

C64 Switchless Kernal Switcher

PCB v1.0

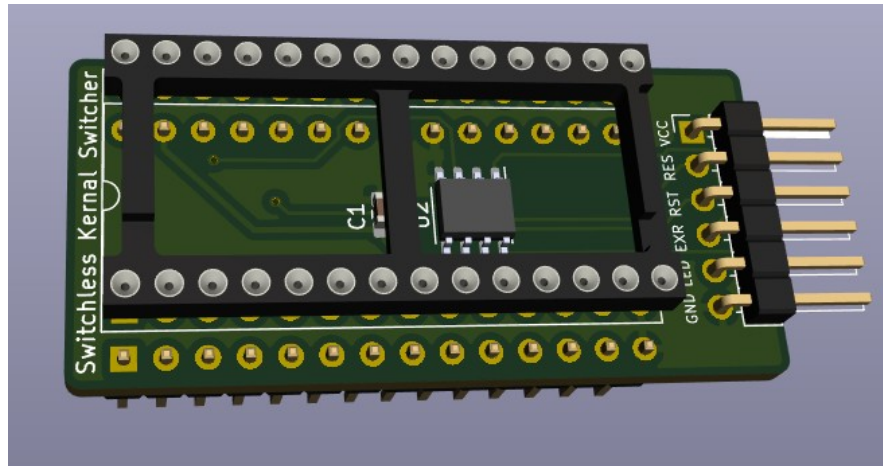


Table of Contents

Introduction.....	2
Partlist.....	2
Tools required.....	3
Pinouts.....	3
Switching Kernels.....	4
RESET.....	4
EXROM RESET.....	4
Installation and Wiring.....	4
Setup.....	6
ROM layout.....	6
Programming.....	7

Introduction

This guide and PCB design is based on the original work by Bwack. For more information see

<https://github.com/bwack/C64-Switchless-Multi-Kernal-27C256-adapter>

The multi kernel switcher allows you to boot into different kernels by selecting them with the RESTORE key

There are two versions of these boards, one for the longboard and one for the shortboard.

Before ordering and fitting the PCB to the C64, make sure you have the correct board version for your motherboard.

Longboards (not 250469) and shortboards (250469) are sometimes found in both C64C and C64! You must open the machine to be 100% sure which motherboard you have

Long boards:

326298, 250407, 250425, 250466

Short board:

250469

Partlist

Included with your purchase:

- Assembled PCB
- Blank 27C256 or W27C512 ROM (Please specify which you would prefer)
- Reset/Exrom/Restore cables with dupont connectors for PCB header
- Red LED with dupont connector for PCB header

Tools required

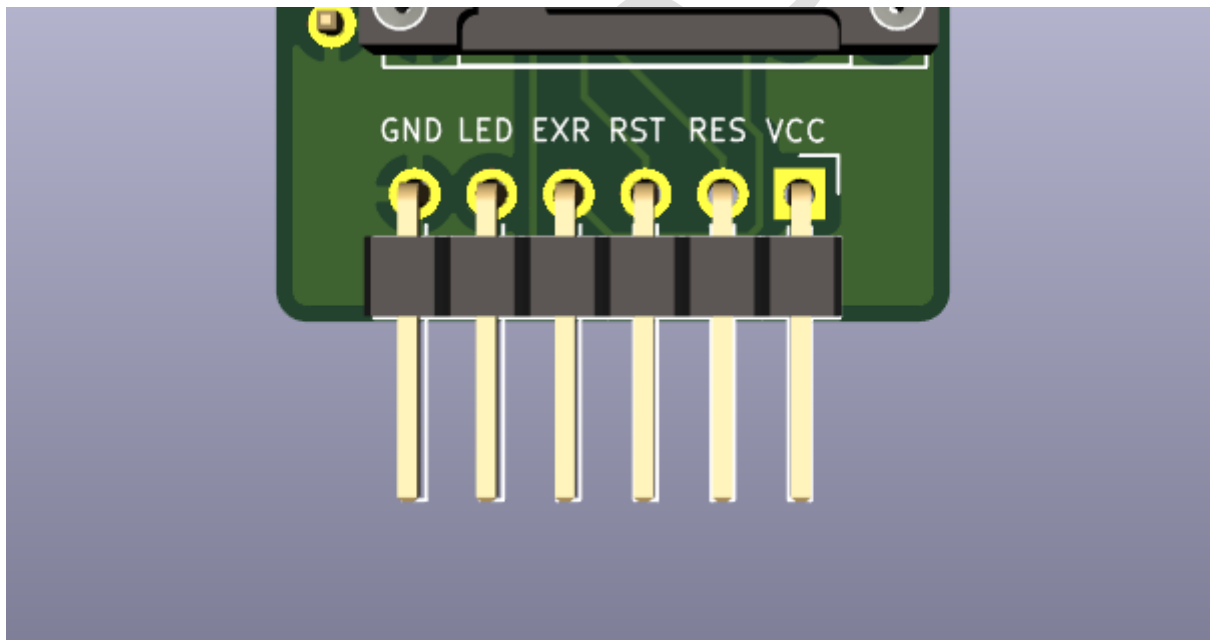
In order to fit the kernel switcher some soldering is required to various vias (points) on the C64 motherboard.

If the kernel chip in your Commodore is not socketed you will first need to remove the chip and insert a socket. Take special care when doing this as to not damage any of the tracks.

The ROM supplied with the PCB (Either a 27C256, 8Kb ROM, or W27C512, 32Kb EPROM) will be blank. If you want to use the JiffyDOS or JaffyDOS kernel you will need a license as it's not freeware. (<http://www.jiffydos.com>)

To program the ROM/EPROM you will also need a programmer similar to the TL866II Plus (http://autoelectric.cn/EN/TL866_main.html)

Pinouts



6 pin right angled pinout

PCB	C64	Programmer
GND	RED Led (Positive)	GND
LED	RED Led (Negative)	MISO
EXR	Exrom	RESET
RST	Reset	SCK
RES	Restore	MOSI
VCC	-	VCC

Switching Kernels

The selection mode is entered by holding RESTORE for two seconds, and is indicated with a flash of RED LED. Be quick and continue to tap RESTORE to select the kernel you want to boot. The RED LED will flash quickly to show which kernel is selected. (One flash for bank1, 2 flashes for bank2 etc)

The computer will then reset after two seconds of no activity.

The RESTORE key still works as a normal for short presses. The C64 cannot read long RESTORE key presses anyway.

RESET

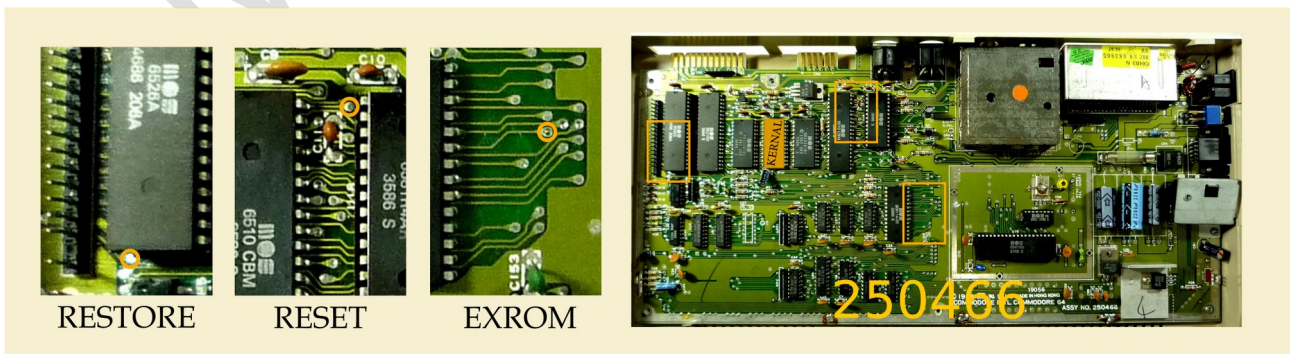
Hold the RESTORE key for two seconds. Wait two seconds for the reset.

EXROM RESET

Hold the RESTORE key for five seconds. Some machine language programs change the way the computer returns after a reset. In that case the only way to reset to basic is to turn the machine off. By controlling both RESET and EXROM it is possible to "cold start" the machine. Note: EXROM reset is only available when the ATtiny's RESET pin is disabled (fuse bit #RSTDISBL). This can only be done with HV-programmers (like TL866).

Installation and Wiring

Desolder the KERNAL IC and replace it with an IC socket or precision turned socket lists. Pin headers should fit into the C64 vias connected to RESTORE, RESET and EXROM. The via locations varies between the motherboard revisions.

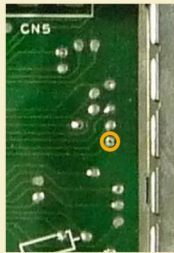




RESTORE



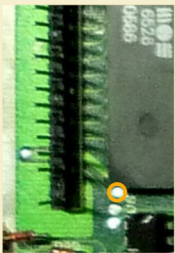
RESET



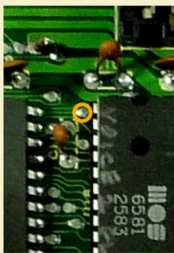
EXROM



250407



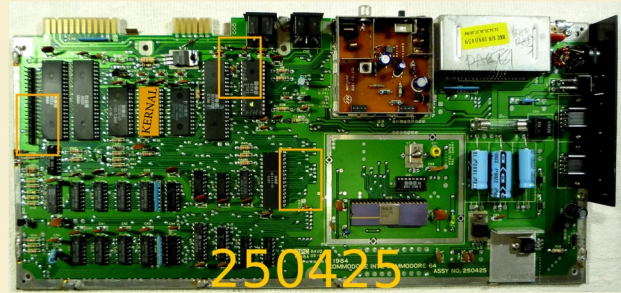
RESTORE



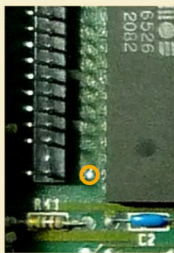
RESET



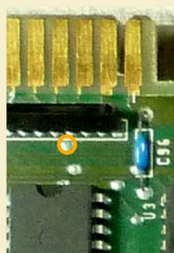
EXROM



250425



RESTORE



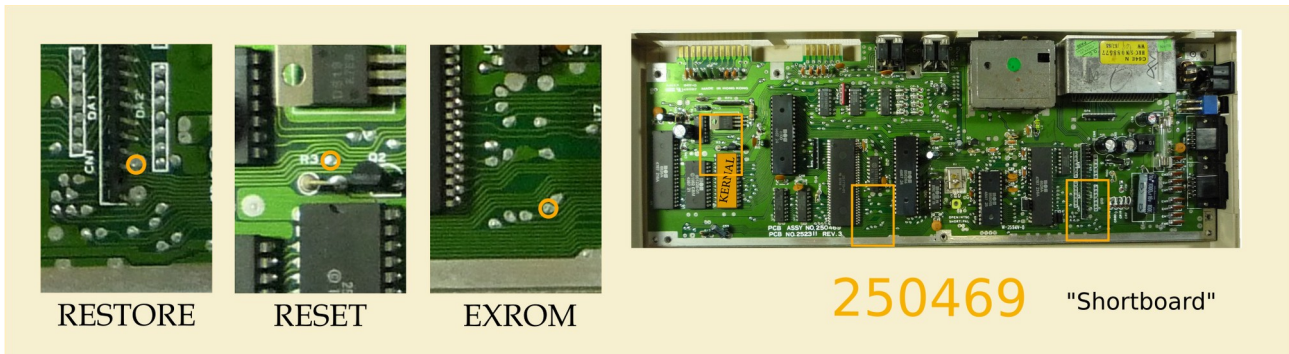
RESET



EXROM



326298



Remove the RED LED from the case and insert the supplied LED (Which has longer leads)

Connect the LED brown cable to 6 pin header (GND Pin), and connect LED red cable to 6 pin header (RED pin)

Setup

After installing the firmware in the SKS64, and installing it in the computer you can enter the setup menu by holding RESTORE while powering on the machine. Continue to hold RESTORE until the LED flashes. Tap RESTORE to rotate through all the four possible setups. Two flashes, short or long, can be seen periodically. They indicate the selected setup where the first flash is the motherboard form factor, and the second flash is related to the size of the EPROM used.

LONG - SHORT	longboard, 4 banks (27C256)
LONG - LONG	longboard, 8 banks (27C512)
SHORT - SHORT	shortboard, 4 banks (27C256)
SHORT - LONG	shortboard, 8 banks (27C512)

Hold RESTORE again for 5s to store setup in the ATtiny's EEPROM, and the main program starts.

ROM layout

ROM images are placed in 8k banks.

If using a 27C256 (32Kb ROM):

Longboard: Can use up to 4 kernel images

Shortboard: Use the basic image followed by up to 3 kernel images.

If using a 27C512 (64Kb ROM):

Longboard: Can use up to 8 kernel images

Shortboard: Use the basic image followed by up to 7 kernel images.

To combine kernel images using Windows, you can use the copy command:
copy /b image1.bin + image2.bin + image3.bin + image4.bin combined.bin

Then use a programmer to write combined.bin to the ROM

Programming

The microcontroller used on the PCB is a Attiny85 which can be programmed with an Arduino IDE (<https://www.arduino.cc>) and a suitable programmer like the USBTinyISP. (Connect up ISP pins as listed on page 3)

The latest code has been applied to the Attiny85. If you wish to customize or change the code you can download from

<https://github.com/bwack/C64-Switchless-Multi-Kernal-27C256-adapter/>

It's unlikely you will brick the device but there is always a chance if you don't know what you are doing. However, this is not something I can support.

If you have any questions please contact me at sales@myretrostore.co.uk