STM32 - Add the SWO pin on a ST-LINK/V2 Debugger (clone boards)

Almost cloned ST-LINK/V2 debuggers do not have SWO pin exposed. To add this feature, it's needed to wire the PA10 on the microprocessor to a pin on the header. This pin will then connect to the SWO pin (PB3) of the target MCU.

#stm32 #debug

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Any original ST's board has an integrated ST-LINK/V2 debugger which supports SWO to trace ITM outputs on Cortex-M3+. That debugger can be used to program and debug an external MCU on other board, or turn into an J-Link debugger.

Many ST-LINK clones do not have SWO pin exposed. When open the clone board, the STM32F103 chip is found, which is the same as the chip used in the original ST-LINK. So, the problem of missing SWO can be solved by exposing the SWO pin.

1. ST-LINK/V2 Schematic

The original boards from ST always come with a schematic. Under the tab **CAD Resources** of the page for the Nucleo-F103 board on ST's site, the schematic is nucleo_64pins_sch.zip.

In the schematic, it is clear that **T_SWO** line is connected to the pin **PA10** (#31) on the STM32F103 chip.
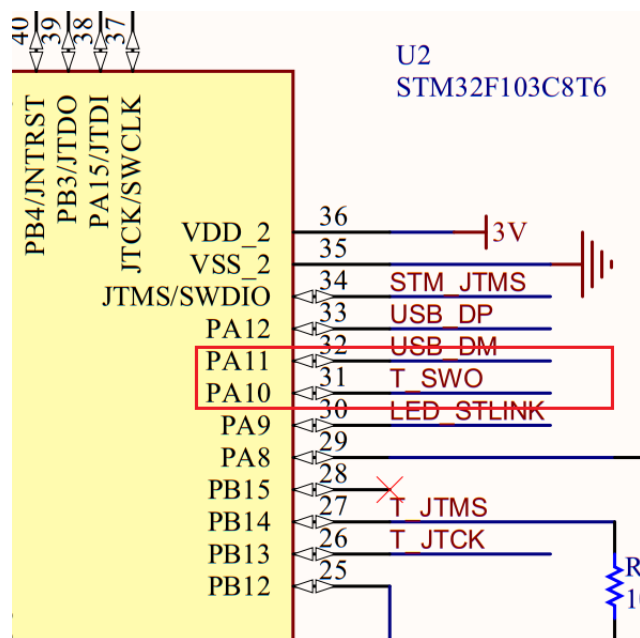
*Original ST-LINK/V2 with the SWO pin*

2. Clone schematic

There is no way to see a schematic of a clone device. Clone hardware modules are marked with MX-LINK label. However, as the schematic for ST-LINK/V2 is public in the board document, it's expected that the clone uses the exactly same hardware with the original one. The firmware download works well on the clone, so it's mainly sure that the hardware is identical.

People also have found that some cloned devices use **STM32F101** instead of **STM32F103**, and the pinout maybe LQFP64, not LQFP48. However, thanks to the pin compatibility of STM32, **PA10** will still have the same function on variant chips.

3. Wire SWO Pin

One thing apparently clear at the moment is the **PA10** (#31) pin can be exposed to the header. Just cut a 5V pin, and wire the **PA10** pin through a small resister (22R or 100R).
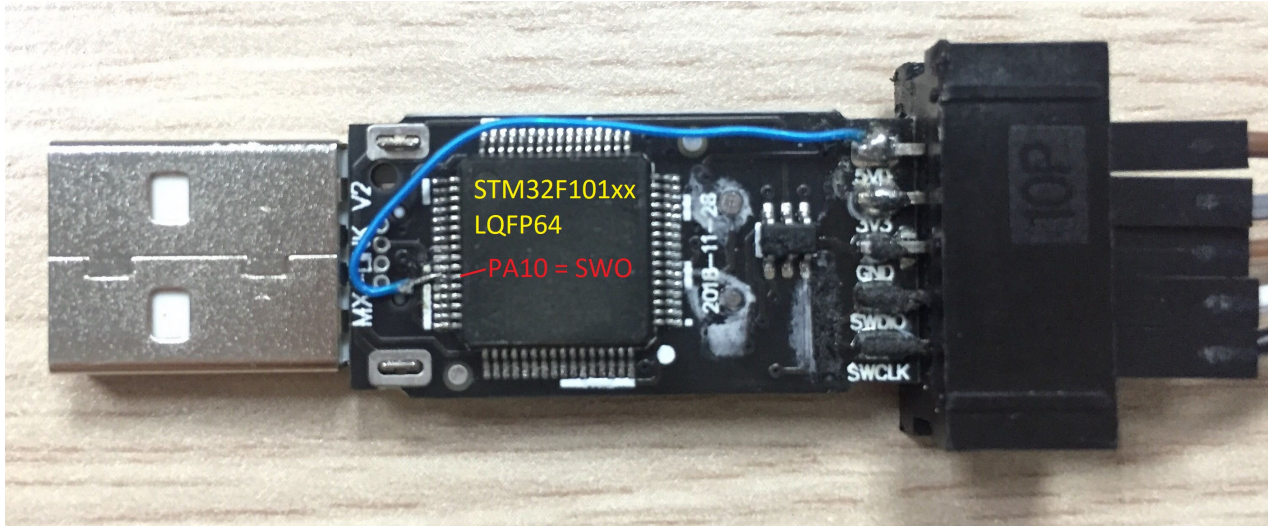
Write the PA10 pin to the header on a LQFP64 STM32F101

That's it. Hardware modding is very simple. Next is to test with SWV mode in a debugging session. Check the steps in Debug with SWV mode.

Capture of working ST-LINK/V2 SWV with SWV Viewer or CubeMonitor: