ThinkIO™ - P

Premium DIN Rail PC
for Fieldbus and IO Systems

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PROGRAMMING ASSISTANCE GUIDE

-

Windows XP Embedded

TM

The product described in this manual is in compliance with all applied CE standards.

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2. Introduction

The ThinkIO-P Windows XP Embedded Board Support Package (BSP) is intended for use with the Microsoft® Windows XP Embedded Studio.

It is not a complete Windows XP Embedded target image of the ThinkIO-P and only contains ThinkIO-P specific components.

This Programming Assistance Guide is designed to provide information about the basic steps required to design a custom Windows XP Embedded target image for the ThinkIO-P. It begins with general information about the Windows XP Embedded Studio and ends with specific suggestions for using the ThinkIO-P Windows XP Embedded BSP.

This guide is designed to be read sequentially, however, experienced Windows XP Embedded Studio users may choose to proceed with section 4.

2.1 Presumptions

The use of this guide requires the availability of the Windows XP Embedded Studio and basic knowledge of how to use it.

2.2 List of Terms

BSP	Board Support Package
Component	A single object in the in the SLD file or the Component Database such as the SRAM driver, the VGA driver, or a macro component which contains references to several other components
CRT	Cathode Ray Tube: an analog monitor
DVI	Digital Visual Interface: used for connecting digital monitors
FBA	First Boot Agent: a program which installs a Windows XP Embedded image on a target computer. The FBA runs only once.
INF File	An ".inf" file (information file) contains instructions and settings required for the installation of a driver by the Windows Hardward Manager.
GUID	Globally Unique Identifier: a unique random number.
Repository	A folder or directory which contains all files referenced by one or more components of the Component Database. The files referenced by components used in the target design will be copied during the build phase of the target image.
SLD File	System Level Definition: a component definition file which contains all information about a component

3.   Windows XP Embedded Studio

This is only a short introduction into the Windows XP Embedded Studio and not intended as a complete user guide. For in-depth information refer to Microsoft® MSDN Library and the Help-Files of the Studio itself.

3.1   General

The Windows XP Embedded Studio consists of a database and three main programs:

- Component Database
- Component Database Manager
- Component Designer
- Target Designer

The programs run independent of each other, except the Component Database Manager, whose functionality is restricted if one of the other programs is open.

The heart of the Studio is the Component Database**.** This database can be edited by the Component Database Manager only. The Target Designer and Component Designer are based on the contents of the Component Database. This means, components not in the Components Database cannot be added to a target design project.

3.2   The Component Database

The Component Database contains:

- repositories
- components
- packages and groups

The repositories contain the physical driver, application, and program files which may be used on a target device.

A repository is a folder which has a GUID as name. There are already several basic repository folders which contain all necessary files needed by the more than 10,000 components which are already in the database.

The screenshot on the following page illustrates the composition of the root repository with its basic repository folders.

```
─  ⊡  wiNCVS
⊟  📁  Windows Embedded Data
    ⊟  📁  Repositories
            📁 {1AC3561A-E184-4D86-8A73-B0D8246CDCDD}
            📁 {2EB8FFD2-647B-4538-85AF-00CF4AD7511B}
            📁 {3DC166E5-E335-49D9-8C75-450318AFD940}
            📁 {41B0394B-74D8-4CFD-86C0-BDCE45CE4728}
            📁 {64FA6303-3502-4D29-892A-59D78D203587}
            📁 {67C85615-B0C5-42EA-8B8A-E8AB47DB2B1D}
            📁 {484C9D34-846E-40E2-A2E6-FF2771A303D5}
            📁 {022716D8-0CF0-4779-B94C-8E52EB36709C}
            📁 {347677C8-8935-4d30-8DDA-FB6D701ACF47}
            📁 {720001E6-3E0B-42CF-A9A1-837C61A6F815}
            📁 {31423882-0921-4CFF-BCE9-272EC892F325}
            📁 {AEDD66D0-66DB-44E8-88AE-4E6875881D1C}
            📁 {BD09932B-D989-4C00-B5A6-EF7D92434B47}
            📁 {DF23B715-5EA9-4D00-BC57-CFB8B07E1078}
            📁 {F0892DF6-F02C-4B61-8E48-B06555990113}
⊞  📁  Windows Embedded Images
```

WARNING!

Except for folders created by importing OEM ".sld" files such as the ThinkIOP_0203.sld into the database, do not delete folders in the repository. Refer also to section 5.3 for further information.

A new component added to the database will add a new folder containing all files required by that component.

3.3 The Component Database Manager

The Component Database Manager is used:

- for importing new component files (".sld" files)
- to set or change the location of the root repository
- to provide an overview of and for the deletion of component packages
- to provide an overview of and for the deletion of components
- to filter the component overview
- for repository manipulation (root, location, deletion)
- to provide an overview of and for the deletion of component groups

3.4 The Component Designer

The components contain descriptions of their composition (drivers, applications, other components), to what repository they are associated, and information about where to copy files, what registry settings to set, etc. Components can be assigned to groups and packages.

The Component Designer is used to create and modify custom components and any associated repositories, packages, dependency groups, and repository sets. These objects are saved in component definition files (".sld" files), imported into the component database, and used in configurations.

For further information regarding the Component Designer refer to the Help menu and the following WEB link:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnanchor/html/xpembedded.asp

There are several methods available for creating an ".sld" file:

Manual creation (File/New) – (see Help Manual of the Component Designer)

- importing an existing INF file (*.inf)
- importing a Target Analyser file (*.pmq) (created by ta.exe/tap.exe)
- importing a Registry file (*.reg)
- importing a Windows NT Embedded KDF file (*.kdf)or
- opening of an existing ".sld" file and modifying it.

Use of the above methods requires exact knowledge about the hardware, including required registry settings and drivers. Therefore, whenever possible, an existing file of the type mentioned above should be imported.

3.5   The Target Designer

The Target Designer is used to create and modify a configuration and build it into a runtime image. With the Target Designer it is possible: to add components and resources to a configuration; modify various properties of the components and resources added; modify properties of the configuration itself; check component dependencies to ensure that necessary components are included in the configuration; estimate the footprint of a runtime image before building it; and much more.

New components such as the ThinkIO-P BSP are available after being imported into the Component Database.

After all required components have been added to the configuration and the dependency check has been run without errors, the runtime image must be built. It can be created in a freely selectable directory. The following screenshot illustrates this.
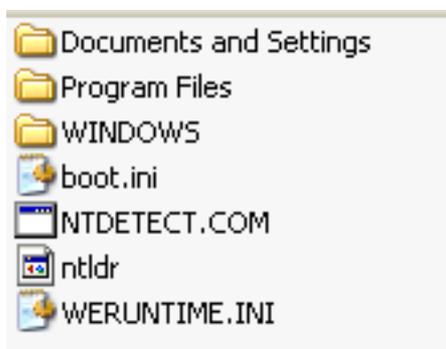
> ***Note...***
>
> An error free dependency check and an error free build does not guarantee that the FBA has been executed without problems or that the runtime image will work as expected on the target machine.

4. Components of the ThinkIO-P Win XPe BSP

The ThinkIO-P Windows XP Embedded BSP contains the following:

This Programming Guide

ThinkIOP_<nnnn>.sld	the ".sld" file to be imported into Component Data Base
	<nnnn> represents the version index for the ".sld" file, e.g. 0000
UserGuide_SLD_import.chm	shows how to import an ".sld" file into the Component Database (refer to section 5.2)
Files Folder	Contains all drivers, files, etc. for every component in the ".sld" file
DemoSources Folder	Contains demo source code for application programmers who want to develop applications using KBus, SRAM, and KOMisc drivers
	The demo sources are not part of the ".sld" file as they are intended to be a reference only for developers.
Component Help Folder	Contains HTM help files used by the Component Database Manager for inserting component help into the Component Database

5.   ThinkIO-P BSP Installation Procedures

5.1   Preparation

Create an empty directory folder and unpack the Kontron delivered ".zip" file in this directory. Afterwards the file and folder list should be as illustrated in the screenshot below:
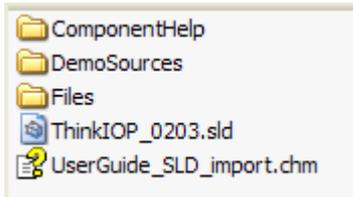
5.2   Import of Components

To import components perform the following:

- Open the Component Database Manager
- Select "Import"
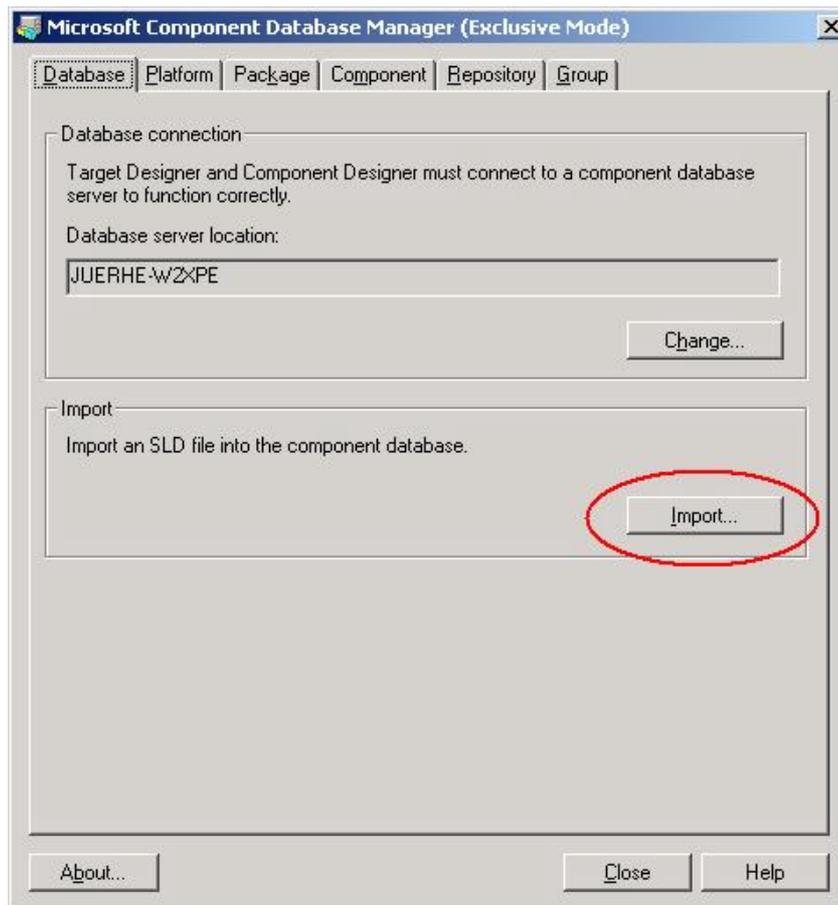
- To search for the component file to import, browse to the folder where the "ThinkIOP_<nnnn>.sld" file is located and select it

- Check mark "Copy repository files to repository root" of the Component Database Manager. This ensures that the associated files are found and included in the target image when using the component later on in the Target Designer.
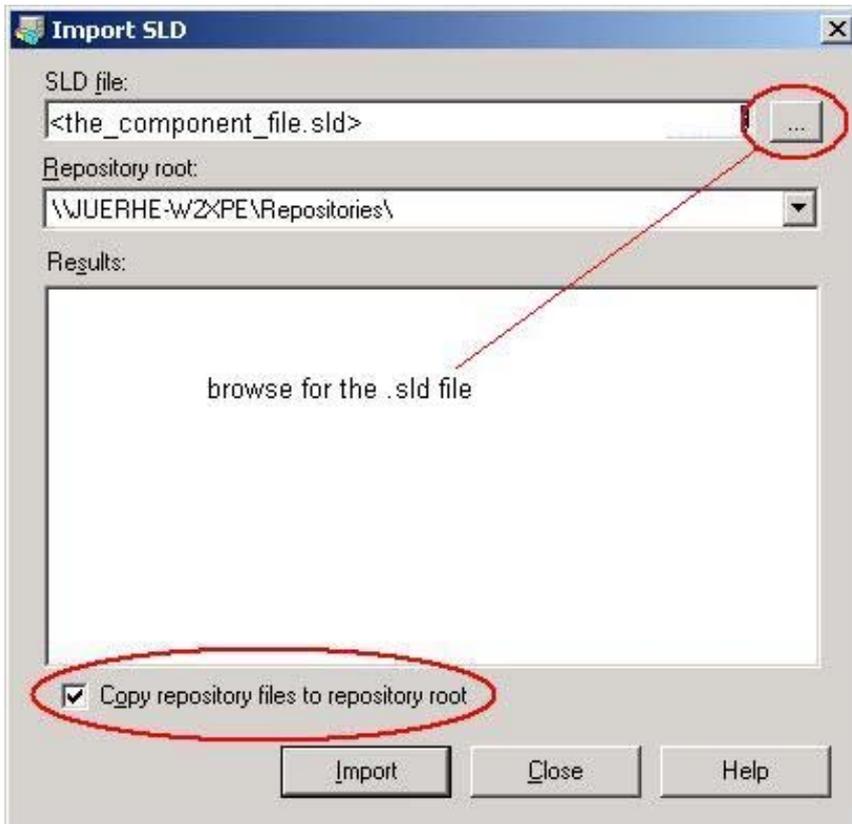
- Select "Import"

Note...

If the source files cannot be found during the import process, this copy function fails silently, and the first time an error will appear is during the runtime image build process in the Target Designer.

After a successful import the following information should be displayed.
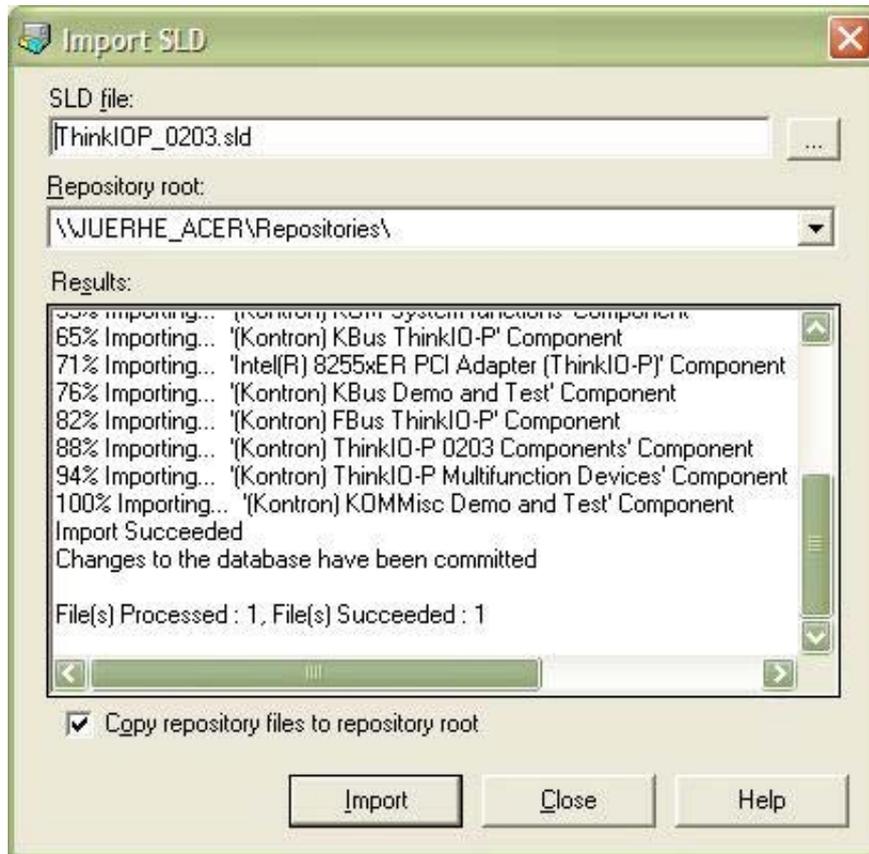
- Close the Component Database Manager

  The components are now available in the Target Designer.

5.3   Removing ThinkIO-P Components from the Database

The easiest method to remove the ThinkIO-P components from the Component Database is to remove the ThinkIO-P package. This ensures that all components and the ThinkIO-P repository are removed from the database.

- Select the package to be removed from the database
- Select "Delete Package"
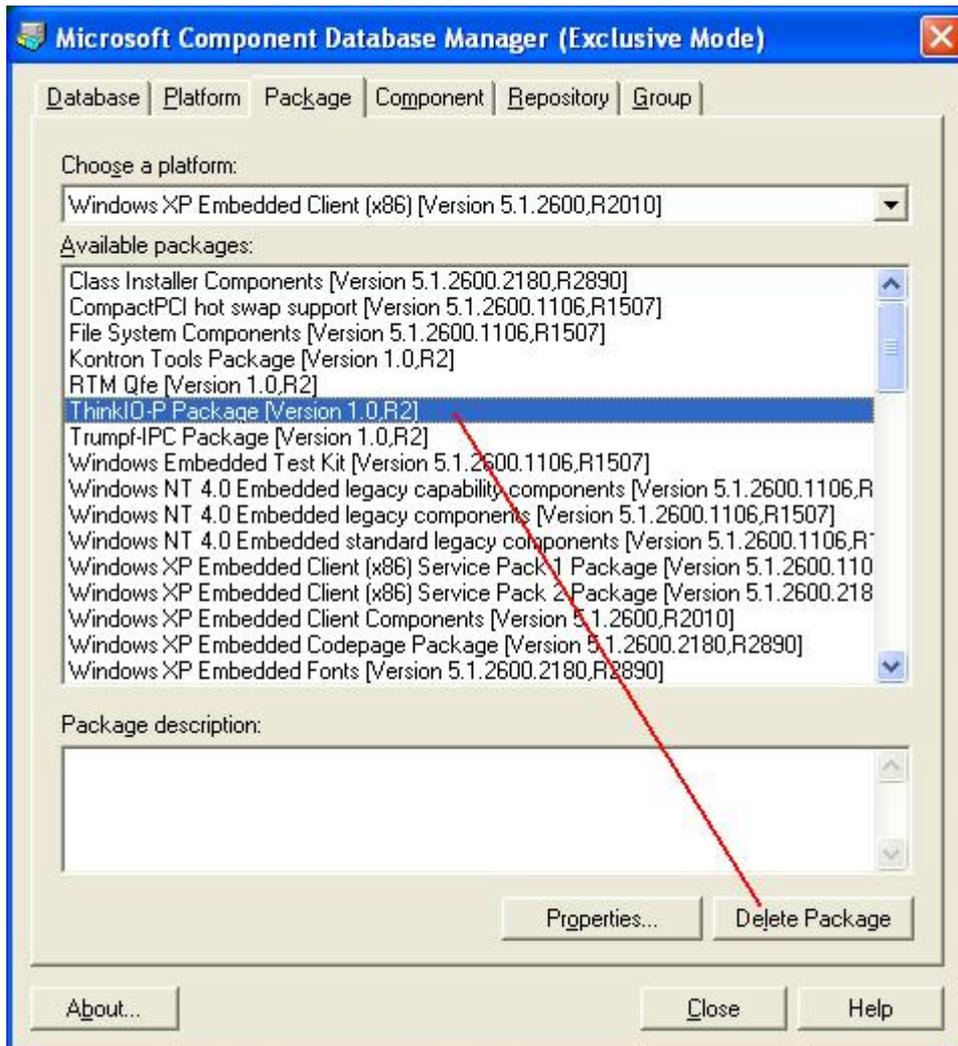
Note...

Removing a repository from the database will remove the reference to that repository only. The physical repository itself including all files will not be removed. This must be done manually.

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6.   Using the Target Designer

After importing the "ThinkIOP_<nnnn>.sld" file into the Component Database, open the Target Designer and select: "File"; then select either "New" or "Open an existing SLX file".

The components list on the lefthand side indicates the macro component "(Kontron) ThinkIO-P 0203 Components".

The macro "(Kontron) ThinkIO-P 0203 Components" combines several components suitable for the ThinkIO-P (see list below). After adding this macro to the target design but before running the dependency check, the single components to be added by the macro can be selected via the settings of the macro (refer to section 6.3, default is all).
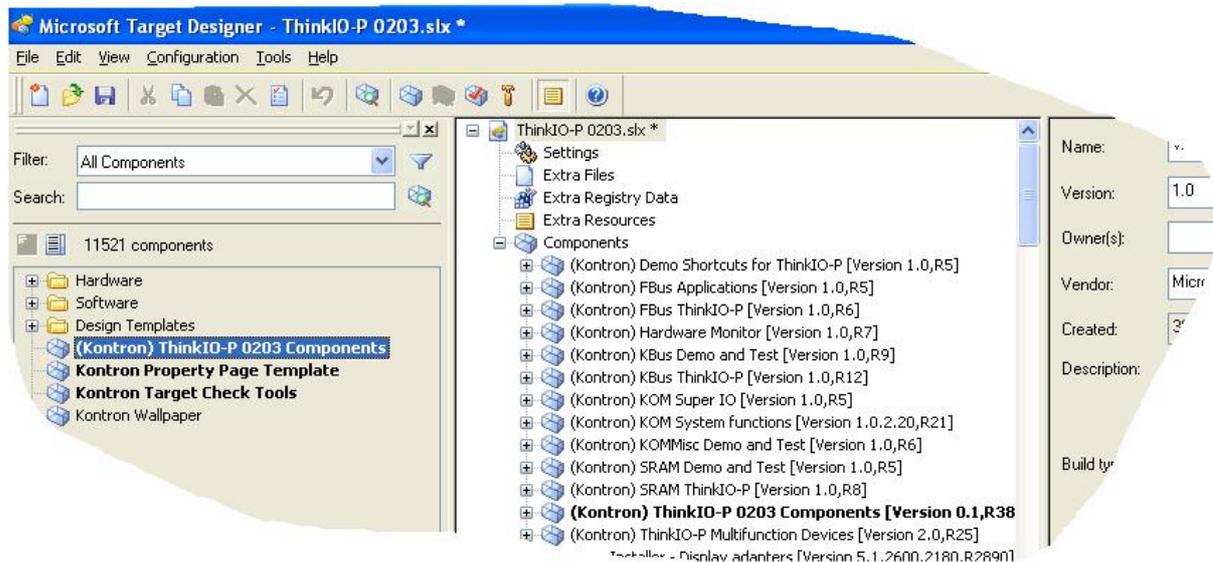
6.1   Services

There are no services for this component.

6.2   Associated Components

The "(Kontron) ThinkIO-P 0203 Components" macro is associated with the components listed below.

Some components depend on the existence of other components (see Dependencies column). The dependency check makes sure that components on which already selected components depend on are also included into the target design.

COMPONENT NAME	DEPENDENCIES
(Kontron) KOM System functions	none
(Kontron) KOMMisc Demo and Test	(Kontron) KOM System functions
(Kontron) KBus ThinkIO-P	(Kontron) ThinkIO-P Multifunction Devices
(Kontron) KBus Demo and Test	(Kontron) KBus ThinkIO-P
(Kontron) SRAM ThinkIO-P	(Kontron) ThinkIO-P Multifunction Devices
(Kontron) SRAM Demo and Test	(Kontron) SRAM ThinkIO-P
(Kontron) FBus ThinkIO-P	(Kontron) ThinkIO-P Multifunction Devices
(Kontron) FBus Applications	(Kontron) FBus ThinkIO-P
(Kontron) KOM Super IO	none
(Kontron) Hardware Monitor	(Kontron) KOM Super IO
Intel(R) 8255xER PCI Adapter (ThinkIO-P)	none
Intel(R) 82852/82855 GM/GME Graphics Controller	none
(Kontron) Demo Shortcuts for ThinkIO-P	none

After adding the macro component to the target design and running the dependency check that all components of the list above have been added to the components list unless some of them were deselected prior the dependency check (refer to section 6.3 Settings).

6.3   Settings

Each component of the list above can be selected or deselected.
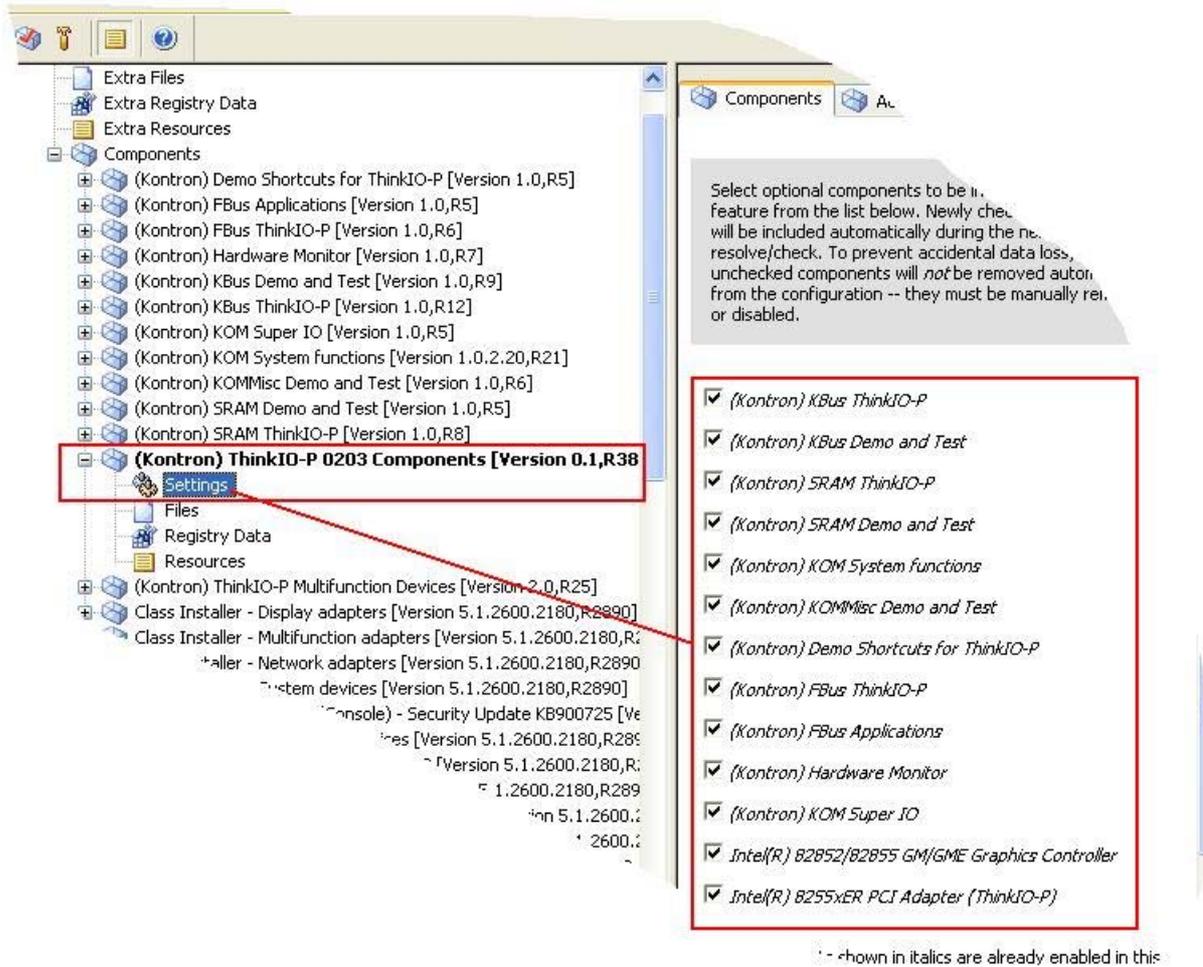
Note...

Deselecting a component which is part of the dependencies list will be disregarded, if simultaneously a component is selected, which depends on the deselected component.

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7.   Transfer of the Runtime Image to the Target Machine

All files and directories of the runtime image must be copied to the target device. Depending on the target machine interfaces for storage devices and/or network connections, there are several options to copy the runtime image.

Headless targets and targets booting from a read-only device require special preparation which is not addressed by this document. Refer to the HELP menu or the Microsoft library.

> *Note...*
>
> Ensure that the boot device drive letter in the target designer configuration is the same as the actual drive letter of the boot device of the target machine, otherwise the FBA will be aborted with an error.

7.1   Creating a Boot Device

If possible prepare a memory stick with a bootable DOS partition. If a memory stick is not available, prepare a bootable DOS floppy disk.

The memory stick or floppy should contain the following files: "bootprep.exe", "format.com", "fdisk.exe" or better "xfdisk.exe" (freeware), and a freeware called "LFN" (a collection of DOS commands which is able to handle long file names).

7.2   Preparing the Compact Flash (CF)

Perform the following to prepare a CompactFlash:

- If using an external CF, insert the CF into the ThinkIO-P.

- Boot the target machine with DOS from the floppy or the memory stick.

- If required, use "fdisk.exe" or "xfdisk.exe" to create a primary partition (FAT16 or FAT32) on the CompactFlash. If there is a primary partition already present (e.g. FAT16), then delete all partitions from the CF (best is to use "xfdisk.exe") and create a new primary partition and activate it.

- Run: "FORMAT <CF drive letter>:"

- Run "BOOTPREP.EXE from stick/floppy: (syntax: "bootprep /d<CF drive letter>"). This prepares the CompactFlash for booting Win XPe.

  The program is found under: "Program Files\Windows embedded\utilities".

- Remove the CF from target machine and insert it into the development machine. Copy the XPe image from the development machine to the Compact Flash. Ensure that the Target Device Settings of the image are set to drive "C".

- If this is not possible or if the internal CF is used, the target image must be copied from the memory stick onto the CF. If the memory stick size is not sufficient to hold the target image or a floppy is used as a boot device, an external card reader (USB) could be used to copy the target image first onto an external CF and from there onto the internal CF.

7.3   Run First Boot Agent (FBA)

To run the First Boot Agent, perform the following:

- Shut down the ThinkIO-P and disconnect the boot device.

- Insert the external CF with the target image and restart, or

  if using the internal CF, just restart the ThinkIO-P.

After the FBA finishes, the ThinkIO-P is rebooted automatically.

> *Note...*
>
> In the event that a digital monitor is connected via the DVI port, the screen remains blank after the first reboot. Refer to section 8.1 to solve this problem.

8.   Known Problems

8.1   ThinkIO-P Is Connected to a Monitor via the DVI Port

If the component "Intel(R) 82852/82855 GM/GME Graphics Controller" is used in the target design, and the ThinkIO-P is connected to a monitor via the DVI port, the screen remains blank after First Boot Agent (FBA) reboots the target.

This is due to the fact that this driver does not recognize a monitor device connected to the DVI automatically.

The following procedure assumes that Auto Logon is used, otherwise connect a CRT to the ThinkIO-P and complete the logon dialog.

Then reconnect the LCD Monitor again and apply the procedure described below:

In order to activate the monitor press Ctrl-Alt-F4 after the First Boot Agent has rebooted for the very first time. Afterwards the monitor will always be recognized. Swapping the monitor with another type or brand later on will create the same problem because the new monitor device settings cannot be found in the registry. In this case apply Ctrl-Alt-F4 again.

Additionally, the Hot-Key Ctrl-Alt-F1 will switch back to a CRT monitor. If required, the Display Devices and settings can be selected via the Intel Extreme Graphics Control Panel.

9.   Application Development

Some features of the ThinkIO-P can be used in custom designed applications. The ThinkIO-P Windows XP Embedded BSP contains demo applications including source code and API description for:

FEATURE	SEE DEMO PROGRAM	SUPPORTING DRIVER
User LED programming	Test_misc.exe	KOMMisc.sys
Watchdog programming	TIOPWatchdogDemo.exe	KOMMisc.sys
Run/Stop switch position polling	Test_misc.exe	KOMMisc.sys
Use of SRAM	Test_SRAM.exe	SRAM.sys
KBus programming	KbusApiDemo.exe KbusHandler.exe	KBus.sys

Test applications without demo sources:

FEATURE	SEE DEMO PROGRAM	SUPPORTING DRIVER
FBus Driver Test	DrvSetup.exe DrvTest.exe	CifDRV.sys
Hardware Monitor	Hwmon.exe	W83627HF.sys

For further Information see the various help files and source codes under the folder "Demo-Sources". Ready to use test or demo applications can be found in the "Files" folder.

Also, refer to the ThinkIO-P Hardware Reference Guide for further information.