MCV Quick Start Guide

Release 2

ARIES Embedded GmbH

April 28, 2020

ABOUT THIS MANUAL

1.1 Imprint

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1.5 Care and Maintenance

- Keep the device dry. Precipitation, humidity, and all types of liquids or moisture can contain minerals that will corrode electronic circuits. If your device does get wet, allow it to dry completely.

- Do not use or store the device in dusty, dirty areas. Its moving parts and electronic components can be damaged.

- Do not store the device in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.

- Do not store the device in cold areas. When the device returns to its normal temperature, moisture can form inside the device and damage electronic circuit boards.

- Do not attempt to open the device.

- Do not drop, knock, or shake the device. Rough handling can break internal circuit boards and fine mechanics.

- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the device.

- Do not paint the device. Paint can clog the moving parts and prevent proper operation.

- Unauthorized modifications or attachments could damage the device and may violate regulations governing radio devices.

INTIAL OPERATION

The following steps guide you to the correct settings of your MCVEVP.

2.1 Apply Correct Jumper Settings
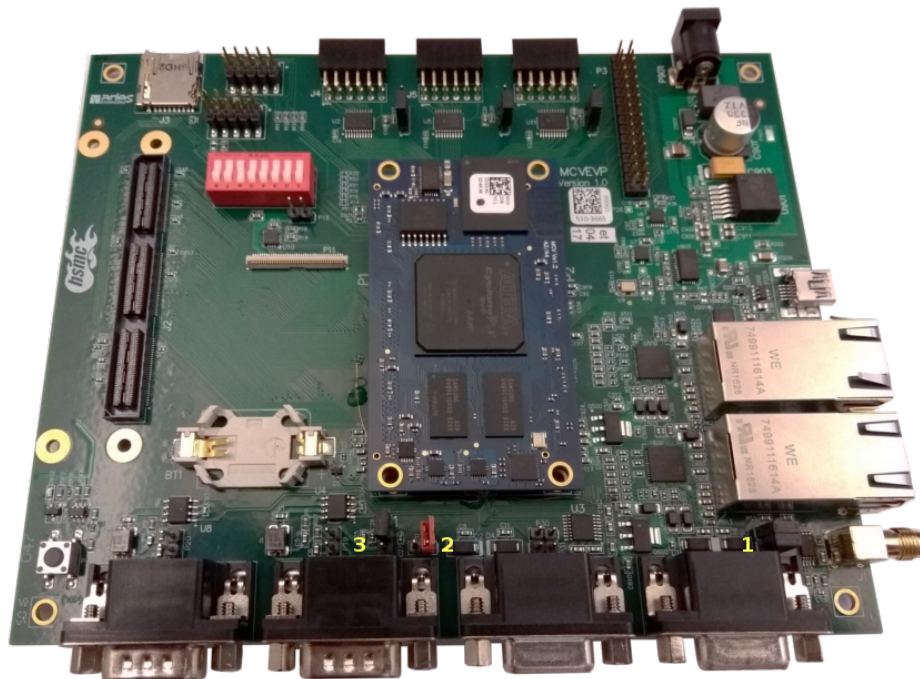
Pin 1 of each header is marked with a yellow dot in the picture.

1. place jumpers on P25 and P29 to activate the UART0 interface
2. leave jumper P32 open to select eMMC boot mode for MCV
3. place jumper to connect pin 1 and pin 2 on connector JP4 to connect VCCIO3B4A to 3.3V
4. Insert the MCV SoM into the Samtec connectors on MCVEVP

! CAUTION ! |

Electronic components are sensitive against mechanical pressure. Certain contacts/housings may mechanically break when mechanical force is applied to the board. Due to the insertion force that has to be applied to the two board-to-board connectors the user has to press on the MCV pcb to insert it on a baseboard.

The following image shows the do not touch area when inserting the board on a baseboard.

DO NOT APPLY ANY MECHANICAL PRESSURE TO THE MARKED AREAS

Disregard of this provision may break the components and/or the contacts of the BGA components.
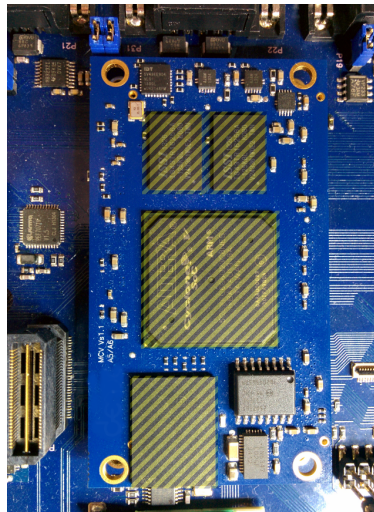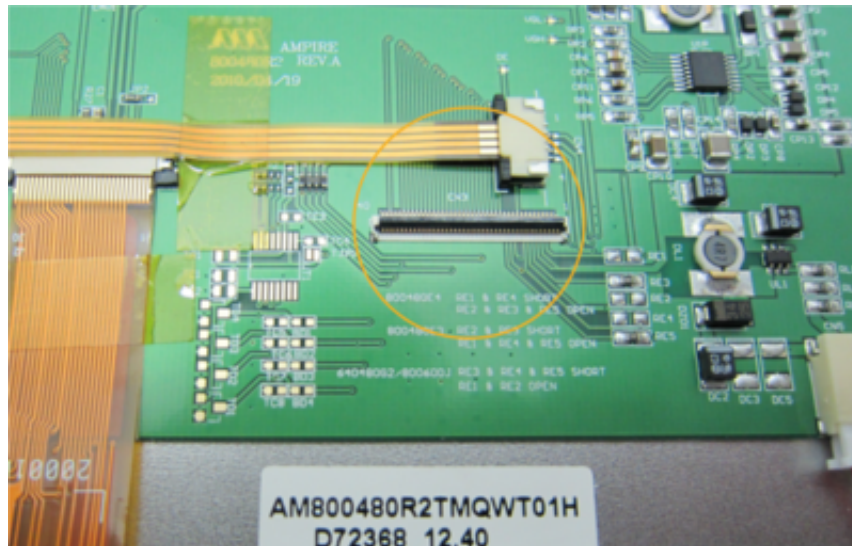

Please make sure that the TOP side of the Altera logo on the CPU is facing the ethernet connector when inserting the SoM into the EVK.
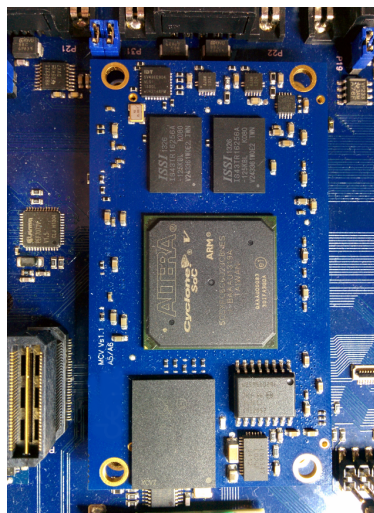
2.2 Mount the MxxDK Displaykit on MCVEVP

Note: MxxDK is compatible with MCVEVP V1.0. For MCVEVP V2.0 please refer to the MxxDK2.

Open the FPC connector on the backside of your MxxDK carefully

Place the FPC cable in the FPC connector on MxxDK, the contact side has to be placed towards the TFT PCB so that the isolation of the cable is on top. Close the FPC connector on the MxxDK carefully.
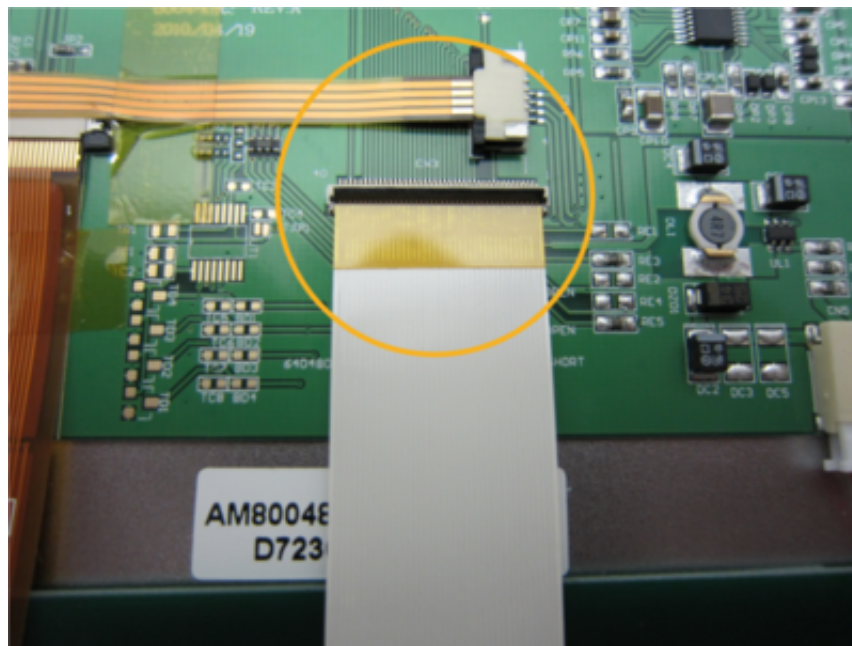
Place the FPC cable in the FPC connector on MCVEVP, the contact side has to be placed towards the TFT PCB so that the isolation of the cable is on top. Close the FPC connector on the MCVEVP carefully.
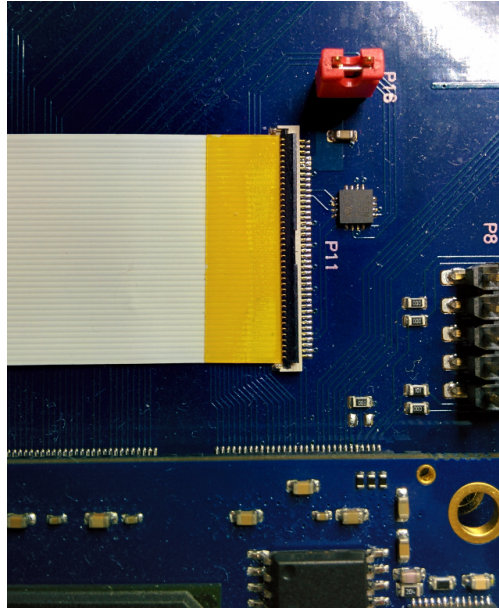
Place the MxxDK Displaykit on MCVEVP without twisting or disconnecting the FPC cable. Mount the MxxDK Displaykit on MCVEVP by using four screws.

2.3 Start your Linux Computer and install ckermit

Boot your Linux Computer and log in. Open a console port and install ckermit (if not already installed):

```
sudo apt-get install ckermit
```

After typing in your sudo password ckermit will be installed.

2.4 Configure kermit

Configure ckermit by creating the file .kermit in your home directory:

```
cd
nano .kermit
```

Copy into .kermit:

```
set line /dev/ttyS0
set speed 115200
set carrier-watch off
set handshake none
set flow-control none
robust
set file type bin
set file name lit
set rec pack 1000
set send pack 1000
set window 5
```

Save the file by typing:

```
<ctrl> + o
```

Exit nano by typing:

```
<ctrl> + x
```

2.5 Start kermit and connect

Start kemit by typing:

```
kermit
```

Connect by ty typing:

```
c
```

2.6 Connect the console cable

Connect the console cable to the UART port P21 of your MCVEVP and the serial port of your Computer as specified below
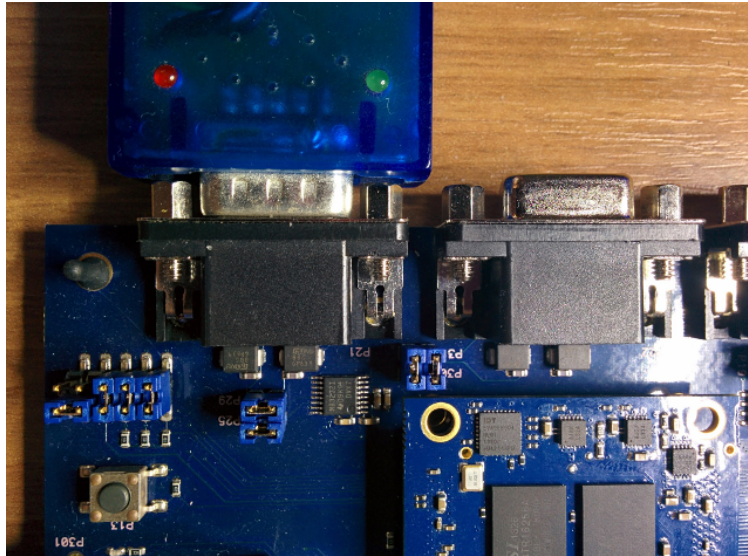
2.7 Connect power to your kit

Connect the wall plug to P901 on MCVEVK
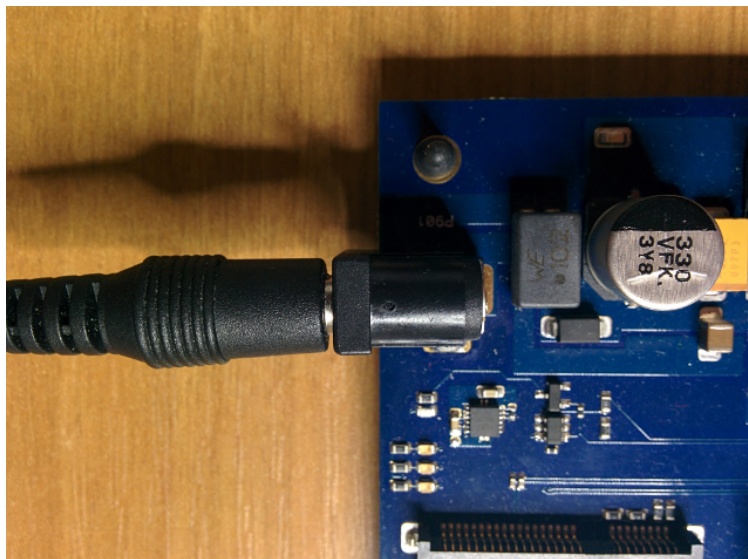
MCV will start booting:

```
U-Boot SPL 2013.01.01-00110-g3cbaeae-dirty (Oct 24 2014 - 18:54:05)
BOARD : Altera SOCFPGA Cyclone V Board
CLOCK: EOSC1 clock 25000 KHz
CLOCK: EOSC2 clock 25000 KHz
CLOCK: F2S_SDR_REF clock 0 KHz
CLOCK: F2S_PER_REF clock 0 KHz
CLOCK: MPU clock 800 MHz
CLOCK: DDR clock 333 MHz
CLOCK: UART clock 100000 KHz
CLOCK: MMC clock 50000 KHz
CLOCK: QSPI clock 3125 KHz
```

```
RESET: COLD
INFO : Watchdog enabled
SDRAM: Initializing MMR registers
SDRAM: Calibrating PHY
SEQ.C: Preparing to start memory calibration
SEQ.C: CALIBRATION PASSED
SDRAM: 1024 MiB
ALTERA DWMMC: 0


U-Boot 2014.10 (Oct 24 2014 - 18:54:19)

CPU:   Altera SoCFPGA Platform
BOARD: Altera SoCFPGA Cyclone5 Board
DRAM:  1 GiB
MMC:   SOCFPGA DWMMC: 0
In:    serial
Out:   serial
Err:   serial
Net:   dwmac.ff700000

** File not found boot.scr **
Hit any key to stop autoboot:  0

After booting the kernel the login will appear:

Starting Bootlog daemon: bootlogd.
Populating dev cache
Fri Oct 24 17:31:00 UTC 2014
INIT: Entering runlevel: 5
Configuring network interfaces... [    5.259856] eth0: device MAC address c0:e5:4e:NN:NN:NN
udhcpc (v1.22.1) started
Sending discover...
[    8.328723] libphy: stmmac-0:01 - Link is Up - 1000/Full
Sending discover...
Sending select for 192.168.0.131...
Lease of 192.168.0.131 obtained, lease time 43200
/etc/udhcpc.d/50default: Adding DNS 192.168.1.254
done.
Starting system message bus: dbus.
Starting OpenBSD Secure Shell server: sshd
  generating ssh RSA key...
  generating ssh ECDSA key...
  generating ssh DSA key...
  generating ssh ED25519 key...
done.
Starting rpcbind daemon...done.
Starting Distributed Compiler Daemon: distcc.
Starting syslogd/klogd: done
[ ok ]rting Avahi mDNS/DNS-SD Daemon: avahi-daemon
Starting OProfileUI server
Stopping Bootlog daemon: bootlogd.

ELDK 5.6 mcvevk /dev/ttyS0

mcvevk login: root
root@mcvevk:~#
```

2.8 Have fun !

Start hacking, developing your application, setting up benchmarks.......

2.9 Shut down your kit

To avoid damage of the SD-card alway shut down your kit properly by typing:

```
root@mcvevk:~# poweroff

Broadcast message from root@mcvevk (ttyS0) (Fri Oct 24 17:32:06 2014):

The system is going down for system halt NOW!
INIT: Sending processes the TERM signal
Stopping OpenBSD Secure Shell server: sshdstopped /usr/sbin/sshd (pid 296)
.
 * Stopping Avahi mDNS/DNS-SD Daemon: avahi-daemon

[ ok ]rofile-server:332): WARNING **: Avahi error: Daemon connection failed
Stopping system message bus: dbus.
Stopping Distributed Compiler Daemon: distcc/etc/rc0.d/K20distcc: stop failed with error code 1
Stopping OProfileUI server
Error opening /dev/fb0: No such file or directory
Stopping syslogd/klogd: stopped syslogd (pid 312)
stopped klogd (pid 315)
done
Stopping rpcbind daemon...
done.
Deconfiguring network interfaces... done.
Sending all processes the TERM signal...
Sending all processes the KILL signal...
Unmounting remote filesystems...
Deactivating swap...
Unmounting local filesystems...
[   78.018275] EXT4-fs (mmcblk0p3): re-mounted. Opts: (null)
[   80.153444] reboot: System halted
```

UPDATE EMMC MEMORY

This guide explains how to update the content of the eMMC memory on MCV.

This instruction is based on the assumption that MCV is operational and hosts on a valid image in the eMMC memory, i.e. U-Boot and Linux provided in default configuration, provided by the factory.

3.1 Perform initial operation

The Initial Operation, explained in this guide must be performed. The kit must still be powered off after completing the initial operation.

3.2 Connect MCVEVP to your PC

Open a console1 on your host PC.

Connect a USB A-miniB cable from your PC to the USB-connector P201 on MCVEVP

Connect the serial port of your PC to the UART0 on the P21 DSUB9 connector on MCVEVP

Open a console2 on your host PC and start kermit/minicom, connect to your target:

```
mcv@aries-lp-01:~$ minicom

Willkommen zu minicom 2.7

Optionen: I18n
Übersetzt am Feb  7 2016, 13:37:27.
Port /dev/ttyUSB0, 12:10:31

Drücken Sie CTRL-A  Z für Hilfe zu speziellen Tasten
```

Connect the power supply to your MCVEVP, MCV starts booting and you will get something like the following output. Interrupt the boot countdown in U-Boot:

```
U-Boot SPL 2016.11 (Jan 10 2017 - 20:16:15)
sdram_calibration_full: Preparing to start memory calibration
debug_mem_calibrate: CALIBRATION PASSED
debug_mem_calibrate: Calibration complete
Trying to boot from MMC1


U-Boot 2017.09 (Dec 05 2017 - 17:00:45 +0100)
```

```
CPU:   Altera SoCFPGA Platform
FPGA:  Altera Cyclone V, SE/A2 or SX/C2, version 0x0
BOOT:  SD/MMC Internal Transceiver (3.0V)
       Watchdog enabled
I2C:   ready
DRAM:  1 GiB
MMC:   dwmmc0@ff704000: 0
*** Warning - bad CRC, using default environment

In:    serial
Out:   serial
Err:   serial
Model: Aries MCVEVK
Net:
Error: ethernet@ff700000 address not set.
No ethernet found.
Hit any key to stop autoboot:  0
=>
```

Activate the USB mass storage function of U-Boot:

```
=> ums 0 mmc 0
UMS: LUN 0, dev 0, hwpart 0, sector 0x0, count 0x734000
\
```

A rotating dash will appear on the screen.

Change to the other console1. Check for mounted partitions:

```
mcv@aries-lp-01:~$ lsblk

NAME    MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sdb      8:16   1   3,6G  0 disk
  sdb2   8:18   1    16M  0 part /media/aw/boot
  sdb3   8:19   1  32,1M  0 part /media/aw/root
  sdb1   8:17   1     2M  0 part

sr0     11:0    1  1024M  0 rom

sda      8:0    0 111,8G  0 disk
  sda2   8:2    0     1K  0 part
  sda5   8:5    0     2G  0 part [SWAP]
  sda1   8:1    0 109,8G  0 part /
```

Carefully identify the partitions related to MCV, in case any of the are mounted. In this special case all sdax partitions are related to the host PC, sdb2 and sdb3 are mounted on MCV. Unmount the partitions which are mounted on MCV:

```
mcv@aries-lp-01:~$ sudo umount /dev/sdb2
mcv@aries-lp-01:~$ sudo umount /dev/sdb3
```

NOTE:

USING THE WRONG PARTITIONS FOR PROGRAMMING MCV WILL DESTROY THE CONTENT OF YOUR HOST PCS STORAGE

Copy the SD-card image from your host PC to the eMMC memory of MCV:

```
mcv@aries-lp-01:~$ sudo dd if=/home/MCV/core-image-full-cmdline-mcvevk-20171205152219.rootfs.wic of=/
311714+0 Datensätze ein
311714+0 Datensätze aus
159597568 bytes (160 MB, 152 MiB) copied, 1,2931 s, 123 MB/s
```

```
```

This process will take some minutes, depending on the size of the SD-card image you program.

After the programming process is terminated switch back to console2 and terminate the USB mass storage function of U-Boot by pressing <Ctrl-C>:

```
=> ums 0 mmc 0
UMS: LUN 0, dev 0, hwpart 0, sector 0x0, count 0x734000
CTRL+C - Operation aborted
=>
```

Now, still at the U-Boot prompt, reboot MCV by typing:

```
=> reset
```

The MCV starts booting:

```
=> reset
resetting ...

U-Boot SPL 2016.11 (Jan 10 2017 - 20:16:15)
sdram_calibration_full: Preparing to start memory calibration
debug_mem_calibrate: CALIBRATION PASSED
debug_mem_calibrate: Calibration complete

Trying to boot from MMC1

U-Boot 2017.09 (Dec 05 2017 - 17:00:45 +0100)

CPU:   Altera SoCFPGA Platform
FPGA:  Altera Cyclone V, SE/A2 or SX/C2, version 0x0
BOOT:  SD/MMC Internal Transceiver (3.0V)
       Watchdog enabled
I2C:   ready
DRAM:  1 GiB
MMC:   dwmmc0@ff704000: 0
*** Warning - bad CRC, using default environment

In:    serial
Out:   serial
Err:   serial
Model: Aries MCVEVK
Net:
Error: ethernet@ff700000 address not set.
No ethernet found.
Hit any key to stop autoboot:  0
3666596 bytes read in 384 ms (9.1 MiB/s)
Loading kernel from FIT Image at 10000000 ...
   Using 'conf@socfpga_cyclone5_mcvevk.dtb' configuration
   Trying 'kernel@1' kernel subimage
     Description:  Linux kernel
     Created:      2017-12-05  15:47:10 UTC
     Type:         Kernel Image
     Compression:  uncompressed
     Data Start:   0x1000011c
     Data Size:    3638576 Bytes = 3.5 MiB
     Architecture: ARM
     OS:           Linux
```

```
      Load Address: 0x00008000
      Entry Point:  0x00008000
      Hash algo:    sha1
      Hash value:   867ce5f1e3aa5eff24f507066be43981818f3303
   Verifying Hash Integrity ... sha1+ OK
Loading fdt from FIT Image at 10000000 ...
   Using 'conf@socfpga_cyclone5_mcvevk.dtb' configuration
   Trying 'fdt@socfpga_cyclone5_mcvevk.dtb' fdt subimage
      Description:  Flattened Device Tree blob
      Created:      2017-12-05  15:47:10 UTC
      Type:         Flat Device Tree
      Compression:  uncompressed
      Data Start:   0x10378758
      Data Size:    26032 Bytes = 25.4 KiB
      Architecture: ARM
      Hash algo:    sha1
      Hash value:   2b3a9d68c6aa9cc3ed67951682a0ba63dae2fbf4
   Verifying Hash Integrity ... sha1+ OK
   Booting using the fdt blob at 0x10378758
   Loading Kernel Image ... OK
   reserving fdt memory region: addr=0 size=1000
   Loading Device Tree to 03ff6000, end 03fff5af ... OK

Starting kernel ...
```

Unitil the login prompt appears:

```
No lease, forking to background
done.
Starting system message bus: dbus.
Starting OpenBSD Secure Shell server: sshd
done.
Starting rpcbind daemon...done.
starting statd: done
Starting atd: OK
hwclock: can't open '/dev/misc/rtc': No such file or directory
exportfs: can't open /etc/exports for reading
NFS daemon support not enabled in kernel
Starting system log daemon...0
Starting kernel log daemon...0
Starting crond: OK
umount: /mnt/.psplash: not mounted.

Poky (Yocto Project Reference Distro) 2.4 mcvevk /dev/ttyS0

mcvevk login:
```

MCV now runs your newly programmed image.

RECOVERY

Recovery for software components on MCV.

4.1 Modify boot settings

Close Jumper P32 on MCVEVP.

4.2 Connect USB Blaster and USB A-miniB cable

On MCVEVP connect the USB blaster to header P8 (pin 1 of P8 is closest to the SoM) and to a host PC. Connect the USB A-miniB cable to the USB miniB connector P201 and a host PC.

4.3 Open a Console

Open a console2 on your host PC and start kermit/minicom, connect to your target:

```
mcv@aries-lp-01:~$ minicom

Willkommen zu minicom 2.7

Optionen: I18n
Übersetzt am Feb  7 2016, 13:37:27.
Port /dev/ttyUSB0, 12:10:31

Drücken Sie CTRL-A  Z für Hilfe zu speziellen Tasten
```

4.4 Power up the board

Connect power supply to the board. The board will produce no console output, yet.

4.5 Start Quartus Programmer

Start Altera Quartus II software , from the Tools drop-down menu, select the "Programmer" tool. In the newly invoked "Programmer":

1. Click 'Auto-Detect' in the left hand panel

2. In the 'Select Device' dialog, select '5CSXFC2C6' or '5CSXFC6C6' (depending on the SoM) and click OK

3. In the top part of main pane, right-click '5CSXFC2C6' or '5CSXFC6C6' (depending on the SoM) and select 'Change File'

4. In the 'Select New Programming File', select the file 'Recovery-C2.sof' or 'Recovery-C6.sof' (depending on the SoM).

5. In the top part of main pane, check the 'Program/Configure' box for the '5CSXFC2C6' or '5CSXFC6C6' (depending on the SoM)

6. Click 'Start' in the left hand panel

Note

Please contact ARIES Embedded to obtain your version of the correct rescue image for MCV.

4.6 Use USB Mass Storage

After the programming finished, the board comes up and immediately starts USB Mass Storage mode. The USB Mass Storage is backed by the eMMC integrated on the MCV SoM. The host PC will detect a new USB storage device, which can be used as a regular USB stick. The data on the eMMC can be read and written using usual methods.

Installation of a new software image from the host PC to the MCVEVK is performed using the usual:

```
=> dd if=software_image.img of=/dev/sdX
```