ARS Technologies

'USB2', 'SSI2', and 'XPRS' families of products

User's Guide

V 2.150

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Table of Contents

1. Introduction

The User's Guide is organized in the following sections :

- **introduction** – chapters 1 , 2 ; outlines the product lines and individual products that we have, and considerations for purchasing and using of our products
- **hardware** – chapters 3, 4, 5 ; shows the individual products in the 'USB2' , 'SSI2' and 'XPRS' - settings, connecting, powering, enclosures
- **software** – chapters 6, 7 ; describes installation of the software and utilities, with details and specifics for the ARSTech Enumerator
- **use** – chapters 8, ; shows the use of ISA, PCMCIA, PCI, PCI Express peripheral cards with our products

We recommend our customers to read :

- *introduction* - all of chapters 1, 2
- *hardware* – the specific chapter(s) for our product(s) planned to be purchased, or already purchased; this will allow to do physical installation, jumper settings, powering, putting into enclosure
- *software* – all of chapters 6, 7 , which helps in understanding the specifics of running on different operating systems, using through USB, settings for peripheral cards
- *use* - the specific chapter, based on the peripheral card used

1.1 ARS Technologies product lines

ARS Technologies has 4 lines of products:

- USB1 line - discontinued
- USB2 line - active, mature
- SSI2 line - inactive, new edition under development
- XPRS line – active, growing

Information on products based on USB1.1 interface is available in earlier versions of this document. This User's Guide deals only with the current active products.

USB2 Cards

The USB2 line of products allows using ISA and 16bit PCMCIA cards outside of computers systems through USB. It includes two families of products:

- USB2.0 to ISA cards family of products
- USB2.0 to PCMCIA card

The family of USB 2.0 to ISA cards enable connection of one or more ISA cards and use through USB. The products of the family USB 2.0 to ISA include 2 active products:

- **USB2ISA-R** – USB2.0 to ISA card, allows the use of one ISA card
- **USB2ISA-X3** – USB2.0 to ISA 3 connector card, allows use of up to 3 ISA cards

Other cards are available only on special/volume orders:

- **USB2ISA-RA** – USB2.0 to ISA right angle card, allows the use of one ISA card
- **USB2ISA-SL** - USB2.0 to ISA slot version card, requires a separate passive ISA back plane where it is installed, and allows the use of number of ISA cards, depending on the number of ISA connectors on the back plane
- **USB2ISA-X7** – USB2.0 to ISA 7 connector card, allows the use of up to 7 ISA cards

The USB 2.0 to PCMCIA card enables connection of a PCMCIA card and use through USB. It is available only on special/volume orders. The products of the USB2.0 to PCMCIA family includes:

USB2PCMCIA-R – USB2.0 to PCMCIA card, allows the use of one 16bit PCMCIA card

SSI2 Cards

The SSI2 line of products allows use of PCI, ISA and 16/32bit PCMCIA cards outside of computers systems, through cable.

The SSI2 products are multi-interface products which connect with:
- SSI2 host cards
- standard USB2 hosts

The SSI2 products include:

- **SSI2 ISA** family - allow the use of one or 3 ISA cards
- **SSI2 PCI** family - allows the use of one or 3 PCI cards
- **SSI2 PCMCIA** - allows the use of one 16/32bit PCMCIA card

The SSI2 Host side products include:

- **SSI2 HostPCI** – mounted in a PCI slot of a desktop computer
- **SSI2 HostCB** – mounted in a CardBus slot of a notebook computer

XPRS Cards

The XPRS line of products allows use of PCI, PCI Express, ExpressCard, and 32bit PCMCIA cards outside of computers systems, through cable.

There are 2 type of XPRS products:
- host cards – mounted on a desktop system, or on a notebook system with
- and peripheral cards – handling PCI, PCI Express, ExpressCard, and 32bit PCMCIA cards

Based on the computer system there are the following host cards:
- xprs-host-dt for a PCI Express desktop system
- or, xprs-host-ec for a notebook system with an ExpressCard slot

There are the following **XPRS** peripheral cards:
- xprs-px-x1 with a PCI Express X1 card
- xprs-px-x16 with a PCI Express X16 card
- xprs-pci-x1 with a PCI card
- xprs-cb with a PCMCIA CardBus card
- xprs-ec with an ExpressCard card

1.2 Software

Supported Platforms

The platforms that ARS Technologies' cards work on are:

- Windows – 32bit and 64bit / Windows 2000 – Windows 10, and later
- Linux – x86 32bit and 64bit / most kernels and distros
- Linux – ARM 32bit / (tested on Raspberry Pi)
- Android – ARM phones, tablets
- Mac OS X – 10.6 – 10.11, and later

The Windows platform includes support on - Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, and Windows 7 and Windows 10. If you have Windows Vista or 8, we recommend upgrading to Windows 7 or 10.

The Linux platform includes support on 3.x.xx and later kernels, on x86 processors - 32bit and 64bit releases, and ARM processors – 32bit releases.

The Android platform includes support on phones and tablets which have USB host support.

The Mac OS X platform includes support for Mac OS X 10.6 – 10.11 and later releases.

The OS version and releases are the currently tested. Newer OS releases may work as well.

1.3 Customers

We offer our products to two groups of customers:

- **Manufacturers** of ISA, PCI, or PCMCIA cards. Manufactures have the source code of the software for their cards. They can use our **ArsGui** utility to manually access the hardware on the peripheral card, and then our **basic simple API set** to develop programs. Or they can use the **extended API set** and samples in our **SDKBUS** kit to convert their software to work our USB2.0 products, or the SSI2 products. For more information, please visit : www.arstech.com/SDKBUS.htm

- **End users** who do not have the source code, but just the binaries of an ISA, PCI or PCMCIA card they use. End users can use our universal software layer (USL) option with the original software of the card. The USL is included in the installation software. There is a detailed description on the purpose, set-up and use of the universal software layer in the following chapters.

2. Considerations before and after purchase

This chapter provides considerations on selecting of our products.

If you have selected, purchased and use the ideal set of products – congratulations!

In all the other cases you may need to revisit multiple times this chapter before and after purchasing of our products.

2.1 Hardware considerations

XPRS or SSI2 / USB2 ?

XPRS line of products allows handling of peripheral cards in a way like they are attached directly to the computer system.
If you have a high data throughput peripheral card we strongly recommend using XPRS line of products.

The USB interface is present / available on almost all systems and supported in our USB2 and SSI2 product lines, however is not similar to the interfaces of the peripheral cards. We recommend testing/evaluating first with 1 set of – product/enclosure/power supply/cable .

Single card or multiple cards ?

All of our product lines have products supporting a single peripheral card, or up to 3 peripheral cards .

If having multiple cards not similar to each other, we recommend mounting/testing with one peripheral card at a time.

Choosing of powering of a peripheral card

An ISA card may use:

- either +5V only
- or +5V, and any combination of +12V, -5V and -12V

A PCI card may use:

- either +5V only
- or +3.3V only
- or +5V and any combination of +12V and -12V
- or +3.3V and any combination of +12V and -12V

A 16bit PCMCIA card may use:

- either +5V only
- or +3.3V only

A 32bit PCMCIA card uses

- +3.3V only

A PCI Express card may use:

- either +3.3V only
- or +3.3V and +12V

A ExpressCard card may use:

- +3.3V only
- or +3.3V and +1.5V

Regarding the voltages used by peripheral cards, please check our articles in the 'Knowledge Base' section - http://www.arstech.com/page--ste_whitepapers.html

All of product our lines provide power through the cable – some peripheral cards may be powered/handled in this way.

ARS Technologies offers the following power supply options for ISA and PCI peripheral cards:

- **isa-pwr-** Power-supply-module-isapwr.html
- **isa-pwr-xr-** External-Power-Supply-25W-ROHS

ARS Technologies offers the following power supply options for PCI, PCMCIA and PCI Express peripheral cards:

- **pwr-3v** - 3.3V Power-supply
- **pwr-5v, -eu, -uk** - 5V Power-Supply

The **currents** consumed by the different voltages may vary from several mA to several A .

The **voltages** used by a particular card are available in the documentation/specifications sheet for that particular card. When using multiple cards, please add the currents for a particular voltage to get the total current consumed.

Choosing an enclosure for ISA, PCI and PCI Express cards

If you have a single ISA, PCI or PCI Express card, you can choose between:

- Enclosure-for-1-ISA-PCI-card
- Enclosure-Double-length-for-1-ISA-PCI-card

If you have multiple ISA, PCI or PCI Express cards, you can choose between:

- Enclosure-for-3-ISA-PCI-cards-isax3b1.html
- Enclosure-Double-length-for-3-ISA-PCI-cards

The above web pages offer:

- the enclosure **images**
- the **maximum dimensions** of an ISA, PCI or PCI Express card which can fit into the enclosure
- **assembly instructions** for the enclosure and the peripheral card

2.2 Software Considerations

Different operating systems

Software written for one operating system may or may not work on other operating systems.

ARS Technologies recommends finding software packages for the same hardware- i.e. ISA, PCI, PCMCIA cards- for different operating system, and testing on the particular operating system where you want to use the peripheral card.

Virtualization

Current solutions for virtualized operating systems are good for application / user level software, however may be having problems with drivers / kernel level software and special hardware.

If a test with our products on virtualized operating system, an option may be to test on current os which is not virtualized.

Resources detection

Some peripheral cards like PCI, PCMCIA and Plug and Play (PNP) ISA cards can be detected by our software and can provide their resources.

Other cards, like non PNP ISA cards can be scanned by our software and the detected resources reported.

There may be a need to manually add resources which were not automatically detected by ARS Technologies' installation software.

Peripheral card handling

Peripheral cards like PCI, PCI Express, PCMCIA and ISA cards may already have a software binaries for one of more operating systems. We offer support for some types binaries – with limitations.

Software developers who want to port the source of existing software, or wrote new software can use our API set – the basic/simple set included in the install software, or the extended set in the sdkbus product.

Adjustments

You can view ARS Technologies' warranty/refund store policies at:
http://www.arstech.com/page--ste_storepolicies.html

You can consider a number of solutions, until you find the most suitable option-peripheral solution card, power supply, enclosure and/or cable.

If our product from one line does not work with a peripheral card, you can consider testing with a product from another line which handles the same type of a peripheral card.

3. USB2 product line

The chapter describes each individual card and the ways of powering, placing it in an enclosure and connecting the card.

3.1 USB2ISA-R card

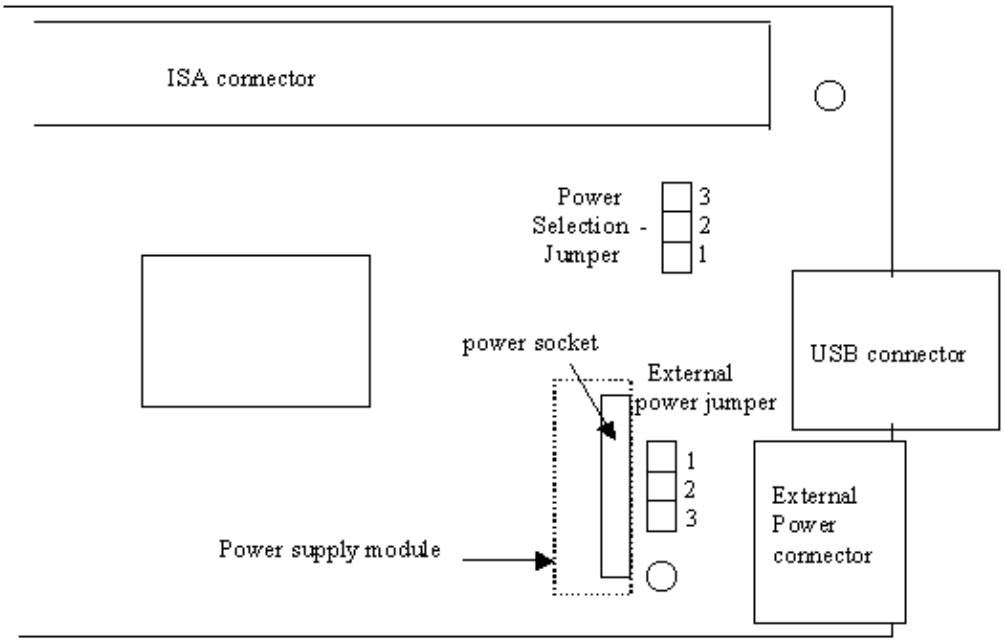


Image of USB2ISA-R

The USB 2.0 to ISA (USB2ISA-R) card works with one ISA card.

Step 1 - Powering considerations

There are 3 possible choices for powering an ISA card mounted on an USB2ISA-R:

- using the power provided through the USB cable- if the ISA card needs only +5V and the power consumption is within 500mA.

- using an **isa-pwr-** in addition to the +5V coming through the USB cable, the power supply module provides +12V, -12V and -5V when currents consumed by an ISA card are within 50mA.

- using an external power supply (**isa-pwr-xr)** adapters to provide +5v, +12V, -12V and -5V when currents consumed by an ISA within the limits of the particular external power adapter.

To find out if a particular ISA card needs additional voltages please read the article located at:

http://www.arstech.com/page--pwrsupplyneeds.html .

To find the currents consumed, please check the documentation of the particular ISA card in use.

ARS Technologies offers the following powering options:

- **isa-pwr-** Power-supply-module
- **isa-pwr-xr-** External-Power-Supply-25W-ROHS

If you want to use the **isa-pwr** (power supply module), it has to be mounted on the power supply socket .

If you want to use the **isa-pwr-xr** (external power supply), the USB 2.0 to ISA card will not work until the external power is turned on.

To assist with choosing a powering option, ARS Technologies offers a universal choice, which can cover most available ISA cards - using **isa-pwr-xr** external power supply to power ISA cards.

The **USB2ISA-R** board has a light emitting diode (LED) which indicates when there is power supplied or not. When there is power, the LED is on, when there is no power, the LED is off.

ARS Technologies recommends first connecting the USB 2.0 to ISA card without an ISA card mounted and then checking in our Enumerator for connect/disconnect events in order to make certain that the USB2ISA-R card is powered properly.

After mounting an ISA card in the USB 2.0 to ISA card, check in our Enumerator for connect/disconnect events to make sure certain that the USB2ISA-R card is powered properly.

The power selection jumper has two options:
(Please reference the USB2ISA-R image in section 3.1 to change jumper position)

Option 1: 1-2 Position (default)

- 1-2 (default) - power provided by the USB cable; this choice has 2 options:

  1. ISA card using only +5V; there is limit of 500 mA current consumption from +5V

  2. **isa-pwr** power supply module connected providing –5V, +12V or -12V to the ISA card; the card consumes currents within the powering limitations.

Option 2: 2-3 Position

- 2-3 - power provided by an external power source; this choice has the option:

  The power comes from an external power supply in the power socket (**isa-pwr-xr**) adapters; there are +5V, +12V, -12V or -5V going to the ISA card; the limit of current consumption depends on the external power supply

External Jumper Powering Options

The external power jumper is placed in permanent position:
2-3 – (default) power provided by the **isa-pwr-xr**

Step 2 (optional) – Place USB2ISA-R card into an enclosure

ARS Technologies offers single and double length plastic enclosures. You will need to measure the ISA card you have and select the appropriate single or double length plastic enclosure for your card.

If you have an ISA card and are using the **USB2ISA-R** you can choose between two enclosure options:

- Enclosure-for-1-ISA-PCI-card
- Enclosure-Double-length-for-1-ISA-PCI-card

The above web pages offer:

- enclosure **images**
- **maximum dimensions** of an ISA card which can fit into the enclosure
- assembly instructions for the enclosure and the peripheral card

3.2 USB2ISA-X3 card

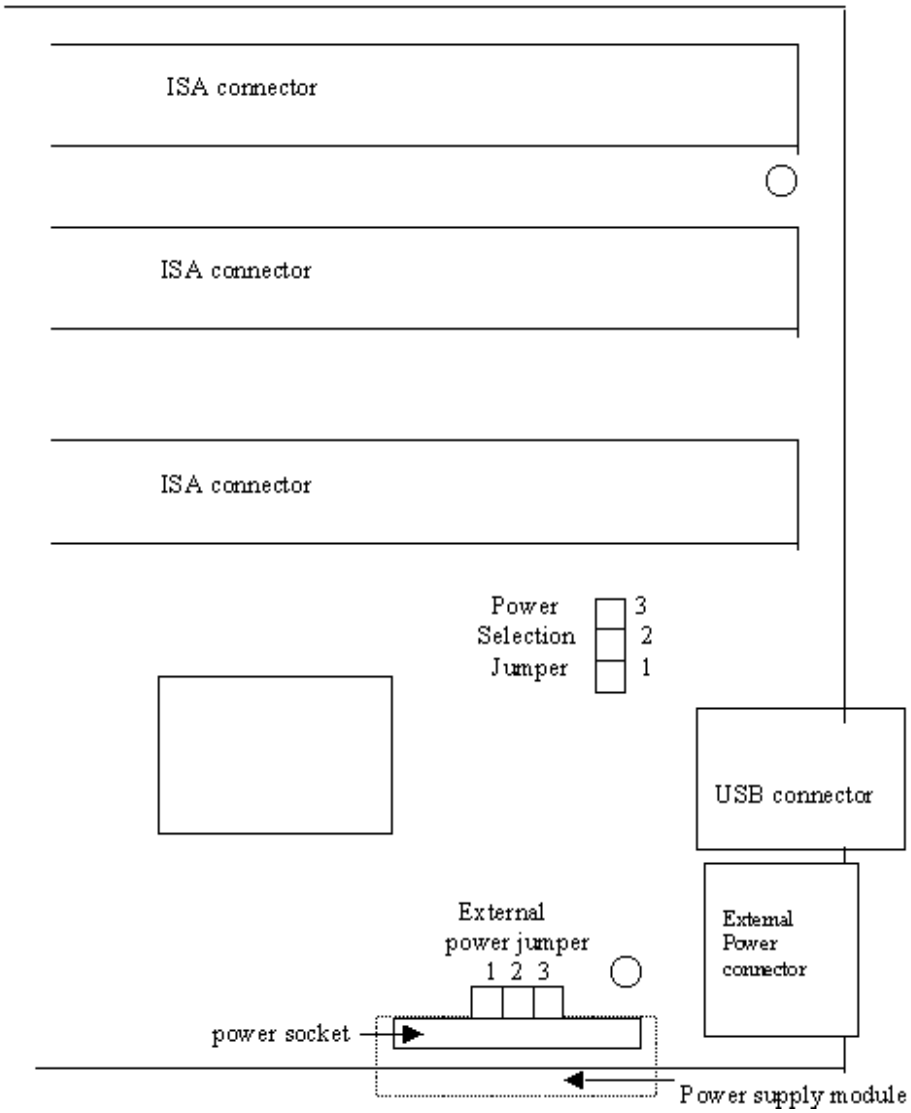


Image of USB2ISA-X3

The USB 2.0 to ISA Three Connector (USB2ISA-X3) card works with up to three ISA cards.

Step 1 - Powering considerations

There are 3 possible choices for powering an ISA card mounted on an USB2ISA-X3:

- using the power provided through the USB cable- if the ISA card needs only +5V and the power consumption is within 500mA.

- using an **isa-pwr-** in addition to the +5V coming through the USB cable, the power supply module provides +12V, -12V and -5V when currents consumed by an ISA card are within 50mA.

- using an external power supply (**isa-pwr-xr)** adapters to provide +5v, +12V, -12V and -5V when currents consumed by an ISA within the limits of the particular external power adapter.

To find out if a particular ISA card needs additional voltages please read the article located at:

http://www.arstech.com/page--pwrsupplyneeds.html .

To find the currents consumed, please check the documentation of the particular ISA card in use.

ARS Technologies offers the following powering options:

- **isa-pwr-** Power-supply-module
- **isa-pwr-xr-** External-Power-Supply-25W-ROHS

If you want to use the **isa-pwr** (power supply module), it has to be mounted on the power supply socket .

If you want to use the **isa-pwr-xr** (external power supply), the USB 2.0 to ISA card will not work until the external power is turned on.

To assist with choosing a powering option, ARS Technologies offers a universal choice, which can cover most available ISA cards - using **isa-pwr-xr** external power supply to power ISA cards.

The **USB2ISA-X3** board has a light emitting diode (LED) which indicates when there is power supplied or not. When there is power, the LED is on, when there is no power, the LED is off.

ARS Technologies recommends first connecting the USB 2.0 to ISA card without an ISA card mounted and then checking in our Enumerator for connect/disconnect events in order to make certain that the USB2ISA-X3 card is powered properly.

After mounting an ISA card in the USB 2.0 to ISA card, check in our Enumerator for connect/disconnect events to make sure certain that the USB2ISA-X3 card is powered properly.

The power selection jumper has two options:
(Please reference the USB2ISA-X3 image in section 3.2 to change jumper position)

Option 1: 1-2 Position (default)

- 1-2 (default) - power provided by the USB cable; this choice has 2 options:

  3. ISA card using only +5V; there is limit of 500 mA current consumption from +5V

  4. **isa-pwr** power supply module connected providing –5V, +12V or -12V to the ISA card; the card consumes currents within the powering limitations.

Option 2: 2-3 Position

- 2-3 - power provided by an external power source; this choice has the option:

  The power comes from an external power supply in the power socket (**isa-pwr-xr**) adapters; there are +5V, +12V, -12V or -5V going to the ISA card; the limit of current consumption depends on the external power supply

External Jumper Powering Options

The external power jumper is placed in permanent position:
2-3 – (default) power provided by the **isa-pwr-xr**

Step 2 (optional) – Place USB2ISA-X3 card into an enclosure

ARS Technologies offers single and double length plastic enclosures. You will need to measure the ISA card you have and select the appropriate single or double length plastic enclosure for your card.

If you have an ISA card and are using the **USB2ISA-X3** you can choose between two enclosure options:

- Enclosure-for-3-ISA-PCI-cards
- Enclosure-Double-length-for-3-ISA-PCI-cards

The above web pages offer:

- enclosure **images**
- **maximum dimensions** of an ISA card which can fit into the enclosure
- assembly instructions for the enclosure and the peripheral card

3.3 USB2PCMCIA-R card

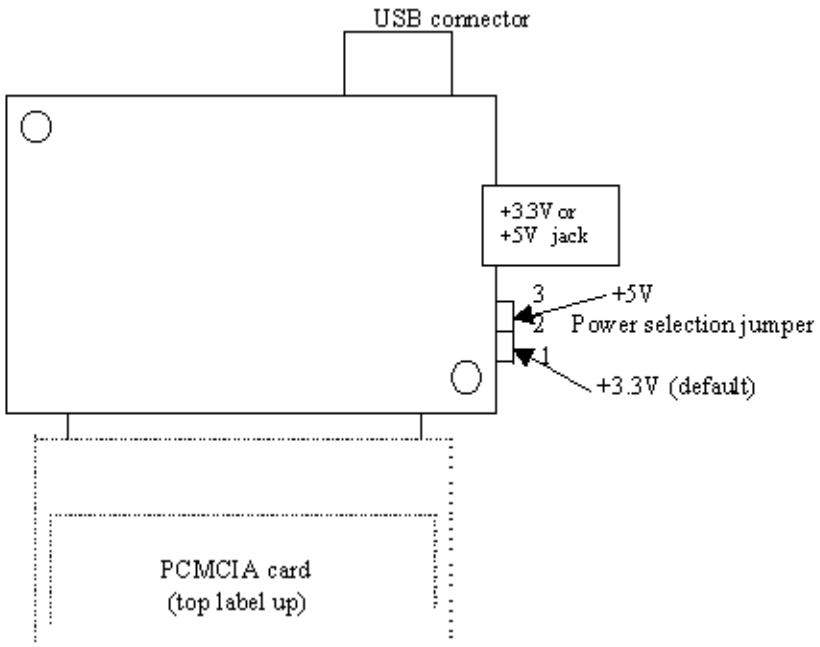


Image of USB2PCMCIA-R

The USB 2.0 to PCMCIA (USB2PCMCIA-R) card works with one 16bit 'PC Card' type of PCMCIA card.

Both +5V and +3.3V PCMCIA cards are supported by the USB2PCMCIA-R

Step 1 - Powering considerations

A header on the USB2PCMCIA-R card allows selection of +5V or +3.3V as a Vpp voltage to the PCMCIA card.

There are two possible choices of powering on the USB2PCMCIA-R:

- using the power provided through the USB cable if the PCMCIA card consumes up to 500mA of current, selecting the voltage on the header
- using the **pwr-5v** or **pwr-3v** adapter, which will provide up to 2A current for the PCMCIA card.

Jumper Powering Selections

Jumper powering options

(See the image in section 3.3 to reference jumper powering position.)

The power selection jumper has 3 options:

- 1-2 (default) – provides +3.3V as Vpp power to the PCMCIA card
- 2-3 – provides +5V as Vpp to the PCMCIA card
- no jumper – power provided by pwr-5v or pwr-3v connected to the power jack.

If you are not sure about the correct setting of Vpp for the particular card, please start with the lower voltage +3.3V, and if the testing does not bring the required results, then switch to +5V.

To find the voltage and the current consumed, please check the documentation of the particular PCMCIA card.

ARS Technologies offers the pwr-5v or pwr-3v to power the USB2PCMCIA-R card. For more info see:

- External-Power-Supply-5V-pwr5v.html
- External-Power-Supply-3V-pwr3v.html

3.6.2 Mounting a PCMCIA card to the USB2PCMCIA-R

Step 2 – Mounting

The **USB2PCMCIA-R** card comes with an enclosure.

In general one PCMCIA card has a top side and a bottom side. Ideally, when connected to the **USB2PCMCIA-R** card , the top side of the PCMCIA card will be up and the bottom side will face down.

Mount the PCMCIA card as illustrated in figure 3.6.

3.6.3 Connecting a power source

Step 3 – Connecting

The PCMCIA card has to be mounted to the **USB2PCMCIA-R** before connecting it to the USB cable.

Jumper powering

Please change the jumper settings according to the voltage of the PCMCIA card.

External powering

If you want to use the **USB2PCMCIA-R** card with an external power source:

1. Connect the power source
2. Turn the power on
3. Connect the **USB2PCMCIA-R** card to the USB host

The USB2PCMCIA-R card will not work until the external power is turned on.

ARS Technologies recommends first connecting the **USB2PCMCIA-R** card without a PCMCIA card mounted and then checking in our Enumerator for connect/disconnect events, in order to make sure for the proper powering.

After mounting a PCMCIA card to the **USB2PCMCIA-R** card, check in our Enumerator for connect/disconnect events in order to ensure proper powering.

3.4 Other USB2 cards

ARS Technologies did previously offer also the following products:
- USB2ISA-RA – takes one ISA card, mounted horizontally
- USB2ISA-SL – takes multiple ISA cards, mounted in a passive ISA backplane
- USB2ISA-X7 – takes up to 7 ISA cards

You can initially evaluate with our regular – similar / comparable products, and contact us if you want to get a specific one of the above products.

4. SSI2 Product Line

This chapter briefly describes the SSI2 product line - each individual card. A new edition is under development.

4.1 SSI2 ISA card

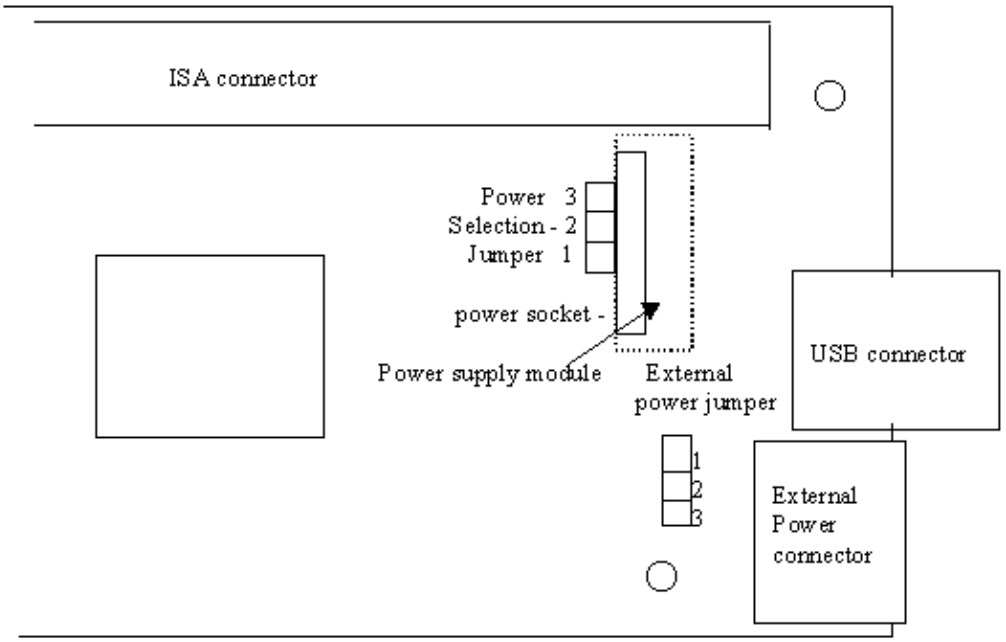


Image of SSI2 ISA

The SSI2 ISA card allows the work with one ISA card.

4.2 SSI2 PCI card

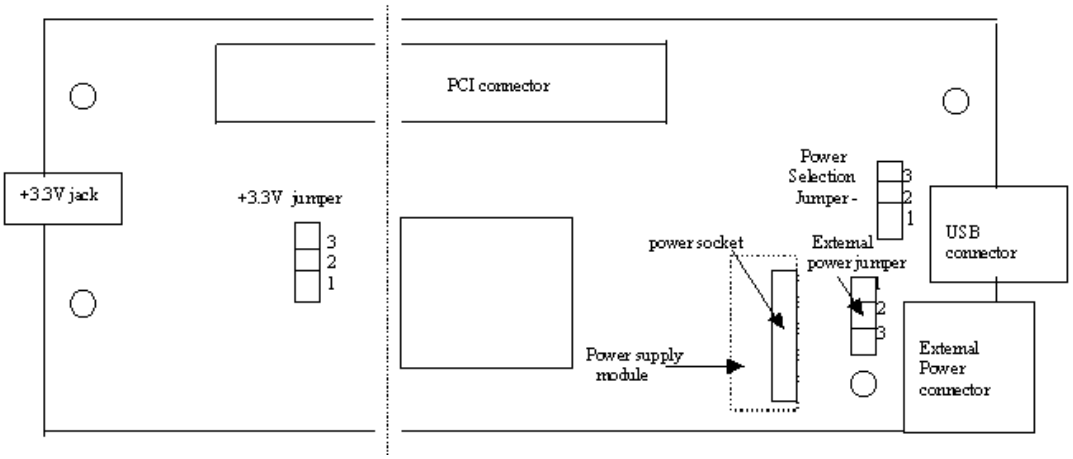


Image of SSI2 PCI

The SSI2 PCI card works with one PCI card.

4.3 SSI2 ISA X3 card

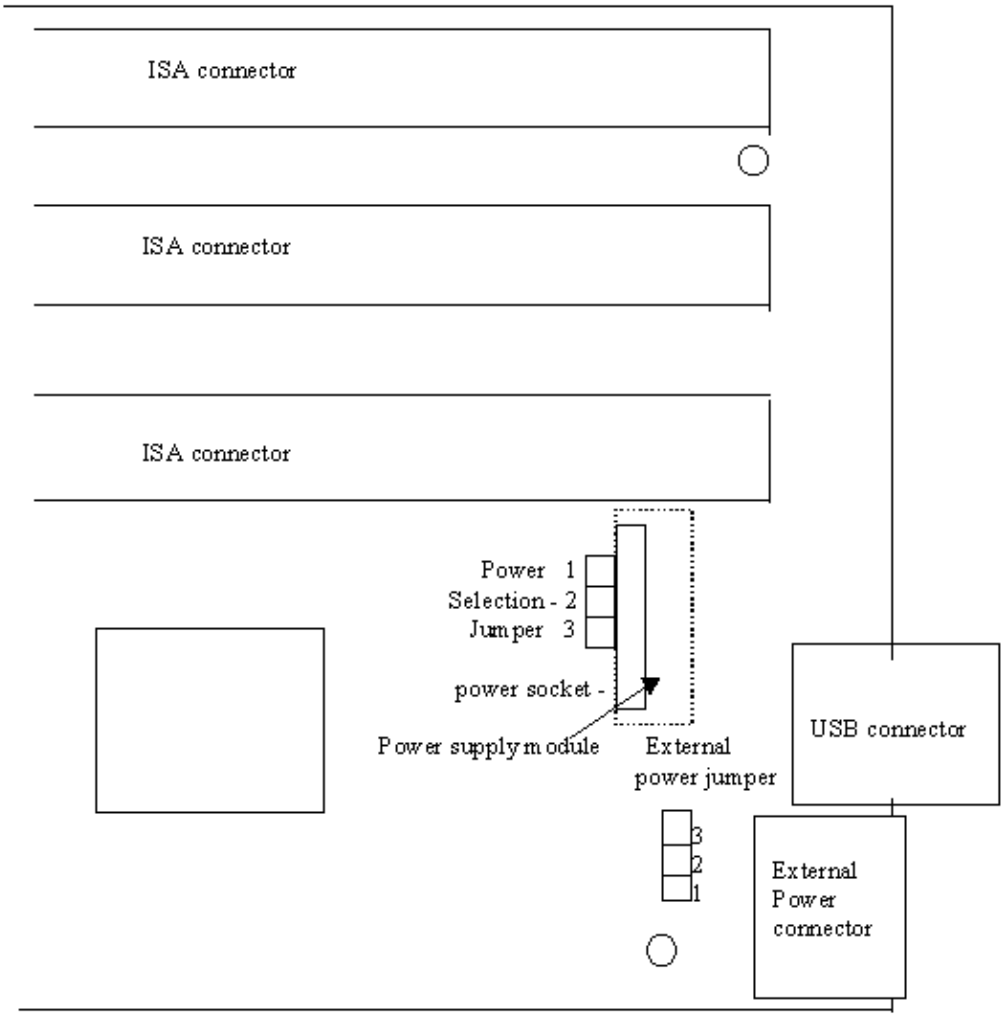


Image of SSI2 ISA X3

The SSI2 ISA X3 card allows the work with up to 3 ISA cards.

4.4 SSI2 PCI X3 card

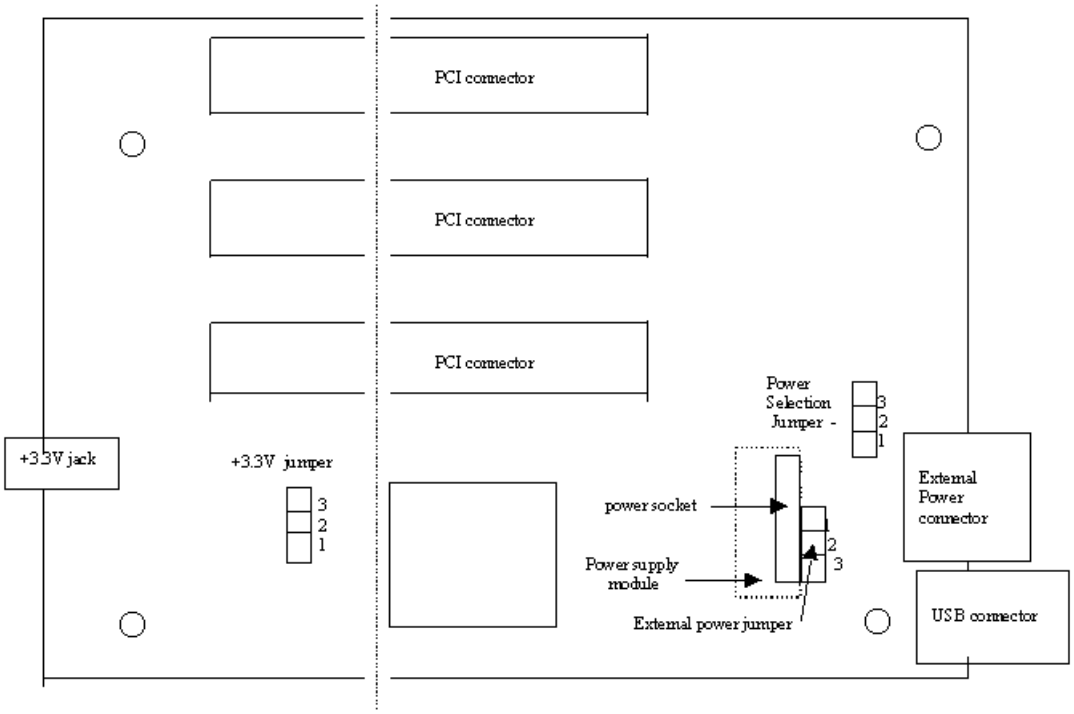


Image of SSI2 PCI X3

The SSI2 PCI X3 card works with up to 3 PCI cards.

4.5 Evolution of SSI2 cards

The ssi2 line have multi-protocol products which works currently through -

- usb , on systems with usb2.0 hosts
- or, with our our ssi2-host-.. cards

We plan

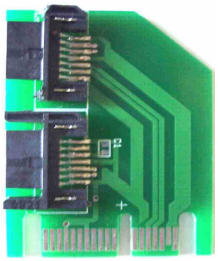
- including additional interfaces
- adding support for devices – iphone/ipad, android ...

5. XPRS Product Line

XPRS line of products allow using of peripheral cards – PCI, ExpressCard, PCI Express, CardBus outside of computer systems – through cable.

This chapter describes the XPRS product line; each individual card; the ways of powering the cards; and how to place the card in an enclosure and connect it to a power source.

5.1 XPRS-Host-DT card



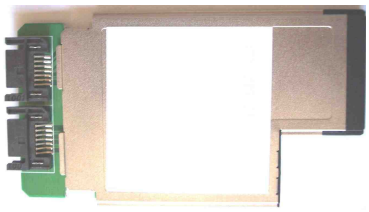
XPRS-Host-DT product is a kit containing – the card, 2 cables of 0.5m / 1.6" length and a metal bracket.

The card is mounted in a computer system (normally a desktop) with PCI Express -x1 connectors.
Optionally XPRS-Host-DT card may be mounted and used in a PCI Express -x16 connectors.

XPRS-Host-DT card connects with all of the XPRS-.. peripheral cards

The web page of the product includes a link showing the way of mounting and use of XPRS-Host-DT in multiple pictures.

5.2 XPRS-Host-EC card



XPRS-Host-EC product is a kit containing – type54 card (as on the picture above), type34 card, and 2 cables of 0.5m / 1.6”.

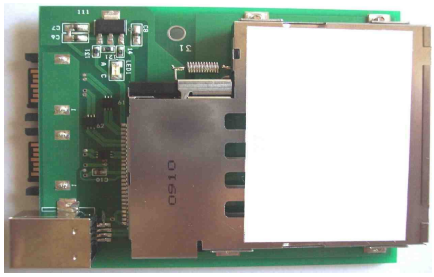
Some computer systems can not take type54 card – please use type 34 card in this case.

The card is mounted in a computer system (normally a notebook) with an ExpressCard slot.

XPRS-Host-EC card connects with all of the XPRS-.. peripheral cards

The web page of the product includes a link showing the way of mounting and use of XPRS-Host-EC in multiple pictures.

5.3 XPRS-EC card



XPRS-EC allows mounting / using of ExpressCard type34 and type54 peripheral cards .

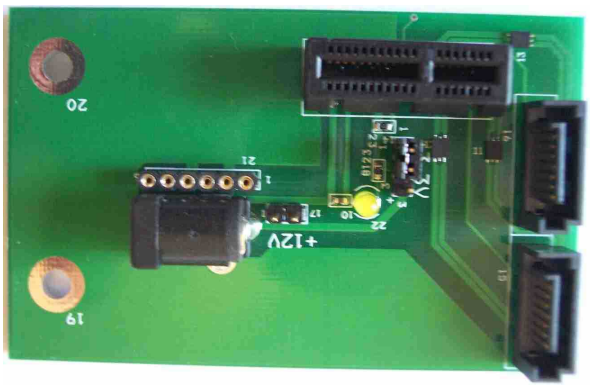
XPRS-EC card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS-EC has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

The web page of the product includes a link showing the way of mounting and use of XPRS-EC in multiple pictures.

5.4 XPRS-PX-X1 card



XPRS-PX-X1 allows mounting / using of one PCI Express -x1 card.

XPRS- PX-X1 card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS- PX-X1 has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

A PCI Express card uses +3.3v and also may require +12v to function.

There are the following ways of powering :

- through the cables - when the PCI Express -x1 card uses/requires only +3.3v, and has current consumption of less than 0.5A; the 3.3v jumpers has to be closed

- through the cables / with 3,3v power module mounted in the 6pin socket - when the PCI Express -x1 card has current consumption of less than 0.5A, and consumes of up to 50mA on +12v; the jumper for +12v has to in closed position; the 3.3v jumpers has to be closed

- through the cables / with 12V external supply connected to the power jack - when the PCI Express -x1 card has current consumption of less than 0.5A, and consumes high current , of up to 5A on +12v

The web page of the product includes a link showing the way of mounting and use of XPRS- PX-X1 in multiple pictures.

5.5 XPRS-PX-X16 card

XPRS-PX-X16 allows mounting / using of one PCI Express -x16 card.

In addition, XPRS-PX-X16 allows mounting / using of one PCI Express -x1 / -x4 / -x8 card, as well.

XPRS- PX-X16 card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS- PX-X16 has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

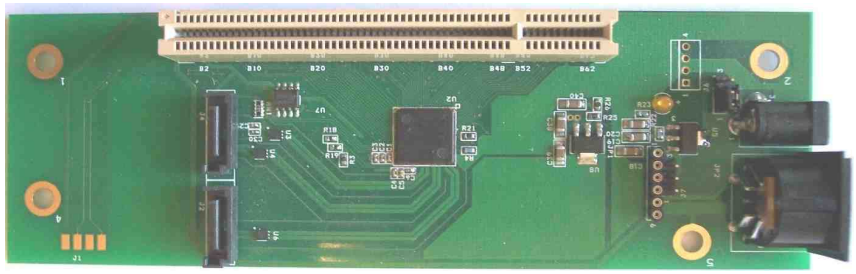
A PCI Express card uses +3.3v and also may require +12v to function.

There are the following ways of powering :

- through the cables - when the PCI Express -x1/4/8/16 card uses/requires only +3.3v, and has current consumption of less than 0.5A; the 3.3v jumpers has to be closed
- through the ATX power supply - when the PCI Express -x1/4/8/16 card has high current consumption on +3,3v and +12v; the 3.3v jumpers has to be open; to turn on the ATX power supply the on-board button has to be pushed
- through the '**pwr-12v**' product

The web page of the product includes a link showing the way of mounting and use of XPRS- PX-X16 in multiple pictures.

5.6 XPRS-PCI-X1 card



XPRS-PCI-X1 allows mounting / using of one PCI card.

XPRS- PCI-X1 card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS- PCI-X1 has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

A PCI card uses normally +3.3v and +5v , and also may require +12v and/or -12v to function.

In the order page for the product , we include the choice to add **pwr-5v** power supply, which connects to power jack.

After mounting the PCI card , we recommend connecting **pwr-5v** power supply, and then connecting cables.

There are the following ways of powering :

- **pwr-5v** power supply and power through the cables - when the PCI card uses/requires only +3.3v and +5v; 3.3v comes through the cables; **pwr-5v** provides +5v; the 3.3v jumper has to be closed

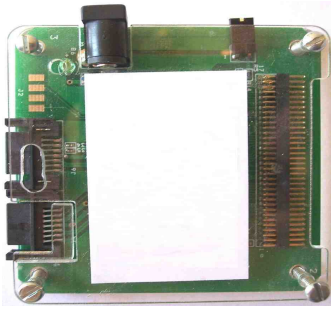
- **pwr-5v** power supply**,** power through the cables, and **isa-pwr** module - when the PCI card uses/requires +3.3v, +5v, and +12v/-12v; 3.3v comes through the cables; **pwr-5v** provides +5v; **isa-pwr** module provides +12v, -12v; the 3.3v jumper has to be closed

- **isa-pwr-xr** power supply**,** power through the cables - when the PCI card uses/requires +3.3v, +5v, and +12v/-12v; 3.3v comes through the cables; **isa-pwr-**

xr provides +5v,+12v,-12v; the 3.3v jumper has to be closed

The web page of the product includes a link showing the way of mounting and use of XPRS- PCI-X1 in multiple pictures.

5.7 XPRS-CB card



XPRS-CB allows mounting / using of 32bit PCMCIA card - CardBus type peripheral cards .

XPRS-CB card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS- CB has to be on.
If the LED is not on:

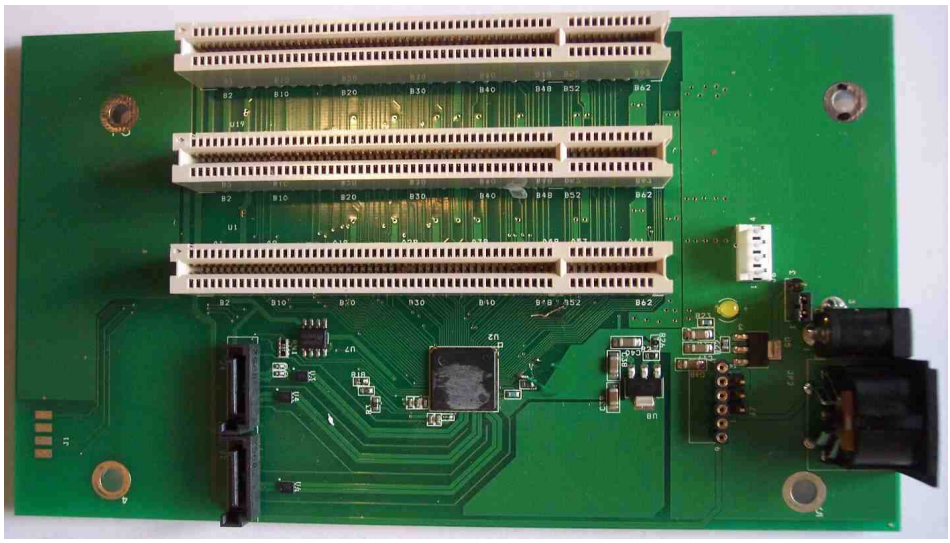
- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

There are the following ways of powering :

- power through the cables - when the +3.3v for the CardBus card comes through the cables; the 3.3v jumper has to be closed
- **pwr-3v** power supply- when the +3.3v for the CardBus card is provided by - **pwr-3v**, which is connected to the power jack; the 3.3v jumper has to be open

The web page of the product includes a link showing the way of mounting and use of XPRS- CB in multiple pictures.

5.8 XPRS-PCI-X3 card



XPRS-PCI-X3 allows mounting / using of up to 3 PCI cards.

XPRS- PCI-X3 card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS- PCI-X3 has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

A PCI card uses normally +3.3v and +5v , and also may require +12v and/or -12v to function.

In the order page for the product , we include the choice to add **pwr-5v** power supply, which connects to power jack.

After mounting the PCI card/s , we recommend connecting **pwr-5v** power supply, and then connecting cables.

There are the following ways of powering :

- **pwr-5v** power supply and power through the cables - when the PCI card/s uses/requires only +3.3v and +5v; 3.3v comes through the cables; **pwr-5v** provides +5v; the 3.3v jumper has to be closed

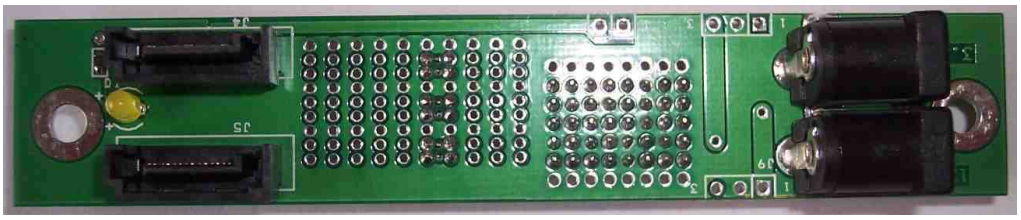
- **pwr-5v** power supply**,** power through the cables, and **isa-pwr** module - when the

PCI card/s uses/requires +3.3v, +5v, and +12v/-12v; 3.3v comes through the cables; **pwr-5v** provides +5v; **isa-pwr** module provides +12v, -12v; the 3.3v jumper has to be closed

- **isa-pwr-xr** power supply**,** power through the cables - when the PCI card/s uses/requires +3.3v, +5v, and +12v/-12v; 3.3v comes through the cables; **isa-pwr-xr** provides +5v,+12v,-12v; the 3.3v jumper has to be closed

The web page of the product includes a link showing the way of mounting and use of XPRS- PCI-X3 in multiple pictures.

5.7 XPRS-cPCIe card



XPRS-cPCIe allows mounting / using of a Compact PCI Express or PXI Express type peripheral cards .

XPRS- cPCIe card connects with all of the XPRS-Host-.. cards

After connecting the cables to already mounted/powered on XPRS-Host-.. card the LED on XPRS-cPCIe has to be on.
If the LED is not on:

- make sure XPRS-Host-.. card is mounted/powered on
- and/or, switch the positions of the cables

There are the following ways of powering :

- power through the cables - when the +3.3v for the Compact PCI Express or PXI Express card comes through the cables; the 3.3v jumper has to be closed
- **pwr-3v** power supply - when the +3.3v for the Compact PCI Express or PXI Express card card is provided by - **pwr-3v**, which is connected to the power jack; the 3.3v jumper has to be open
- **pwr-3v** + pwr-12v power supplies - when the +3.3v for the Compact PCI Express or PXI Express card card is provided by - **pwr-3v**, the +12v for the Compact PCI Express or PXI Express card card is provided by - **pwr-12v,** which are connected to the power jacks; the 3.3v jumper has to be open

The web page of the product includes a link showing the way of mounting and use of XPRS- cPCIe in multiple pictures.

6. Installation

6.1 Installation files and folders

The ARS Technologies installation software is packed in a single ZIP file and is available for download at:

www.arstech.com/install2rel.zip

The install file – **install2rel.zip ,** after unzipping, has a number of folders, including:

- **\windows** - a folder for installing on the Windows platform; single setup file covers installing for 32bit and 64bit Windows releases
- **\linux-x86** - a folder for installing on the Linux platform on x86 processor; there is a single package – for both 32bit and for 64bit Linux releases
- **\linux-arm** - a folder for installing on the Linux platform on ARM processor; there is a package for 32bit ARM Linux release
- **\android -** a folder for installing on the Android platform on ARM processor;
- **\mac-os-x** - a folder for installing on the Mac OS X platform; single package file covers installing for all Mac OS X releases
- **\4developers** – a folder with information for developers; it includes our simple/basic API set and a sample which covers all operating systems that we support

First time install may require system libraries to be installed before the main software. They are available for download at::
www.arstech.com/install2libs.zip .

The install file – **install2libs.zip ,** after unzipping, has a number of folders, including:

- **\windows** - a folder for installing system libraries on the Windows platform
- **\linux-x86** - a folder for installing system libraries on the Linux platform on x86 processor
- **\macosx** - a folder for installing system libraries on the Mac OS X platform

6.2 Specifics for installing on Windows platform

Install system libraries

Unzip **install2libs.zip** and from **'\windows'** folder double click or run from 'command prompt' – **setup-libs.exe** to install system libraries.

This needs to be done only once – the first time the software is installed on the specific computer.

Install main software

Unzip **install2rel.zip - t**he **'\windows'** platform folder contains a single executable file– **setup-X-Y.exe** ,
where -**X-Y** represents the current software version, for example **setup-2-150.exe** .
Please run this file, and follow the install process.

Choose the way of starting of the Enumerator – during setup

A message box with a question appears asking:

Run the ARSTech Enumerator

- automatically- at start up
- manually- from the menu

If you choose "Yes", our Enumerator program **arsenum3** is placed in the -
Start / Programs / StartUp ,
and will be started immediately after boot of the operating system.

If you choose "No", our Enumerator program **arsenum3** is placed in the -
Start / Programs / ARSTech ,
and after boot of the operating system have to be started manually.

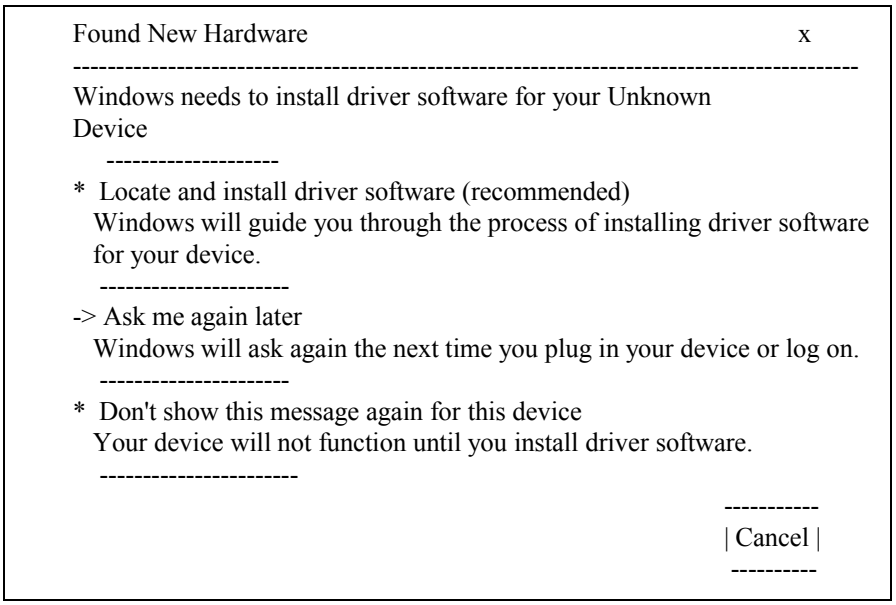
Installing USB drivers on Windows operating systems

The USB drivers are placed in this location:
\program files\arstech\arstech utilities\drivers
which has 2 sub-folders:

- 'w2k-w7' - contains drivers for Windows 2000, XP (x86),
Windows 2003, 2008, 7 (x86 and x64)
- 'w10' - contains .inf file for driver install on Windows 10 (x64)

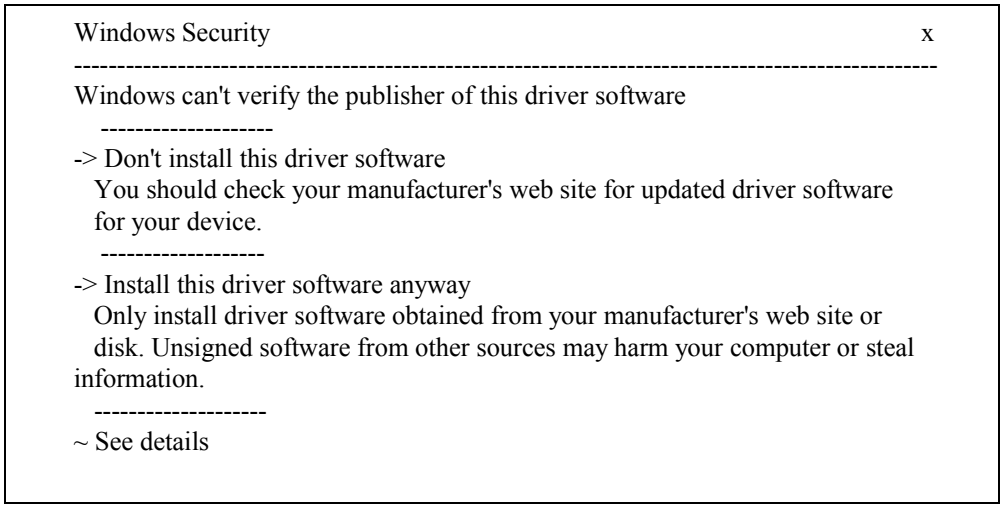
Regarding Windows Vista and 8 os-es we strongly recommend upgrading to Windows 7 or Windows 10.

After connecting the USB2 cards when the Enumerator does not run, the following message box appears:



- Select and click "*Locate and install driver software*"
- There will be a message, "*Windows needs a permission to continue*"
- Click "*Continue*"

A new dialog box appears



When connecting **'usb2isa'** or **'usb2pcmcia'** initially the **'device manager'** may show '**Unknown**' under **'Other devices**'.

In this case double click on the '**Unknown**' device - it will bring '**Properties**' dialog box.

In '**general**' tab click on '**update driver**' button and choose -
'**browse my computer for driver software**'.

Push '**browse**' button and point to -
\program files\arstech\arstech utilities\drivers\w2k-w7
or **\program files\arstech\arstech utilities\drivers\w10**
depending on the os.

A warning dialog box comes that the driver does not contain digital signature and choice to abort or continue.

Select to continue and finish driver install.

Driver details

The current software release uses a standard operating system driver - winusb.sys , made by Microsoft.

This driver have been available through the driver search by downloading it from Microsoft , or actually included in the os files on newer os-es - Windows 8, 10 ...

To find details on the driver, in '**device manager**' double click on -
ars technologies usb 2.0 to isa device
or **ars technologies usb 2.0 to pcmcia device**

Select '**driver**' tab, and push '**driver details**' button.
The screen will show file folder and - provider, file version, copyright, digital signer.

Large companies have strong network control policies and may be reluctant to allow installing a driver when a warning message comes.

To address these concerns we repeat that the driver is actually made by Microsoft, and the the operating system should trust its own drivers.

Next steps

If not familiar, please check the chapter on software utilities - arstech enumerator **arsenum3** and **arsgui** .

Based on the peripheral card please check the chapter for the way of using our products with ISA or PCMCIA cards.

Developers of software for peripheral card may check chapters on the:
- simple/ basic API set
- extended API set in **sdkbus**

Upgrading of the software

ARS Technologies offers free upgrades on the installation software for our products. These upgrades are available for download on our web site, packed as a single .zip file at:

www.arstech.com/install2rel.zip

The first step in upgrading is to unload the currently running ARS Technologies software. Please bring up the *ARS Technologies Enumerator* **arsenum3** dialog box, and click the *'Unload'* button.

The next step is to remove the previously installed ARS Technologies software.

After this, please run the **Setup file** and go through the installation process described in the previous chapters. **Please read the important message below:**

Note!!!: Please preserve all older setup-X-Y.exe files, to restore previous software versions, if necessary.

6.3 Specifics for installing on Mac OS X platform

Install system libraries

Unzip **install2libs.zip** and from **'macosx'** folder copy **'arstech-libs-mac.run'** into **/Users/Shared** folder

- you may need to open **'Terminal'** and make file executable, or do:
chmod +x ./arstech-libs*

- to install do:
  - double click in **'Finder'** on **'arstech-libs-mac.run'**
  - or, run the file in **'Terminal'- ./arstech-libs***

This needs to be done only once – the first time the software is installed on the specific computer.

Install main software

Unzip **install2rel.zip ,** and from **'mac-os-x'** folder copy **'arstech-utils-mac-x-yyy.run'** into: **'/Users/Shared'** folder
*** where -**X-Y** represents the current software version, for example **arstech-utils-mac-2-120.run**

- you may need to open **'Terminal'** and make file executable, or do:
chmod +x ./arstech-utils-mac*

- to install run the file in **'Terminal'**-
./arstech-utils-mac*

- the main utilities are located in:
'/Users/Shared/artech-utils' folder

Next steps

If not familiar, please check the chapter on software utilities - arstech enumerator **arsenum3** and **arsgui** .

Based on the peripheral card please check the chapter for the way of using our products with ISA or PCMCIA cards.

Developers of software for peripheral card may check chapters on the:
- simple/ basic API set
- extended API set in **sdkbus**

Upgrading of the software

ARS Technologies offers free upgrades on the installation software for our products. These upgrades are available for download on our web site, packed as a single .zip file at:

www.arstech.com/install2rel.zip

The first step in upgrading is to unload the currently running ARS Technologies software. Please bring up the *ARS Technologies Enumerator* **arsenum3** dialog box, and click the ***'Unload'*** button, or push ESC in **arsenum4** .

The next step is to remove the previously installed ARS Technologies software – delete **'arstech-utils'** folder, then repeat the same steps as above to install newer software.

6.4 Specifics for installing on x86 Linux platform

Install system libraries

Unzip **install2libs.zip** and from **'linux-x86'** folder copy **'arstech-libs...run'** into **'/home/...'** folder

- in '**file explorer**' make file executable, or do:
chmod +x ./arstech-libs*

- run the file in **'terminal'** - **./arstech-libs***

This needs to be done only once – the first time the software is installed on the specific computer.

Install main software

Unzip **install2rel.zip ,** then to install the software from **'linux-x86'** folder copy **'arstech-utils-x-yyy.run'** into **'/home/...'** folder
*** where -**X-Y** represents the current software version, for example **arstech-utils-2-120.run**

- in **'file explorer'** make file executable, or do:
chmod +x ./arstech-utils*

- run the file in **'terminal' -** **./arstech-utils***

Software is placed in the **'arstech-utils'** folder.

Next steps

If not familiar, please check the chapter on software utilities - arstech enumerator **arsenum3** and **arsgui** . Linux x86 32/64b platform includes a text based enumerator – **arsenum4 .**

Based on the peripheral card please check the chapter for the way of using our products with ISA or PCMCIA cards.

Developers of software for peripheral card may check chapters on the:
- simple/ basic API set
- extended API set in **sdkbus**

Upgrading of the software

ARS Technologies offers free upgrades on the installation software for our products. These upgrades are available for download on our web site, packed as a single .zip file at:

www.arstech.com/install2rel.zip

The first step in upgrading is to unload the currently running ARS Technologies software. Please bring up the *ARS Technologies Enumerator* **arsenum3** dialog box, and click the ***'Unload'*** button, or push ESC in **arsenum4** .

The next step is to remove the previously installed ARS Technologies software – delete **'arstech-utils'** folder, then repeat the same steps as above to install newer software.

6.5 Specifics for installing on ARM Linux platform

Install main software

Unzip **install2rel.zip , -** from **'linux-arm'** folder copy **'arstech-utils-arm...zip'** into **'/home/...'** folder, then unzip

- in **'file explorer'** make file executable, or do:
chmod +x ./arstenum4

- run the file **-** **./arsenum4**

Hardware considerations

There is a wide variety of ARM processor Linux systems.

The current software release was developed and tested on the most popular ARM board - Raspberry Pi.

The binaries may work on other ARM based systems as well.

One important consideration - if possible please use a dedicated USB port to connect our USB2ISA and USB2PCMCIA products.

What do we mean by this?

Normally there are several USB devices connected to a system - mouse, keyboard, wifi device, usb disk device... etc.

We did our initial test on a Raspberry Pi system with a single USB port. There was a USB hub connected to this port and all USB devices including USB2ISA+ISA cards were connected through the hub.

When running the enumerator - 'arsenum4' the USB2ISA+ISA cards were not enumerated. There was an initial attempt but it was not completed successfully.

The second test we did was on a Raspberry Pi system with two USB ports. We connected the USB hub with all USB devices to one of the Pi's USB ports and connected USB2ISA+ISA cards to the other of the Pi's USB ports.

When running the enumerator - 'arsenum4' the USB2ISA+ISA cards were properly enumerated.

Powering

An ARM board is normally powered by 5v power supply however an ISA card may need additional voltages and may consumes high currents.

Connecting usb2isa + isa , powered by the usb cable may crash an ARM system because of the current consumed exceeds the power limits of the system. An external power supply is needed .

Regarding powering of an ISA card please check our article - www.arstech.com/install/cms-display/ste_pwrsupplyneeds.html

You can select one of the power supplies that we have - www.arstech.com/cat--powersupplies.html

Next steps

If not familiar, please check the chapter on software utilities - text based arstech enumerator **arsenum4 .**

Based on the peripheral card please check the chapter for the way of using our products with ISA or PCMCIA cards.

Developers of software for peripheral card may check chapters on the:

- simple/ basic API set
- extended API set in **sdkbus**

6.6 Specifics for installing on Android platform

Pre-requisites for the Android device

Android devices come in a variety of form factors - phone, tablets, embedded devices, etc.
In addition, they come pre-installed with a variety of Google API releases and Linux kernel versions.

The very basic requirements for an Android device to be able to run our Android OS software support are:

- has to allow Root access '#'; many devices do not allow and have this support; since Google does not design this to be always available in the OS, the device users have to resort to solutions provide by the hacking community, like from -
http://www.cyanogenmod.org/

- have USB drivers to connect to Windows, or Linux, or Mac OS X system; the standard Android device has a usb connector to connect to a USB host on a standard computer system, running one of the above standard and widely popular OS-es; some devices, like for ex. Amazon Kindle did not provide such drivers; it may be possible to use standard drivers (windows), or the os support (linux/mac), by just adding the specific vendor/product ID (VID/PID) of the Android device to an .inf file (windows), or to OS script/config files (linux/mac).

- has to provide USB host or OTG ports;
our USB2ISA and USB2PCMCIA products connect through a cable to USB host ports;
there are variety of Android devices which come in a variety of form factors - phones, tablets, embedded devices, etc.;
if the Android device has one or more USB host ports - great!
however some Android devices have only one USB port, based on the on-the-go (OTG) USB specification; such port combines a USB device and a USB host; the USB device part is normally extensively tested and working, however some Android device manufacturers may have not tested the USB host portion, and it may be not working;

Installing of ARSTech software support

- the ARSTech Android software support is packed together with all other OS software support;
you will need to download the installation software, unzip, locate **'Android'** folder

- the pre-requisites for the Android device as described in ch.1 have to be met - root access, USB drivers, USB host port;
connect the Android device, and install based on host OS Windows/Linux/MacOSX;
under Windows run - **'win-run-enum.bat'**
under Linux run - **'./lnx-run-enum.bat'** ; the file may need to be made executable, for ex. by - **'chmod +x lnx-run-enum.bat'**
as a result the **'arsenum-andr'** enumerator will run on the Android device;

2 ways to start the enumerator -

- display mode, when entering shell through ADB (adb shell), and starting just as
./arsenum-andr
In this mode the shell console displays on screen insertion events with all detected resources, and removal events. Exit from this mode is through 'ctrl-c', and the enumerator stops working.

- run silently in the background, when started through the xxx-run-enum.bat as
./arsenum-andr g
In this mode the enumerator is started and returns right away the control back to the user. The enumerator continues running, and puts the results into the

'arsenum.log' file.
The user can display the results by running -
tail -f arsenum.log
!!! some systems do not provide 'tail' command.

Next steps

If not familiar, please check the chapter on software utilities - text based arstech enumerator **arsenum4 (arsenum-andr) .**

Based on the peripheral card please check the chapter for the way of using our products with ISA or PCMCIA cards.

Developers of software for peripheral card may check chapters on the:
- simple/ basic API set
- extended API set in **sdkbus**

7. Utilities - ARSTech Enumerator and ARSGui

Location of the utilities – Windows platform

There are 2 or 3 utilities installed and available for the end user:

- **ArsEnum3** – GUI enumerator; available on Windows, Mac OS X, Linux x86 platforms
- **ArsEnum4** – text (command line/terminal) enumerator; available on Linux x86, Linux ARM, and Android platforms
- **ArsGui** – manual read/write test utility; available on Windows, Mac OS X, Linux x86 platforms

7.1 Starting of utilities on Windows

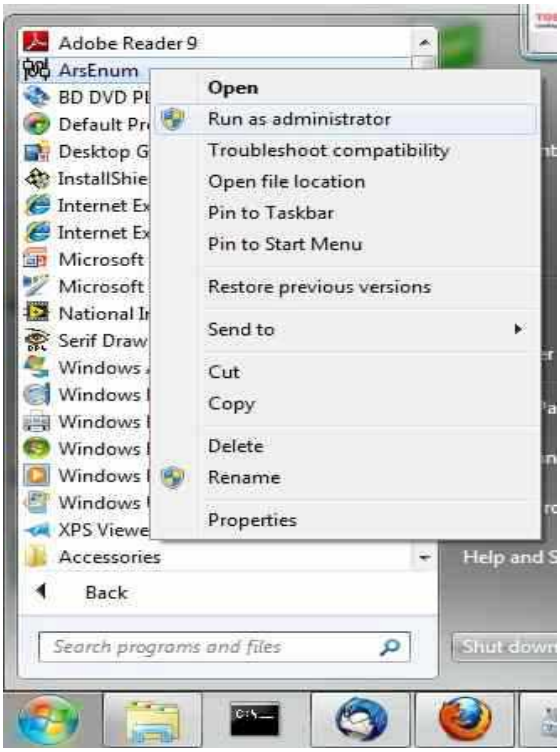
There are 2 utilities installed and available for the end user on Windows platform:

- **ArsEnum3.exe** – GUI enumerator
- **ArsGui.exe** – manual read/write test utility

The ARS Technologies Enumerator must run in order to use ISA, PCMCIA, cards and cards with the USB2 and the SSI2 lines of products.

After setup and installation, the Enumerator program is loaded one of three ways:

- automatically, immediately after the boot of the operating system or
- manually, by clicking on **Start** -> **Programs** -> **ARSEnum**
- manually, by clicking **Start** -> **Programs** -> **ARSTech** -> **ARSEnum**

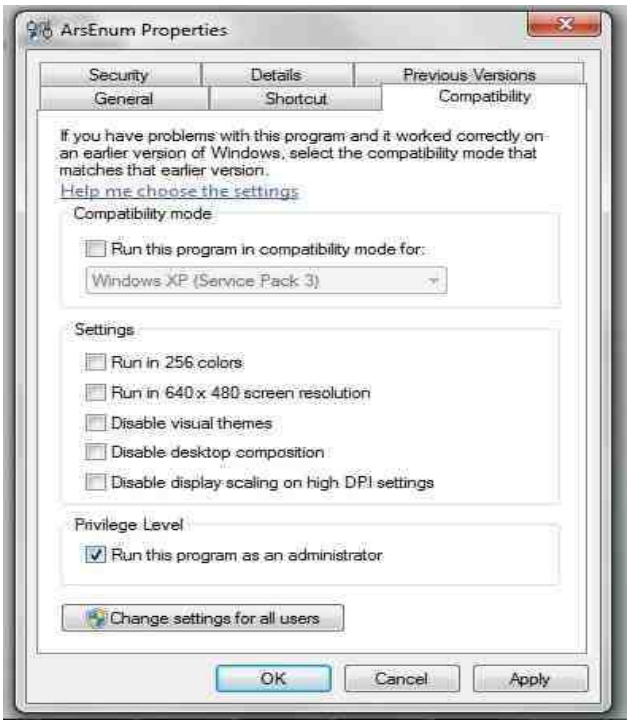


Manually starting the Enumerator in a way of – Run as administrator

Modern operating system releases like Windows Vista, Windows 7 and later have strict security requirements in place.

The program have to be started as – Run as administrator .

To adjust the program settings, place mouse cursor over 'ArsEnum' do right mouse click, select 'Properties'.

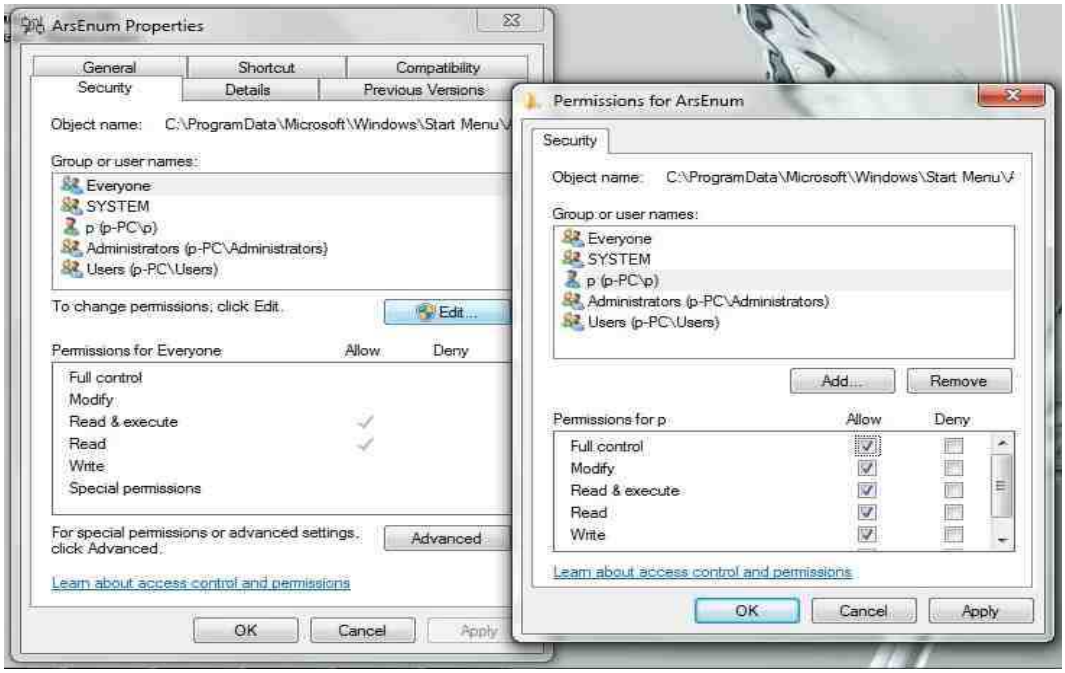


'Run as administrator' may be selected in the 'Properties', as a default way to run 'ArsEnum'.
Under 'Compatibility' , check 'Privilege level' to - *'Run as administrator'*.

The Enumerator may need to save settings and privileges may need to be adjusted.

The way described below applies to the ARSGui utility as well.

Under 'Security', click 'Edit' button. A new screen appears - select 'Everyone', check 'Full Control' -> 'Allow'.



After starting the Enumerator, a screen appears for several seconds and then the Enumerator is minimized. Then the Enumerator appears as an icon in the system tray of the computer, next to the clock, in the down right corner of the computer screen. (See images below.)

The Enumerator icon may be not visible – click on up arrow 'Show hidden icons' to see the Enumerator icon.

7.2 Starting of utilities on Mac OS X

There are 2 utilities installed and available for the end user on Mac OS X platform:
- **ArsEnum3.app** – GUI enumerator
- **ArsGui.app** – manual read/write test utility

Both the Enumerator and ARSGui must be started from superuser / root.

There are 2 script files - **'ARSEnum.bat'** and '**ARSGui.bat'** which are used to launch the **.app** enumerator and the read/write utility.

If you change the location of out utilities from the default folder:
/Users/Shared/arstech-utils
you will need to open and edit **'ARSEnum.bat'** and **'ARSGui.bat'** in **'TextEdit'** utility.

To load the GUI type of enumerator and/or the read/write utility, double click on - **'ARSEnum.bat'** and/or **'ARSGui.bat'.**

7.3 Starting of utilities on Linux x86 32/64bit

There are 3 utilities installed and available for the end user on Linux x86 platforms:
- **ArsEnum3** – GUI enumerator
- **ArsEnum4** – text (command line/terminal) enumerator
- **ArsGui** – manual read/write test utility

To load the GUI type of enumerator type in '**terminal**' -
sudo ./arsenum3

To load the GUI type read/write utility type in '**terminal**' -
sudo ./arsgui

7.4 Starting of utilities on Linux ARM (Raspberry Pi)

There are 2 utilities installed and available for the end user on Raspberry Pi and other Linux ARM platforms:
- **ArsEnum4** – text (command line/terminal) enumerator
- **isarw** – read/write test utility built with simple/basic API set

To load the text type of enumerator on Linux ARM type in '**terminal**' -
sudo ./arsenum4

To load the read/write test utility type in '**terminal**' -
sudo ./isarw

7.5 Starting of utilities on Android

There is 1 utility installed and available for the end user on Android ARM platforms:
- **arsenum-andr** – text (command line/terminal) enumerator

There are 2 ways to start the enumerator on Android -

- display mode, when entering shell through ADB (adb shell), and starting just as
 # ./arsenum-andr
In this mode the shell console displays on screen insertion events with all detected resources, and removal events. Exit from this mode is through 'ctrl-c', and the enumerator stops working.

- run silently in the background, when started through the xxx-run-enum.bat as
 # ./arsenum-andr g
In this mode the enumerator is started and returns right away the control back to the user. The enumerator continues running, and puts the results into the

'arsenum.log' file.
The user can display the results by running -
tail -f arsenum.log
!!! some systems do not provide 'tail' command.

7.6 ARSTech Enumerator – GUI and text based

When started the main Enumerator windows comes up.

The Enumerator is available as a GUI or text based utility on all operating systems that we support and offers the following features:

- USB 2.0 host controller support and the Universal Software Layer
- connect / disconnect events of peripheral cards
- automatic detection of the resources of ISA, PCI and PCMCIA cards, and loading drivers if necessary

!!!!!!!! These are the main types of support for peripheral cards: !!!!!!!!!!!!!!!

- **type1: under all supported operating systems and platforms we offer support of software developers for peripheral cards – with our simple/basic API set or the extended API set**
- **type2: under Windows (32 and 64bit), Mac OS X, Linux 32bit platforms we offer support for 16bit DOS/Windows 3.1 binaries of peripheral cards**
- **type3: under Windows (32bit only) platforms we offer support for 32bit binaries (win98, winNT, .inf type) of peripheral cards**

Main Enumerator window

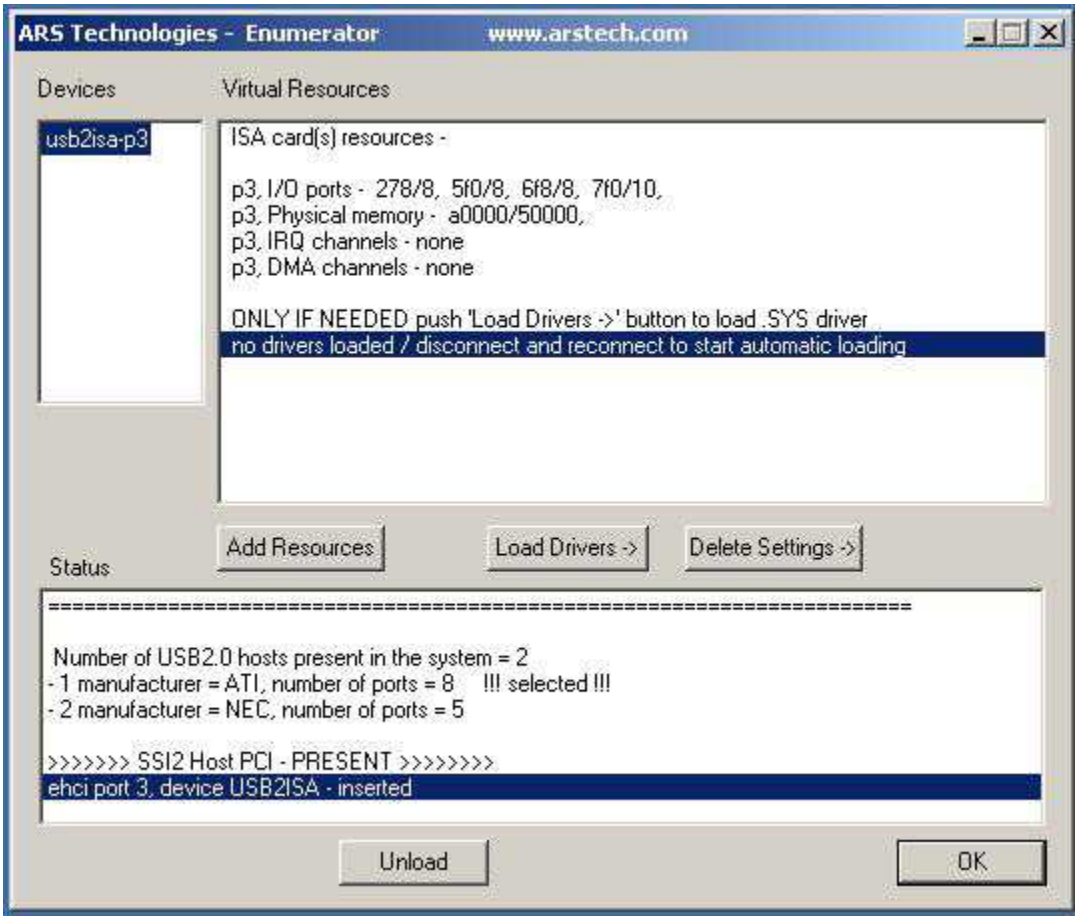
The main ARS Technologies Enumerator window is brought up by double clicking on the Enumerator icon in the system tray.

Clicking the "**OK**" button will close the window, however *the Enumerator still runs*. Clicking the "**Unload**" button will remove the Enumerator application and the Enumerator icon from the system tray.

There are three areas in the Enumerator window:

- ***Devices*** area – shows currently connected devices
  The groups currently available:
  - USB2 line of devices, showing as for example USB2ISA-p1 , USB2PCMCIA-p4
  - SSI2 line of devices, showing as for example SSI2-ISA-0 , SSI2-PCMCIA-0 , SSI2-PCI-0
- ***Virtual Resources*** area – shows information about the card and resources
- ***Status*** area – shows available hosts, the short status messages, for example insertion / removal, error messages

A screen shot of the ARSTech Enumerator –main Enumerator window



Examples

When a USB2ISA card is connected, the *Devices* area shows "usb2isa-p1", and the *Status* shows "ehci port 1, device USB2ISA - inserted".

The *Status* area provides information on the number of present USB2.0 host(s), the manufacturer's name, number of USB ports and the selected USB2.0 host for use by the ARSTech Enumerator.

Selecting the "usb2isa-p1" in the *Devices* area, for example creates the following text in the *Virtual Resources* area:

ISA card(s) resources
p5, Detected I/O ports - 278/8, 6f8/8, 7f0/8
p5, Detected memory – none

There are three buttons in the middle of the Enumerator window:

- **Add Resources** - clicking it will bring a dialog box for manually adding resources which have not been detected.

- **Load Drivers** - applies only to an ISA device, with a driver which needs loading; clicking it will bring load driver dialog box.

- **Delete Settings** - clicking this button will remove previously entered settings.

Adding resources

The Enumerator auto-detects resources, however the auto-detect process is not perfect. Some peripheral cards hide their resources and need a sequence of commands to enable these resources.

When not detected, resources can be added manually for an ISA , PCMCIA , PCI , PCI Express card by clicking the **Add Resources** button.

A dialog box comes up, where the status area contains:

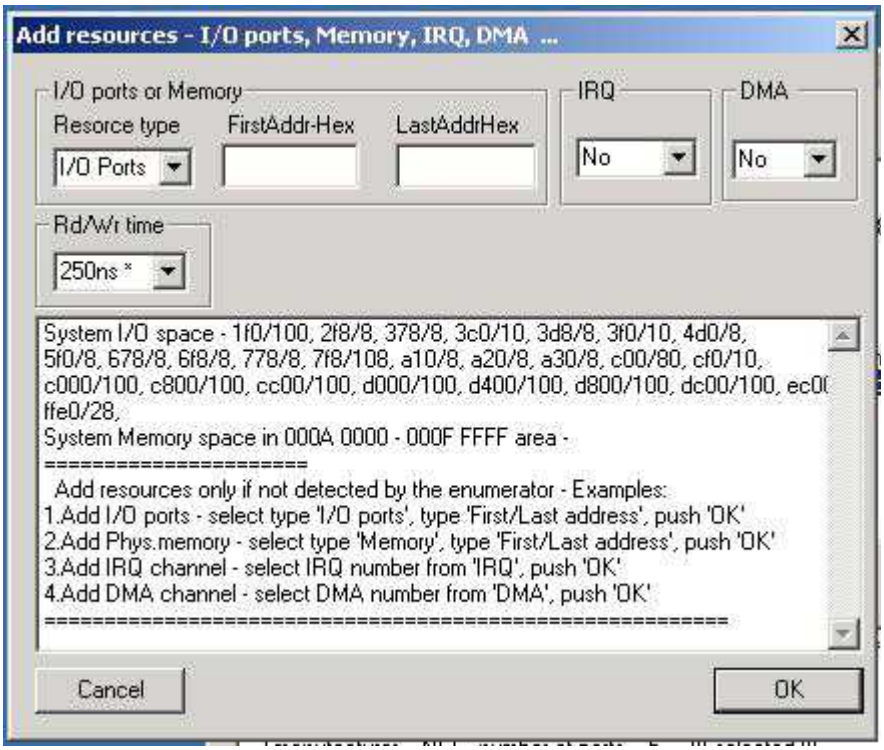
- the system I/O ports used
- the system physical memory

In addition, there are instructions on way of adding resources.

The dialog box allows adding:

- I/O ports
- Physical memory
- IRQ channels
- DMA channels (ISA card only)
- Extend/shorten the read/write timing

The Enumerator allows setting the read/write cycle time of the ISA or 16bit PCMCIA bus. By standard, the time is 250ns and it may be extended to 2.3µs.



Add Resources dialog box

Resources need to be added one at a time. In order to add another resource, please click the **Add Resources** button again.

Delete Settings, choosing another host

Clicking the "***Delete Settings***" button will bring the following message box –

ARSTech Enumerator –delete settings message box

Selecting ***Yes*** will delete:

- the settings for all of the previously loaded devices
- the USB2 host settings
- the current manually added resources

Running the Enumerator again will bring a dialog box to select the USB 2.0 host.

Selecting ***No*** will delete settings for the currently selected device.

If a device is still connected, the message box below appears:

The connected device has to be disconnected before completing "*Delete Settings*".

Loading drivers

!!!!!!! This feature is used only under 32bit Windows operating systems. !!!!!!

Some peripherals like PCMCIA cards and Plug and Play (PNP) ISA cards allow for obtaining information about the card, and loading one or more drivers for the card. The appropriate drivers are loaded automatically by the ARS Technologies Enumerator. There is no need of manual loading.

Other peripheral cards have drivers which do not need loading or do not use a driver. In such cases, there is no need of driver loading as well.

Some peripherals like standard (non Plug and Play) ISA cards are serviced by drivers, and these drivers need to be loaded.

One ISA card may contain several devices, and each of these devices may or may not need loading of a driver.

Every ISA card has a certain range of the of some, or all of the resources listed below:

- I/O port addresses
- Memory area addresses
- IRQ channels
- DMA channels

Examples of resources

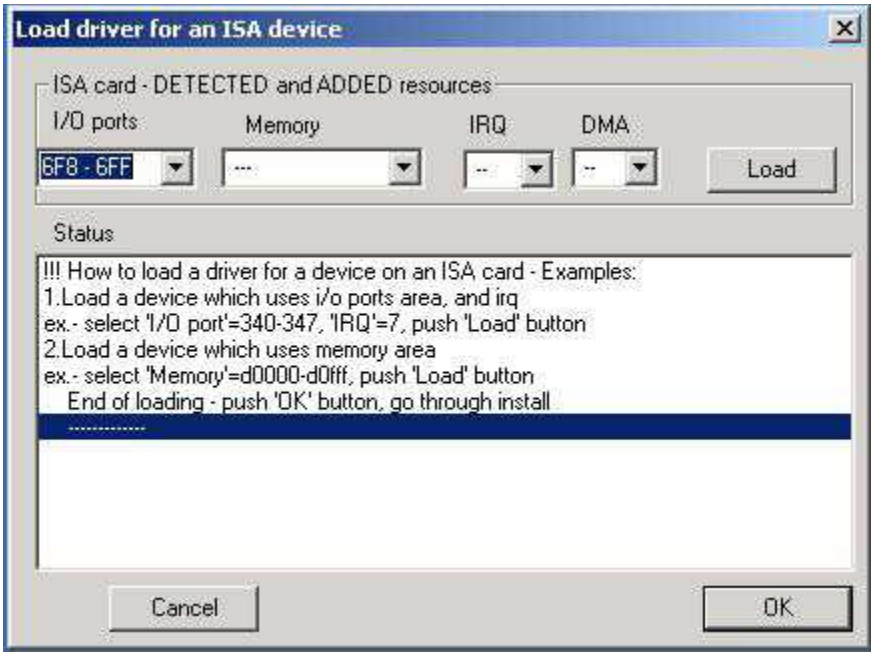
One device is defined as a combination of one or more of the above resource types. For example, a **serial port** is a combination of 8 I/O ports and 1 IRQ channel.

A **floppy disk controller** is a combination of 6 I/O ports, 1 IRQ channel and 1 DMA channel.

Loading one or more drivers

In the case there is need to loading of one or more drivers for the devices on the ISA card, you will need to bring up the main Enumerator window by double clicking on the Enumerator icon and click "***Load Drivers"***.

This will bring the following dialog box shown on the next page:



Load driver dialog box

The dialog box has resources sections and a status area:

- *I/O, Memory, IRQ, DMA* - section , in the top part of the dialog box
- *Status* – an area on the lower part of the dialog box

The process of selecting goes as follows:

1. Select one of the I/O ports / Memory ranges listed in the drop down boxes

2. If necessary, select one of the IRQ / DMA channels listed in the drop down boxes

3. Click the "***Load***" button; the status provides a feedback on the selection

Repeat the above steps for different I/O ports / Memory + IRQ / DMA ranges, if needed. When finished adding, please go to the next section .

The selections provided for I/O port and Memory ranges are found automatically after scanning, or added manually, and depend on the ISA/PCMCIA card mounted. Each is responding to different addresses.

When finished adding:

Click the "*OK*" button

A message box appears with the current device instance.

The original installation software disk for an ISA card (on a floppy or a CD) contains the .inf installation files and hold the drivers for the devices on a particular ISA card.

Modifying .inf files

The .inf installation files for the different devices need to be modified manually in order to install and load drivers for a device on an ISA card mounted to a USB2ISA and SSI2-ISA.

To modify the .inf file, please pay careful attention to the message box which will give you the current device instance- for example, **arsusb100** , **arsusb101, ... or PCI\VEN_0010&DEV_0064, PCI\VEN_0010&DEV_0065 ... etc**, and the location where the modification is made. Please refer to next chapters for examples of modified .inf files.

The Enumerator will bring next a message box as shown below:

ARSTech Enumerator –no driver files found message

Clicking the "**Yes**" button will bring a file open dialog box for finding and opening the .inf file for the PCMCIA card.

In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and load the driver for the card.

Example of a modified .INF file for installing

An example of a modified .inf file for Windows 2000, XP, Server 2003, Vista ,Server 2008 and 7 32bit operating systems is shown bellow.

The example provided is for reference purposes only. You will need to:

1. Identify the [Manufacturer] section,
2. Add a line with the particular device instance
3. Save the file – preferably under a new name
4. Point to this file – when needed

The example below adds a line with the device instance - **PCI\VEN_0010&DEV_0064 .**

```
;-------------------------------------------------------------------------------
;
;Copyright (c) ARS Technologies - All rights Reserved
;
;Module Name:
;
;    arswdm2kxp.INF
;
;Abstract:
;    INF file for installing of a sample wdm driver :
;
; operating systems - Windows 2000, XP, Server 2003, Vista, Server 2008, 7
;

[Version]
Signature="$WINDOWS NT$"
Class=Sample
ClassGuid={78A1C341-4539-11d3-B88D-00C04FAD5171}
Provider=%ARS%


[DestinationDirs]
DefaultDestDir = 12

; ================ Class section ====================
[ClassInstall32]
Addreg=SampleClassReg
```

```
[SampleClassReg]
HKR,,,0,%ClassName%
HKR,,Icon,,-5

; ================= Device Install section =====================
[Manufacturer]
%ARS%=ARS

[SourceDisksFiles]
arswdm1.sys=1

[SourceDisksNames]
1=%DISK_NAME%,

[ARS]
; DisplayName            Section           DeviceId
; -----------              -------           --------
%ARSwdm1.DRVDESC%=ARSwdm1_Inst,root\ARSwdm1
; !!! modified here !!!
%ARSwdm1.DRVDESC%=ARSwdm1_Inst,PCI\VEN_0010&DEV_0064

[ARSwdm1_Inst.NT]
CopyFiles=ARSwdm1.CopyFiles

[ARSwdm1.CopyFiles]
arswdm1.sys

[ARSwdm1_Inst.NT.Services]
AddService=ARSwdm1,0x00000002,ARSwdm1_Service


[ARSwdm1_Service]
DisplayName    = %ARSwdm1.SVCDESC%
ServiceType    = 1                  ; SERVICE_KERNEL_DRIVER
StartType      = 3                  ; SERVICE_DEMAND_START
ErrorControl   = 1                  ; SERVICE_ERROR_NORMAL
ServiceBinary  = %12%\arswdm1.sys

[Strings]
ARS = "ARS Technologies"
ClassName = "ARS Technologies Sample Drivers"
ARSwdm1.SVCDESC = "ARS Technologies Sample wdm Service"
ARSwdm1.DRVDESC = "ARS Technologies Sample wdm Driver"
DISK_NAME = "ARS Technologies Sample Install Disk"
--------------------------------------------------------------------------------
-
```

7.7 Exclusive mode and host controller support - specifics for USB2 products

Exclusive mode of the enumerator is provided only for: type3 support, under Windows (32bit only) platforms - support for 32bit binaries (win98, winNT, .inf type) of peripheral cards

ARS Technologies USB2 line of products require that at least one USB 2.0 host chip be present on the motherboard.

One modern computer system may contain as a minimum one USB 2.0 host chip on the computer motherboard.

Additional USB 2.0 hosts can be added as PCI cards to a desktop computer, or as PCMCIA cards inserted into a notebook computer.

We have designed our own USB 2.0 host controller support, allowing the use of our products under the different operating system releases. Currently our software will work with our products in the same way under all of the Microsoft's operating systems we support (Windows 98, ME, 2000, XP, Server 2003, Vista, Server 2008 and Windows 7).

When the Enumerator is run for the first time, there is a dialog box for selecting the host controller, as shown in the screen shot below:

ARSTech Enumerator – choosing USB 2.0 host

This handling of USB2 hosts is specific only for our USB2 line of products. Our SSI2 and XPRS lines of products do not need selecting and disabling a USB2 host.

The drop down box lists all of the available USB 2.0 host controllers, for example:

- *0 – mfg=Intel, ports=3*
- *1 – mfg=Intel, ports=3*

which means that there are total of two USB 2.0 hosts.

The number of ports shows the total physical ports on chip. The actual number of ports going to a USB connector may be lower.

If there is only one choice, it is selected as a default. Please select one of the choices and click OK.

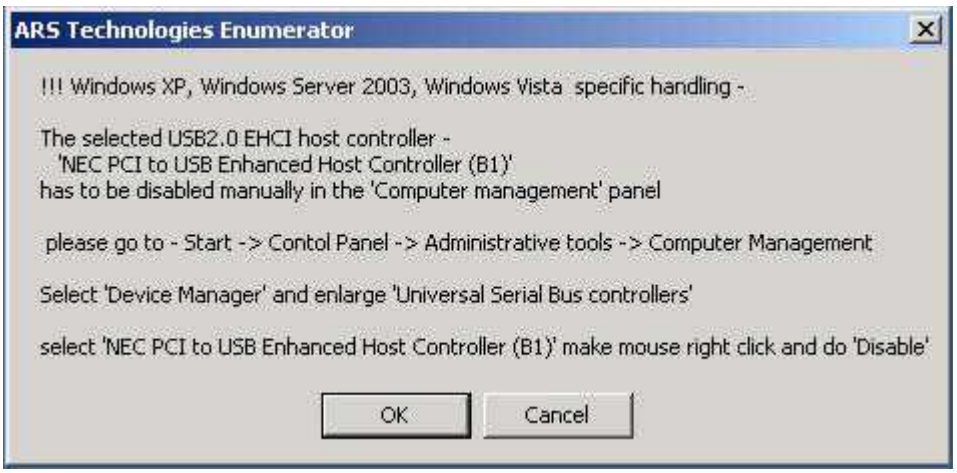
In case there is more than one USB 2.0 host, please use the drop down and select a host.

One USB 2.0 chip- either as part of the chip set on the computer motherboard, or on a PCI peripheral card- consists of one USB 2.0 EHCI controller and several USB 1.1 "companion" UHCI or OHCI controllers.

Though the computer system may have one USB 2.0 chip, and the USB2ISA and

USB2PCMCIA devices are serviced by our USB 2.0 host software, other USB devices like a USB keyboard, USB mouse, USB hub, etc. can be serviced by the "companion" USB 1.1 host controllers within the USB 2.0 chip.

Windows XP, Server 2003, Vista, Server 2008 and Windows 7, operating systems need manually disabling of the USB2.0 host driver – if the driver for the particular host is running. There is the following message box coming:

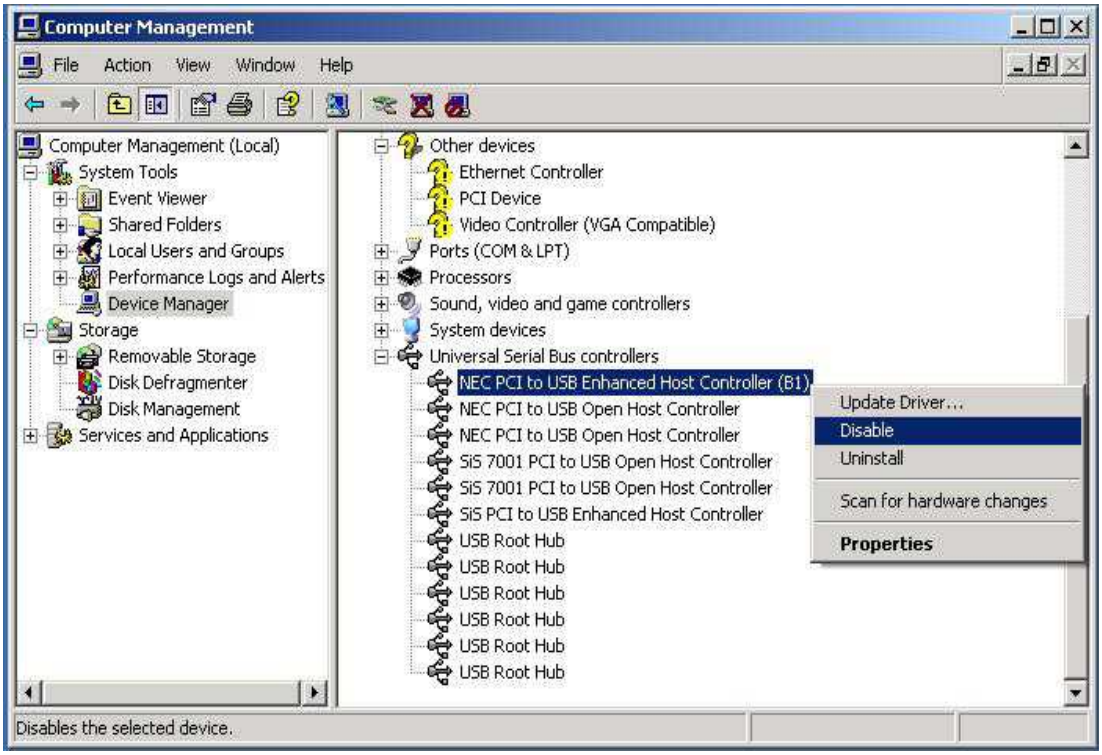


It provides the particular name of the USB2.0 host driver which needs to be disabled.

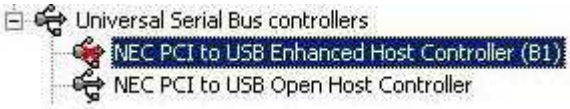
Open the 'Device Manager', select the specified USB2 host driver, and disable it.

If having 2 identical USB2 hosts, as part of the chip set on the motherboard, some of the USB ports located on the computer enclosure are service by one of the USB2 hosts, and some ports by the other.

In this case, when connecting USB2ISA/USB2PCMCIA products, you may need to connect to different ports, in order to find a USB port which belongs to the USB2 host selected and handled by the enumerator.



When disabled, the particular USB2 host driver will be marked as shown -



NOTE 1: ARS Technologies requires having a USB 2.0 host in the system. If the system has only USB 1.1 hosts, please add a USB 2.0 host as a PCI card to a desktop computer or a PCMCIA card to a notebook computer.

NOTE 2: If the system has more than one USB2.0 host, ARS Technologies recommends selecting the last one. Leave the first one, normally belonging to the motherboard, to service other USB devices.

7.8 Universal Software Layer

!!!!!!!! Universal Software Layer offers support for binaries of the software of peripheral cards as follows: !!!!!!!!!!!!!!!!

- **type2: under Windows (32 and 64bit), Mac OS X, Linux 32bit platforms we offer support for 16bit DOS/Windows 3.1 binaries of peripheral cards**
- **type3: under Windows (32bit only) platforms we offer support for 32bit binaries (win98, winNT, .inf type) of peripheral cards**

The Universal Software Layer (USL) is part of the installation software for ARS Technologies products that allow redirection of resources through USB – for our 'USB2' products and for our 'SSI2' products.

This redirection allows the use of an ISA, PCI, and PCMCIA card through USB with the original software of the particular card.

Every ISA, PCI and PCMCIA cards has associated resources for itself, which may be a combination of :

- I/O ports
- Physical memory area
- IRQ channels
- DMA channels (ISA only)

Resources

For **example, a multifunction ISA card** with one disk controller, one floppy controller, one parallel port and two serial ports has:

- disk - 10 I/O ports - base port 1f0 or 170 , 8 ports + 3f6,7 or 376,7 , 2 ports , and 1 IRQ channel - IRQ14 or 15
- serial ports - base port 3f8 or 3e8 or 2f8 or 2e8 , 8 ports , and IRQ channels - IRQ3 or 4
- parallel port - ...
- floppy - ...

An example of a PCMCIA card is a PCMCIA modem having:

- 8 I/O ports , located anywhere in the I/O space without conflicts , and 1 IRQ channel

An example of a PCI card is a PCI network card having:

- 4096 bytes of physical memory, located anywhere in the memory space without conflicts , and 1 IRQ channel

After connecting an ISA, PCI , or a PCMCIA card to our 'USB2' or SSI2' products, the Enumerator automatically checks for the resources on the ISA, PCI card(s) or the PCMCIA card, and automatically redirects these resources through USB.

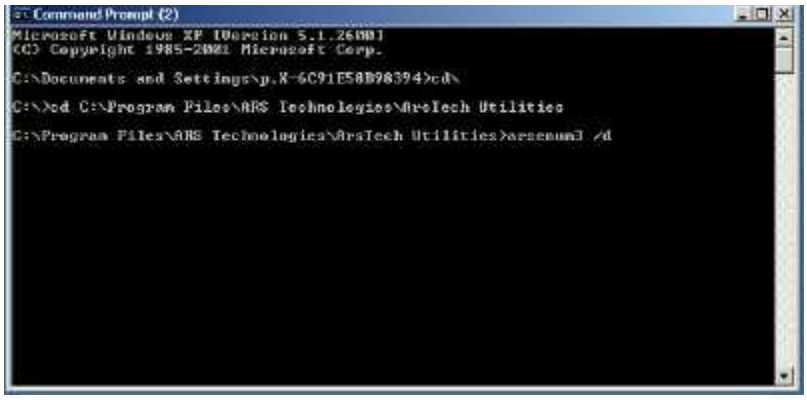
NOTE 1: All of the device handled by the Universal Software Layer share the same I/O space, Memory area, and IRQ channels with all the other devices on the computer system. **When there are hardware conflicts it maybe necessary to manually change and adjust the resources settings**.

NOTE 2: ARS Technologies cannot guarantee that the software for an ISA, PCI , or PCMCIA card under the USL will work with all combinations of computer hardware, operating systems, and ISA, PCI or PCMCIA card software.

7.9 Diagnostics mode of the ARS Technologies Enumerator

The Enumerator has to run on a wide variety of computer systems. If problems are encountered – 'freezing', 'blue screen', 'crashing', there is a special *diagnostics mode* which allow execution step by step, and pinpointing the issue.

The *diagnostics mode* is entered from command line -



The default installation folder is - C:\Program Files\ARS Technologies\ArsTech Utilities .
Change the folder to the current / default folder and run –> **arsenum3 /d**

You as a user may need to enter this mode only for diagnostics purposes – normally this mode is not entered or used.

There will be 3 separate message boxes with Yes/No buttons for – *initialization, connect, exit* phases of the work of the Enumerator:

then,

then,

Depending on the Yes/No selection all of some of the steps will be displayed in a way as -

Push 'OK' and remember the last successfully completed step before - 'freezing', 'blue screen', 'crashing'.

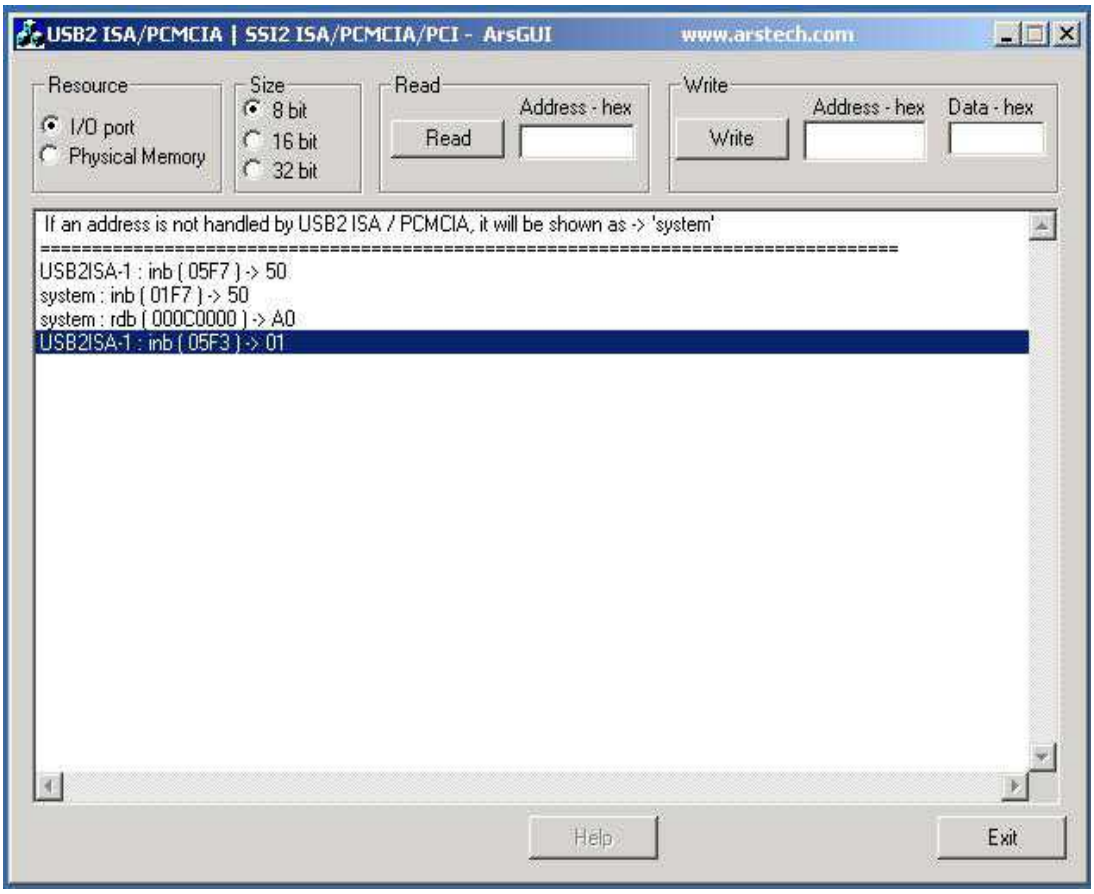
You can contact us with the following details :

- last successfully completed step
- computer system model/type - desktop/notebook
- processor maker, clock – Intel/AMD..., single/multi core...

7.10 ArsGUI

The ArsGUI is a graphical user interface program that allows manual read/write functions of I/O ports and Physical memory.

The ArsGUI utility allows access to resources on ISA and PCMCIA cards mounted on our USB2.0 line of products, and access to resources on ISA, PCI and PCMCIA cards mounted on our SSI2 line of products.



ArsGUI – main screen

Step 1:

When using the application, the first thing to select is the **Resource** type. Decide if ti will be I/O port or Physical Memory.

Step 2:

Select a **Size** - 8bit, 16bit or 32bit.

Step 3: Read or Write

- **To do a read**, type the hexadecimal address in the edit box, and push the **Read** button.
- **To do a write**, type the hexadecimal address and the hexadecimal data in the two edit boxes. Then push the **Write** button.

The results are displayed in the main status area.

With cards mounted to a USB2ISA/USB2PCMCIA type card

When reading or writing resources on ISA/PCMCIA cards mounted on connected USB2ISA or USB2PCMCIA cards, the status shows the device as connected. For example, "USB2ISA-1" and the results from the operation.

With cards mounted to an SSI2 ISA, SSI2 PCI or SSI2 PCMCIA type card

When reading or writing resources on ISA/PCI/PCMCIA cards mounted on connected SSI2 ISA, SSI2 PCI or SSI2 PCMCIA cards, the resources are part of the computer system's resources. The status shows "System" and the results from the operation.

The ArsGui utility is a powerful utility and extreme care must be taken when deciding what resources are accessed. Be careful when writing to memory or i/o areas of the system.

Exiting

To exit the application, click the **Exit** button.

7.11 Developers' support – basic/simple API set for access of ISA / PCI / PCMCIA hardware

Introduction

This chapter will help a developer of hardware and software to bring up the hardware, and develop / build / debug / test the software to working condition.

We offer a subset of our API set from our commercial product - SDKBUS, to ISA / PCI / PCMCIA software developers.

The current version is based specifically on our USB2 line of products - USB2ISA family products and USB2PCMCIA, and the SSI2 line of products - SSI2 ISA, SSI2 PCI, SSI2 PCMCIA .

We are establishing a standard , in dealing with peripherals , for all of the operating systems , programming levels , and programming languages we support .

The general API set is available on user / application level, for the following language:

- c/c++ - Windows, Linux, Mac OS X, Android platforms

The API set is available through a static library / archive, or dynamic library. Use of the API set is demonstrated in the 'isarw' sample.

Hardware not working yet

We offer a test utility - ArsGui which can generate access commands to read/write to i/o ports, and physical memory to a peripheral connected on our USB2 and SSI2 products.

A developer of the hardware can analyze how is the generated access handled by the peripheral card hardware - modify it, and bring it to working condition.

Connecting existing and new peripheral card hardware

One hardware peripheral device is a collection of one or more of the following resources:
- physical memory registers
- i/o ports registers
- IRQ channels
- DMA channels (ISA bus only)

A developer has to know the exact resources by the peripheral card.

When the peripheral card is mounted on one of our products, the ARSTech Enumerator auto-detects resources.

The developer has to compare the detected resources with what the peripheral card actually has.
The card may contain hidden resources, made available after software initialization.
If needed , the developer may add manually resources in the enumerator for the particular peripheral card.

Developing software for a new peripheral card

Our API set, as described in the '**ars-api.txt**', is available as part of our installation software.

A developer may build a variety of applications including - stand alone / command line, or graphical GUI/X application.

An additional API set and samples are available in our SDKBUS product.

Working sample of use

Pre-requisites

To illustrate the use of the API set we offer one sample which can be built and used in real world conditions.

The sample uses one of our USB2ISA family cards - you will need to order one, download the installation software, setup the software, and get familiar with our user's guide.
Different environments may has some specific requirements for installing and setup.

In addition, the sample uses 2 ISA cards :
- standard ISA i/o card which includes - 1 floppy and 1 ide controllers, 1 parallel, 2 serial ports; this type of card was popular in the past - with dozens of different manufacturers, and millions of cards produced;
- standard ISA VGA card; popular in the past as well - with lots of different manufacturers and cards produced;

You can mount USB2ISA + ISA cards, and connect/disconnect to USB. The ARSTech Enumerator will show auto detected resources for the connected ISA card - i/o ports, memory area, IRQ channels.
If some resources are not detected, they can be added manually in the Enumerator.

The resources of the particular used ISA cards may appear as :

- ISA i/o card - i/o ports: 278/8, 5f0/8, 7f0/10 | irq: 4,7,14
device interpretation:
~ i/o port x278/8 + irq 7 are the resources for LPT2, as selected by the jumpers on the particular isa card;
~ i/o port x5f0/8 + irq 14 are the resources for the IDE controller; initially located at i/o address x1f0; the enumerator 're-located' it with x400 to avoid a collision with the controller on the motherboard of the system;
~ i/o port x7f0/10 + irq 4 are several devices; the address is i/o x3f0 're-located' with x400 to avoid a collision; x7f0-7f3 are floppy controller ports, the irq6 is not connected by jumpers; i/o x7f6-7f7 are IDE ports; i/o x7f8-7ff + irq 4 are the COM1 ports; COM2 ports and irq are not connected / enabled by jumpers;

- ISA VGA card - i/o ports: i/o ports x3c0/10 | irq 9 | physical memory xc0000/8000
device interpretation:
the card is has a video BIOS area - x0c0000/8000, which has to be executed in order to initialize and 'see' the video ram area - x0a0000+ ; the video card is controlled through the i/o ports and irq channel;

Building of the 'isarw' sample

Almost identical 'C/Cpp' source code is placed in a number of folders for the different environments - Windows, Linux, Mac OS X.

Windows folder includes 2 sample projects built with Visual C++ - on older Visual Studio 98 , and newer Visual Studio 2013.

Linux, and Mac OS X come with the GCC compiler environment - if not already pre-installed you will need to install it.

To build, go to the 'linux-macosx' folder and run from 'terminal' utility -

./mk-l32.bat	- on Linux x86 32bit
./mk-l64.bat	- on Linux x86 64bit
./mk-arm.bat	- on Linux ARM 32bit (raspberry pi)
./mk-mac.bat	- on Mac OS X x86 64bit

Running of the 'isarw' sample

The 'isarw' sample contains 3 sub-tests :

a) i/o read/write test
- uses USB2ISA with an ISA i/o card - uses the parallel port portion of the card
- does write to the par.port - digital outputs, which may be observed with a voltmeter on the 25pin connector
- exercises in8(),out8() - single 8bit i/o port read/write commands of the API set

b) irq test
- uses USB2ISA with an ISA i/o card - uses the parallel port portion of the card; requires an additional wire connecting 2 pins on the 25 pin con.
- exercises GetIrqDmaSts(), in8(),out8() - checking irq and dma status, and single 8bit i/o port read/write commands of the API set

c) physical memory buffer read test
- uses USB2ISA with an ISA VGA card - uses the VGA BIOS on the card
- does a single read of a portion of the VGA BIOS
- exercises rd16() - 16bit phys.mem. read commands of the API set

8. ISA cards - use

This chapter describes the way of use of ISA cards on our 'USB2' line of products, and on our 'SSI2' line of products. Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

8.1 Using of a PnP ISA card

Plug and play ISA cards are a special type if ISA cards. They contain information on the name and the resources of the ISA card.

When connected for the first time, ARS Technologies software will automatically:

- Look for the resources of the card
- Redirect them with the USL
- Look for an .inf file for the ISA card and if the .inf file is found, start the "***Found New Hardware***" installation process of the operating system, and load the driver for the card.

This installation process is called only the first time. Afterward, when an ISA card and USB2ISA card are connected, the driver is automatically loaded.

No .inf file found

When connecting for the first time it is possible that **no .inf file is found** for the particular PnP ISA card. In this case, the Enumerator will bring a message box reading, "***No driver files found***".

Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PnP ISA card.

In the dialog box you can:

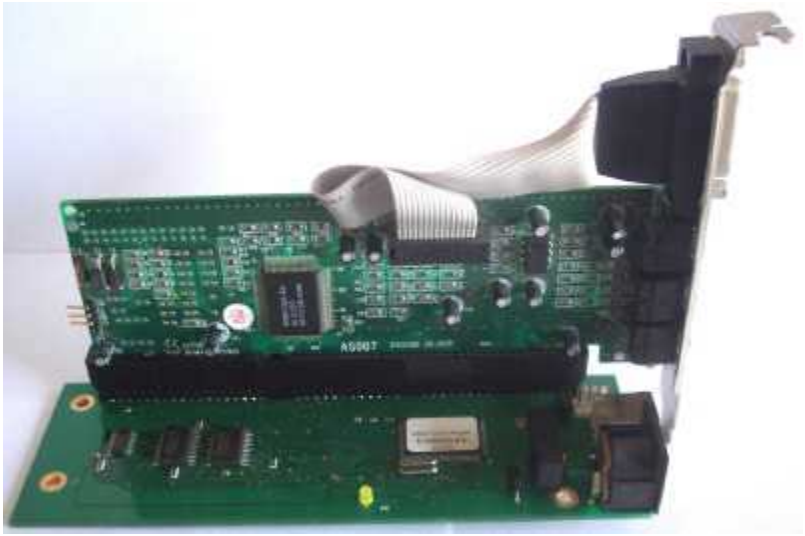
- Select drive
- Double click to select directory
- Select file type, type file name
- Push open button

This will start the "***Found New Hardware"*** installation process of the operating system and load the driver for the card.

Normally one PnP ISA card has multiple devices such as sound, midi, joystick, etc devices.

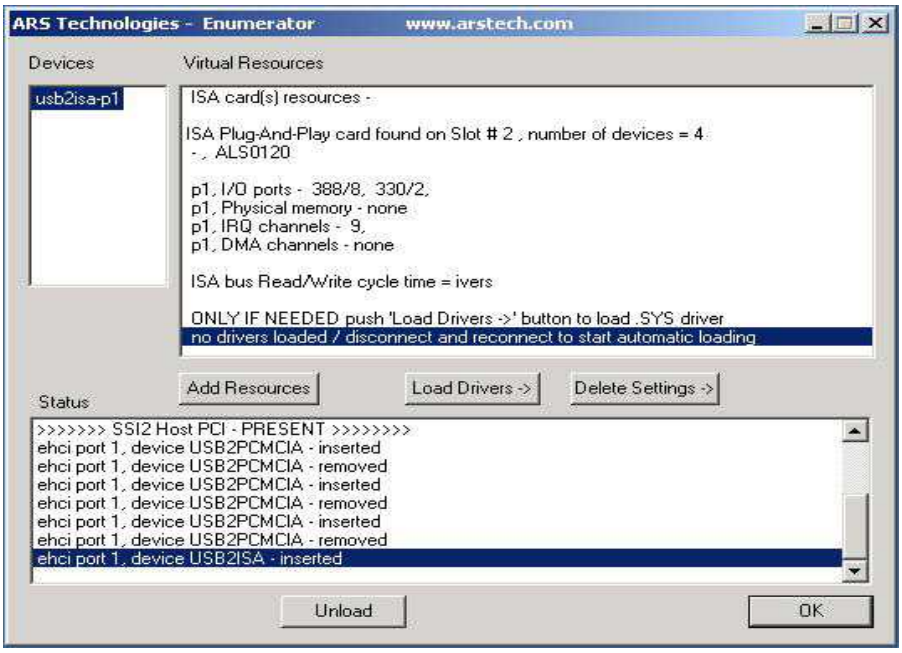
Voltages and current

A particular PnP card may need a variety of voltages and particular amounts of currents to work.



Example – PnP ISA sound card + USB2ISA-R

In the above example there is a PnP ISA sound card. The power comes from the USB cable, and the additional voltages are provided by the mounted **isa-pwr (**power supply module).



The Enumerator shows the name of the PnP ISA card, number of devices and resources detected.

8.2 Using of a standard (non PnP) ISA card

Standard (non Plug and play) ISA cards do not contain information on the name and the resources of the ISA card. These type of cards are the wide majority of ISA cards.

When connected for the first time our software will look for the resources of the ISA card, and redirect them with the USL. One ISA card may contain several devices, and each of these devices may or may not need loading of a driver.

Resources

What are the "resources"? Every ISA card has a certain range with one or more of:

- I/O port addresses
- Memory area addresses
- IRQ channels
- DMA channels

The process of looking for the resources of the ISA card may take up to 10-30 seconds, as the Enumerator goes through devices on the Plug and Play ISA cards and standard ISA cards as well.

Normally one ISA card has multiple devices, such as for example sound, midi, or joystick devices.

Voltages and current

A particular ISA card may need a variety of voltages and particular amounts of currents to work.

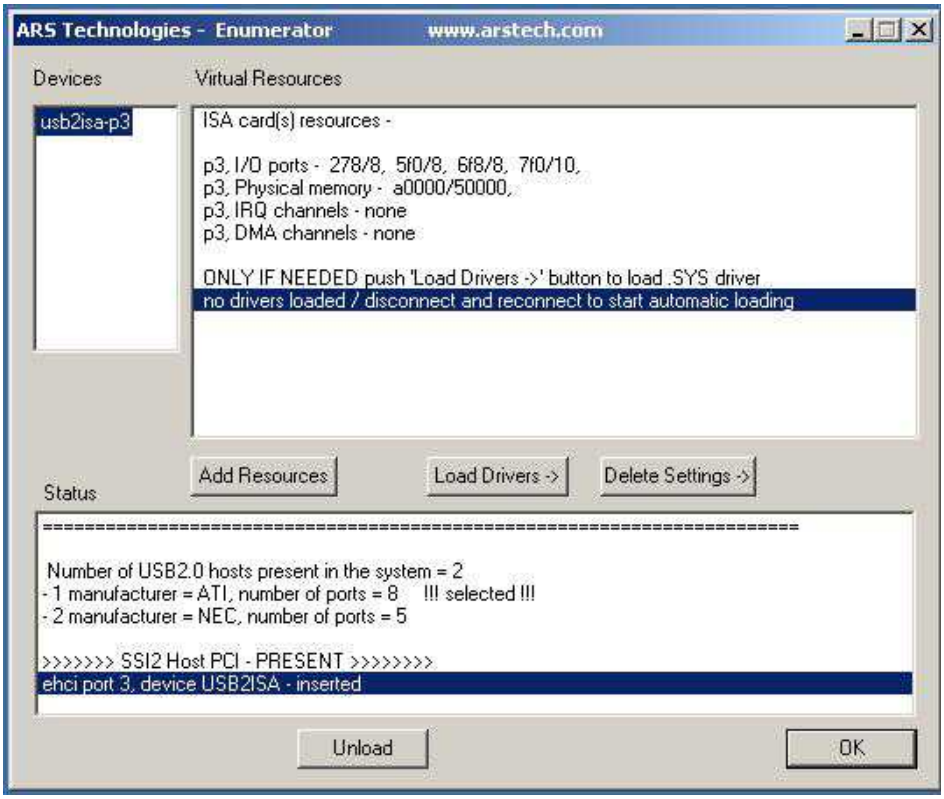
Example – standard ISA input/output card + USB2ISA-R

In the above example there is a standard ISA input/output card with two serial ports, one parallel port, one IDE and one floppy device. The power comes from the USB cable and the additional voltages are provided by the mounted **isa-pwr (**power supply module).

Manually adding resources

The process of automatically detecting resources of the Enumerator cannot handle specific ISA cards which have **hidden resources** that need to be enabled by a sequence of commands.

The Enumerator allows manually adding resources by clicking the "***Add Resources***" button in the main Enumerator window.



Manually loading drivers for a device on an ISA card

When an ISA card is mounted in USB2ISA or SSI2-ISA type of card for the first time the 'software types' dialog box comes – as described in the next chapter.

The Enumerator allows manual loading of a driver by clicking the "***Load Driver***" button in the main Enumerator window.

The .inf file of the driver needs to be modified

When connecting for the first time it is possible that no .inf file will be found for the particular ISA card. In this case the Enumerator will bring a message box that reads *"**No driver files found**"*.

Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the ISA card. In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and load the driver for the card.

This installation process is called only the first time the ISA card and USB2ISA or SSI2-ISA card are connected. Each proceeding time, the driver loads automatically.

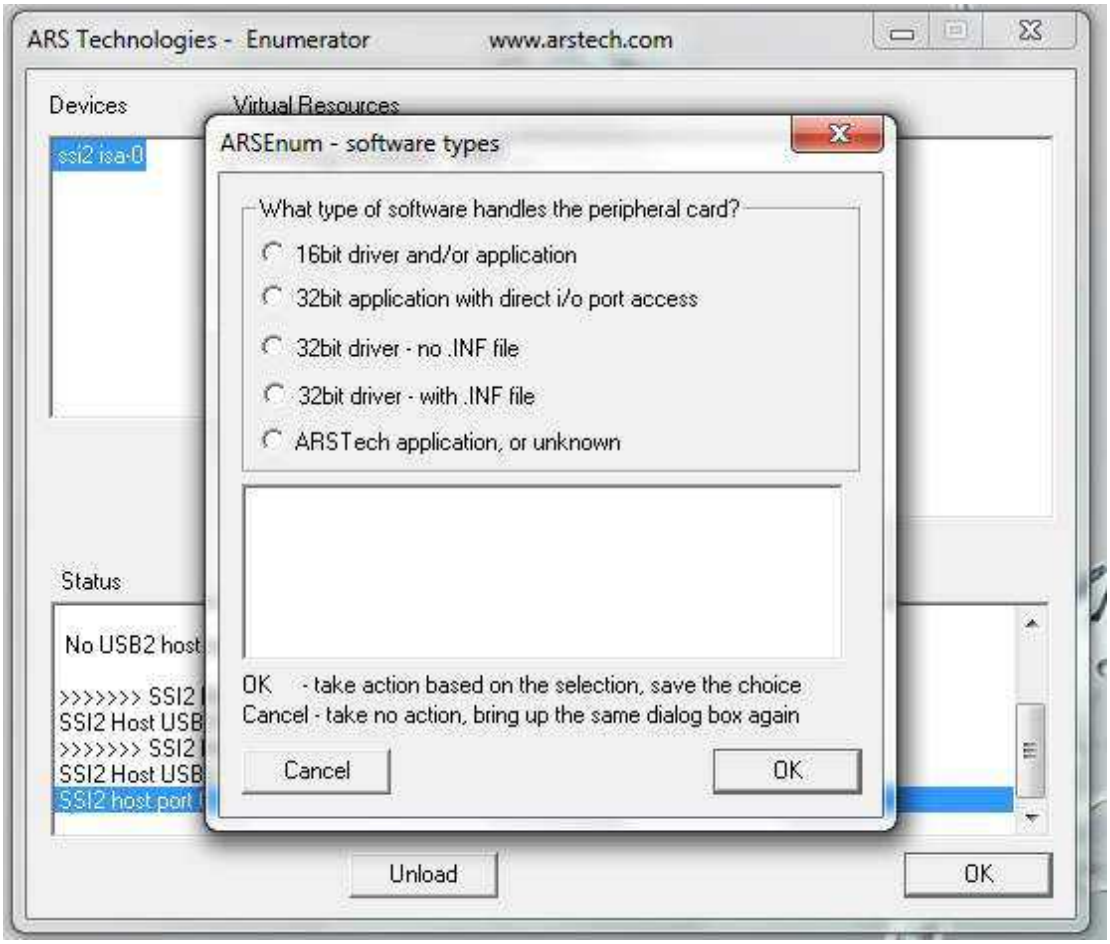
8.3 Software types

We deal with PCMCIA, PCI, PCI Express cards in standard well defined ways. There is no single standard way of dealing with non plug and play / standard ISA cards.

The ISA card manufacturer probably spent -
- months or years to make ISA card working on one operating system
- and then, weeks or months to make ISA card working on additional operating systems

For non standard ISA software you need to find -
- what operating system was the original ISA software working on
- was the ISA software working on the current operating system
- what software type is the ISA software

When an ISA card is mounted in USB2ISA or SSI2-ISA type of card for the first time the 'software types' dialog box comes -



The isa software can include -
- 16bit DOS type of a driver or and / or application
- 32bit Windows 98 type of an application
- 32bit Windows NT type driver - no .inf file
- 32bit Windows driver - with .inf file

Based on the above you can deal with the isa cards that you have.

If not knowing the software type for the ISA card/s software, you can push 'Cancel'. The 'software types' dialog box will come again when USB2ISA / SSI2-ISA with ISA card/s are connected.

If knowing the software type, please select it and push 'OK' button. The 'software types' dialog box will not come again, but will perform an action cased on the selection.

If the ISA software is 16bit DOS type , you need to run it under our customized 'dosbox' environment.

A Windows 98 application with direct i/o ports access will crash is run on windows 2000 and later operating system. We provide support for this type of application so that it run normal on modern operating systems.

When having 32bit Windows NT type driver, the driver has to be in 'stopped' state after boot. Then, after connecting USB2ISA / SSI2-ISA with ISA card/s the driver has to be started.

If having 32bit Windows driver - with .inf file, you need to modify the .inf file, and go through the 'Install new hardware' process to install the driver, and then load it.

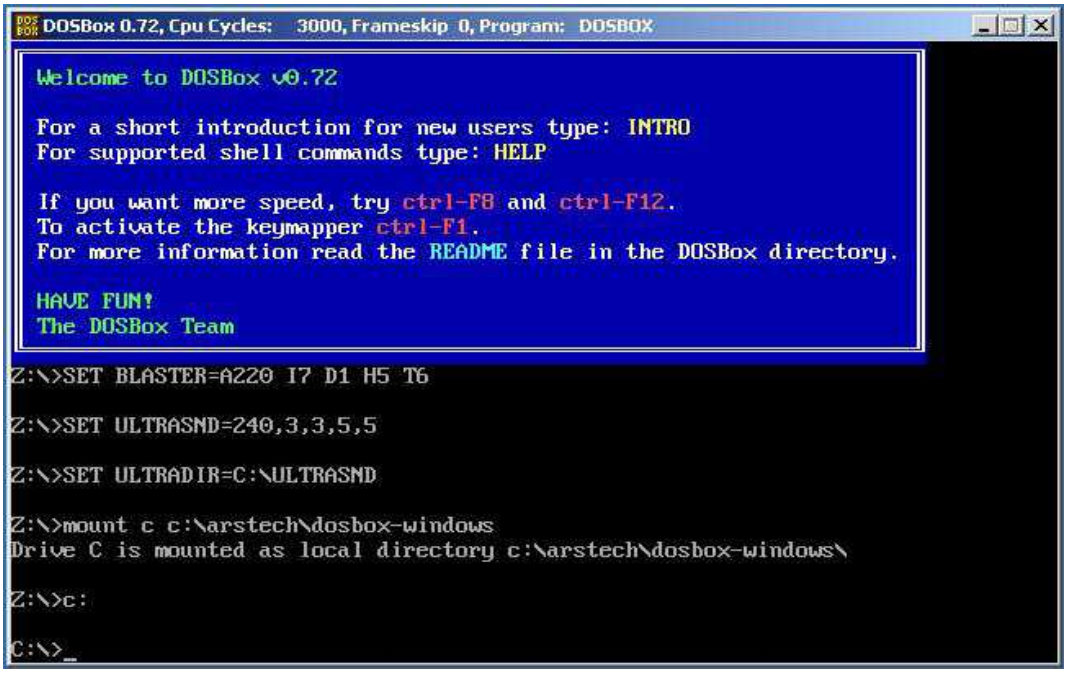
When having an application built using the ARSTech API set, or the type is not known, there are no additional actions taken – the device/s on ISA card/s are handled by USL or API set.

Details on the specific steps are in the following chapters.

8.4 '16bit DOS' software type

Support for 16bit DOS/Windows 3.1 binaries of peripheral card is offered under - Windows (32 and 64bit), Mac OS X, Linux 32bit platforms.

With this selection for 'software type the following screen comes -



After opening the main dosbox window, you will need to select the location of the DOS software.
If, for example, the DOS software is placed in the "**dosprog**" folder, please type:

mount c c:\dosprog

Then type:

c:

DOS drivers

If the ISA DOS software includes a driver, you need to load it in advance.
A utility DEVLOAD - provides a method of loading device drivers from the command line under MS-DOS, rather than having to re-boot in order to load extra drivers. It is freeware, available on -
ftp://ftp.infradead.org/pub/devload/devload.exe

Then you can run the main ISA DOS application.

Windows 3.1 / 3.11 ISA software

The ISA software may have been running on Windows 3.1 or 3.11 operating systems.

Such software may be handled under our 'dosbox' environment.

The initial step is to install Windows 3.1 (or 3.11), as follows -

- make folders in the dosbox directory for each install disk,
- then in the 'dosbox' window (after mounting 'dosbox direcotry' as C) go to the first folder and start **setup**,
- select to do custom setup so you could tell where each disk folder location is (7 total)

  After installation, if mouse doesn't work - shut down dosbox (and as a precaution unload and restart the enumerator).

When you start 'dosbox', mount the drive, go to windows folder, and type -

win

the windows 3.1 / 3.11 starts, and mouse is working.

You may need to install additional packages required by the isa software.

There is additional information available, listed when doing a Google search for -

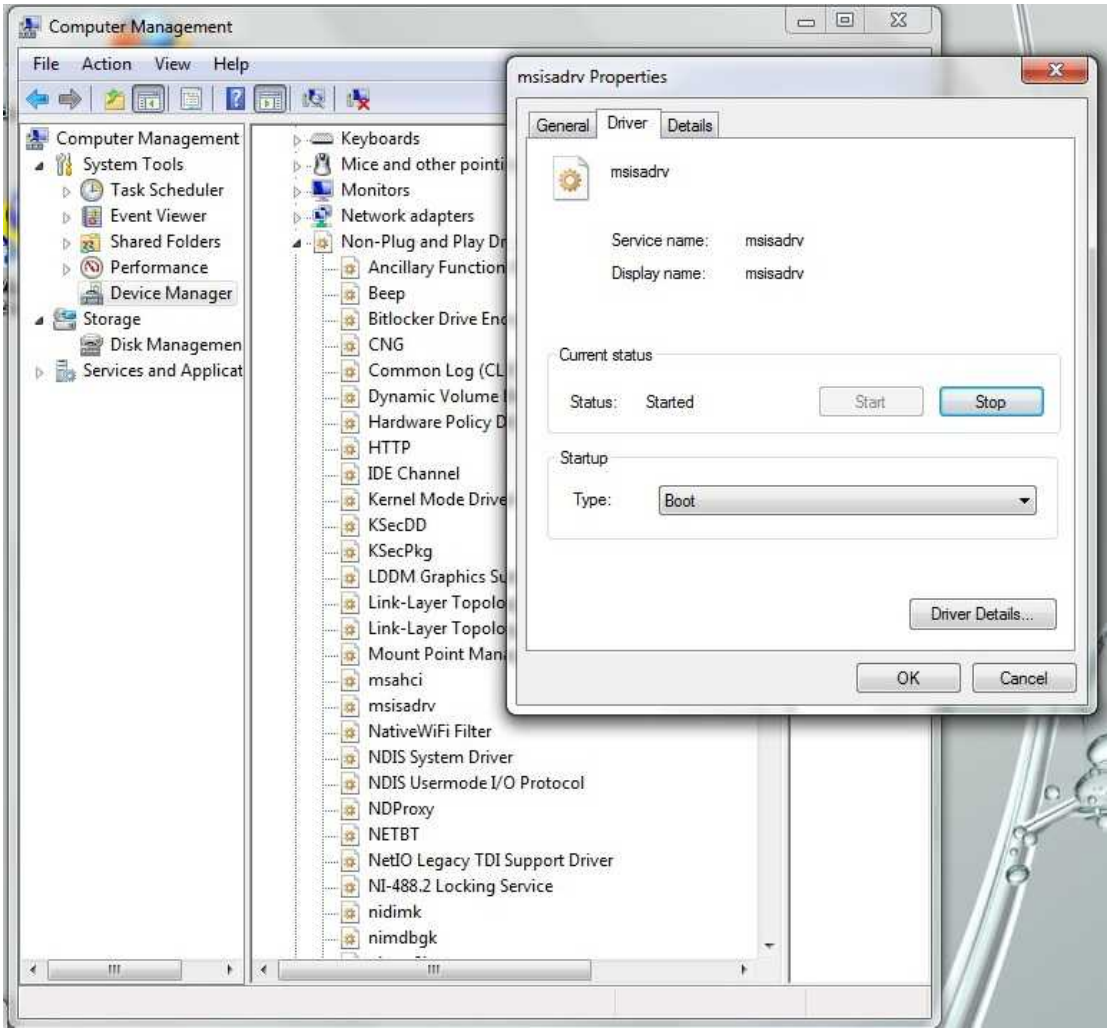
windows 3.1 dosbox

After installing all software needed, and having USB2/SSI2 ISA , while in Windows 3.1 , the ISA board/s is found and working.

8.5 '32bit Windows NT type driver - no .inf file' software type

Support for this type of binaries is offered under only 32bit Windows platforms – from Windows 2000 to Windows 7.

With this selection for 'software type' the driver has to be in 'stopped' state after boot.
The procedure is -
- connect usb2isa / ssi2-isa + isa
- do 'start' on isa driver
- run the isa application



The above screen shows the way of 'stop'/'start'.

You can do start / stop by -
- In 'computer management' -> 'device manager' -> 'view' ,
- check 'show hidden devices'
- enlarge 'non plug and play drivers'
- select the particular isa driver – for ex. 'msisadrv'
(normally the listed device for ex. 'abc' is based on the driver name 'abc.sys')
- double click on the 'msisadrv' device , select 'driver' tab

An alternative way of start / stop is to type from command line -

```
net start  msisadrv
net stop  msisadrv
```

The Enumerator attempts to do automatically the stop / start process, however you may need to make additional checks to find what the current state of the Windows NT type driver is, and do start / stop in 'device manager' or from command line.

8.6 '32bit Windows type driver - with .inf file' software type

Support for this type of binaries is offered under only 32bit Windows platforms – from Windows 2000 to Windows 7.

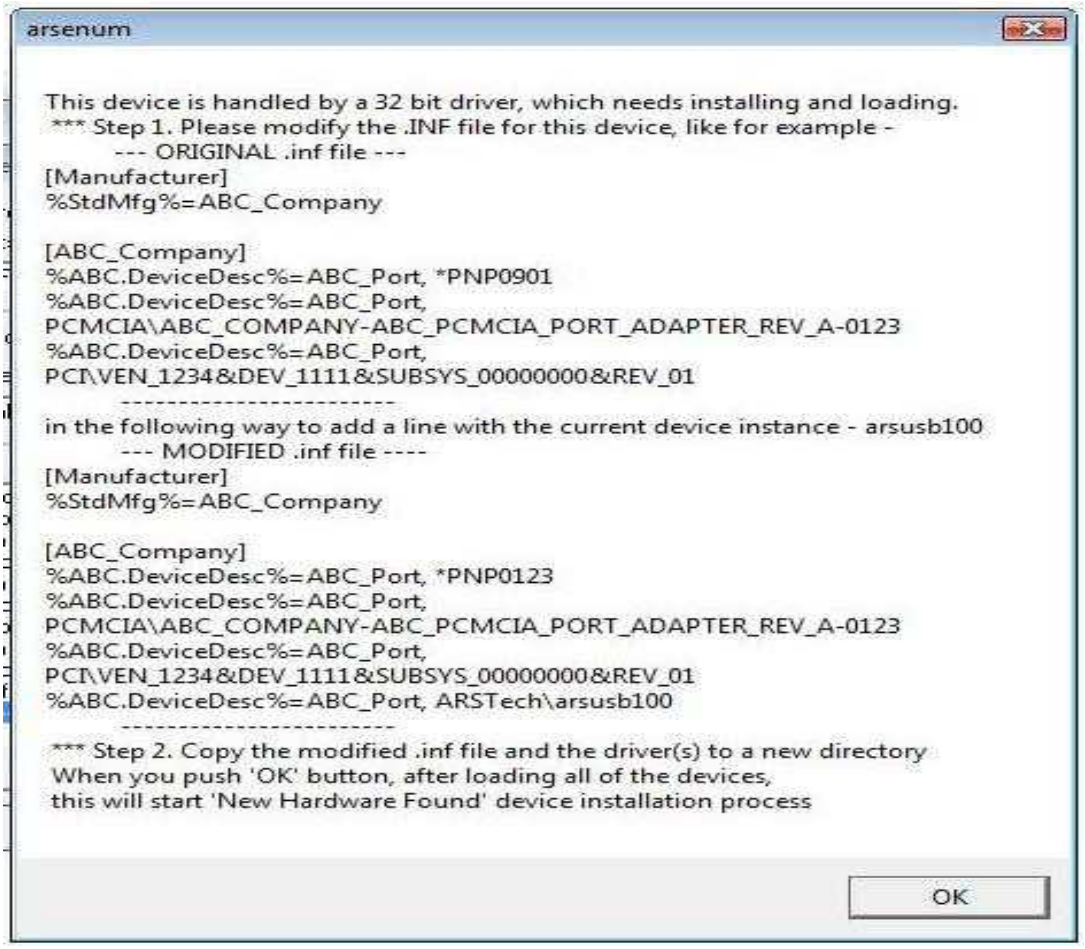
The original installation software disk for an ISA card (on a floppy or a CD) contains the .inf installation files and hold the drivers for the devices on a particular ISA card.

The .inf installation files for the different devices need to be modified manually in order to install and load drivers for a device on an ISA card mounted to a USB2ISA and SSI2-ISA.

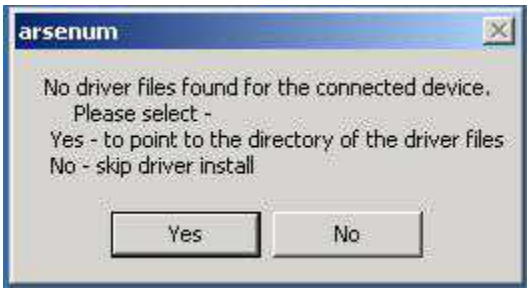
Modifying .inf files

With selection of '32bit Windows type driver - with .inf file' a message box appears with the current device instance.

To modify the .inf file, please pay careful attention to the message box which will give you the current device instance- for example, **arsusb100** , **arsusb101, ... or PCI\VEN_0010&DEV_0064, PCI\VEN_0010&DEV_0065 ... etc**, and the location where the modification is made. Please refer to next chapters for examples of modified .inf files.



The Enumerator will bring next a message box as shown below:



ARSTech Enumerator –no driver files found message

Clicking the "**Yes**" button will bring a file open dialog box for finding and opening the .inf file for the PCMCIA card.

In this dialog box you can:

- Select drive
- Double click to select directory

- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and load the driver for the card.

8.7 Example of a modified .INF file for installing

Support for .INF file for installing is offered under only 32bit Windows platforms – from Windows 2000 to Windows 7.

An example of a modified .inf file for Windows 2000, XP, Server 2003, Vista ,Server 2008 and 7 operating systems is shown bellow.

The example provided is for reference purposes only. You will need to:

5. Identify the [Manufacturer] section,
6. Add a line with the particular device instance
7. Save the file – preferably under a new name
8. Point to this file – when needed

The example below adds a line with the device instance for example - **ARSTech\arsusb102**

```
;-------------------------------------------------------------------------------------
;
;Copyright (c) ARS Technologies - All rights Reserved
;
;Module Name:
;
;    arswdm2kxp.INF
;
;Abstract:
;    INF file for installing of a sample wdm driver :
;
; operating systems - Windows 2000, XP, Server 2003, Vista, Server 2008
;

[Version]
Signature="$WINDOWS NT$"
Class=Sample
ClassGuid={78A1C341-4539-11d3-B88D-00C04FAD5171}
Provider=%ARS%


[DestinationDirs]
DefaultDestDir = 12

; ================ Class section ====================
[ClassInstall32]
Addreg=SampleClassReg
```

```
[SampleClassReg]
HKR,,,0,%ClassName%
HKR,,Icon,,-5

; ================= Device Install section =====================
[Manufacturer]
%ARS%=ARS

[SourceDisksFiles]
arswdm1.sys=1

[SourceDisksNames]
1=%DISK_NAME%,

[ARS]
; DisplayName            Section           DeviceId
; -----------              -------           --------
%ARSwdm1.DRVDESC%=ARSwdm1_Inst,root\ARSwdm1
; !!! modified here !!!
%ARSwdm1.DRVDESC%=ARSwdm1_Inst,ARSTech\arsusb102



[ARSwdm1_Inst.NT]
CopyFiles=ARSwdm1.CopyFiles

[ARSwdm1.CopyFiles]
arswdm1.sys

[ARSwdm1_Inst.NT.Services]
AddService=ARSwdm1,0x00000002,ARSwdm1_Service


[ARSwdm1_Service]
DisplayName    = %ARSwdm1.SVCDESC%
ServiceType    = 1                  ; SERVICE_KERNEL_DRIVER
StartType      = 3                  ; SERVICE_DEMAND_START
ErrorControl   = 1                  ; SERVICE_ERROR_NORMAL
ServiceBinary  = %12%\arswdm1.sys

[Strings]
ARS = "ARS Technologies"
ClassName = "ARS Technologies Sample Drivers"
ARSwdm1.SVCDESC = "ARS Technologies Sample wdm Service"
ARSwdm1.DRVDESC = "ARS Technologies Sample wdm Driver"
DISK_NAME = "ARS Technologies Sample Install Disk"
-----------------------------------------------------------------------------------------
```

8.8 'ARSTech application or unknown' software type

This type of support for peripheral cards is available under all supported operating systems and platforms we offer.

This software type is chosen for developers using our **simple/basic API set** or **the extended API set** to build applications.

9. PCMCIA cards - use

This chapter describes the way of use of PCMCIA cards on our 'USB2' line of products, on our 'SSI2' line of products, and on our 'XPRS' line of products.

Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

The PCMCIA interface supports 2 types of cards -
- 16bit , 'PC Card' type
- 32bit , 'CardBus' type

If you have 16bit card you can use - our USB2PCMCIA product.

16bit PCMCIA cards can be powered by either 3.3V or +5V power to work. Some cards can use either one or the other voltage.
If a PCMCIA card requires +5V for powering, it can be handled only by USB2PCMCIA product, because our SSI2-PCMCIA product uses only 3.3V.

When connected for the first time, ARS Technologies software will automatically:

- Look for the resources of the card
- Redirect them with the USL
- Look for an .inf file for the PCMCIA card and if the .inf file is found, start the "*Found New Hardware"* installation process of the operating system, and load the driver for the card.

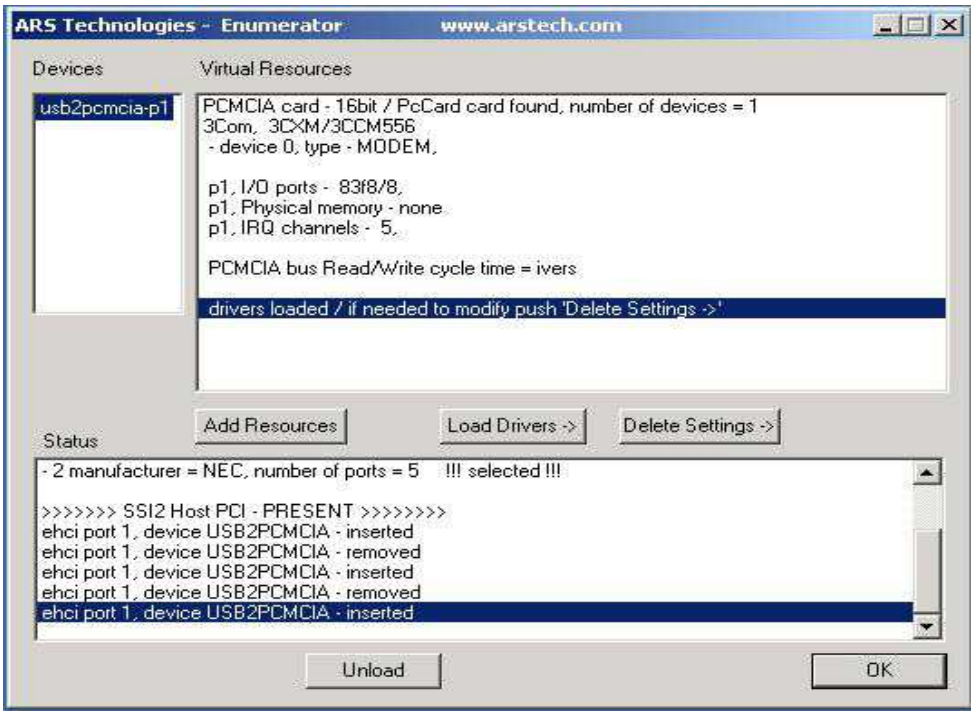
Support for this type of binaries is offered under only 32bit Windows platforms – from Windows 2000 to Windows 7.

This installation process is called only the first time the PCMCIA card and our USB2PCMCIA device are connected. In proceeding, the drivers load automatically.

Devices
Normally a PCMCIA card has one device such as a modem, a network device... There are cases where a PCMCIA card has two devices such as a modem and network device. In this case, each device has to have separate .inf install. files and driver files.
The results of the driver loading are shown in 2 places -
- in the Enumerator
- in the 'Device manager'

Enumerator shows the:

- Name of the card
- Number of devices and their type
- Resources used



The '**Device Manager**' will show a driver loaded, based on the type of a device.

When connecting for the first time, it is possible that there will be **no .inf file found** for the particular PCMCIA card. In this case the Enumerator will bring a message box reading *"**No driver files found**"*.

Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PCMCIA card. In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system, and load the driver for the card.

Examples -

16bit PCMCIA modem card + USB2PCMCIA

10. PCI cards - use

This chapter describes the way of use of PCI cards on our 'SSI2' line of products, and on our 'XPRS' line of products.

Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

When connected for the first time, the ARS Technologies software will automatically:

- Look for the resources of the card
- Redirect them with the USL (do not apply to XPRS-PCI-..)
- Look for an .inf file for the PCI card and if the .inf file is found
- Start the *'Found New Hardware'* installation process of the operating system, and load the driver for the card.

This installation process is called only the first time the PCI card and SSI2-PCI / XPRS-PCI-.. are connected. Afterward, the driver is loaded automatically.

When connecting for the first time, it is possible that there will be no .inf file found for the particular PCI card. In this case the Enumerator will bring a message box that reads "***No driver files found***".

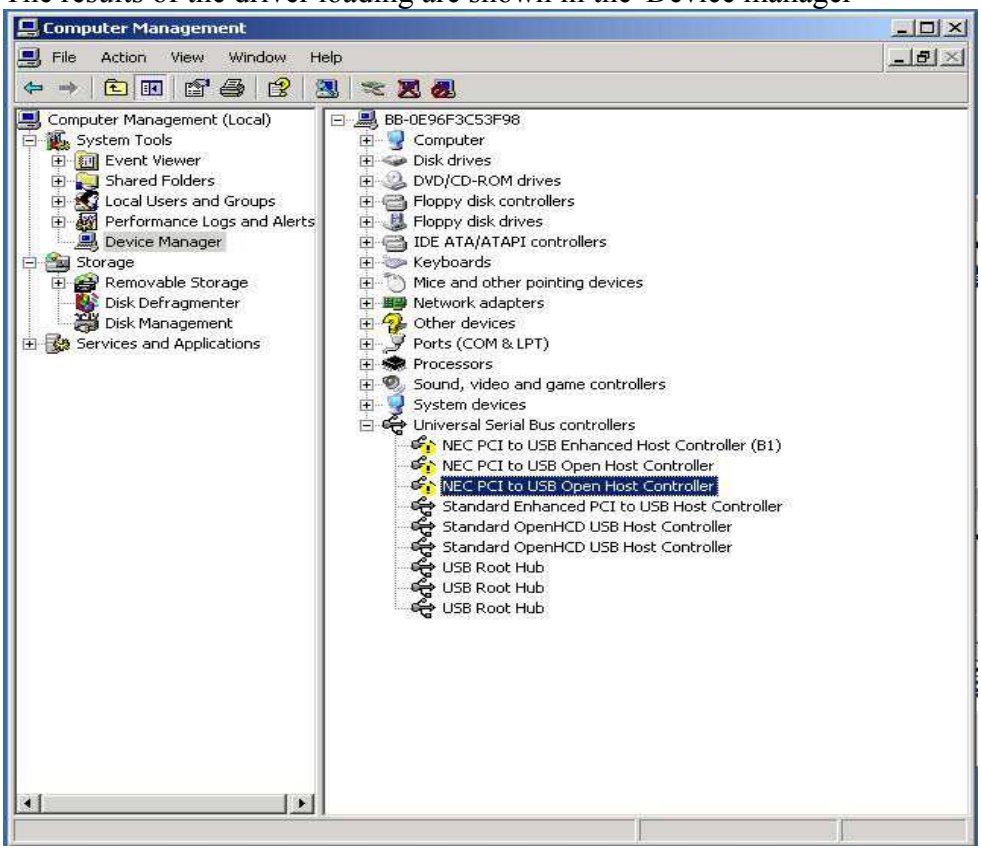
Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PCI card. In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and then load the driver for the card.

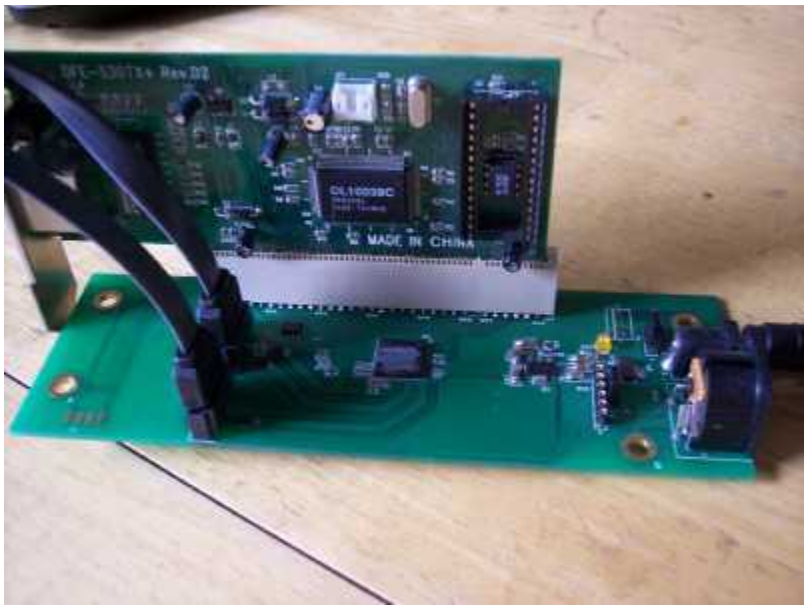
Devices
One PCI card may have one device, for example modem device, or a network device. There are cases where a PCI card has multiple devices. In this case each device has to have separate .inf install. files and driver files.

The results of the driver loading are shown in the 'Device manager'

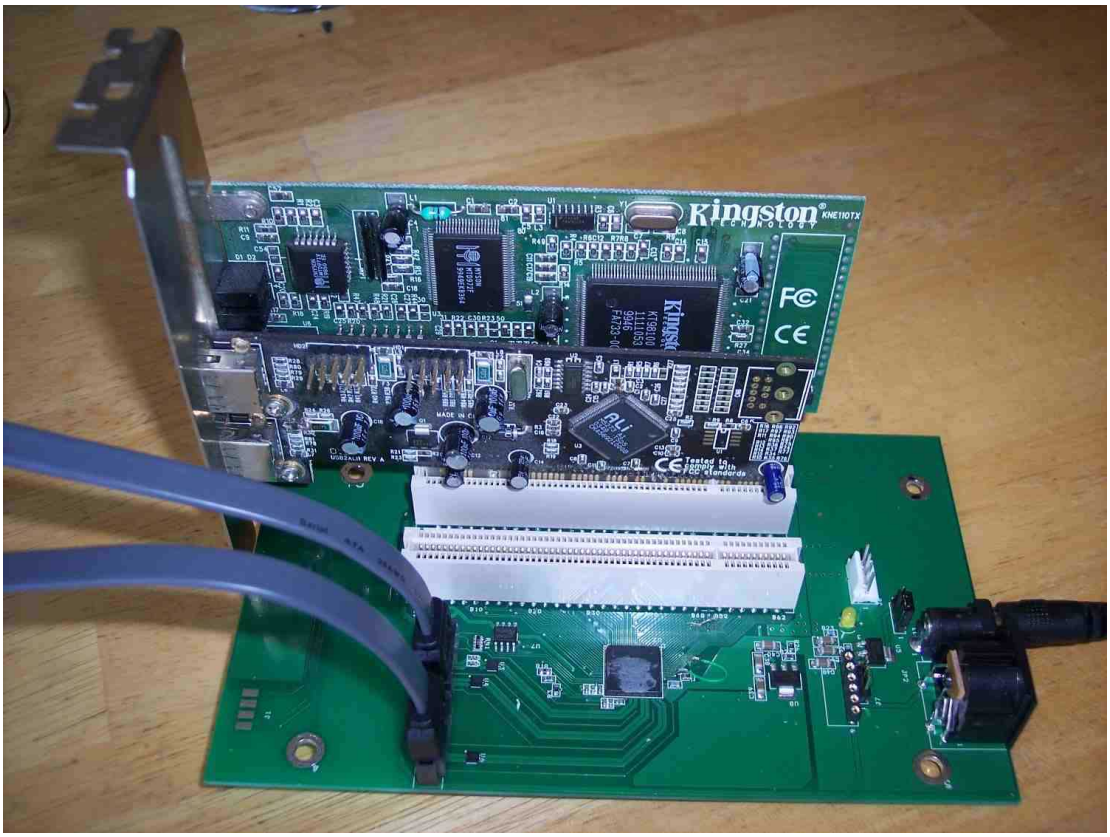


The 'Device Manager' will show drivers loaded for the USB host devices.

Examples of mounting



PCI network card + XPRS-PCI-X1



2 PCI cards + XPRS-PCI-X3

11. PCI Express -x1 and -x16 cards - use

This chapter describes the way of use of PCI Express -x1/-x16 cards on our 'XPRS' line of products.

Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

When connected for the first time, the ARS Technologies software will automatically:

- Look for the resources of the card
- Look for an .inf file for the PCI Express -x1/-x16 card and if the .inf file is found
- Start the *'Found New Hardware'* installation process of the operating system, and load the driver for the card.

This installation process is called only the first time the PCI Express -x1/-x16 card and XPRS-PX-.. are connected. Afterward, the driver is loaded automatically.

When connecting for the first time, it is possible that there will be no .inf file found for the particular PCI Express -x1/-x16 card. In this case the Enumerator will bring a message box that reads "***No driver files found***".

Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PCI card. In this dialog box you can:

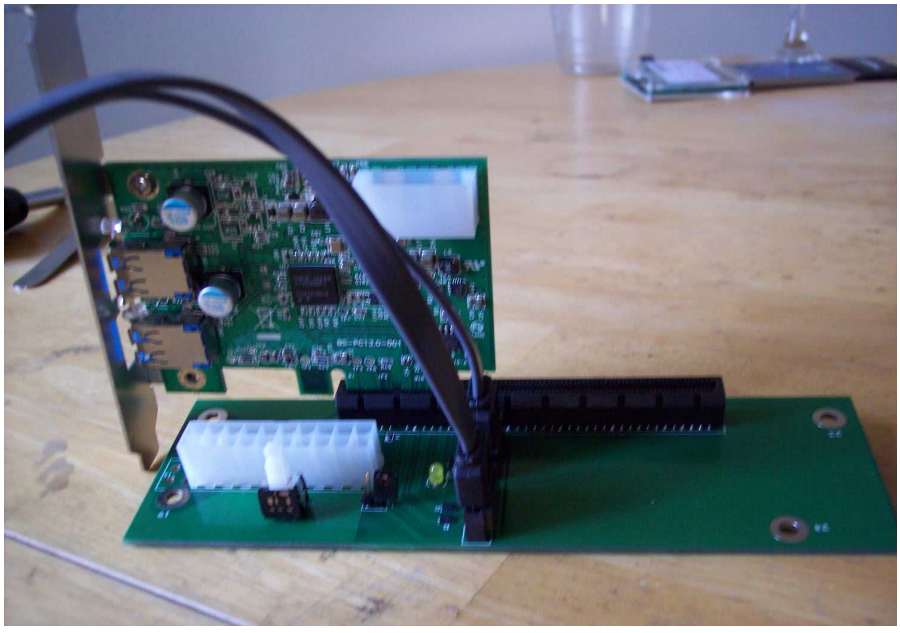
- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and then load the driver for the card.

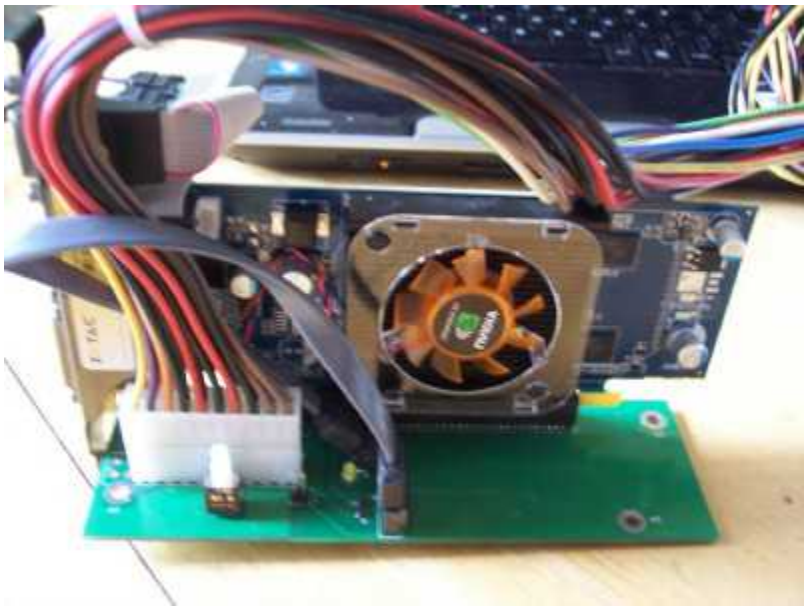
Devices
One PCI Express -x1/-x16 card may have one device, for example video device, or a network device. There are cases where a PCI Express -x1/-x16 card has multiple devices. In this case each device has to have separate .inf install. files and driver files.

Examples

PCI Express -x1 card mounted in XPRS-PX-X1



PCI Express -x1 card mounted in XPRS-PX-X16



PCI Express -x16 card mounted in XPRS-PX-X16

12. ExpressCard type34 and type54 cards - use

This chapter describes the way of use of ExpressCard type34/type54 cards on our 'XPRS' line of products.

Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

When connected for the first time, the ARS Technologies software will automatically:

- Look for the resources of the card
- Look for an .inf file for the ExpressCard type34/type54 card and if the .inf file is found
- Start the *'Found New Hardware'* installation process of the operating system, and load the driver for the card.

This installation process is called only the first time the ExpressCard type34/type54 card and XPRS-EC are connected. Afterward, the driver is loaded automatically.

When connecting for the first time, it is possible that there will be no .inf file found for the particular ExpressCard type34/type54 card. In this case the Enumerator will bring a message box that reads "***No driver files found***".

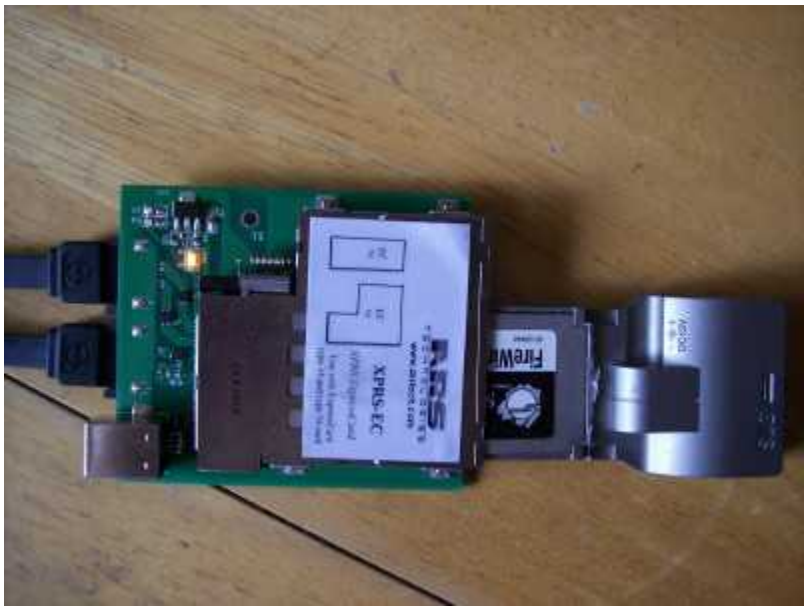
Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PCI card. In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and then load the driver for the card.

Devices
One ExpressCard type34/type54 card may have one device, for example 1394 device, or a network device. There are cases where a ExpressCard type34/type54 card has multiple devices. In this case each device has to have separate .inf install. files and driver files.

Examples



ExpressCard type34 1394 card + XPRS-CB

13. Compact PCI Express and PXI Express cards - use

This chapter describes the way of use of Compact PCI Express and PXI Express cards on our 'XPRS' line of products.

Information on the specific product, the way of connecting, powering, enclosures, etc. is available in the chapters 1-3 .

When connected for the first time, the ARS Technologies software will automatically:

- Look for the resources of the card
- Look for an .inf file for the Compact PCI Express and PXI Express card and if the .inf file is found
- Start the *'Found New Hardware'* installation process of the operating system, and load the driver for the card.

This installation process is called only the first time the Compact PCI Express and PXI Express card and XPRS-cPCIe are connected. Afterward, the driver is loaded automatically.

When connecting for the first time, it is possible that there will be no .inf file found for the particular Compact PCI Express and PXI Express card. In this case the Enumerator will bring a message box that reads "***No driver files found***".

Clicking the "**Yes"** button will bring a file open dialog box for finding and opening the .inf file for the PCI card. In this dialog box you can:

- Select drive
- Double click to select directory
- Select file type
- Type file name
- Push open button

This will start the "***Found New Hardware***" installation process of the operating system and then load the driver for the card.

Devices

One Compact PCI Express and PXI Express card may have one device, for example a DAQ device. There are cases where a Compact PCI Express and PXI Express card has multiple devices. In this case each device has to have separate .inf install. files and driver files.

Examples

PXI Express DAQ card + XPRS-cPCIe

Appendix

The install software is available for download at - www.arstech.com/install2rel.zip .

First time install may require system libraries - www.arstech.com/install2libs.zip .

For details on our products please check our user's guide - www.arstech.com/users-guide.pdf

Frequently asked questions - www.arstech.com/install/cms-display/ste_faqs.html