Linux Installation Notes for Axxon MAP/950 PCI I/O Cards
Revision 1.2

This document discusses the installation of the Axxon MAP/950 PCI family of products under the Linux operating system.

Axxon offers are a variety of PCI bus products based on the enhanced Oxford Semiconductor PCI bus components.

Axxon MAP/950 PCI 2 Port Serial I/O Cards

The MAP/950 products are available in 2 versions:

1) PCI 2 Ports based on the OX16PCI954 device. In this model, the OX16PCI954 device is configured using the onboard EEPROM device to appear as a 2 Port Serial adapter using:

Vendor ID: 0x1415
Device ID: 0x950A

The MAP/950 products based on the OX16PCI954 chip are supported with the default Linux 2.4 kernel. If required you may download the most recent Linux serial driver by selecting the URL found later in this document. Axxon has confirmed the installation and auto-detection of the noted products under Linux 7.1, 7.2 and 7.3 distributions.

2) PCI 2 Ports based on the OX16PCI952 device. In this model, the OX16PCI952 device is configured using the onboard EEPROM device to appear as a 2 Port Serial adapter using:

Vendor ID: 0x1415
Device ID: 0x9521

During the development of the Linux serial driver a few minor errors were coded into the distributions.

These errors will prevent the automatic installation and recognition of the Axxon MAP/950 Pro and similar products based on the OX16PCI952 device.

The issues that need correction in the Linux device driver are:

a) Correct the Device ID for the OX16PCI952 device.
b) Correct the register mappings for the OX16PCI952 such that the 2nd serial port channel is supported under Linux.
c) Correct the relationship between the actual UART clock found on the Axxon MAP/950 products and the expected clock value in the Linux device driver.

You may download rev 5.05 serial driver at:

http://prdownloads.sourceforge.net/serial/serial-5.05.tar.gz?download

a) Correct the Device ID for the OX16PCI952 device.

You must change the Linux serial driver from 0x950A to 0x9521 Device ID.

In file serial_compat.h at line 394, an incorrect PCI device ID is defined.
Change this line:

#define PCI_DEVICE_ID_OXSEMI_16PCI952   0x950A

to this:

#define PCI_DEVICE_ID_OXSEMI_16PCI952   0x9521

Also check your kernel file /usr/src/**linux**/include/**linux**/pci_ids.h for this
same define. If it is present, it must also be changed to 0x9521.

b) Correct the register mappings for the OX16PCI952 such that the 2nd serial port channel is supported under Linux.

Assuming the rev 5.05 **serial** driver package on SourceForge, in file **serial**.c at line 4341, change the 16PCI952 table
entry from this:

```
{        PCI_VENDOR_ID_OXSEMI, PCI_DEVICE_ID_OXSEMI_16PCI952,
             PCI_ANY_ID, PCI_ANY_ID,
             SPCI_FL_BASE0 , 2, 115200 },
```

To this:

```
 {        PCI_VENDOR_ID_OXSEMI, PCI_DEVICE_ID_OXSEMI_16PCI952,
             PCI_ANY_ID, PCI_ANY_ID,
             SPCI_FL_BASE0 | SPCI_FL_BASE_TABLE , 2, 115200 },
```

The SPCI_FL_BASE_TABLE flag means that the second port is addressed by the
next BAR instead of at a higher address in the first BAR.

b) The 115200 base baud value is your oscillator rate divided by the default oversample rate, 16. An alternative
    method to establish the correct baud rate relationship is to use the "set base baud" command. Varying with the
    distribution of your Linux operating system, the default serial port driver may be expecting a higher clock value for
    the serial port. If this is the present then the Axxon I/O card will not be able to frame at the proper baud rate. That
    is, 115,200 baud may be skewed to a multiple of due to the expectations of the device driver.

Eg. setserial /dev/ttyS6 baud_base 115200   ; change the ttySx to suit your installation

If you wish to confirm the baud rate relationship, please run this test to see what the actual baud rate is:

dd ibs=512 count=100 < /dev/zero | cat > /dev/ttyS4

It should take about 53 seconds at 9600 bps.

The default OX16PCI952 Linux driver code is expecting a clock value of 14.7456 Mhz while the Axxon designs typically
are pre-set to a value of 1.8432 Mhz. You may either configure the device driver or the clock value to compensate.

Axxon MAP/950 PCI 4 and 8 Port Serial I/O Cards

The MAP/950 products based on the OX16PCI954 / OX16C954 chips are supported with the default Linux 2.4 kernel. If required you may download the most recent Linux serial driver by selecting the URL found in this document. The MAP/950 PCI 4 and 8 Port Serial I/O Cards are based on the 1.8432 Mhz clock oscillator. Axxon has confirmed the installation and auto-detection of the noted products under Linux 7.1, 7.2 and 7.3 distributions.

Axxon RS422/RS485 PCI I/O Cards

The MAP/950 products featuring RS422 electrical interface are transparently supported under the Linux operating system. Provided the necessary changes are made as documented above, the Linux OS will not care if the electrical interface is RS232 or RS422. In RS422 configurations, the TRANSMITTER and RECEIVER are always enabled.

The MAP/950 products featuring RS485 electrical interface require that the proper register in the Oxford UART be enabled for hardware auto-gating of the RS485 transmitter. In the Axxon designs, the DTR line is used to auto-gate the RS485 transmitter during a byte transmission and disable otherwise. The DTR RS485 feature is supported under the Windows 9x, ME, XP, 2000 as DTR Active High Enable.

For Linux the device driver may required to be configured to support the DTR RS485 toggling mode.

Please consult the details of the ACR[4:3] register in the Oxford UARTS:

http://www.softio.com/ox16pci952ds.pdf (page 47)

ACR[4:3] = 11 for DTR to toggle ACTIVE HIGH

http://www.softio.com/ox16pci954ds.pdf (page 47)

ACR[4:3] = 11 for DTR to toggle ACTIVE HIGH

Acknowledgements:

Our thanks to Mr. Ed Vance and the numerous Linux gurus for their public contributions to the correction of the Oxford UART device driver code for the Linux operating system.