Instructions for Installing QNX 6.5.0 with SP1 on Advantech AIMB-782 Motherboard, 7 May 2015

The Advantech-782 motherboard has 4 PCI slots. It has been qualified to run both REX and MEX. However it requires the latest versions of QNX and drivers and also must use the APIC (Advanced Programmable Interrupt Controller) version of the startup-bios. This means that one must 'build' a new QNX kernel (instructions below).

This is the specification from Advantech for ordering a system. **NOTE:** We now recommend that you order a Core i5 processor instead of the Core i3 specified below to get four cores. This is because REX and MEX can now run on the same machine if you have enough cores.

System part number: C-NIC01D-IPC-**REX**-1

	PN	Description	Qty
100	SYS-WM-BTO	System Consisting of the Following:	1
101	IPC-7220-00XE	CHASSIS, IPC-7220 Bare Chassis RoHS	1
102	PS8-400ATX-ZE	80+ Bronze PS/2 SPS 400ATX (FSP) RoHS	1
103	AIMB-782QG2-00A1E	LGA1155 ATX IMB w/VGA/DVI/2GbE/2 SATA 3	1
104	96MPI3-3.3-3M11T	CORE 3.3G 3M 1155P 2CORE I3-2120(G)	1
105	96D3-4G1333NN-AP	4G DDR3-1333 240PIN 256X8 HYX(G)	2
106	**96HD500G-ST-SG7K12**	SEAGATE 500G 3.5" SATA 7KRPM 16M(G)	1
107	**96DVD-18X-ST-LT-B**	LITEON 18X SATA DVD-ROM BLACK(G)	1
108	1700003194	M Cable SATA 7P(W/LOCK)/SATA 7P 60	2
109	1702002600	Power Cord 3P UL/CSA(USA) 125V 10A 1.83	1
110	1960047831N001	Cooler I-LGA1156 S-95W 83*83*56.5mm-SS	1
111	XNIC1-P69-MDDE128F	Matrox P690	1
112	AGS-CTOS-SYS-B	Standard Assembly + Functional Testing	1

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Note that REX also requires a digital i/o card and a National Instruments "E series" a/d card which is now hard to obtain. We are adding new a/d cards for REX. If you are building a new system please contact Art Hays for info about card options (art@nei.nih.gov)

Installation Instructions:

First download the following from the QNX web site. Note as of May 2015 QNX does not automatically provide evaluation keys via email for version 6.5.0. Academic licenses are also not provided for version 6.5.0. It will be necessary to apply for an academic license and ask Art Hays to appeal to QNX for a license for version 6.5.0. However if you ever received an eval key by email you can install using that key if you change the date in the BIOS to within 30 days of the issuance of the key. Later you can change the date back to the current date and development features will be disabled. REX and MEX will run without these features. We are currently porting REX/MEX to real-time Linux.

Download QNX version 6.5.0 installation .iso CD image:
http://www.qnx.com/download/feature.html?programid=21182

1. Download QNX 6.5.0 SP1. This is a file, not a .iso.
   http://www.qnx.com/download/feature.html?programid=23654
2. If you are going to use the new Matrox P690 card download the latest "devg-matroxp.so" driver and "graphics.matrox" enumeration file (both contained in one .tar.gz file):
   http://community.qnx.com/sf/frs/do/viewRelease/projects.bsp/frs.matrox_devg_matroxp_so_graphics.devg_matroxp_so_graphics_driver
3. Download the latest "devnp-e1000.so" network driver and "net" enumeration file:
   http://community.qnx.com/sf/frs/do/viewRelease/projects.bsp/frs.intel_e1000_network_drivers.devnp_e1000_so_for_x86
   http://community.qnx.com/sf/frs/do/viewRelease/projects.bsp/frs.intel_e1000_network_drivers.intel_e1000_network_drivers

Now that you have these files continue:

4. Install the National Instruments a/d card in the second PCI slot as numbered starting with slot 1 being closest to the processor chip. This will give it an unshared IRQ.
5. Go to BIOS setup (press Delete repeatedly when booting). Go to 'Save & Exit' and select "Restore Defaults". Then go to Advanced -> SATA Configuration. Change 'SATA Mode Selection' from "IDE" to "AHCI". With this version of QNX the rest of the default BIOS settings are fine.
6. Evaluation license keys for 6.5 are only valid for a few months after which a number of development options stop working. However REX/MEX doesn't need these. If your license key has expired set the date in the BIOS so that it is within the valid time for your key. Then later you can set the correct date.
7. Burn the installation .iso to a CD and install QNX. Choose F3 to install to new disk partition.
8. Choose F1 for disk partition and F1 again to allow QNX partition to be anywhere on disk.
9. See if disk has any current partitions that must be deleted and delete these. When you are asked to choose a partition type choose F1, power-safe filesystem. Then complete with more F1's to use all space.
10. QNX will now mount the disk and start copying files from CD to disk.
11. Start answering install questions with defaults.

12. QNX will tell you to remove installation CD and it will reboot. If it doesn't come up with the Photon login screen press the hardware reset button on the front of the computer. Now when it boots again and it asks you to press the SPACE bar for boot options do it. Then press F1 for Safe mode options and F3 to boot without starting Photon. Press ENTER until system boots. It will come up with the "login: " prompt. Login with user name 'root'.
13. Burn the rest of the files downloaded above to a data CD and insert the CD. Run 'mount' to see where QNX mounts the CD (probably /fs/cd0). Copy the file "qnxsdp-6.5.0SP1…sh" from the CD to /tmp:

```
cp /fs/cd0/qnx* /tmp
chmod 777 /tmp/qnx*
cd /
/tmp/qnx*.sh
```

    Answer 'y' to everything.
14. If using the new P690 card copy "devg-matroxp.so" to /lib/dll. Copy "graphics.matrox" to /etc/system/enum/devices/.
15. Copy the network driver "devnp-e1000.so" to /lib/dll. If the system won't let you copy this try moving /lib/dll/devnp-1000.so to /lib/dll/devnp-1000.so_bak first. Copy the "net" enumeration file to /etc/system/enum/devices/. Note that wm0 is probably the plug farthest from cards.
16. Reboot and see if you can configure the display and network interface.
17. 'jed' editor can be installed from NIH tar file "jedonly.tar".
18. Build new kernel:

    - cd to /boot/build
    - cp qnxbasesmp-apic.build qnxbasedma-apic.build
    - Edit qnxbasedma-apic.build with whatever editor you prefer. Change end of line near top that ends with "procnto-smp-instr" to "procnto-instr".
    - Build new kernel by running
      mkifs qnxbasedma-apic.build /.boot/qnxbasedma-apic.ifs
      Make sure you type in above line exactly including the '.' in /.boot.
    - You will now have a new kernel choice when booting named "qnxbasedma-apic". It is stored in /.boot.
    - To create the SMP version of this kernel for REX or MEX type
      "mkifs qnxbasesmp-apic.build /.boot/qnxbasesmp-apic.ifs

19. For the non-SMP version of REX always boot qnxbasedma-apic. For the SMP version or MEX boot qnxbasesmp-apic.
20. Verify that the REX a/d is not sharing an interrupt. When the clock is running run "pidin irq" in a terminal window. You will notice under some processes there is a second line that has in the second column numbers like 0x2, 0x4, 0x10, 0x17, etc. These are IRQ's. Make sure that the

number listed under the REX paradigm is unique, that it's not the same as any of the other IRQ's.

21. If you want to use dual displays you must edit /etc/system/config/display.conf. Under the section for the graphics card you are using ("drivername=") you must add a second "display" definition. The example below has this added for "drivername=matroxp", which is the P690 card. Note the P690 card (driver matroxp) can handle dual head resolutions using the analog (not DVI) outputs of up to 2048x1536. The G550 card (driver matroxg) can only handle 1280x1024 in dual head mode.

```
device {
      photon {
            driver {
                  drivername=matroxp
                  modeopts=
            }
            driver {
                  drivername=vesabios
                  modeopts=
            }
            driver {
                  drivername=svga
                  modeopts=
            }
      }
      drivername=matroxp
      modeopts=
      vid=0x102b
      did=0x2539
      deviceindex=0x0
      display {
            xres=1600
            yres=1200
            refresh=60
            pixel_format=rgb565
            photon {
                  enabled=1
                  xoffset=0
                  yoffset=0
                  cursor=hardware
                  input_group=1
            }
      }
      display {
            xres=1600
            yres=1200
            refresh=60
            pixel_format=rgb565
            photon {
                  enabled=1
                  xoffset=1600
                  yoffset=0
                  cursor=hardware
                  input_group=1
```

```
            }
      }
}
device {
      photon {
            driver {
                  drivername=svga
                  modeopts=
            }
            driver {
                  drivername=vesabios
                  modeopts=
            }
      }
      drivername=svga
      modeopts=
      vid=0x8086
      did=0x102
      deviceindex=0x0
      display {
            xres=1024
            yres=768
            refresh=60
            pixel_format=rgb565
            photon {
                  enabled=1
                  xoffset=0
                  yoffset=0
                  cursor=hardware
                  input_group=1
            }
      }
}
device {
      photon {
            driver {
                  drivername=svga
                  modeopts=
            }
            driver {
                  drivername=radeon
                  modeopts=
            }
            driver {
                  drivername=vesabios
                  modeopts=
            }
      }
      drivername=radeon
      modeopts=
      vid=0x1002
      did=0x4e48
      deviceindex=0x0
      display {
            xres=1280
            yres=1024
            refresh=60
```

```
            pixel_format=argb1555
            photon {
                  enabled=1
                  xoffset=0
                  yoffset=0
                  cursor=hardware
                  input_group=1
            }
      }
}
device {
      photon {
            driver {
                  drivername=svga
                  modeopts=
            }
            driver {
                  drivername=matroxg
                  modeopts=
            }
            driver {
                  drivername=vesabios
                  modeopts=
            }
      }
      drivername=matroxg
      modeopts=
      vid=0x102b
      did=0x2527
      deviceindex=0x0
      display {
            xres=1280
            yres=1024
            refresh=60
            pixel_format=rgb565
            photon {
                  enabled=1
                  xoffset=0
                  yoffset=0
                  cursor=hardware
                  input_group=1
            }
      }
      display {
            xres=1280
            yres=1024
            refresh=60
            pixel_format=rgb565
            photon {
                  enabled=0
                  xoffset=1280
                  yoffset=0
                  cursor=hardware
                  input_group=1
            }
      }
}
```

```
device {
      drivername=coral
      vid=0x10cf
      did=0x201e
      deviceindex=0
      display {
            xres=640
            yres=480
            refresh=60
            pixel_format=argb1555
      }
}
device {
      drivername=coral
      vid=0x10cf
      did=0x2019
      display {
            xres=640
            yres=480
            refresh=60
            pixel_format=argb1555
      }
}
device {
      drivername=carmine
      vid=0x10cf
      did=0x202b
      deviceindex=0
      display {
            xres=640
            yres=480
            refresh=60
            pixel_format=argb8888
      }
}
device {
      drivername=vmware
      vid=0x15ad
      did=0x405
      deviceindex=0
      display {
            xres=640
            yres=480
            refresh=60
            pixel_format=argb8888
      }
}

#Add your Devices PCI vid and did
#device {
#     drivername=vesabios
#     vid=0x0
#     did=0x0
#     deviceindex=0
#     display {
#           xres=640
#           yres=480
```

```
#            refresh=60
#            pixel_format=argb8888
#      }
#}

#Add your Devices PCI did
#device {
#      drivername=extreme2
#      vid=0x8086
#      did=0x0
#      deviceindex=0
#      display {
#            xres=800
#            yres=600
#            refresh=60
#            pixel_format=argb8888
#      }
#}
```