE:  : 10604/30721 BYTES
TYPE:  : PRG
LOAD ADR.: $0801

DELETE ENTRY
RENAME
SWAP WITH OTHER SLOT
LOAD NEW DATA INTO SLOT
BACK TO MAIN MENU
-----
```

**DELETE ENTRY:** The Kernal / program behind the entry is deleted and the memory is freed.

**RENAME ENTRY:** The Kernal / program behind the entry can be renamed.

**SWAP WITH OTHER SLOT:** The Kernal / program behind the entry can be swapped with another one.

**LOAD NEW DATA INTO SLOT:** Here you can add a Kernal or program to the SuperKernal menu. In the file browser with the keys 8 - 9 - 0 - 1 (floppy 8 9 10 11) or 5 = FTP selects the appropriate drive. Then press ENTER to select the file you want to load into the slot (PRG / ROM).

```

192.168.0.250:777                               895K
-----
abbayedesmorts+6                                prg 48k
Arkanoïd/Auto-KiWi                               prg 50k
Aztec Challenge (1983)(Cosmi)                    prg 30k
bruce lee r.o.f.                                 prg 34k
c64anabalt                                       prg 17k
Chimera (1986)(Firebird)                         prg 27k
Choplifter (1982)(Broderbund)                   prg 16k
Commando (1985)(Elite)                           prg 45k
Decathlon (1983)(Activision)                     prg 14k
Delta (1987)(Thalamus)[cr CCS]                  prg 48k
digilois64                                       prg 37k
Falcon Patrol (1983)(Virgin Game)                prg 20k
Football Manager (1984)(Addictiv)                prg 32k
Fort Apocalypse (1982)(Synapse S)                prg 37k
fort apocalypse ii                               prg 44k
Fort Apocalypse                                  prg 21k
Frantic Freddie (1984)(CDS Micro)               prg 29k
Frantic Freddie II                              dir
GALENCIA                                         prg 31k
Ghettoblaster (1985)(Virgin Game)                prg 48k
Ghostbusters (1984)(Activision)                  prg 46k
-----
```

The SuperKernal loads and analyses the file and gives a name and a start address. The SuperKernal compresses the Kernals and programs itself - so it is advantageous to load uncompressed files into the SuperKernal.

**The SuperKernal can unpack 100x faster than the C64 itself - so the programs start much faster !**



**STORE IN SLOT:** The Kernal / program is saved - with Back the change is aborted.

# File Browser

Press F7 in the main menu to enter the file browser.

Key mapping:

8 – Open Drive 8  
9 – Open Drive 9  
10 – Open Drive 10  
11 – Open Drive 11  
15 – Open FTP Server  
F3 – 10 Entries up in the directory  
F5 – 10 Entries down in the directory  
A-Z Search (Multiple Input ! )  
RUNSTOP – Abort  
ENTER – Load

The file browser can load PRG, CRT and Kernals.

Kernals can be loaded WITHOUT flashing - just to try them out.

CRT only CBM80 modules and partly Ultimex (\$E000) go.

## MISC:

**How do I get back to the SuperKernal menu ?**

### **Three possibilities**

1. Trigger RESET twice in a row with a reset button every 0.5 seconds
2. Simply switch the computer off and on again. If COLD BOOT MENU is Enabled (factory setting), the selection menu always appears when the computer is switched on.
3. Hold down the S key when switching on