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Introduction

1 Introduction

Thank you for your interest in the PickMaster. This manual will give you an overview of the product characteristics and how it can be used.

PickMaster supplies you with the application software for the IRB 340 and a floor mounted IRB 140 robot. It is a powerful software product from ABB for effortless configuration and control of high speed picking applications.

PickMaster - the PC-based control software - is a plug & produce high-end integration of our high performance S4Cplus robot controller. It uses a reliable powerful vision system which enables high speed picking of random placed objects from moving conveyors. Picking can be done on conveyor speeds up to 1400 mm/s.

PickMaster can control up to 4 robots simultaneously.

PickMaster can be integrated with any other automation system by the use of RIS (remote integration services). Several RIS clients are delivered with PickMaster. One RIS client can communicate over all common field buses such as ProfiBus, InterBus and DeviceNet. Another client can use RS232. Executable example source code is delivered in Visual Basic so that it is possible to customize any RIS client to meet the special needs for all projects.

PickMaster has a great flexibility to meet a multitude of installation cases. PickMaster controls vision cameras for pinpointing positions and robots for operation execution connected through a flexible Ethernet configuration.

PickMaster gives you the benefit of:

- fast installation and configuration of multiple robots
- instant product change-over
- risk reduction offering a product-based repeat solution
- best cycle time performance through enhanced built-in conveyor tracking and optimal position transfer pipe line
- highest possible conveyor tracking speed through special conveyor tracking enhanced for high volume production flows

PickMaster runs with the S4Cplus robot controller and RobotWare - at least 4.0.42. Required RobotWare software option is “Prepared for PickMaster” which includes all necessary options to interface PickMaster as well as efficient conveyor tracking.

PickMaster runs on Windows NT 4.0 on a regular PC with at least 750 MHz clock frequency for efficient production.

The vision capability is provided by the Cognex MVS-8110 frame grabber board, which plugs into the PCI-bus of the PC. The powerful vision search algorithms are executed on the MMX accelerated PC. A maximum of four cameras can be connected on one PC – thus requiring an even more powerful PC – 1400 MHz and above.

When PickMaster has been installed on your computer an on-line help is available for
fast navigation through the use of PickMaster, identical to the paper copy delivered with the product.

PickMaster is licensed through two basic licenses and additional licenses determining the maximum number of robots and cameras attached as well as additional options during run-time.

All PC-software is contained on a CD-ROM:

- Configuration wizard
- Calibration wizard
- Model wizard
- Project Viewer
- Logging
- Production panel
- Interlink 2.0
- Cognex OMI 2.2

A PickMaster basic license order is delivered with the following hardware:

- Cognex MVS-8110 vision board
- Camera break out box
- Trig-Strobe I/O board
- Ribbon cable between vision and I/O boards

How to use this manual

Chapter Description gives an understanding of the definitions and structure of the PickMaster product and its use.

Chapter three Technical Specification gives the technical data about hardware and software constituting the product. It also defines its abilities and limitations.

Other manuals

3HAC 7702-2  PickMaster User’s Guide
A detailed step-by-step description of the programming can be found in guide.

3HAC 7756-1  Conveyor Tracking
A detailed description on the conveyor tracking functionality.

3HAC 7783-1  RAPID Overview
Gives and overview of the RAPID programming language.

3HAC 7774-1  RAPID Reference Manual - System Data Types and Routines
The robot programming language is described in detail in this manual.
2 Description

PickMaster controls an installation of one or more IRB 140 or IRB 340 robots where each robot picks up an item at one location and places it at another. The robots are located along conveyor belts feeding items and packages. Items, which can be placed randomly on the feeder conveyor, are placed in the packages. The vision system identifies the items before they arrive at the working area of the robots. PickMaster sends the position information to the robot controllers which executes the pick-and-place operation in less than 0.4 seconds - on an IRB 340.

2.1 Pick-and-Place Operation

The robot gets a pick-and-place position pair to execute a pick-and-place cycle, i.e. it picks up the item at the advised pick position and it places it at the place position. If the position place is moving the robot will automatically adjust its speed to the speed of the feeder to make a smooth pick or place of an item.
2.2 Structure and Concepts

The central function of the PickMaster product is the actual pick-and-place operation by the robot. The robot picks up an item at a pick position and places it at a place position, the item target.

An item as well as an item target is defined by type, position and direction. An item and an item target can have the same type which means that a pick-and-place operation can be performed between these two. The position is the x, y and z-coordinates and direction is the item and item target angle towards the x-axis.

Items and item targets can be combined into patterns. This technique is used to describe boxes or other packages used to pick items from or place items at item targets. The items or item targets within a pattern have a fixed position relationship, i.e. the item or item target positions are the same for different instances of the pattern.

Seen from a strict descriptions view, item, item targets and patterns are described in the same way, and in fact handled by the system as purely items.
2.3 A PickMaster Project

To use the PickMaster application it is necessary to define at least one project. There can be several. A project defines the configuration of the system, i.e. its robots, feeders and position sources (e.g. vision systems), relations between the different parts and the different items to handle. A project also includes a calibration phase before it is ready to be used in operation.

A PickMaster project includes all information needed by the application to perform a pick-and-place task in one or more cells. The project assigns the pick-and-place task to the robots, i.e. the pick-and-place strategy of how to distribute the items in the cell.

The project information is defined as properties to a number of objects that correspond to the physical equipment. The object types are described below.

Figure 1 Physical view of a cell

The project information is defined as properties to a number of objects that correspond to the physical equipment. The object types are described below.
Description

Feeder

A **feeder** is the location where the robot picks or places the items. The feeder can either be a continuously moving conveyor or an indexed conveyor. It can also be a fixed position where items are placed.

Robot

A **robot** is an IRB 340 or floor mounted IRB 140 controlled by a S4Cplus robot controller attached to the Ethernet. PickMaster communicates with the controller over Ethernet via RAP and InterLink. Each robot must have a pick or a place **queue** for each type of item.

Position Source

A **position source** generates the location of the items. The location can be found by a camera and a vision system or if they are known in advance, i.e. pre-programmed, they can be defined in a file. A photocell or some other detection device can also be used as a trigger. A position source is connected to a feeder.

Item

An **item** is an object which is picked and placed by the robot. An item can be an **atomic item** or a **compound item**. The compound item is typically an item found by the vision system with a number of pick or place positions forming a pattern. An example is a Blister.

The IRB 140 can use all axes to pick and place 3-D items. The pick/place-surface of the 3-D item can easily be configured by defining angle orientations around the vision models grip point.
Pattern

A pattern is a compound item with a number of fixed positions. Each position is defined so that an atomic item can be encapsulated and picked or placed there. Normally a pattern is used to place items in the pick-and-place task.

The IRB 140 can use all axes to pick and place items. Each position in the pattern can therefore be orientated in 3-D.

Mixing

Different items can be sorted by use of PickMaster specific RAPID instructions. Instructions can specify which item type that shall be picked. Time-out can be set for getting specific items so that the instruction doesn’t hold the program execution. It is also possible to foresight the item types in a source queue.

Vision Model

A vision model is the model used by the vision system to locate an item. An item can have one or more models attached. A model can only be attached to one item. A vision model is originated by an image taken by a camera and stored as a mathematic description and a bit map in the PickMaster system.

2.4 Installation

The PickMaster product delivery consists of a CD with the PickMaster software, a vision board, a camera break out box, an I/O interface board and a ribbon cable.
**Description**

To start using PickMaster the following steps must be performed.
1. Install the software on the PC. Start the installation procedure by double-click the `setup.exe` at root level on the CD.
2. Request and install the license key
3. Install the Vision interface board into the PC. Follow the installation procedures described in the documentation accompanying the board.
4. Install the trig-strobe I/O board and connect the ribbon cable with the vision board.
5. Connect the S4Cplus I/O to robot, possible conveyors and vision system. Make sure to follow the guide-lines for the trig- and strobe-connections in the User´s Guide.
For more detailed information see the Getting Started manual and the User’s Guide.

### 2.5 Configuration

**Configuration types**

PickMaster 1.1 supports the following configurations:\(^1\(^2\):

1. **Fixed Place item position**

   Robot: One robot
   Pick: One Pick Feeder; Randomly placed Pick items; One Pick item type;
   Vision guidance. Stop & Go. Optional photo cell trigging.
   Place: Fixed Place item position; One Place item type.

---

1. The described configurations have been verified in tests. Other similar configurations are most likely to work perfectly but have not been formally verified.
2. The restrictions apply to one defined project. Note that several projects can be defined and e.g. different Pick item types can be used between projects.
2. **90° - Semi-Fixed Place item position using indexed place feeder**

   Robot: One robot
   Pick: One Pick Feeder; Randomly placed Pick items; One Pick item type; Vision guidance. Stop & Go. Optional photo cell trigging.
   Place: One Place Feeder; Semi-fixed Place item position; One Place item type; Indexed Place Feeder.

3. **90° - Random Place item position**

   Robot: One robot
   Pick: One Pick Feeder; Randomly placed items; One item type; Vision guidance. Stop & Go. Optional photo cell trigging.
   Place: One Place Feeder; Randomly placed Place items; One item type; Vision guidance. Optional photo cell trigging.
4 90° (2)- Semi-Fixed Place item position using indexed place feeder

Robot: Two robot
Pick: One Pick Feeder/Robot; Randomly placed Pick items; One Pick item type/Pick Feeder; Vision guidance and Stop & Go on both Pick Feeders. Optional photo cell trigging.
Place: One Place Feeder; Semi-fixed Place item position; One Place item type; Indexed Place Feeder.
5 90°(2) - Random Place item position

Robot: Two robot
Pick: One Pick Feeder/Robot; Randomly placed Pick items; One Pick item type/Pick Feeder; Vision guidance and Stop & Go on both Pick Feeders. Optional photo cell trigging.
Place: One Place Feeder; Randomly placed Place items; One item type; Vision guidance. Optional photo cell trigging.
6 Parallel - Fixed Place item position using indexed place feeder.

Robot: One robot
Pick: One Pick Feeder, Randomly placed Pick items; One Pick item type; Vision guidance. Stop & Go. Optional photo cell triggering.
Place: One Place Feeder; Semi-fixed Place item position; One Place item type; Indexed Place Feeder.

7 Parallel - Random Place item position

Robot: One robot
Pick: One Pick Feeder, Randomly placed Pick items; One Pick item type; Vision guidance. Stop & Go. Optional photo cell triggering.
Place: One Place Feeder; Randomly placed Place items; One item type; Vision guidance. Optional photo cell triggering.
8 **Multi robot setup**

Robot: Four robots
This system setup corresponds to the use of two of type 2 system and one of type 4 system described above.
Description

Configuration Process

The user configures the PickMaster line of robot cells by the use of the Configuration Wizard. The whole configuration process is described in detail in PickMaster User’s Guide.

The user is guided through the configuration process by means of stepping through the wizard dialogues in a pre-ordered sequence. At each dialogue the appropriate values are filled in and the next step is taken. It is possible to go back and forth within the wizard to adjust previously entered configuration data.

The process is done in the following order.
1. Define or select the **project** you should configure
2. Define the **objects** of the line, i.e.
   - **Feeders**
   - **Robots**
   - **Position Sources**
   - **Items**
3. Define the **relations** between the objects, i.e.
   - Feeder to robot
   - Source position to feeder
   - Item to feeder
   - Item to source position
4. Define the **flow** of the items, i.e. how items are connected to its item targets.

This configuration can be done off-line, i.e. the PC running the Configuration Wizard does not need to be connected to an S4Cplus controller.
2.6 Calibration

The user calibrates the PickMaster line of robot cells by the use of the Calibration Wizard. The whole calibration process is described in detail in PickMaster User’s Guide.

The user is guided through the calibration process by means of stepping through the wizard dialogues in a pre-ordered sequence. At each dialogue the appropriate values are filled in and the next step is taken. The sequence of the dialogues secure an accurate and correct calibration of the cells. The calibration is necessary when conveyors and vision systems are used.

The process is done in the following order.
1. Select the project you should calibrate
2. Calibrate the camera (only when vision system is used)
3. Calibrate the base frame (feeder to robot calibration)
4. Calibrate the camera to the robot coordinates (only when vision system is used).

2.7 Modelling

When using a vision system to identify items, item targets and patterns it is necessary to “teach” the vision system what they look like. This is accomplished by defining one or more model for an item, item target or pattern. This definition is performed by the assistance of the Modelling Wizard. The whole modelling process is described in detail in PickMaster User’s Guide.
The user is guided through the modelling process by means of stepping through the wizard dialogues in a pre-ordered sequence. At each dialogue the appropriate values are filled in and the next step is taken. The modelling is necessary when vision systems are used.

The process is done in the following order.
1. Select the project you should calibrate
2. Make model definitions
3. Associate the defined models with items, item targets and patterns

2.8 Operation

Operators Panel

When configuration, calibration and possibly modelling is finished a project is ready to run. The run-time process is managed from the Operators Panel. The details of the Operators Panel is described in PickMaster User´s Guide.
Each project is represented by a “traffic-light”, only one project at a time can be in operation. The active projects “traffic-light” shows either green light, yellow light or red light. Green light means that the project is running normally, yellow light indicates a warning situation and red light indicates an error situation and the project is stopped.

From the operators panel it is also possible to get key figures from the running system like the state of the robot controller, the vision system and the PickMaster itself. Alarms and log messages are also available from the operators panel.

Remote operation

The run-time process can also be managed from the a remote system through the RIS option.

Remote instruction set

- Set/get the current folder project
- Read number of projects and robots
- Read project and robot names
- Read current cycles per minute
- Start and stop project
- Start and stop robot
- Reset and restart after emergency stop
- Check if a robot is running
- Show operator’s panel
2.9 Maintenance

Projects is most conveniently maintained from the Project Viewer. Each project with all its defined objects are available for modification instead of going through the wizards for configuration, calibration or modelling. The details of the Project Viewer is described in detail in PickMaster User’s Guide.

2.10 Synchronization

It is of utmost importance to synchronize cameras, conveyors and robots towards items to pick and item targets to place picked items to achieve high accuracy for the pick-and-place operation.

The vision system grabs a frame from one of its cameras upon reception of a trig signal. This trig signal can come from different sources.

1 A photocell can indicate when an item passes a certain position and this signal can act as trig signal to the vision system. This is asynchronous trigging.
2. The encoder keeps track of the conveyor movement and when a certain distance has passed an event is sent to the S4Cplus controller. The controller sets a digital output which act as trig signal for the vision system. This is synchronous trigging.

When the frame is grabbed the vision system indicates this by activating a strobe signal on one of its outputs. This strobe is caught by the encoder board and we get a very exact and accurate synchronization between the vision system and the encoder board. This means that we have exact position information of the grabbed frame in conveyor coordinates. This is essential for the accuracy.

Diagram
Description
3 Technical Specification

3.1 Hardware

**PC**

At least a Pentium-based 750 MHz. Two free PCI-slot are required.

**Network**

**Communication**

The PickMaster PC communicates with the robot controllers through EtherNet and TCP/IP. Ordinary Ethernet interface boards can be used for the PC. The EtherNet interface is standard for the robot controller.

PickMaster and Prepared for PickMaster include all the necessary communication software.

**RIS**

PickMaster can be integrated into other systems by use of RIS (remote integration services). RIS is a COM interface that can be used for control of the operators panel. Three RIS clients (with full source code) is delivered with PickMaster.

- A field bus gateway that supports all common filed buses (e.g. Device Net and ProfiBus)
- A serial RS232 gateway
- A WinClient
**Vision Hardware**

The Cognex vision system is available in one hardware configurations, the MVS-8110 for four simultaneous image acquisitions:

- MVS-8110 PCI
- DSQC 524 Trig-Strobe I/O
- Ribbon cable to DSQC 524
- Camera break out box 8110

Additional equipment: cameras, camera cables

The image recognition time and transfer time for one type of objects in a scene is typically about 50-200 ms. Variations occur depending on the objects’ variations from the model.

The number of vision boards installed on the PCI-bus is limited to one.

Recommended camera is Sony XC-55\(^1\).

The vision system and conveyor tracking is synchronized according to the description in (Synchronization).

For detailed descriptions of the required connections, see also the Cognex documentation.

**Robot Controller**

The robot controller must be equipped with the Digital I/O-board DSQC 328 to control

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1. For a complete list of supported cameras consult Cognex documentation.
conveyor drive units and the gripper tool.

Robots

IRB 340 (See 3HAC 5054-1/Rev. 2 Product Specification IRB 340)
IRB 140 (See 3HAC 9041-1 Product Specification IRB 140)

Conveyor

Continuously moving conveyor belts are the preferred way to feed items and packages. It gives a high flexibility since the robot can operate on the items on the fly for the entire time they are within the working area of the robot.

Speed

The maximum conveyor speed is 1400 mm/s without vision recognition. The capability to follow conveyors at high speeds is dependent on the acceleration and speed limitations of the actual robot.

On conveyors with vision recognition the speed is limited by the following factors:

- Camera trigger frequency. The vision model search time and position transfer time limits the trigger frequency. For an average time of 250 ms the maximum frequency is 4 Hz.
- Motion blur. On high speed conveyors the camera shutter time needs to be very short which again requires very good light.

Repeatability

The tracking error for an IRB340 described as conveyor repeatability is valid for each pick and place position separately and under the assumption that the speed is kept constant.

<table>
<thead>
<tr>
<th>Conveyor speed [mm/s]</th>
<th>Repeatability [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>250-500</td>
<td>2</td>
</tr>
<tr>
<td>500-800</td>
<td>5</td>
</tr>
<tr>
<td>800-1400</td>
<td>15</td>
</tr>
</tbody>
</table>

*Table 1 Conveyor repeatability*

The above figures are considering a belt with small speed deviations.

Drive Unit

1. The repeatability depends on the conveyor accuracy. On a guided conveyor less than 1.4 mm repeatability is possible at 400 mm/s
The conveyors are operated by external drive units by I/O controls. Drive units like the ABB AC300 has a 24V I/O interface allowing forward, backwards, and stop operations, speed preset, and increment and decrement.

**Encoder**

The position of a conveyor is measured by one or more encoders. Usually an encoder is placed close to an identification and operation area in order to minimise errors caused by the elasticity and inaccurate guidance. The encoder measurement sample rate is configured in the robot controller and by default set to 10 ms.

The interface DSQC 377 board handles one encoder. It is possible to connect an encoder to two interface boards thereby making it possible for two robots to track frames on the same conveyor.

The encoder should be of type two phase with 90 degrees phase shift, voltage 24 VDC and current 50 - 100 mA. The pulse ratio from the encoder should be in the range of 5000 - 20000 pulses per meter of conveyor motion (See 3HAC 0966-48 Conveyor Tracking Manual chapter 7 Hardware Configuration and Connections). The maximum frequency is 50 kHz (may occur with high conveyor speed and many pulses per meter).

**Limitations**

Basic CPU-load for the robot controller for one conveyor is 10%, for every added conveyor the CPU-load is increased by 10%. Max number of conveyors controllable from one robot controller is two.

**Trig-Strobe Board**

The DSQC 524 Trig-Strobe board adapts the vision system I/O (5 VDC) with the I/O of the robot controller (24 VDC). The board supports four trig-strobe pair which matches the maximum number of cameras an MVS 8110 interface board can support. Each trig-strobe pair is separately fed, i.e. 24 VDC and ground which makes it possible to connect to more than one robot controller simultaneously.

### 3.2 Software

**Windows NT**

- NT4.0, Service Pack 6
- Internet Explorer 5.0

**PickMaster Software 3HAC 14768-1**

The PickMaster Software resides on one CD and installs according to standard Windows procedures. The following PickMaster executables will be visible under the Start-button/Programs/PickMaster:

- Configuration Wizard
- Model Wizard
• Calibration Wizard
• Project Viewer
• Operators Panel

Vision Software

The vision software from Cognex, OMI 2.2, is installed in parallel with the PickMaster software and resides on the same CD. The vision software is fully controlled from the PickMaster software and does not show any executables to the user.

Robot Communication Software

The communication software, Interlink 2.0, is installed in parallel with the PickMaster software and resides on the same CD. The communication software is fully controlled from the PickMaster software and does not show any executables to the user.

RobotWare

RobotWare 4.0.42, at least, is necessary to run in the robot controller S4Cplus, with the option Prepared for PickMaster included.

Prepared for PickMaster

Prepared for PickMaster is the name of the RobotWare option installed in the robot controller. Each robot controller in a PickMaster line needs the Prepared for PickMaster option which includes all necessary functions for conveyor tracking, communication with PickMaster and running stereotype pick-and-place movements. Maximum two conveyors can be tracked by one robot controller.

The option Prepared for PickMaster is exclusively offered together with PickMaster.

3.3 Pick and Place process performance

The performance is here described as a realistic process case for complete cycles with varying distances and real gripping and dropping time. The performance can both be higher and lower depending on the products and grippers.
In the diagram below the grip and drop time is 35 ms each.
4 Specification of Variants and Options

The different variants and options for PickMaster 1.1 are described below. The same numbers are used here as in the specification form. For IRB 340 manipulator options see Product Specification IRB 340 M2000 and for robot controller options see Product Specification Robot Ware Options 4.0.

For operating with PickMaster the Robot Controller S4Cplus needs to be equipped with RobotWare 4.0.42 or later.

4.1 PickMaster Options

PickMaster is ordered through license options. There are two basic licenses which are mutually exclusive and there are additional licenses. There is one basic license order required for each PC.

A license key is always locked to one PC. This shall be the PC where PickMaster is installed and which is used for production. The procedure to request a license key is described in detail in the “Getting Started”-Manual and follows the ABB Robotics standard software procedures.

A PickMaster license key enables the run-time execution of PickMaster for a designated number of robots and cameras and other options. All design time procedures for project definitions are possible without a valid license key. The license key check mechanism is activated when a PickMaster project is invoked. The content of the key is compared to the use of options required in the project. I.e. if the number of robots or cameras should exceed the key-definition, the project launch is aborted with an error message.

Basic Licenses

732 License for one robot and one camera. Not available with option 733. The robot controller has to be ordered with option 567 ‘Prepared for PickMaster’. Upon an order for a basic license the following will be delivered:
- PickMaster 1.0 Software: Software box containing CD and “Getting Started”-manual
- Cognex vision board MVS 8110 (8110 PCI)
- 3 Cognex camera break out box 8110
- DSQC 524 Trig-strobe I/O board
- Ribbon cable to DSQC 524
- User’s Guide PickMaster
- The right to request a license according to the order

733 License for one robot and two cameras. Not available with option 732. The robot controller has to be ordered with option 567 ‘Prepared for PickMaster’. Upon an order for a basic license the following will be delivered:
- PickMaster 1.0 Software: Software box containing CD and “Getting Started”-manual
- Cognex vision board MVS 8110 (8110 PCI)
Specification of Variants and Options

- Cognex camera break out box 8110
- DSQC 524 Trig-strobe I/O board
- Ribbon cable to DSQC 524
- User’s Guide PickMaster
- The right to request a license according to the order

Additional licenses

734  License for one additional robot.
Option type is “number of”. Maximum number is three. Each robot controller
has to be ordered with option 567 ‘Prepared for PickMaster’.
This option gives the right to request a license key matching the number of
licenses ordered. No physical delivery will be executed.

735  License for one additional camera
Not available with option 732. Option type is “number of”. Maximum number
is two.
This option gives the right to request a license key matching the number of
licenses ordered. No physical delivery will be executed.

736  Remote Integration Services (RIS)
Possibility to integrate external production panel interfaces, typically a PLC
through field buses.
Option type is “single”.
This option gives the right to request a license key to run RIS. No physical
delivery will be executed.

738  Six axes control.
Multidimensional orientation for six axes robots. Available today is IRB 140.
Option type is “single”.
This option gives the right to request a license key to run six axes control. No
physical delivery will be executed.

4.2 PickMaster related Controller Options

The following options need to be ordered for the robot controller operating with
PickMaster.

RobotWare option ‘Prepared for PickMaster’

567  RobotWare option ‘Prepared for PickMaster’
This option is only available if a PickMaster option 732, 733 or 734 was
ordered.
The option is tightly integrated with PickMaster. It enables the robot controller
to receive targets from PickMaster in the fastest possible way over Ethernet.
Furthermore it enables high speed picking from two moving conveyors
without time delays. Prepared for PickMaster also enables individual item
supervision to detect out of bounds positions.
With Prepared for PickMaster a number of new high speed RAPID
instructions are available.
PickMaster contains a standard RAPID program for optimal cooperation between robot controller and PickMaster.

**Hardware options**

*249/235 Encoder interface unit for PickMaster (internal/external)*
For each conveyor serving the robot controller an encoder board for PickMaster is required

*201 At least one digital I/O is required for exchanging signals between PickMaster and the robot controller.*
Specification of Variants and Options
The documentation is supplied as pdf-files and on-line help on the PickMaster CD.

The following documents are a part of the PickMaster product:

1. 3HAC 5842-2 Product Specification PickMaster 1.1 (this document).
2. 3HAC 7702-2 PickMaster User’s Guide
3. - Cognex Documentation

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1. The Acrobat Reader is included in the installation for your convenience. You could choose to install it together with PickMaster or at some other time.