The information for this document was found at **"https://www.electronicshub.org/programming-raspberry-pi-pico-with-swd/"**

Testing a new installation method using a prefix in the configure and creating a squashfs img that can install bin & share in **"/home/devel/local/openocd"**. Using this method it can be installed on my other RPi4 without having to rebuild from source.   A 2nd **"openocd081421-71510a.img"** is the source compiled to be installed at **"/home/devel/local/openocd"**

 "export PATH=/home/devel/local/openocd/bin:$PATH"

The build was done on PI400 and the with the **"installed-openocd081421-71510a.img"** it was installed on a RPi4B 4Gb.

sudo apt install gdb-multiarch

dpkg -l | grep gdb-multiarch
gdb-multiarch   8.2.1-2   armhf   GNU Debugger (with support for multiple architectures)

git clone https://github.com/raspberrypi/openocd.git --recursive --branch rp2040 --depth=1

commit 71510a77a61c6eb2b1266e00010f8f258785a54b (grafted, HEAD -> rp2040, origin/rp2040, origin/HEAD)
Author: Peter Lawrence <12226419+majbthrd@users.noreply.github.com>
Date: Thu Jun 3 14:06:09 2021 -0500

    tcl/boards: add pico-debug.cfg

cd openocd/

 ./bootstrap
+ aclocal --warnings=all
+ libtoolize --automake --copy
+ autoconf --warnings=all
+ autoheader --warnings=all
+ automake --warnings=all --gnu --add-missing --copy
configure.ac:26: installing './compile'
configure.ac:37: installing './config.guess'
configure.ac:37: installing './config.sub'
configure.ac:16: installing './install-sh'
configure.ac:16: installing './missing'
Makefile.am:46: warning: wildcard $(srcdir: non-POSIX variable name
Makefile.am:46: (probably a GNU make extension)
Makefile.am: installing './INSTALL'

Makefile.am: installing './depcomp'
Makefile.am:23: installing './mdate-sh'
Makefile.am:23: installing './texinfo.tex'
Setting up submodules
Generating build system...
libtoolize: putting auxiliary files in AC_CONFIG_AUX_DIR, 'build-aux'.
libtoolize: copying file 'build-aux/config.guess'
libtoolize: copying file 'build-aux/config.sub'
libtoolize: copying file 'build-aux/install-sh'
libtoolize: copying file 'build-aux/ltmain.sh'
libtoolize: putting macros in AC_CONFIG_MACRO_DIRS, 'm4'.
libtoolize: copying file 'm4/libtool.m4'
libtoolize: copying file 'm4/ltoptions.m4'
libtoolize: copying file 'm4/ltsugar.m4'
libtoolize: copying file 'm4/ltversion.m4'
libtoolize: copying file 'm4/lt~obsolete.m4'
configure.ac:43: installing 'build-aux/ar-lib'
configure.ac:37: installing 'build-aux/compile'
configure.ac:30: installing 'build-aux/missing'
libjaylink/Makefile.am: installing 'build-aux/depcomp'
Bootstrap complete. Quick build instructions:

Use the –help to see what the options provide.

 ./configure --help
  --enable-sysfsgpio   Enable building support for programming driven via
                 sysfs gpios.
--enable-bcm2835gpio   Enable building support for bitbanging on BCM2835

The folder where
sudo mkdir /media/devel/03ba8473-3445-4a49-8e7b-1876b5d543d2/installed-openocd

 ./configure --enable-sysfsgpio --enable-bcm2835gpio --prefix=/media/devel/03ba8473-3445-4a49-8e7b-1876b5d543d2/installed-openocd

make -j4

sudo make install

top
swclk   grd   swdio
x   x   x

GPIO24   pin 18   swdio
GRD   pin 20   GRD
GPI025   pin 22   swclk

Raspberry Pi2 GPIO Header

~/local/openocd/bin/openocd --version
Open On-Chip Debugger 0.10.0+dev-g71510a7-dirty (2021-08-15-17:08)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
local/openocd/bin/openocd: invalid option -- 'e'

local/openocd/bin/openocd --help
Open On-Chip Debugger 0.10.0+dev-g71510a7-dirty (2021-08-15-17:08)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
Open On-Chip Debugger
Licensed under GNU GPL v2
--help | -h display this help
--version | -vdisplay OpenOCD version
--file | -f   use configuration file <name>
--search | -s dir to search for config files and scripts
--debug | -dset debug level to 3
        | -d<n>   set debug level to <level>
--log_output | -l   redirect log output to file <name>
--command | -c   run <command>

cd /opt/pico-examples/build/

sudo ~/local/openocd/bin/openocd -f interface/raspberrypi-swd.cfg -f target/rp2040.cfg -c "program blink/blink.elf verify reset exit"
[sudo] password for devel:
Open On-Chip Debugger 0.10.0+dev-g71510a7-dirty (2021-08-15-17:08)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
adapter speed: 1000 kHz

Info : Hardware thread awareness created
Info : Hardware thread awareness created
Info : RP2040 Flash Bank Command
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : Read incorrect DLIPDR 00000000 (possibly CTRL/STAT value) when selecting coreid 0
Info : DAP init failed
in procedure 'program'
** OpenOCD init failed **
shutdown command invoked

Info : Read incorrect DLIPDR 00000000 (possibly CTRL/STAT value) when selecting coreid 0

Wiring Raspberry Pi and Raspberry Pi Pico

On RPi4B 4Gb
red GPIO24 pin 18 black jumper black swdio
orange GRD pin 20 orange jumper green GRD
yellow GPI025 pin 22 red jumper blue swclk
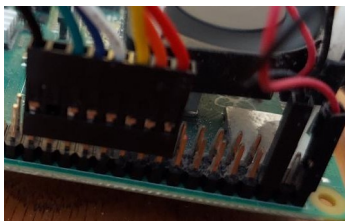
red GPIO24 pin 18 red SWDIO black jumper black
orange GRD pin 20 orange GRD orange jumper green
yellow GPI025 pin 22 yellow SWCLK red jumper blue
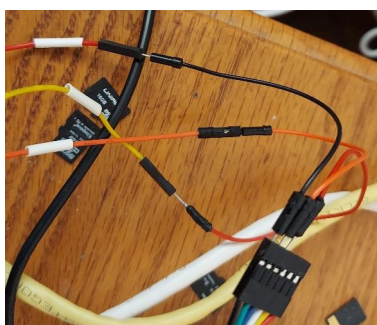
RPi4B 4Gb	Pico Pi	
GPIO24 pin 18	SWDIO	black
GRD pin 20	GRD	green
GPIO25 pin 22	SWCLK	blue

Testing the OpenOCD

cd /opt/pico-examples/build
sudo su
[sudo] password for devel:

export PATH=/home/devel/local/openocd/bin:$PATH
echo $PATH
which openocd
/home/devel/local/openocd/bin/openocd

Now the blink progran is loaded with the need to remove the usb cable
and hold the boot sel button pico.

root@mypi3-20:/opt/pico-examples/build# openocd -f interface/raspberrypi-swd.cfg -f
target/rp2040.cfg -c "program blink/blink.elf verify reset exit"
 Open On-Chip Debugger 0.10.0+dev-g71510a7-dirty (2021-08-15-17:08)

For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
adapter speed: 1000 kHz

Info : Hardware thread awareness created
Info : Hardware thread awareness created
Info : RP2040 Flash Bank Command
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : SWD DPIDR 0x0bc12477
Info : SWD DLPIDR 0x00000001
Info : SWD DPIDR 0x0bc12477
Info : SWD DLPIDR 0x10000001
Info : rp2040.core0: hardware has 4 breakpoints, 2 watchpoints
Info : rp2040.core1: hardware has 4 breakpoints, 2 watchpoints
Info : starting gdb server for rp2040.core0 on 3333
Info : Listening on port 3333 for gdb connections
target halted due to debug-request, current mode: Thread
xPSR: 0xf1000000 pc: 0x000000ee msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0xf1000000 pc: 0x000000ee msp: 0x20041f00
** Programming Started **
Info : RP2040 B0 Flash Probe: 2097152 bytes @10000000, in 512 sectors

target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
Info : Writing 12288 bytes starting at 0x0
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
** Programming Finished **
** Verify Started **
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
** Verified OK **
** Resetting Target **

shutdown command invoked

Now the hellow_usb is loaded.

openocd -f interface/raspberrypi-swd.cfg -f target/rp2040.cfg -c "program hello_world/usb/hello_usb.elf verify reset exit"
Open On-Chip Debugger 0.10.0+dev-g71510a7-dirty (2021-08-15-17:08)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
adapter speed: 1000 kHz

Info : Hardware thread awareness created
Info : Hardware thread awareness created
Info : RP2040 Flash Bank Command
Info : BCM2835 GPIO JTAG/SWD bitbang driver
Info : clock speed 1001 kHz
Info : SWD DPIDR 0x0bc12477
Info : SWD DLPIDR 0x00000001
Info : SWD DPIDR 0x0bc12477
Info : SWD DLPIDR 0x10000001
Info : rp2040.core0: hardware has 4 breakpoints, 2 watchpoints
Info : rp2040.core1: hardware has 4 breakpoints, 2 watchpoints
Info : starting gdb server for rp2040.core0 on 3333
Info : Listening on port 3333 for gdb connections
target halted due to debug-request, current mode: Thread
xPSR: 0xf1000000 pc: 0x000000ee msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0xf1000000 pc: 0x000000ee msp: 0x20041f00
** Programming Started **
Info : RP2040 B0 Flash Probe: 2097152 bytes @10000000, in 512 sectors

target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
Info : Writing 24576 bytes starting at 0x0
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread

xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
** Programming Finished **
** Verify Started **
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
target halted due to debug-request, current mode: Thread
xPSR: 0x01000000 pc: 0x00000178 msp: 0x20041f00
** Verified OK **
** Resetting Target **
shutdown command invoked

cd /opt/pico-examples/

rm -rf build

mkdir build

cd build

cmake -DCMAKE_BUILD_TYPE=Debug ..

cd hello_world/serial/

make -j4

ls -la
total 1028
drwxr-xr-x 3 devel devel   4096 Aug 17 05:47 .
drwxr-xr-x 5 devel devel   4096 Aug 17 05:43 ..
drwxr-xr-x 3 devel devel   4096 Aug 17 05:44 CMakeFiles
-rw-r--r-- 1 devel devel   992 Aug 17 05:43 cmake_install.cmake
-rwxr-xr-x 1 devel devel 21496 Aug 17 05:47 hello_serial.bin
-rw-r--r-- 1 devel devel 348298 Aug 17 05:47 hello_serial.dis
-rwxr-xr-x 1 devel devel 360616 Aug 17 05:47 hello_serial.elf
-rw-r--r-- 1 devel devel 215933 Aug 17 05:47 hello_serial.elf.map
-rw-r--r-- 1 devel devel 60515 Aug 17 05:47 hello_serial.hex
-rw-r--r-- 1 devel devel 43008 Aug 17 05:47 hello_serial.uf2
-rw-r--r-- 1 devel devel 72357 Aug 17 05:43 Makefile