COGNEX
Vision for Industry®

In-Sight®

IN-SIGHT® 1700 SERIES WAFER READER USER MANUAL

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Revision 9
August 2003

The hardware and portions of the software described in this document may be covered by one or more of the following U.S. patents. Other U.S. and foreign patents are pending.

In-Sight	Patents pending
Hardware	4,972,359; 5,526,050; 5,657,403; 5,793,899; 5,861,910
Vision Tools	5,495,537; 5,548,326; 5,583,954; 5,602,937; 5,640,200; 5,717,785; 5,742,037; 5,751,853; 5,768,443; 5,796,868; 5,818,443; 5,825,483; 5,825,913; 5,845,007; 5,859,466; 5,872,870; 5,909,504

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Regulations/Compliance

Declaration of Conformity

Manufacturer	Cognex Corporation One Vision Drive Natick, MA 01760 USA
Declares this CE-marked product	
Product Number	In-Sight 1700; In-Sight 1701
Complies With	73/23/EEC Low Voltage Directive 89/336/EEC Electromagnetic Compatibility Directive
Compliance Standards	EN 60950:1992 Electrical Safety A1:1993, A2:1993, A3:1995 EN 55022 RF Emissions Information Technology EN 50082-1 EMC Immunity Standard
European Representative	Cognex France Immeuble le Patio 104 avenue Albert 1er 92563 Rueil Malmaison France

Safety

c UL us	Information Technology Equipment (UL 1950) 51KJ	CUL Certification marks are present on products

FC This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules.

Precautions

Observe these precautions when installing the In-Sight 1700 wafer reader to reduce the risk of injury or equipment damage:

- The In-Sight 1700 is intended to be supplied by a Listed, Direct Plug-In Power Unit with an output rated 24VDC, 150mA and marked Class 2, Limited Power Source (LPS). Any other voltage creates a risk of fire or shock and can damage the In-Sight hardware.
- Do not install the In-Sight 1700 in locations that directly expose it to environmental hazards such as excessive heat, dust, moisture, humidity, impact, vibration, corrosive substances, flammable substances, or static electricity.
- To reduce the risk of damage or malfunction due to over-voltage, line noise, electrostatic discharge (ESD), power surges, or other irregularities in the power supply, route all cables and wires away from high-voltage power sources.
- Do not open the In-Sight 1700. This device does not contain user-serviceable parts. Do not make electrical or mechanical modifications to the In-Sight hardware. Unauthorized modifications violate your warranty.

Table Of Contents

1 Introduction

In this section…

1.1 1700 Series Overview

The In-Sight® 1700 series of high performance vision sensors are image formation systems for reading identification marks on silicon wafers. Featuring a vision processor, advanced lighting and optics, and built-in networking support and serial communications, the compact 1700 readers can be utilized in virtually any back-end wafer fab process.

The In-Sight 1700 wafer reader series includes the following models:

- In-Sight 1700: 640 x 480 image resolution, fixed working distance
- In-Sight 1701: 1024 x 768 image resolution, variable working distance

The 1700 wafer reader is configured remotely over a network using a standard Internet browser. This browser interface also allows remote monitoring of the reader's operation during runtime. The 1700 may also be controlled remotely from users' custom application programs using In-Sight Native Mode commands to change settings and retrieve read results.

Unless otherwise specified, references to the In-Sight 1700 wafer reader in this document also apply to the In-Sight 1701 model.

1.2 In-Sight Support

The following resources are available to assist you in using the In-Sight 1700 wafer reader and its spreadsheet interface:

- *In-Sight Guide & Reference*, an on-line HTML Help file provided on the In-Sight CD-ROM.
- The In-Sight Online Support and Learning Center at www.cognex.com/support/In-Sight.asp.

NOTE	Only registered In-Sight users have access to the In-Sight Online Support and Learning Center website.

1.3 Networking a 1700 Reader

The In-Sight 1700 wafer reader is designed to operate as a host system on an Ethernet TCP/IP network. For the purposes of the instructions in this manual, an In-Sight network exists whenever one or more 1700 readers can be accessed remotely from another host on the network.

The In-Sight 1700 may be used in several possible network configurations. For each configuration the reader is configured using an Internet browser, which also provides the remote display for that reader.

1.3.1 Standalone In-Sight Network Configurations

The most basic type of In-Sight 1700 network is shown in Figure 1-1. In this simple configuration, a standard CAT5 network cable and crossover coupler or a CAT5 crossover cable directly connects a single In-Sight 1700 to a standalone PC equipped with a network card. Neither the PC nor the In-Sight 1700 is connected to the larger, fab floor network.

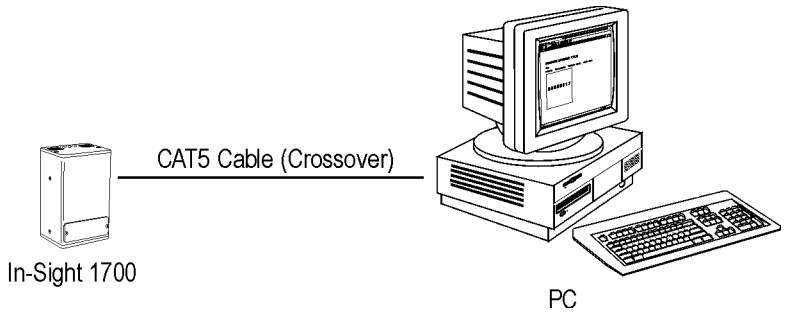

Figure 1-1: Standalone In-Sight 1700 network

To install multiple In-Sight 1700 readers onto a standalone In-Sight network, use an Ethernet switch between the In-Sight 1700s and the remote host. Make all connections via standard, straight-pinned CAT5 cable (Figure 1-2).

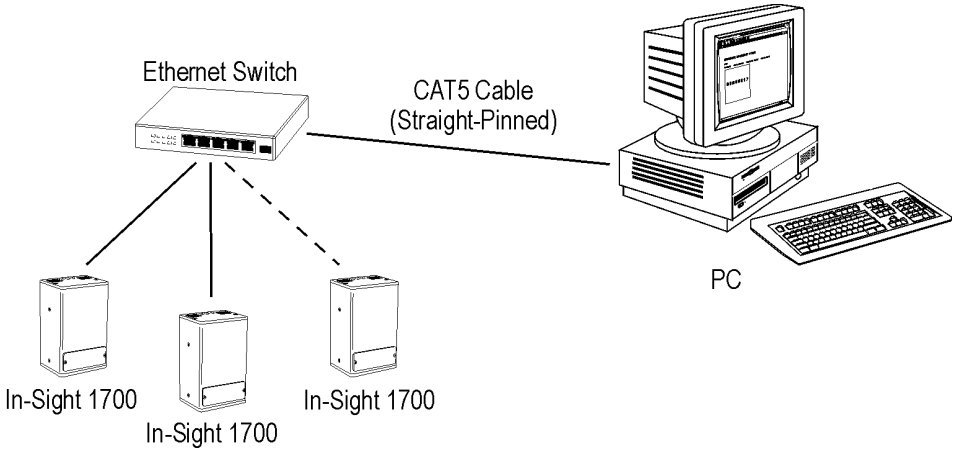

Figure 1-2: Standalone In-Sight 1700 network with Ethernet switch

The number of 1700 readers you can install on a standalone In-Sight network is only limited by the number of ports available on the Ethernet switch. To expand the network, add Ethernet switches as needed to increase the number of available ports.

1.3.2 Fab Floor In-Sight Network Configurations

To take full advantage of its networking capabilities, the 1700 reader can operate as a host on the larger, fab floor network. The only physical difference between fab floor-networked readers and a standalone 1700 reader network is that the Ethernet switch is connected directly to the network.

Groups of 1700 readers connected to the fab floor network through a common Ethernet switch are referred to as a local network, or ***subnet***. Figure 1-3 shows a subnet that includes several In-Sight 1700 readers and a PC host.

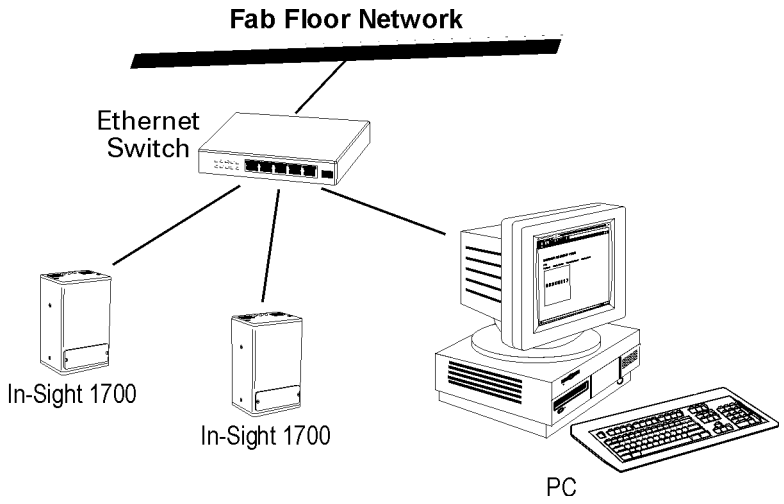

Figure 1-3: Fab floor network

2 Installing the 1700 Reader

In this section…

2.1 Connecting the In-Sight 1700

The In-Sight 1700 has two RJ-45 connector ports: the Network port and the Breakout port (see Figure 2-1). The Network port provides the Ethernet connection for network communications. The Breakout port supplies connections for the 24VDC power source, I/O, acquisition trigger, and serial communications.

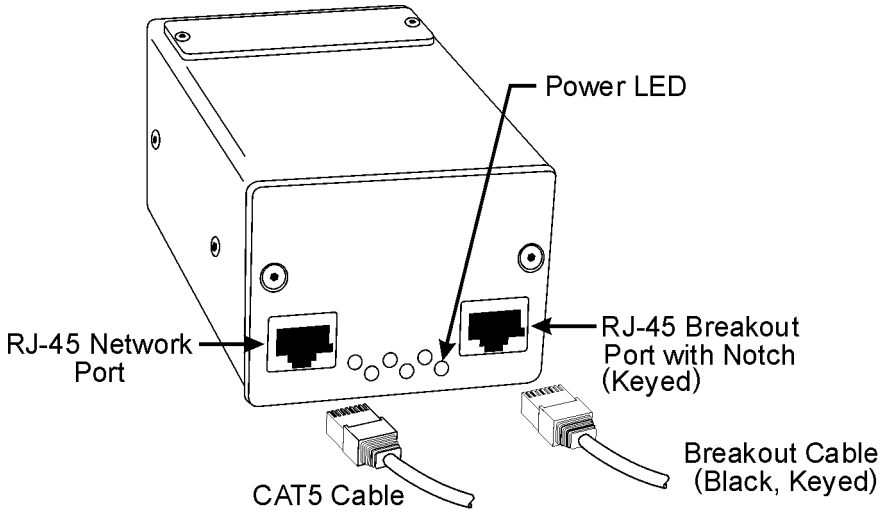

Figure 2-1: Location of RJ-45 ports

2.1.1 Connecting the Network Cable

- **If you are connecting to an Ethernet switch,** plug one of the RJ-45 connectors of a CAT5 straight-pinned cable into the Network port and plug the other end into an available port on the switch.

- **If you are connecting directly to an In-Sight sensor from a remote host**, plug one end of a CAT5 network cable into the crossover coupler and connect the crossover coupler into the 1700 reader's Network port; plug the other end into the remote host's Ethernet port.

2.1.2 Connecting the Breakout Cable

The In-Sight Breakout Cable (P/N 300-0340-15) included with every 1700 wafer reader provides access to the 1700 reader's power, serial communications, and I/O lines. The RJ-45 connector on this cable is "keyed" to the notch in the breakout port, and cannot be inadvertently plugged in to the network port.

See Section 8.2.1: Breakout Port Pin Assignments on page 90 for the Breakout Cable's wiring details.

To connect the Breakout Cable to the In-Sight 1700 reader:

1. Verify the 24VDC power supply being used is switched off.
2. Attach the Breakout Cable's power (white-green wire) and ground (brown wire) to the corresponding terminals on the power supply.
3. Connect the wires for the acquisition trigger, discrete outputs, and serial communications to their corresponding terminals on remote devices.
4. Plug the RJ-45 connector into the 1700 reader's breakout port (labeled 24VDC).
5. Restore power to the 24V supply. The green power LED will indicate that the reader is receiving power.

2.1.3 Connecting the Breakout Module

The optional In-Sight Breakout Module (P/N 800-5743) is more convenient than using the standard Breakout Cable to connect the reader's power, serial communications, and I/O lines.

For additional information on connecting a Breakout module, see Section 8.2.1: Breakout Port Pin Assignments on page 90 or the *Breakout Module Installation and Reference* manual (P/N 597-0008-xx).

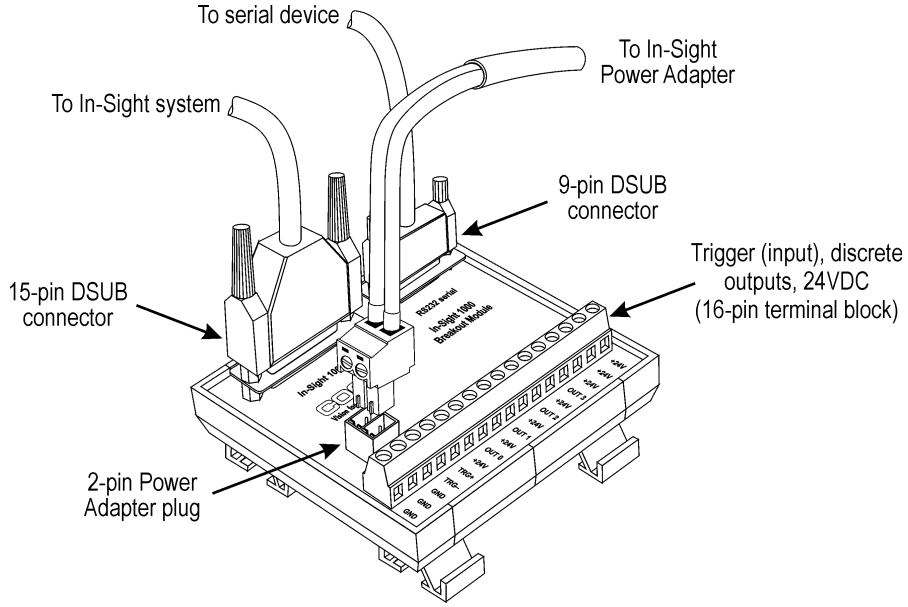

Figure 2-2: Breakout Module Connections

To connect the Breakout Module to the In-Sight 1700 reader:

1. Verify the 24VDC power supply being used is switched off.
2. Optionally, connect the power and ground wires for the acquisition trigger input and the discrete outputs into their corresponding terminals on the Breakout Module.
3. Optionally, connect the 9-pin male D-sub connector of an RS232 serial cable into the corresponding 9-pin female connector on the Breakout Module.
4. Plug the Breakout Module Cable's 15-pin male D-sub connector into the corresponding female connector on the Breakout Module.
5. Plug the RJ-45 connector of the Breakout Module Cable (P/N 300-0341-15) into the reader's breakout port. The cable's connectors are "keyed" to the notch in the Breakout port.
6. Plug the wire leads from a 24VDC supply for the +24V power and ground into the 2-pin terminal plug on the Breakout Module. Alternatively, remove the terminal plug and insert the 2-pin terminal plug attached to the In-Sight power adapter into the keyed power adapter port on the Breakout Module (Figure 2-2).
7. Restore power to the 24V supply. The red power LED on the reader and the orange +24V LED on the Breakout Module will indicate that the reader and Breakout Module are receiving power.

2.1.4 Connecting the I/O Expansion Module

Like the Breakout Module, the optional I/O Expansion Module (P/N 800-5758) provides convenient access to the In-Sight 1700 reader's power, serial communications, and discrete I/O lines. But in addition to the acquisition trigger and serial transmit/receive that are standard on the reader, the I/O Expansion module adds the following:

- 8 discrete outputs
- 8 discrete inputs
- RS232 hardware handshaking

NOTE Firmware version 2.30 or later must be installed on the 1700 reader in order to use the I/O Expansion Module.

For additional information on connecting an In-Sight I/O Expansion module, see Section 8.2.1: Breakout Port Pin Assignments; for information on configuring the 1700 reader to recognize the module, see Appendix D.

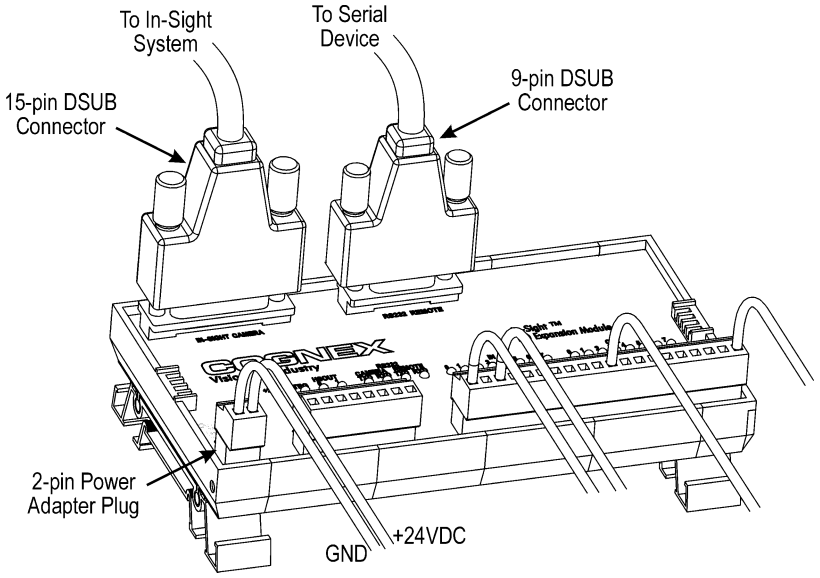

Figure 2-3: I/O Expansion Module Connections

To connect an I/O Expansion Module to the In-Sight 1700 reader:

1 Verify the 24VDC power supply being used is switched off.

2 Optionally, connect the power and ground wires for the acquisition trigger input, discrete outputs, and discrete inputs into their corresponding terminals on the Expansion Module.

3 Optionally, connect the 9-pin male D-sub connector of an RS232 serial cable into the corresponding 9-pin female connector on the Expansion Module.

4 Plug the Expansion Module Cable's (P/N 300-0341-15) 15-pin male D-sub connector into the corresponding female connector on the Expansion Module.

5 Plug the RJ-45 connector of the Expansion Module Cable into the In-Sight 1700 reader's breakout port. The cable's connectors are "keyed" to the notch in the Breakout port.

6 Plug wire leads from a 24VDC supply for the +24V power and ground into the 2-pin terminal plug labeled "Power Input" on the Expansion Module. Alternatively, remove the terminal plug and insert the 2-pin terminal plug attached to the (optional) In-Sight power adapter into the keyed power adapter port on the Expansion Module (Figure 2-3).

7 Restore power to the 24V supply. The red power LED on the reader and the +24V LED on the Expansion Module will indicate that the reader and Expansion Module are receiving power.

2.2 Configuring the Internet Browser

The 1700 wafer reader is platform and operating system independent and can be controlled using a standard, Java-enabled Internet browser. A PC is not required to setup a wafer ID application or to monitor its runtime operation.

When configuring the 1700 browser to communicate with the reader, there are two main requirements:

- The connection must be a local area network (LAN) connection (versus dial-up).
- The connection must not be routed through a proxy server, virtual private network (VPN), or similar gateway.

The 1700 browser interface has been tested using Microsoft Internet Explorer versions 5.0 and later on Windows XP, 2000, NT 4.0, Me, and 98SE. Using a Windows XP/2000/NT PC running Microsoft Internet Explorer 6 (or later) is strongly recommended. If using Internet Explorer 6, the Java virtual machine is not installed as part of the typical installation, but is installed on demand when a page using a Java Applet is first encountered. The latest version of Internet Explorer can be downloaded at:

http://www.microsoft.com/windows/ie/default.asp.

The Sun Java™ virtual machine can also be used on a windows-based PC, and can be downloaded at:

http://java.sun.com/getjava/index.html.

Whichever virtual machine is being used, it must enabled for the 1700 browser interface to execute.

To verify that a virtual machine is enabled:

1. Open Internet Explorer.
2. From the Tools menu select **Internet Option…** .
3. Click the **Advanced** tab.

Under the Microsoft VM settings, verify that **JIT compiler for virtual machine enabled** is checked, as shown in Figure 2-4.

or

Under the Java (Sun) settings, verify that **Use Java…** is checked, as shown in Figure 2-4.

4 If a virtual machine was enabled, the browser must be restarted for the change to be applied.

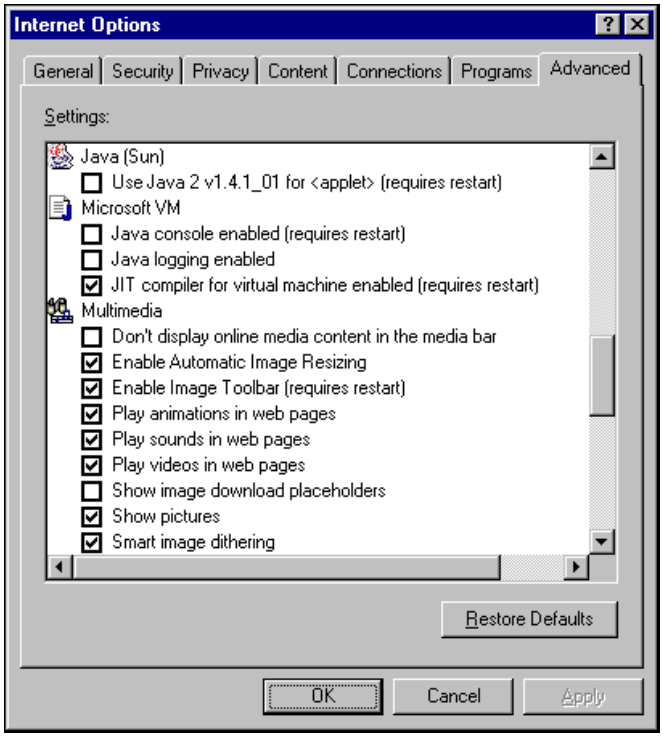

Figure 2-4: Internet Options Dialog – Advanced Tab

2.3 Installing In-Sight PC Host Software

A Microsoft® Windows®-based PC is required to run the In-Sight PC Host program and to add the reader to the network. The following must be installed on the PC to load In-Sight PC Host Software:

- A Microsoft Windows XP, 2000, NT 4.0 (with Service Pack 4 or later), Me, or 98SE operating system.
- A network card that supports 10/100 Base-T Ethernet TCP/IP communications.
- In-Sight PC Host software version 2.13 or later (included on the CD-ROM shipped with your system).
- Internet Explorer 4.0 or higher to display the *In-Sight Guide & Reference*.

NOTE Before installing the software, open the RELNOTES1700.DOC file for current information about the In-Sight 1700. Registered In-Sight users can obtain updated versions of the documentation at www.cognex.com/support/In-Sight.asp.

To install the In-Sight PC Host program:

1. Verify that the target PC is a recognized host on the network where the 1700 reader is installed.
2. Shut down any applications running on the PC.
3. Insert the In-Sight 1700 installation CD-ROM into the PC's CD-ROM drive. If the install program starts automatically, follow the setup dialogs as they appear on screen. If the install program does not start automatically:
   a) Open the Windows Start menu, click **Run**, then click **Browse**.
   b) In the Browse dialog, select the PC's CD-ROM drive, then select the SETUP.EXE file.
   c) Click **OK** to begin the In-Sight PC Host installation program.

During installation, several files are copied to the PC (the default directory is C:\InSight2), including the following:

FILE	DESCRIPTION
\IN-SIGHT.EXE	The In-Sight PC Host program.
\IS1700USER.PDF	The In-Sight 1700 User Manual. Requires Adobe Acrobat Reader 4.0 or higher.
\IN-SIGHT.CHM	The *In-Sight Guide & Reference*, an HTML Help file containing detailed information on the In-Sight PC Host program and remote communications. Requires Internet Explorer version 4.0 or higher.
\RELNOTES1700.DOC	Contains last minute information concerning this release.
\1700\IS1700.UPD or \1700\IS1701.UPD	The firmware file for updating previously installed readers. Requires the In-Sight PC Host program.
\1700\WAFID00.JAR \1700SYSTEM.JAR	The Java applets providing the GUI used to configure and monitor the reader from an internet browser.
\1700\INDEX.HTML \1700\SYSTEM.HTML	The HTML files that load the Java applets in the internet browser.
\1700\PROC.SET	Updates system settings to load WAFID00.JOB automatically at startup.
\1700\WAFID00.JOB	The default job for the 1700, which interacts with the WAFID00.JAR applet to store application configuration settings on the 1700.

4 When the installation is complete, remove the In-Sight 1700 CD from the CD-ROM drive.

5 Open the program group **Programs-->In-Sight2** from the Windows Start menu. Click on the In-Sight PC Host shortcut to run the program and verify that it installed correctly. The In-Sight PC Host window will appear, displaying an empty In-Sight spreadsheet.

The 1700 can now be added to the network, as described in the following section.

NOTE To complete the software installation for previously installed 1700 readers, refer to Appendix B: Updating the Reader for detailed instructions on updating a 1700 with new versions of the firmware, Java applets, HTML, and default job file.

2.4 Adding the 1700 to the Network

After the power and network connections to the 1700 reader have been made and the In-Sight PC Host program has been installed to a networked PC, the reader can be added as a host on the network.

As previously described, there are many possible In-Sight network configurations. The specific procedure for adding an In-Sight 1700 to a network depends on whether or not a ***Dynamic Host Configuration Protocol*** (DHCP) server is available. The DHCP server automatically assigns the In-Sight 1700 sensor a network IP address and Subnet Mask.

NOTE When installing the In-Sight reader to an existing network, consult your network administrator to determine whether a DHCP server is available.

2.4.1 Installing to a DHCP Network

The In-Sight 1700 reader is factory-configured for installation on an existing network with a DHCP server. After connecting the CAT5 network cable and the Breakout, the DHCP server will automatically detect the reader, configure its settings, and install it on the network.

After adding a 1700 reader to a network using DHCP, it is recommended that DHCP is disabled on the reader and that a static IP Address is assigned.

NOTE You will need to record the IP Address to connect to the reader from an Internet browser. To find the IP Address that is assigned to the reader, run the In-Sight PC Host program, then open the System menu and select **Settings** ▸. From the Settings menu, select **Network**.

2.4.2 Installing to a Non-DHCP Network

A static IP Address must be assigned to the In-Sight 1700 reader before the reader will be recognized on a network where a DHCP server is not available.

To install the In-Sight 1700 reader on a non-DHCP network:

1 Supply power to an In-Sight 1700, then open the In-Sight PC Host program.

2 From the In-Sight spreadsheet, press ***<ESC>*** to open the **System** menu.

Figure 2-5: PC Host System menu

3 Select **Logon** to open the **Logon** dialog.

Figure 2-6: PC Host Logon dialog

4 Click on the **Host Name** drop-down list to see the names of any In-Sight systems already installed on the network.

5 Select **< New >** from the list to open the New Host Configuration dialog.

Figure 2-7: PC Host New Host Configuration dialog

6 Enter the last six characters of the In-Sight 1700 sensor's 12-character ***Media Access Control*** (MAC) address, without spaces or dashes. The first six characters are already entered, and should not be deleted or changed.

NOTE The MAC address is located on a label affixed to the back of the In-Sight 1700 reader. This identifier is factory-assigned, unique for every In-Sight system, and cannot be changed or deleted.

7 Verify that the **Use DHCP** checkbox is disabled.

8 Enter a valid **IP Address** for this In-Sight reader. Every In-Sight reader must be assigned a unique IP Address consistent with the addressing scheme in use on the network. Refer to Appendix C for more information on assigning an IP Address, or consult your network administrator.

9 Enter a **Subnet Mask** for the local network. The Subnet Mask specifies which parts of the In-Sight reader's IP Address are the same for all hosts on the local network, and which are unique to each host. The default Subnet Mask 255.255.255.0 is appropriate for the vast majority of users. Refer to Section 6.2, or consult your network administrator for more information.

10 Click **OK**. The message box shown below appears.

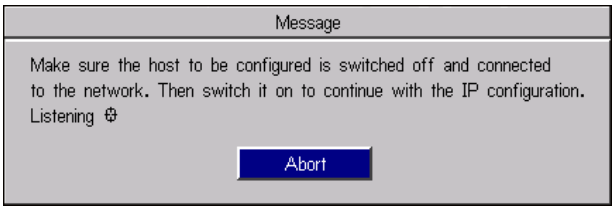

Figure 2-8: IP Configuration Message Box

11 Cycle power on the In-Sight reader by removing, then reinserting, the RJ-45 connector from the reader's Breakout port. When the reader has been located on the network, the following message appears:

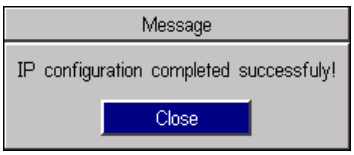

Figure 2-9: IP Configuration Completion Message Box

If this message does not appear within one minute of cycling power, click **Abort**. The New Host Configuration dialog will reappear. Verify that the IP Address entered is valid and the Subnet Mask is appropriate for the local network. Make corrections as necessary, and repeat steps 1 through 11. Contact your network administrator if problems persist.

NOTE The 1700's network settings can also be modified (i.e., disable DHCP and assign a static IP) with HyperTerminal through the serial port using the SetNetwork extended Native Mode command. For more information on the command, refer to the *In-Sight Guide & Reference* HTML Help file.

This completes the basic installation procedure of an In-Sight 1700 onto a network. Additional, optional network settings may be configured as described in Section 6.2.

2.5 Logging On to the 1700

As described in the Introduction, a standard Internet browser is used to configure and monitor wafer ID applications on the 1700. When a connection to a reader is made from a browser, the Java applets resident in 1700 flash memory automatically load in the browser window.

NOTE Java virtual machine (JVM) software must be installed on the host platform and supported by the browser used to connect to the 1700. Many browsers automatically install Java support, but this option may not have been enabled when your browser was installed. Refer to the documentation for your browser for more information.

To open a connection to a 1700 reader from an Internet browser:

1 Enter the IP Address of the reader into the browser's Address Bar (for example, http://192.168.0.1). An Enter Network Password dialog opens.

Figure 2-10: Enter Network Password dialog

NOTE The IP Address shown in Figure 2-10 is only an example. Every 1700 reader installed on the same subnet must have a unique IP Address, which must be consistent with the addressing scheme in use on that network.

2 In the Enter Network Password dialog, enter the default User Name **admin**.

Every 1700 reader is pre-configured with three User Names: admin, operator, and monitor. Each User Name is assigned a specific Access level. The Access level controls how much interaction is allowed for the current user to prevent inadvertent or unauthorized changes to the configuration.

- Admin Level (Full): The user has complete, unrestricted access to the In-Sight system. Any job may be loaded, changed, and saved, and all menu selections are available.
- Operator Level (Protected): The user has limited access to the In-Sight system, which runs only in the Custom View mode of the spreadsheet. A user in Protected mode can edit the values of all Graphics Controls functions visible in the Custom View, but cannot change the functions themselves. The System menu is available to toggle the In-Sight system Online/Offline, access Live mode, Save & Load jobs (if permitted by their FTP Read/Write privileges), and Customize the appearance of the interface.
- Monitor Level (Locked): The most restrictive level of access available, a user in Locked mode can only monitor the operation of the current In-Sight system in Custom View. The System menu is disabled.

NOTE If you are connecting to a newly installed 1700, leave the Password field blank. If you are connecting to previously installed 1700 you may need to enter a password.

3 Click **OK** to logon to the 1700. The In-Sight 1700 Home Page will begin loading automatically in the browser. Wait for the page to finish loading before making any further selections.

NOTE	If there is no job loaded in the spreadsheet or the job is incompatible with the Java applet, an Invalid Job dialog appears. Click the **OK** button and open a compatible job. For more information on opening a job, see Section 4.3.

Figure 2-11: Invalid Job dialog

The 1700 is now ready to be configured using the browser interface.

3 Configuring a Wafer ID Application

In this section…

3.1 Basic Concepts

Wafer reading recipes created in In-Sight are called ***jobs***. Each job can contain up to 10 unique reading configurations, called ***Configs***. Each Config specifies a type of wafer mark, a checksum, the string fielding, light settings, and other information. An automatic ***tuning*** operation can be used to optimize Config settings for maximum reading reliability.

Jobs can run multiple Configs in a ***retry sequence*** until a successful read is achieved, or the mark cannot be read within the time permitted. Optionally, Configs can be tuned automatically during runtime if the retry sequence fails to report a successful read.

When a Config is tried, it reports a string of characters for successful reads, or a string of asterisks (***) or partially read characters and question marks for failed reads. In either case a read score is reported.

All of the steps necessary to configure a standard wafer ID application are performed in the user interface that loads automatically when you connect to a networked 1700 using a Java-enabled web browser, as described below.

3.2 GUI Overview

The user interface that loads in the web browser when connecting to a 1700 reader is divided into four main areas:

- The **File** tab is used to open and save job (.JOB) files. The File tab also provides quick File Transfer Protocol (FTP) access to files in the reader's flash memory.
- The **Setup** tab is used to select Config settings, which can then be optimized through the automated tuning process.
- The **Options** tab is used to specify various runtime settings that determine how the job will execute. These settings include the source of the image acquisition/read trigger, the retry method to use for enabled Configs, and the data format and output destination of read results. The Options tab also provides a hyperlink to the System Settings page (see Section 6: System Settings).
- The **Run** tab is the runtime view of the reader's operation, showing the most recent read results and statistics for the Configs enabled in the job. The Run tab is the default view whenever a 1700 reader is accessed through a web browser, and is the only view allowed while a reader is Online.
- **Status bar**. The status bar shows (from left to right) **the IP Address** for the connected reader, the Access level for the current user (Full, Protected or Locked), the name of the **Current User**, and the name of the user that is logged on with **Admin/Operator** privileges.

NOTE	Only one user at a time may log on the reader with Admin or Operator privileges. If you log on as Admin or Operator and another user is already logged on as Admin or Operator, that user's name is shown next to Admin/Operator. When the other users logs off, the Admin/Operator shows 'None'. Click the Refresh button to take over Admin/Operator privileges.

3.3 Getting an Image

Before Config settings can be defined for reading wafer marks, a reasonable image of the mark is needed.

NOTE For specific information on setting the working distance and adjusting the focus of a 1701 reader, see Appendix E: 1701 Wafer Reader Installation Options.

1. In the **Run** tab, disable the **Online** checkbox.
2. Click the **Setup** tab.
3. Click the **Live** button. Position the wafer mark horizontally in the field of view (FOV), making sure that the entire mark is visible in the image.

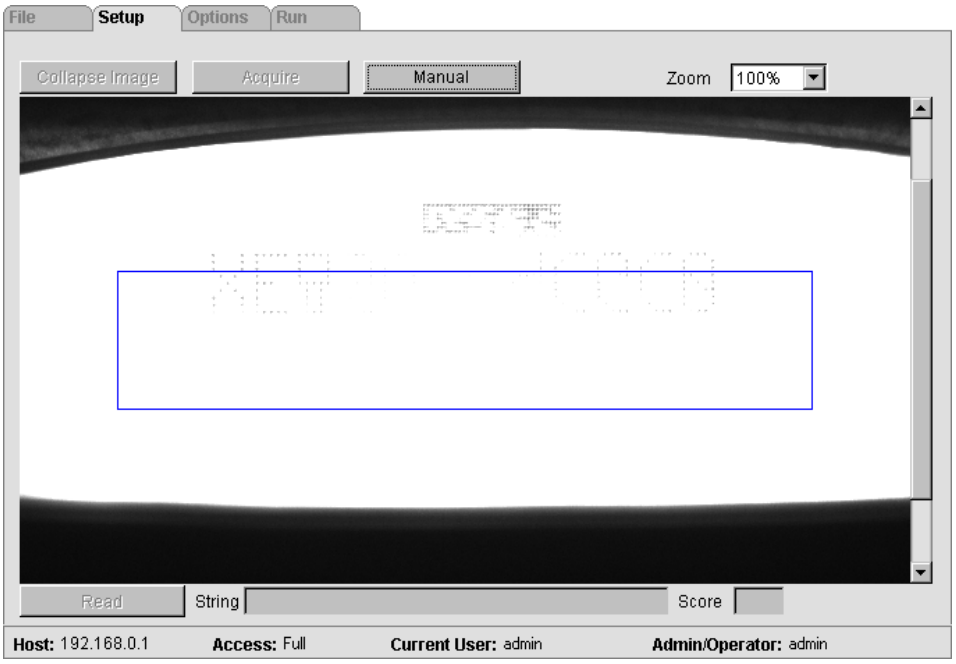

Figure 3-1: Position Mark using Live mode

4 When the mark is properly positioned in the image, double-click the image or click the **Manual** button to exit Live mode.

- If the image is too bright or too dark, adjust the **Light Mode** and **Light Power** slider controls until the mark can be seen against the wafer background.
- If the mark is inverted or mirrored in the image, select a different **Image Orientation** from the drop-down list.

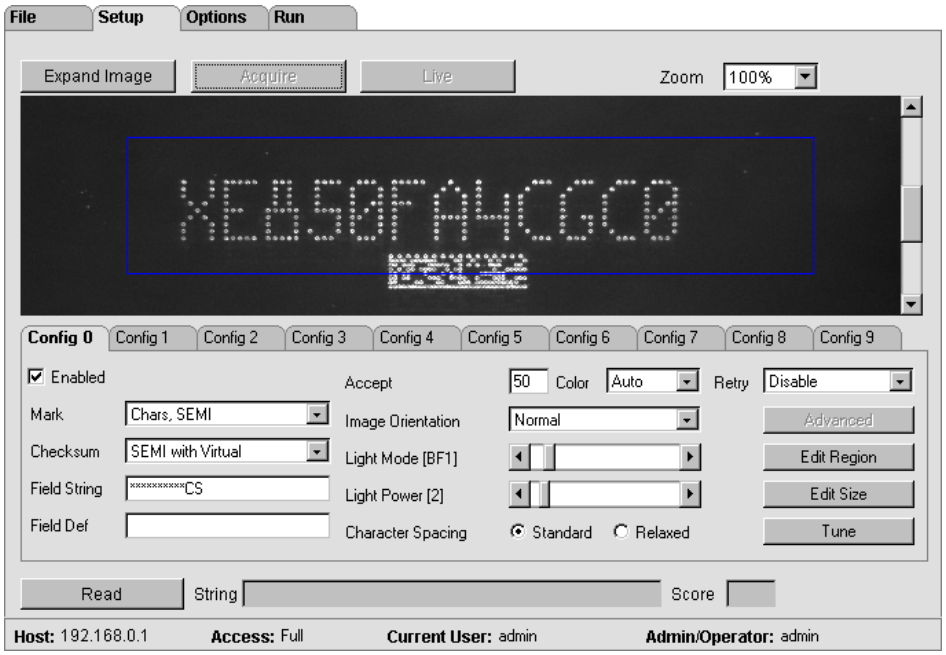

Figure 3-2: Adjusted Mark

Repeat steps 1 through 4 as necessary.

NOTE	The lighting does not need to be optimized at this stage; the wafer mark need only be visible in the image. Light optimization occurs during tuning.

When the mark is suitably imaged in the FOV, the first Config can be defined, as detailed in the following sections.

3.4 Defining Config Settings

The Setup view contains individual tabs for each Config, numbered 0-9 (see Figure 3-3). Each Config contains the same default settings. These settings can be customized according to the type and quality of wafer marks that will be read.

NOTE Settings can be copied between Configs. To copy settings from one Config to another, click and hold the left mouse button on the source Config tab then drag and drop on the tab of the target Config; select **OK** in the Copy Config dialog. When Configs are copied, the stats from the source Config are also copied to the target Config.

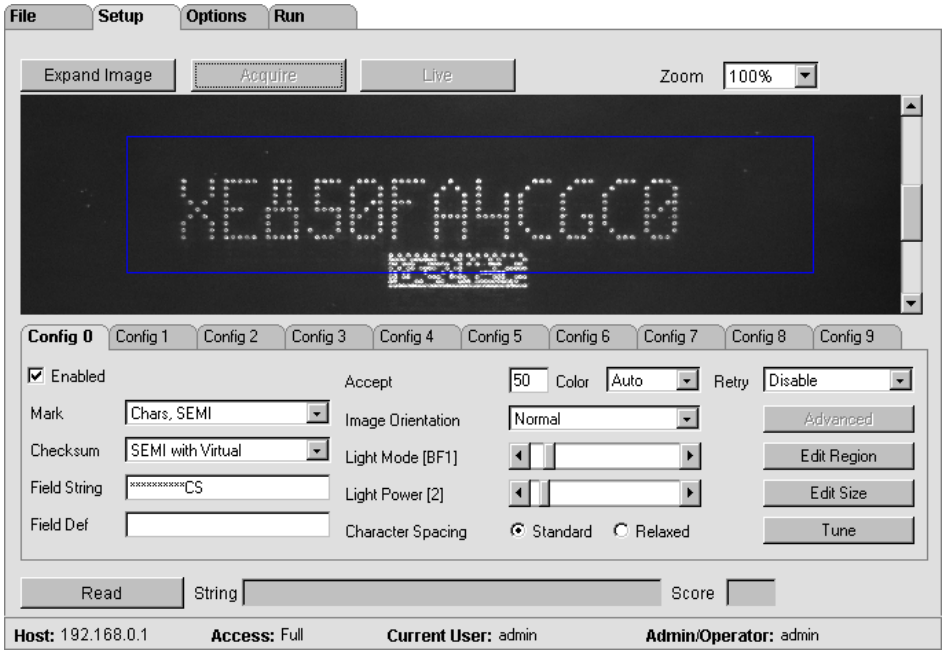

Figure 3-3: Config Settings

The following sections describe each of the settings and available selections in detail.

3.4.1 Expand Image

The **Expand Image** button allows you to increase the size of the image area. The Config settings are hidden while in Expanded mode. This mode is especially useful when properly positioning a mark in the image area.

3.4.2 Zoom

The **Zoom** drop-down list allows you to increase the magnification of the image area (100% to 1600%; 62% to 1600% for 1701 reader). This is especially useful when a high degree of precision is required in positioning graphics.

3.4.3 Enabled

The **Enabled** checkbox determines whether the Config will be used during the retry sequence at runtime. The retry order for Configs is specified in the Options tab (see Section 3.5). When Enabled is checked, the Config number on the tab appears in bold text.

NOTE All Config settings are saved with the job, even when the Config is disabled.

3.4.4 Mark

The **Mark** setting specifies the type of wafer mark the selected Config will read.

SELECTION	DESCRIPTION
2D Sym, T7 Data Matrix	Reads a SEMI® T7 standard 2D Data Matrix symbol (ECC 200, 8 rows by 32 columns).
BC, BC 412	Reads a SEMI T1-95 standard barcode. (See Advanced section, below.)
BC, IBM 412	Reads an IBM 412 barcode. (See Advanced section, below.)
Chars, SEMI (default)	Reads SEMI M12, M13, and M1.15 standard alphanumeric character strings.
Chars, IBM	Reads IBM Hexadecimal alphanumeric character strings.
Chars, Triple	Reads Triple Density standard alphanumeric character strings.

NOTE See Appendix H: SEMI® Wafer Marking Specifications for resources providing detailed information on each of the SEMI mark types.

Advanced

When 'BC, BC 412' or 'BC, IBM 412' is the selected Mark, the Advanced dialog can be accessed from the Advanced button (see Figure 3-4).

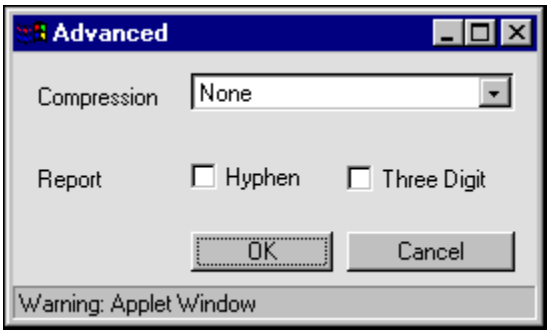

Figure 3-4: BC, Compress Advanced Dialog

The **Compression** drop-down list specifies options for decoding compressed barcodes, including Base 35 compression, as well as a selection for decoding a barcode with no compression.

When one of the Compressed options (Compressed 1 to Compressed 7) is selected, **Report** settings are also available. If **Hyphen** is enabled, the last two digits of the barcode string are separated by a hyphen. If **Three Digit** is enabled, the digits that are encoded for the wafer lot number are replaced by a three-digit number; zeros (0) are

used as place-holders if the lot number is less than three digits. For example, if the encoded lot number is “12”, the lot number would be reported as “012”. Reports settings are ignored if ‘None’ is the selected Compression.

NOTE: For specific information on the customized decoding options, please contact your Cognex Sales Engineer.

3.4.5 Checksum

The **Checksum** setting selects the method by which the read result from a character string will be validated to ensure reliability, and establishes the scoring basis for determining the pass/fail status of the read.

NOTE The Checksum setting is enabled and used only when ‘Chars, SEMI’, or ‘Chars, Triple’ is the selected Mark. When any other Mark is selected, the Checksum setting is ignored.

In all cases, the raw read score of the character string must be higher than the specified Accept threshold before the checksum will be evaluated (see Section 3.4.7). Then if the character string passes its checksum, “bonus points” in increments of 100 and/or 200 are added to the raw reading score and the read passes. The number of bonus points added to the raw score depends on the Checksum selected.

When Virtual Checksum is selected by itself, the Accept threshold should be increased, and the Field String & Field Definition should be made as specific as possible to limit the list of possible characters at each position in the string. These steps will increase reading reliability in the absence of a mathematical checksum.

SELECTION	DESCRIPTION
Virtual	The Cognex Virtual checksum attempts to validate the read result using multiple reading methods. If all methods read identical characters at each position in the string, the string passes the Virtual checksum and 100 “points” are added to the raw response score. This checksum should be used by itself only when the character string is known not to contain one of the other checksums, and then a higher Accept threshold is strongly recommended. Maximum score: 200 points Minimum passed score: 100 plus Accept threshold
SEMI	Applies the SEMI-standard checksum and the Cognex Virtual checksum. If the read result passes the SEMI checksum, 200 points are added to the raw score. If the read result also passes the Virtual checksum and the results from both checksums agree, an additional 100 points are added to the score. The read must pass the SEMI checksum to be successful; if Virtual checksum passes but the SEMI checksum fails, the entire read will fail. Maximum score: 400 points Minimum passed score: 200 plus Accept threshold
SEMI with Virtual (default)	Applies the SEMI-standard checksum and the Cognex Virtual checksum. If the read result passes the SEMI checksum, 200 points are added to the raw score. If the read result also passes the Virtual checksum and the results from both checksums agree, an additional 100 points are added to the score. The read must pass both the SEMI and Virtual checksums to be successful; if either checksum fails, the entire read will fail. The SEMI with Virtual checksum selection is the most reliable method of validating a character string containing a SEMI checksum. Maximum score: 400 points Minimum passed score: 300 plus Accept threshold

SELECTION	DESCRIPTION
BC 412 with Virtual	Applies the SEMI-standard barcode checksum and the Cognex Virtual checksum. If the read result passes the BC 412 checksum, 200 points are added to the raw score. If the read result also passes the Virtual checksum and the results from both checksums agree, an additional 100 points are added to the score. The read must pass both the SEMI BC 412 and Virtual checksums to be successful; if either checksum fails, the entire read will fail. This selection is typically used when the character string is marked directly below the barcode on the wafer. Maximum score: 400 points Minimum passed score: 300 plus Accept threshold
IBM 412 with Virtual	Applies the IBM barcode checksum and the Cognex Virtual checksum. If the read result passes the IBM 412 checksum, 200 points are added to the Raw Score. If the read result also passes the Virtual checksum and the results from both checksums agree, an additional 100 points are added to the score. The read must pass both the IBM 412 and Virtual checksums to be successful; if either checksum fails, the entire read will fail. This selection is typically only used when the character string is marked directly below the barcode on the wafer. Maximum score: 400 points Minimum passed score: 300 plus Accept threshold

3.4.6 Field String and Field Definition

The **Field String** and **Field Definition** settings work together to define the format of the character string when ‘Chars, SEMI’, ‘Chars, IBM’, ‘Chars, Triple’, or one of the barcodes is the selected Mark type.

NOTES

- Both The **Field String** and **Field Definition** settings are case sensitive.
- When ‘Chars, IBM’ is the selected Mark, the only valid characters are Hexadecimal.
- When ‘2D Code, T7’ is the selected Mark, the Field String and Field Definition settings are ignored.

Field String

The Field String specifies the number of characters contained in the character string or encoded in a barcode, including alphanumerics (A-Z, 0-9), dashes (-), dots (.), and spaces.

Each character in the Field String corresponds to an indexed field position between 0 and 21. The Field String must contain the same number of positions as there are characters in the wafer mark for the read to pass. By default, each position in the Field String is represented as an asterisk (*) character, or alphanumeric “wildcard.” This means that any character A-Z or 0-9 is valid at any position in the string.

However, an individual position in the Field String can be limited to consider only a subset of possible characters at that position. This increases overall performance and reliability because characters that are not possible at a position will not be considered during a read. The following table lists predefined “field definitions” that can be entered in the Field String:

FIELD STRING ENTRY	VALID CHARACTERS
* = Alphanumeric wildcard	ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
A = Alpha	ABCDEFGHIJKLMNOPQRSTUVWXYZ
N = Numeric	0123456789
H = Hexadecimal	0123456789 ABCDEF
D = Decimal	0123456789 dot (.)
C = SEMI Checksum, alpha	ABCDEFGH
S = SEMI Checksum, numeric	01234567
X = All	ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789 dot (.) dash (-) spaces
dot (.) = dot (.)	dot (.)
dash (-) = dash (-)	dash (-)
space = space	spaces

NOTE All characters that are not predefined or entered in the Field Definition are treated as an alphanumeric wildcard.

Example: The Field String entry for a SEMI M12 standard character string can be **********CS (the default Field String setting). Any alphanumeric character is valid in the first 10 Field String positions. But in the 11th position, only alpha characters A-H will be considered during the read. And in the 12th position, only numeric characters 0-7 will be considered.

NOTE When the selected Mark is a barcode, the Field String must be changed so that it is appropriate for the selected barcode mark.

Field Definition

Optionally, the **Field Definition** setting can be used to create user-defined entries for the **Field String** if **Mark** specifies a character string or barcode. When included in the Field String, these entries restrict the list of valid characters at the positions in which they are inserted.

- Multiple field definitions can be used, separated by a semicolon (;).
- Characters listed for a Field Definition entry must be contained in the font or barcode. For example: &=123 is valid, because 1, 2, and 3 are valid characters. However, 123=& is invalid because '&' is not included in the standard Semifont or barcode character sets.

NOTE Using one of the predefined entries (*, A, N, H, D, C, S, X, dot, dash, space) in the Field Definition will remap the list of valid characters to the new definition. Therefore, it is strongly recommended that you do not use a predefined field definition.

Example: If the Field Definition is &=123;$=3456;%=789, and the Field String is &$%*******CS, then the only characters that will be valid in the first position will be 1, 2, or

3. The only valid characters in the second position will be 3, 4, 5, or 6. And in the third position, only 7, 8, or 9 will be valid.

3.4.7 Accept

The Accept value specifies the minimum response threshold for the raw reading score (40 to 100; default = 50). The meaning of the Accept value and its role in determining the pass/fail status of a read depends on the type of wafer mark.

In all cases, before a read can be considered successful, the raw score must exceed the Accept threshold. Only then will the bonus points for passing the checksum be added to the raw score, and the pass/fail status of the read determined.

- **Characters**. The response score for a character string is derived from the average of the individual scores for all characters in the string. Refer to Section 3.4.5 for a detailed explanation of how the raw score combines with a checksum to determine the total score and pass/fail status of the read.

  NOTE It is possible for the raw score to exceed the Accept value even when individual character scores fall below the specified threshold. This allows character strings where all but one or two characters score above the threshold to be read successfully.

- **2D symbol.** The response score for a 2D symbol is the score for locating the mark in the image. If the 2D mark cannot be located, the score will be 0 and the read fails. If the 2D mark is located and the mark is decoded, 300 bonus points are added to the raw score (passed scoring range: 340 – 400).

  NOTE Accept is ignored when '2D Sym, T7 Data Matrix' is the selected Mark type.

- **Barcode.** The response score for a barcode is the percentage of "scan lines" within the Region that correctly detect the length of the string encoded in the barcode. If at least three scan lines decode the same string that passes the checksum, 300 bonus points are added to the raw score
  (passed scoring range: 310 – 400).

  NOTE Accept is ignored when a barcode is the selected Mark type.

3.4.8 Image Orientation

The Image Orientation setting selects the orientation of the wafer mark in the image. The default orientation is Normal.

SELECTION	DESCRIPTION
Normal (default)	Unmodified image acquired by the reader.
Mirrored horizontally	Horizontally mirrors the acquired image.
Flipped vertically	Vertically flips the acquired image.
Rotated 180 degrees	Rotates the acquired image by 180 degrees.

3.4.9 Light Mode and Light Power

Each Config can have unique **Light Mode** and **Light Power** settings for optimizing the readability of the wafer mark in the image. In-Sight will automatically determine the optimal light settings for a mark during the tuning process if both the Bright Field and Dark Field checkboxes in the Tune dialog are enabled.

Light Mode

The Light Mode setting specifies either a Bright Field or a Dark Field illumination effect on the mark. Each position on the Light Mode slider control enables specific groups of LEDs to achieve the intended effect in the image.

SELECTION	DESCRIPTION
Slider position 0	All lights are disabled. Use this mode only when an external light source is required in a specialized application.
Slider positions 1-3 (BF1–BF3)	The mark will appear dark on a light background. Default = BF1
Slider positions 4-12 (DF1–DF8)	The mark will appear light on a dark background.

Light Power

The Light Power setting controls the effective intensity of the LEDs on the mark by increasing the exposure time of the 1700's CCD imager, in increments of 0.167 milliseconds. Decrease Light Power for a darker image; increase it for a lighter image. Generally, use Light Power to maximize the contrast of the mark relative to the background on the wafer.

NOTE The effect of the Light Power setting is visible in the duration of the "strobed" light pulse as the reader acquires an image.

3.4.10 Character Spacing

When 'Chars, SEMI', 'Chars, IBM' or 'Chars, Triple' is the selected Mark, the Character Spacing setting controls the tolerance of the spacing between adjacent characters and the vertical alignment of the characters. For more information on SEMI Wafer Marking Specifications, see Appendix H.

NOTE The current Character Spacing setting is used during tuning (Section 3.4.15),

SELECTION	DESCRIPTION
Standard Spacing	Reads the characters using standard SEMI specifications for character spacing and vertical character alignment.
Relaxed Spacing	Reads the characters with more tolerance for deviations from the specifications for character spacing and alignment.

3.4.11 Retry

The **Retry** drop-down list specifies the tuning behavior of the Config during the retry sequence at runtime. The retry order for Configs is specified in the Options tab (see Section 3.5).

SELECTION	DESCRIPTION
Disable (default)	The Config will be tried, but not fine tuned*; fine tuning differs from the more exhaustive tuning process during setup (see Section 3.4.15).
Enable	The Config will be tried, and fine tuned.
Enable & Apply	The Config will be tried and can be fine tuned. If tuned successfully the new settings will be applied to the Config, overwriting the previous settings.
*Fine tuning adjusts the Light Power by ± .5 ms, in increments of .2 ms. It also adjusts the Size region ± 1 pixel, both high and wide. This continues on all enabled Configs until the there is either a read or the timeout is exhausted.	

NOTES

- Enabled must be checked for a Config to be included in the retry sequence, regardless of the Retry selection.
- The Retry setting is ignored when the In-Sight protocol TUNE(<Config>) command is issued.

3.4.12 Color

The Color setting is optional in most Configs, for use when the optimal Light Mode for a particular type of wafer mark is already known, or when the Bright Field and Dark Field checkboxes will be disabled during tuning.

By default In-Sight will automatically determine the correct color of the mark as imaged during the tuning process if both the Bright Field and Dark Field checkboxes in the Tune dialog are enabled.

SELECTION	DESCRIPTION
Auto (default)	Automatically selects 'White' or 'Black' depending on the current Light Mode setting.
Black	Specifies a black mark on a light background. Use when Light Mode is set to Bright Field.
White	Specifies a light mark on a dark background. Use when Light Mode is set to Dark Field.

NOTE The Color setting is ignored when the selected Mark is a barcode.

3.4.13 Region

The **Region** defines the area in which the wafer mark is expected to appear in the FOV. The mark must be sufficiently illuminated and entirely contained within the Region or the read will fail. Generally, the mark may be rotated as much as ± 5 degrees within the region without a significant decrease in readability.

NOTE When '2D Sym, T7 Data Matrix' is the selected Mark, the Region must be set no larger than 120 pixels high. If the Region height is set larger than 120 pixels, the read will fail.

To set the Region:

1 Click the **Edit Region** button. The image area will expand, and the interactive region box will appear (Figure 3-5).

Figure 3-5: Editing the Region

2 Adjust the region as necessary to encompass the entire mark. The image coordinates and the size of the region (row, column, height, width) are displayed below the box.

- To move the region, position the cursor anywhere inside the box, then click and hold the left mouse button while dragging.
- To resize the region, position the cursor over an edge or corner of the region, then click and hold the left mouse button while dragging.

TIP	To move the region one pixel at a time, use the arrow keys on the keyboard; to resize the region one pixel at a time, use shift-arrow keys.

To finish editing the region and accept the changes, double left-click anywhere in the image, or click the **Save** button above the image area.

3.4.14 Size

Size defines the expected height and width of a 2D symbol or the characters in a string, as measured in pixels.

NOTES

- When a BC 412 or IBM 412 barcode is the selected Mark type, Size is disabled.
- The Zoom function can be especially useful when positioning the Size region.

To set the mark size:

1 Click the **Edit Size** button. The image will automatically expand.

2 To adjust the Size, position the cursor inside the size box, then click and hold the left mouse button while dragging. To resize the box, position the cursor over an edge or corner of the box, then click and hold the left mouse button while dragging.

TIP To move the size box one pixel at a time, use the arrow keys on the keyboard; to resize box one pixel at a time, use shift-arrow keys.

- If 'Chars, SEMI', 'Chars, IBM' or 'Chars, Triple' is the selected **Mark**, Size defines the height and width expected for each character in the string. To set the size for characters, position the Size box around a character so that its edges align with the centers of the strokes, as shown in Figure 3-6. "Square" characters with horizontal and vertical strokes — such as 0, 3, and Φ — are the best to use when setting the size, though any character can be used.

Figure 3-6: Editing Character Size

- If '2D, Sym T7 Data Matrix' is the selected **Mark**, Size defines the height and width expected for the entire 2D symbol. To set the size for 2D symbols, position the Size box so that it aligns with the centers of the corner cells of the matrix, as shown in Figure 3-7.

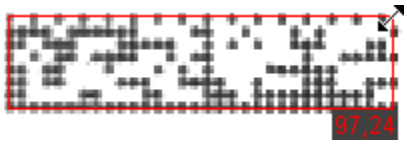

Figure 3-7: Editing 2D Data Matrix Size (Shown at 200% Zoom)

To finish editing the box and accept the changes, double left-click anywhere in the image, or click the **Save Size** button.

3.4.15 Tune

The **Tune** button accesses the automated tuning process used to optimize Config settings (see Figure 3-8).

During tuning, an exhaustive read test is performed on the mark using many combinations of Light Mode, Light Power, Size, and Color settings (and the current definitions for the Mark, Checksum, Accept, Field String/Definition, Character Spacing and Region settings). After each iteration, the string and score results for the last read are displayed. The best string and score result achieved so far are shown, along with counts of the total number of reads attempted and the number of successful reads.

NOTE The image display is not updated during tuning.

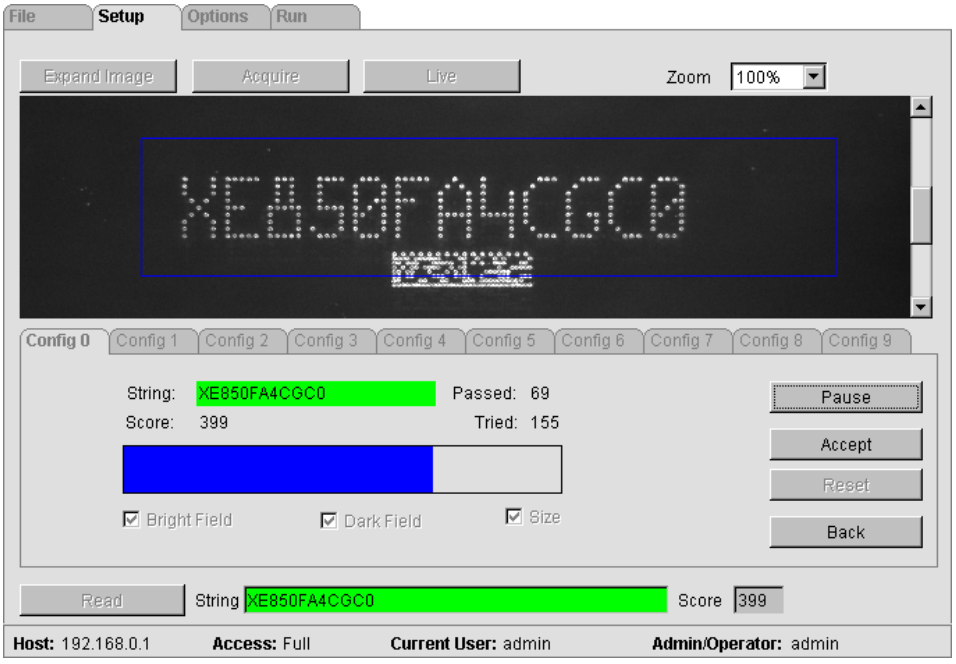

Figure 3-8: Tuning a Character String

When tuning is completed, the combination of settings that correctly read the mark with highest score is retained, and can be applied to the Config or discarded.

To tune a Config:

Choose the tune options to try by enabling/disabling the checkboxes. By default, Bright Field, Dark Field, and Size are enabled. Disabling a checkbox causes tuning to use the current definition for the corresponding setting in the Config.

- Light Power is automatically tuned if one or both Light Mode options (Bright Field and Dark Field) are enabled. If both Light Mode options are disabled, the current Config settings for Light Mode and Light Power will be used, and lighting will not be tuned.
- When the Size option is enabled, tuning will try sizes ± 10 pixels from the current Size setting in the Config.
- Color tuning always occurs. The correct color will automatically be selected in the Config if the tune settings are accepted.

During tuning:

- Click **Pause** to pause tuning. Click **Continue** to resume tuning from where it left off.
- Click **Accept** to stop tuning and update the Config with the settings of the best read so far (the Accept button will be grayed out until the first passed read).
- Click **Reset** to stop tuning and discard the tuning results.
- Click **Back** to stop tuning, discard the tuning results, and return to the Config settings.

After tuning is completed:

- Click **Accept** to apply the tuned settings to the Config.
- Click **Reset** to re-initialize all tuned settings. Select a different combination of tuning options, then click the **Start** button to tune again.
- Click **Back** to return to the Config settings. The Config will be updated with the tuned results if **Accept** was clicked previously. Otherwise, the tuned settings will be discarded.

TUNING TROUBLESHOOTING TIPS

- Make sure the Field String contains the correct number of characters, and any dots, dashes, and spaces are in the correct positions.
- Make sure the correct Checksum is selected (for Chars).
- Make sure Region and Size settings are reasonable before tuning.

3.4.16 Read

The **Read** button, below the Config settings, acquires an image and performs a "test" read on the wafer mark using the current Config. The String and Score results are reported to the right. If the read passes, the String appears on a green background; failed reads appear on a red background.

3.5 Setting Options

The selections in the **Options** tab (Figure 3-9) control how the configured wafer ID application will operate during runtime.

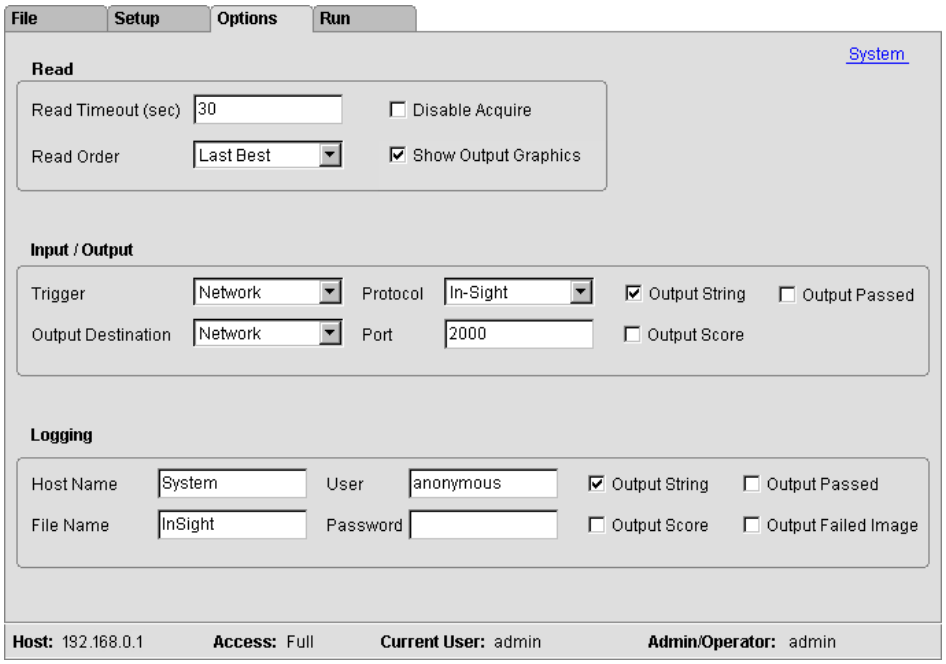

Figure 3-9: Options Tab

3.5.1 Read

Read options control the try sequence for enabled Configs. Optionally, image acquisition can be disabled to allow test reads from image files when the reader is offline.

Read Timeout & Read Order

Read Timeout specifies the total amount of time (up to 60 seconds) to allow for a read, including retries and tuning of enabled Configs. When the timeout limit is reached without a successful read, the read fails.

NOTE Specifying a Read Timeout differs from terminating the execution of the read using the Abort Execution command. For more information on this command, , refer to Section 7: Native Mode Commands.

Read Order Specifies the order in which enabled Configs will be tried until a successful read is obtained.

SELECTION	DESCRIPTION
Last Best (default)	Configs will be tried in the order they scored (from highest to lowest) during the last read until a passed score is read.
In Order	Configs will be tried in numerical order (0-9), regardless of how they scored during the most recent read.

Disable Acquire

Disables image acquisition to allow a test read from the last image acquired, or from an image file, when the reader is offline. The Light Mode and Light Power settings are disabled, as are the Acquire and Live buttons.

To read from an image file:

1 Check the Disable Acquire checkbox.

2 Load a valid .BMP or .JPG image file (640 x 480, 8-bit) using one the following methods:

- With the In-Sight PC Host open, drag and drop an image file onto the spreadsheet. Or, open the Save & Load dialog (System→Save & Load) and select an image from a different In-Sight host on the network.
- Open an FTP connection to the reader (for instructions see Appendix B: Updating the Reader). Drag and drop the image file into the FTP window of the web browser, or use the mput command from an FTP prompt.

NOTE You do not need to rename the image file before loading it on the 1700. The reader will automatically copy the .BMP or .JPG file to the built-in file names, IMAGE.BMP or IMAGE.JPG, respectively.

3 Click the **Read** button on either the Setup or Run tab to read from the image file.

4 Repeat step 2 to read from a different image file, or uncheck Disable Acquire in the Options tab to return the reader to normal operation.

Show Output Graphics

When the Show Output Graphics checkbox is enabled, the character's score, the read character, and the center coordinate of the character are displayed. If the mark passes, the output graphics are shown in green; if the score is below the Accept value, the output graphics are shown in red. If a character cannot be read, a question mark is displayed. If the mark fails, and the character's score is above the Accept value, the output graphics for the character are shown in green. An example with Output graphics enabled is shown in Figure 3-10.

NOTE Output Graphics are only shown when the selected Mark is 'Chars, SEMI', 'Chars, IBM', or 'Chars, Triple'.

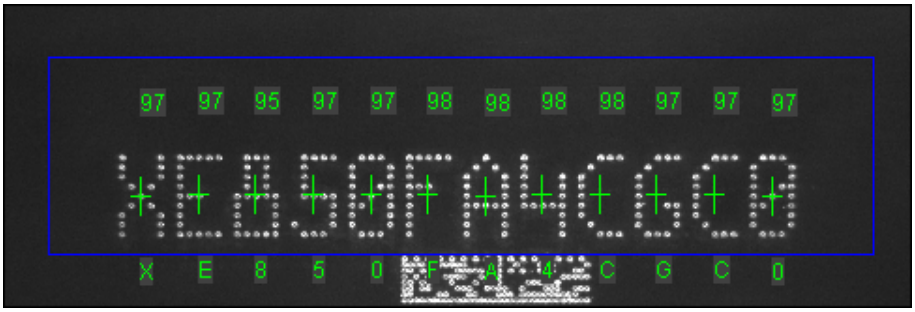

Figure 3-10: Output Graphics

3.5.2 Input/Output

Input/Output options control how reads are initiated on the 1700 reader, and the data format of the output results.

Trigger

Selects the source of the trigger that acquires an image and initiates a read.

SELECTION	DESCRIPTION
Camera	Reads when the acquisition input on the reader receives a pulse from an external trigger source.
Network (default)	Reads when the READ command is received from a remote network host through a TCP/IP device connection at the specified Port.
Serial	Reads when a READ command is received from a remote RS232 serial device.

NOTE When 'Serial' is the selected Trigger, the Mode setting in the Serial tab on the System Settings page must be 'Text'.

Output Destination

Determines where results are sent after each read.

SELECTION	DESCRIPTION
Network	Sends read results to a remote network host through a TCP/IP device connection at the specified Port.
Serial	Sends read results to a remote RS232 serial device.

NOTE When 'Serial' is the selected Output Destination, the Mode setting in the Serial tab on the System Settings page must be 'Text'.

Protocol

Determines the command that a remote device sends to initiate tuning and reading, and the format for outputting the results data.

NOTE The reader must be Online.

SELECTION	COMMANDS	
	Read	**Tune***
In-Sight	READ(<Config>) READ	TUNE(<Config>)
EG	ESC-y1wXON**	n/a

* Each time the TUNE command is sent, the Light Power is adjusted by ± .5 ms, in increments of .2 ms, and the Size region is adjusted ± 1 pixel, both high and wide.

** "ESC" and "XON" are control characters.

In-Sight Protocol

In-Sight is the default protocol for the 1700 reader. This protocol can be used with either a TCP/IP or RS232 connection. If used with TCP/IP, a valid Port number must be specified. When using an RS232 serial device, the settings in the Serial tab (see Section 6.4 Configuring Serial Port Settings) should be configured as follows:

- Baud Rate = 1200
- Data Bits = 8
- Stop Bits = 1
- Parity = None
- Handshake = Xon/Xoff
- Mode = Text

NOTE If using the Send Message Native Mode command, the selected Mode must be Native. For more information on the Send Message command, refer to Section 7: Native Mode Commands.

Also, the Text Mode settings in the Text Mode Details dialog (shown in Figure 3-11) should be configured as follows:

- Fixed Input Length = 6
- Input Terminator = 13
- Output Terminator = 13

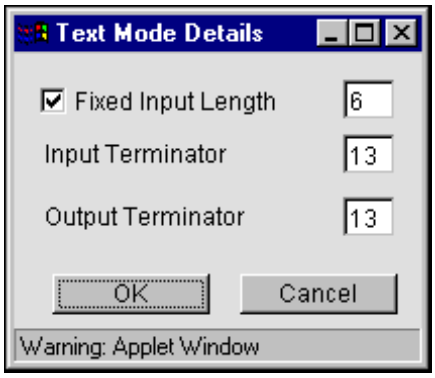

Figure 3-11: Text Mode Details Dialog

When using the In-Sight protocol, a Read can either be done on a single Config using the READ(<Config>) command, or on all enabled Configs using the READ command; this command uses the Read Order selected in the Options tab (see Section 3.5.1 Read). Also, if '–1' is used for the Config number to be read, the command is the same as using the READ command. Tuning is done on a single Config using the TUNE(<Config>) command. If the READ command needs to be terminated before the Read Timeout (see Section 3.5.1) is exhausted, the Abort Execution Native Mode command can terminate the READ execution. For more information on the Abort Execution command, refer to Section 7: Native Mode Commands.

When In-Sight is the selected Protocol, the Output String will be a character string for a successful read. For a failed read, the output will either be a partial read (where unreadable characters are displayed as question marks) or a string of asterisks. The type of output is dependent on the Score (see Section 5.1.6: Score).

An example of the outputs using the In-Sight protocol commands from Microsoft Windows' built-in Telnet client are shown in Figure 3-12.

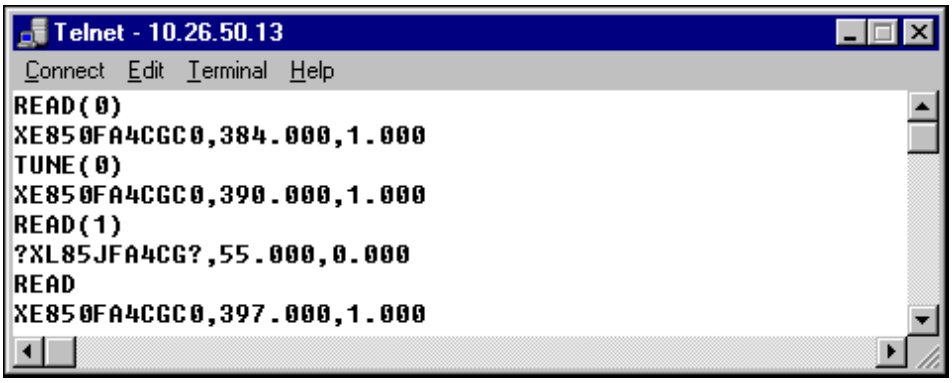

Figure 3-12: In-Sight Protocol Output Example

EG (Electroglas) Protocol

Protocol (TCP/IP or RS232) for use with an Electroglas, Inc. wafer prober. If used with TCP/IP, a valid Port number must be specified. When using an RS232 serial device, the settings in the Serial tab (see Section 6.4 Configuring Serial Port Settings) should be configured as follows:

- Baud Rate = 1200
- Data Bits = 8
- Stop Bits = 1
- Parity = None
- Handshake = Xon/Xoff
- Mode = Text

Also, the Text Mode settings in the Text Mode Details dialog (shown in Figure 3-11) should be configured as follows:

- Fixed Input Length = 6
- Input Terminator = 13
- Output Terminator = 13

When using the EG protocol, a Read can only be done on all enabled Configs using the READ(-1) command. This command also uses the Read Order selected in the Options tab.

When EG is the selected Protocol, the Output String will be either a character string for a successful read or a string of asterisks for a failed read. When using the EG Protocol, partial reads are not returned, since any return other than a strings of asterisks will be interpreted by the wafer prober as a successful read. The number of asterisks returned will be the same as the number of characters specified in the Field String (see Section 3.4.6: Field String and Field Definition).

An example of the outputs using the EG protocol commands from Microsoft Windows' built-in Telnet client are shown in Figure 3-13. The first Read command (entered as a sequence of ASCII characters) shows the output for a successful read; the second Read command shows the output for a failed read.

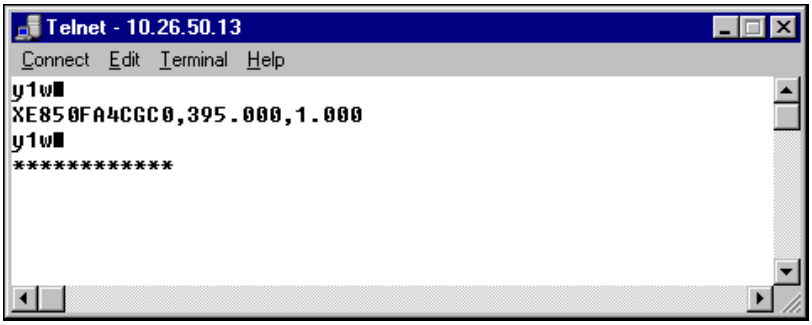

Figure 3-13: EG Protocol Output Example

Port

Assigns the TCP/IP port number to use when 'Network' is selected in the **Trigger** or **Output Destination** settings. This port number is where a TCP/IP connection is established between the 1700 reader (a TCP/IP server waiting for communication) and a remote device (a TCP/IP client that initiates communication). The default port is 2000, but any unused number between 1 and 65535 may be used, excluding 21, 23, 68, 1069 and 1070 (reserved by the 1700 reader).

Output String, Output Score, Output Passed

These checkboxes select the results data that will be sent to the Output Destination after a read. By default, only the Output String box is checked. When the **Output Passed** checkbox is enabled, the resulting data is either a '1.000' if the read passes or '0.000' if the read fails.

3.5.3 Logging

Read results may be written to a log file saved on a network host. Logging options specify which results are written to the log file.

Host Name

The name of the remote host on the network where the log file will be created.

File Name

The name of the file on the specified host where log entries will be appended. The log file is an HTML document; the .HTM extension is automatically appended to the File Name. This file is saved in the default FTP directory; subdirectories cannot be specified. The maximum File Name length is 64 characters.

User

A valid User name for the specified host.

Password

A valid password for the User on the specified host.

Output String, Output Score, Output Passed, Output Failed Image

These checkboxes select the results data that will be written out to the HTML file on specified network Host. Data is appended to the specified log file. The log file must be reset manually by deleting, renaming or moving the current InSight.htm file, or by specifying a new file name for the log file. The reader must be Online for data to be appended to the log file. An example of the HTML log page, with all outputs selected, is shown below.

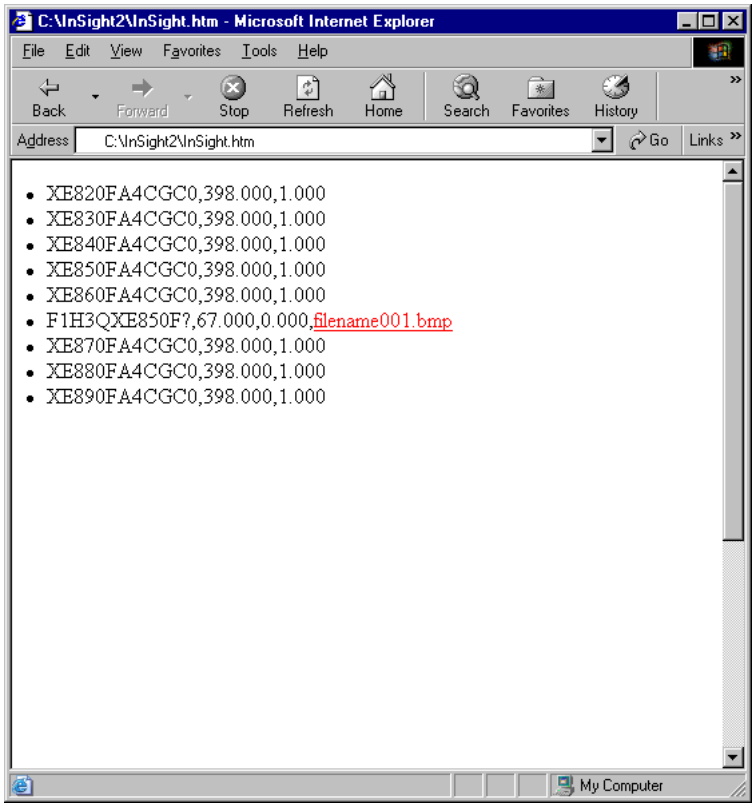

Figure 3-14: HTML Log Page Example

4 Managing Job Files

In this section…

4.1 About Job Files

The File tab (Figure 4-1) provides access to Job files stored in flash RAM on the 1700 reader.

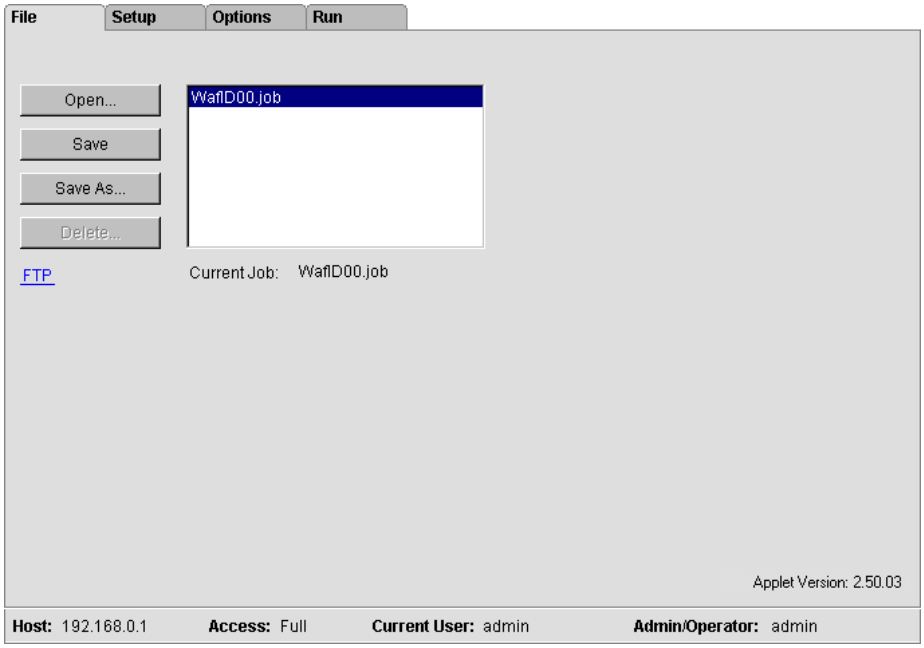

Figure 4-1: File Tab

To use the browser interface, at least one job file must be stored on the reader. The job file can be the default job, WAFID00.JOB, or any other compatible job that has been saved using the browser interface. The File tab also lists the job currently being used by the applet; this job cannot be deleted.

NOTE Jobs that have been modified directly in the In-Sight PC Host spreadsheet can be used, but only if the predefined functions and formulas in the spreadsheet cells have not been rearranged, deleted, or otherwise changed in such a way as to break compatibility with the WAFID00.JAR Java applet. See Appendix A for more information about the default job, WAFID00.JOB.

4.2 Saving Jobs

Jobs must be saved on the 1700 to preserve changes made to Config and Options settings. If the job is not saved, all settings changes will be lost when a new job is opened or the power is cycled on the 1700.

To save a new job:

1. Click on the **File** tab.
2. Click the **Save As…** button.
3. Enter a new file name (do not include a directory or subdirectory) in the **Save As…**dialog. Job file names can contain up to 15 characters (the .JOB extension will be added automatically).
4. Click **OK** to save the Current Job to a new job file, or **Cancel**.

To save changes to an existing job:

1. Click on the **File** tab.
2. Click the **Save** button.
3. Click **OK** to save the Current Job, or Cancel.

4.3 Opening Jobs

Only job files stored in the reader's flash memory can be opened using the browser interface.

To load an existing job from 1700 memory:

1. Click on the **File** tab.
2. Save changes made to the Current Job, if needed.
3. Highlight a job file in the list.
4. Click the **Open** button.
5. Click **OK** in the Open File dialog to load the job, or **Cancel**.

4.4 Sharing Jobs Between Readers

A job file saved on one 1700 reader may be shared with other readers on the network using FTP to copy the file.

4.5 Changing the Startup Job

By default, the 1700 reader is configured to load the WAFID00.JOB automatically after receiving power. However, after making changes to Config and Options settings and saving to a different job file, you will want to configure the reader to automatically load and run that new job at startup.

To change the default startup job for the reader:

1. Click on the **Options** tab.
2. Click on the System link in the upper-right to access the reader's **System Settings**.
3. Click the **Startup** tab.
4. Select a new job file to load on startup from the **Job** list.
5. Click the **Save** button.

5 Running the Job

In this section…

5.1 The Run tab

The **Run** tab is the only view of the 1700 reader available from the browser interface during runtime operation.

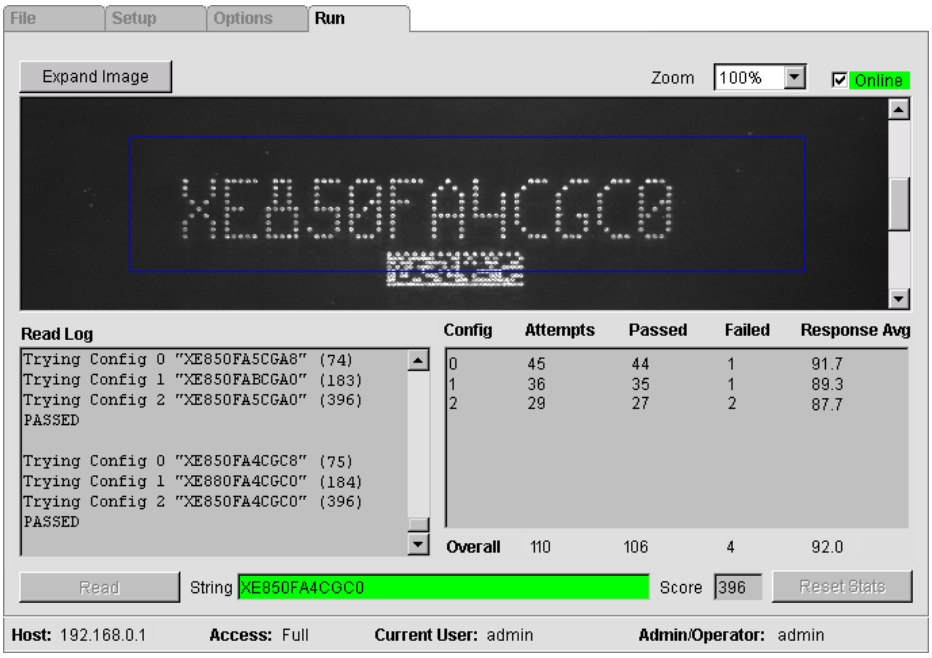

Figure 5-1: Run Tab

The following sections describe the information displayed in the Run tab.

5.1.1 Online Checkbox

The Online checkbox at the top-right of the Run tab switches the reader between its Online and offline modes of operation. When this checkbox is enabled (the default setting), the reader is “online”. The File, Setup, and Options tabs are grayed out, and the following operations are supported:

- Output read results data to the log file specified in the Options tab.
- Output read results over the serial port when Serial is the selected Output Destination in the Options tab.
- Respond to the protocol’s READ and TUNE commands.
- Respond to the camera, network, and serial acquisition Trigger selected in the Options tab.
- Send/receive data to and from the spreadsheet over the network or serial port using the Input/Output functions.

NOTE If the Online checkbox is enabled from the browser and a System Offline dialog appears, open the PC Host and verify that the PC Host’s status bar indicates the reader is online, then click **OK** to close the dialog.

When the Online checkbox is disabled, the reader is “offline”, and the operations listed above are not possible. However, the following actions are allowed:

- Edit settings in the Setup and Options tabs.
- Save & open jobs in the File tab.
- Manually acquire an image and read the wafer mark using the Read button.
- Clear all read results using the Reset Stats button.
- Execute Native Mode commands over telnet.

The reader’s Online state is a combination of three independent flags:

- Spreadsheet flag – Set directly from the System menu’s Online checkbox in the In-Sight spreadsheet. This flag can also be controlled by the Online checkbox in the Startup tab (see Section 6.6). For the browser-based user interface to run properly, this flag should be enabled.
- Native Mode flag – Set from the Online checkbox in the Run tab or from the Set Online Native Mode command (see Section 7.1.3).
- Discrete I/O flag – Not used by the reader; enabled by default.

The reader is Online only when all three flags are enabled.

5.1.2 Read Log

A record of the most recent read results. This log returns the string, score, and pass/fail status of each Config that is read or retried.

NOTE If the reader is offline, a continuous log is displayed. If the reader is online, only the last read results are displayed.

5.1.3 Statistics Window

A statistical record of the read results.

NOTE Any changes to a Config's settings will reset the statistics for that Config, but do not change the overall statistics.

Config

The index of each enabled Config.

Attempts

The number of times that the Config has been used during reading.

Passed

The number of times that the Config read successfully.

Failed

The number of times that the Config failed to read.

Response Avg

The average raw response score of all attempted reads for the Config.

Overall

The cumulative statistics from the results of all reads.

NOTE The Overall statistics are calculated independently of the statistics for the individual Configs.

5.1.4 Read

The **Read** button acquires an image and reads the wafer mark. The String and Score results are reported to the right. The Read button is grayed out when the Online checkbox in enabled.

5.1.5 String

The character string result for the last read. If the read passes, the string appears on a green background.

Failed reads appear on a red background. If a failed read's score is above the minimum threshold for reporting results, individual string characters are displayed. Any character in the string that cannot be read is displayed as a question mark. If the failed score is below the minimum threshold, all characters are shown as asterisks. The number of asterisks returned will be the same as the number of characters specified in the Field String (see Section 3.4.6:Field String and Field Definition).

5.1.6 Score

The score for the last read. For more information on scoring, see Sections 3.4.5 and 3.4.7.

5.1.7 Reset Stats

The **Reset Stats** buttons clears all results in both the Read Log and Statistics windows. The Reset Stats button is grayed out when the Online checkbox in enabled.

6 System Settings

In this section…

6.1 About System Settings

Each 1700 has its own system settings that control the reader's networking configuration and serial port settings, the list of authorized users, and the startup behavior. These settings are stored in the reader's PROC.SET file, and apply to all jobs.

To access a reader's System Settings from the browser interface:

1 Click on the **Options** tab.

2 In the Options tab, click on the System hyperlink in the upper-right corner.

NOTE System Settings may also be configured using the In-Sight PC Host.

6.2 Version Information

The **Info** tab shows important information about your 1700 reader and its current firmware and applet version. This information is needed if assistance is ever required from Cognex Technical Support. The Online checkbox at the top-right of the Run tab switches the reader between its online and offline modes of operation. For more information about the Online checkbox, see Section 5.1.1. The Back hyperlink, located below the Online checkbox, returns you to the Run tab.

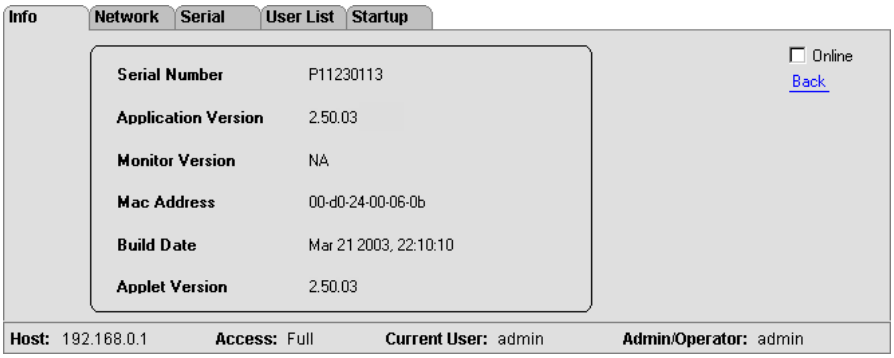

Figure 6-1: Info Tab

6.3 Configuring Network Settings

The **Network** tab (Figure 6-2) configures an In-Sight system to be used on a network.

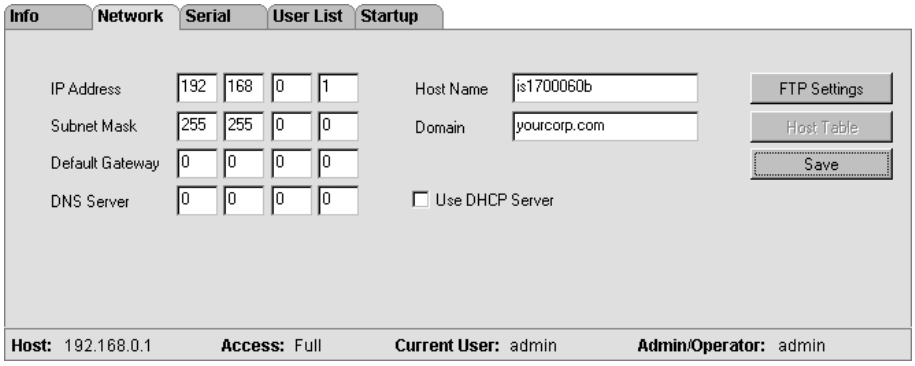

Figure 6-2: Network Tab

Use DHCP Server

The Use DHCP Server checkbox determines whether the 1700 reader uses DHCP (Dynamic Host Configuration Protocol) on start up or if the values in the Network Settings dialog configure TCP/IP.

NOTE	This box should be checked only if a DHCP server is running on the local network. If the box is checked and a DHCP server does not respond within 60 seconds, the reader will boot without network support enabled.

All of the settings that can be configured in the Network tab depend on whether this checkbox is enabled. If enabled, the checkbox allows the 1700 reader to be configured automatically by a DHCP server at startup. Optionally, a new Host Name may be assigned, but all other fields in the Network tab will be grayed out.

However, if the Use DHCP Server checkbox is disabled, the network settings for the 1700 must be configured manually. If the reader was previously assigned an IP Address using DHCP, disabling the Use DHCP Server checkbox will use the same IP Address.

In production environments, a static IP Address should be used instead of DHCP. Using a static IP Address removes the need for a DHCP server on the local network and eliminates extraneous DHCP traffic.

IP Address

Assigns a unique identifier for each reader on the network, which must be consistent with the IP address-numbering scheme of the local network.

NOTE The IP Address setting is grayed out when the Use DHCP Server checkbox is enabled.

Unlike the factory-set MAC address, the IP address is assigned automatically by a DHCP server or must be manually assigned by the user. The following IP addressing schemes are recommended:

ADDRESSING SCHEME	DESCRIPTION
10.0.0.0/8	The 10.0.0.0/8 private network is a class A network ID that allows valid IP addresses from 10.0.0.1 to 10.255.255.254. The 10.0.0.0/8 private network has 24 host bits which can be used for any subnetting scheme within the private organization. The default Subnet Mask is 255.0.0.0.
172.16.0.0/12	The 172.16.0.0/12 private network can be interpreted either as a block of 16 class B network IDs or as a 20-bit assignable address space (20 host bits) which can be used for any subnetting scheme within the private organization. The 172.16.0.0/12 private network allows valid IP addresses from 172.16.0.1 to 172.31.255.254. The default Subnet Mask is 255.255.240.0.
192.168.0.0/16	The 192.168.0.0/16 private network can be interpreted either as a block of 256 class C network IDs or as a 16-bit assignable address space (16 host bits), which can be used for any subnetting scheme within the private organization. The 192.168.0.0/16 private network allows valid IP addresses from 192.168.0.1 to 192.168.255.254. The default Subnet Mask is 255.255.0.0

Subnet Mask

Defines which part of the reader's IP address refers to the network and which part refers to the host.

NOTE When DHCP is enabled, this field is grayed out and displays the value assigned by DHCP.

The network part of the IP address is the same for all hosts on the same subnet, and the remainder is unique to each host. As shown in the table below, a Subnet Mask of 255.255.255.0 (a class C mask) identifies 24 bits for the network portion and 8 bits for the host portion. Most users will not need to change the default Subnet Mask setting of 255.255.255.0.

CLASS	SUBNET MASK	NETWORK ADDRESS	HOST ADDRESS
A	255.0.0.0	8 bit	24 bit
B	255.255.0.0	16 bit	16 bit
C	255.255.255.0	24 bit	8 bit

Default Gateway

Specifies the IP address of the gateway host, if available on the network.

NOTE The Default Gateway setting will be grayed out when the Use DHCP Server checkbox is enabled. The value shown is the gateway assigned by the DHCP server.

The gateway host is responsible for sending and receiving data between hosts on different networks, routing data packets from a device on the local subnet to a device on another subnet.

For example, if a 1700 reader will need to communicate with a remote host on a different subnet, enter the address of the gateway device in the Default Gateway field. However, if the reader will need to communicate only with devices on the local subnet, do not enter an address for the Default Gateway (leave the field all zeros).

DNS Server

Specifies the IP address of the host on the network providing DNS resolution, if available.

NOTE The DNS Server setting will be grayed out when the Use DHCP Server checkbox is enabled. The value shown is the DNS Server assigned by the DHCP server.

A Domain name (i.e., yourcorp.com) is an alias for an IP address (i.e., 192.168.0.1). A DNS (Domain Name Server) maintains the data on corresponding domain names and IP addresses. The DNS Server setting determines which host is contacted (by IP address) in response to a given Domain Name.

Host Name

Assigns a name, or “alias” for the reader as it will appear when browsing the network using the In-Sight PC Host.

Each 1700 reader has its host name set automatically the first time it boots. The format is “is17*xxxxxx*", where “*xxxxxx*" consists of the last 24 bits of the reader’s unique MAC address. For example, a reader with the MAC address 00-d0-24-00-06-0b will be assigned the host name, "is1700060b".

NOTE The Host Name setting is not automatically assigned by the DHCP server (if used) or referenced through the DNS server. If the Use DHCP Server checkbox is enabled and the DHCP server supplies the Host Name, it is ignored in favor of the default host name or the name entered by the user.

Domain

Specifies the 1700 reader's Fully Qualified Domain Name (FQDN) for the network on which it is installed.

NOTE When the Use DHCP Server check box is enabled, this field is grayed out and displays the value assigned by the DHCP server.

An In-Sight 1700 must have a FQDN to be accessible from a remote host that is not part of the local network. The Domain setting sets the string that is appended to the host name to make a FQDN.

For example, setting Domain to **yourcorp.com** yields the following results:

- If a host name is **is1700060b**, the FQDN for lookup is **is1700060b.yourcorp.com**.
- If a host name is **is1700060b.yourcorp.com.** (notice the period at the end), the FQDN for lookup is **is1700060b.yourcorp.com**.

Appending the period to the end of the host name prevents redundancy in appending the Domain name to the FQDN. For example, if the period is omitted, **is1700060b. yourcorp.com** would become **is1700060b.yourcorp.com.yourcorp.com).**

FTP Settings

This button opens the FTP Settings dialog to configure the File Transfer Protocol (FTP). FTP Settings dialog controls include:

- **Idle Timeout**: The amount of time (in seconds) that a connection from another host may be left open without any activity. The default is 120 seconds.
- **Read Timeout**: The amount of time (in seconds) that FTP remains blocked in a read (or write). This value is used to recover from an unresponsive peer. The default is 120 seconds.
- **Connection Retry**: The number of times to try connecting to a peer. The default is 1 try.
- **Local Port**: The port address at which the local FTP server awaits connections. The default port is 21.
- **Remote Port**: The port address at which a remote FTP awaits connections. The default port is 21.
- **Passive Transfers**: This checkbox enables "passive" FTP client transfers, which may be required when In-Sight needs to access an FTP server through a firewall that does not allow connections to be initiated from the outside. The checkbox is OFF by default.

Host Table

This button opens the Host Table dialog to specify a local mapping of network host names to IP addresses. Host Table dialog controls include:

- **Favor Host Table over DNS**: When enabled, this checkbox specifies that the search order for In-Sight host names will be the host table, followed by the network browser, then DNS. When disabled, the Host Name search order is the network browser, followed by the host table, and then DNS.
- **Host Name**: The name of the networked In-Sight system to map (or assign) to the specified IP Address. The Host Name entered will appear in any list of Host Names throughout the In-Sight interface.
- **IP Address**: The IP Address of the networked In-Sight system to map to the specified Host Name.

6.4 Configuring Serial Port Settings

The **Serial** tab (Figure 6-3) configures the 1700 reader's RS232 serial port communications.

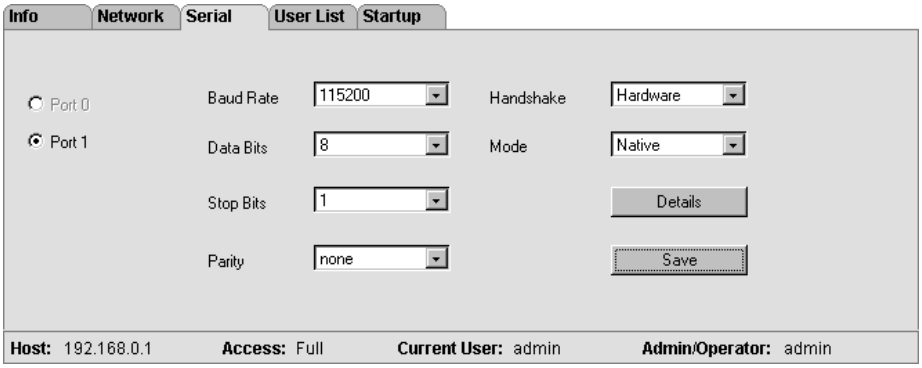

Figure 6-3: Serial Tab

Baud Rate

300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, or 115200 (default).

Data Bits

7 or 8 (default).

Stop Bits

1 (default) or 2.

Parity

None (default), Even, or Odd.

Handshake

None, Xon/Xoff, or Hardware (default).

Mode

Sets the serial protocol to use.

SELECTION	DESCRIPTION
Text	Standard ASCII protocol for sending/receiving text strings. To define the input and output terminator characters, press the Details button to open the Text Mode Details dialog. 'Text' must be the selected Mode when Trigger and Output Destination are set to 'Serial'.
Native (default)	Custom ASCII protocol for controlling In-Sight from any remote host. To define the input and output terminator characters, press the Details button to open the Native Mode Details dialog.
DeviceNet	Protocol for communicating with Allen-Bradley PLC (requires an optional, RS232-to-DeviceNet Gateway adapter from Cognex). To define the input and output data packets sizes, press the Details button to open the DeviceNet Details dialog.
Motoman	Protocol for communicating with Motoman MRC, MRC-II, and XRC robot controllers operating in DCI mode.
Unused	Closes the serial port so that no commands or data can be received/sent.

Details

Opens the Details dialog for the selected Mode.

SELECTION	DESCRIPTION
Text Mode Details	The Text Mode Details dialog defines the terminator characters to use for Text Mode serial communications. Text Mode Details dialog controls include: ■ **Fixed Input Length**: Reads a fixed number of characters before triggering an event. ■ **Input Terminator**: The ASCII value interpreted by In-Sight as the end of an incoming string. The default is 13 (carriage return). ■ **Output Terminator**: The ASCII value that In-Sight adds to each output string to mark the end of the transmitted string. The default is 13 (carriage return), and 0 specifies "no terminator".
Native Mode Details	The Native Mode Details dialog defines the terminator characters to use for Native Mode serial communications. Native Mode Details dialog controls include: ■ **Fixed Input Length**: Reads a fixed number of characters before triggering an event. ■ **Input Terminator**: The ASCII value interpreted by In-Sight as the end of an incoming string. The default is 13 (carriage return), and 0 specifies "no terminator". ■ **Output Terminator**: The ASCII value that In-Sight adds to each output string to mark the end of the transmitted string. The default is 13 (carriage return), and 0 specifies "no terminator".
DeviceNet Mode Details	The DeviceNet Mode Details dialog defines the terminator characters to use for The DeviceNet Mode serial communications. DeviceNet Mode Details dialog controls include: ■ **Input Packet Size**: Sets the expected packet size to be received through the DeviceNet Interface Module, in bytes. The setting must agree with the MaxWidth value in the RS232-to-DeviceNet configuration. ■ **Output Packet Size**: Sets the packet size to send out through DeviceNet Interface Module, in bytes. The setting must agree with the Transmit Width value in the RS232-to-DeviceNet configuration. ■ **Trigger on First Byte**: Triggers an acquisition when the first byte is received.

6.5 Managing the User List

The **User List** tab (Figure 6-4) administers the access level and FTP read/write privileges for authorized users of a 1700 reader. The User List settings determine which users may log onto a particular reader using any of the available methods: browser interface (HTTP), In-Sight PC Host, Telnet, and FTP. The User List also specifies the types of configuration changes they can make. The User List is specific to each reader and is not shared between readers; if a user needs access to a particular reader, they must know a User Name and password that already exists in that reader's User List.

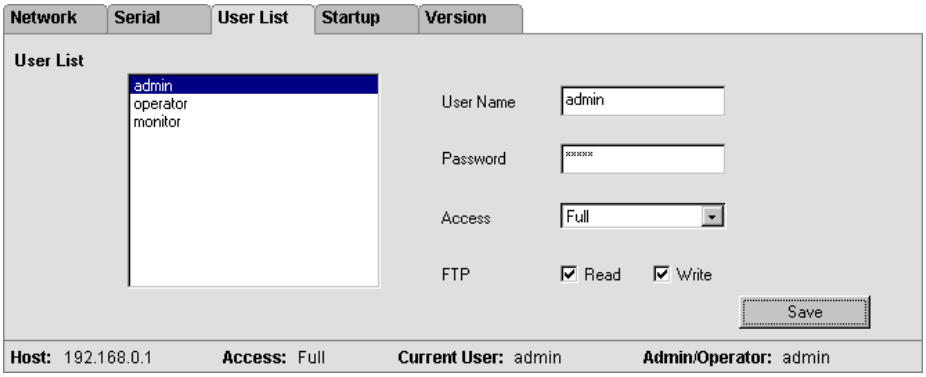

Figure 6-4: User List Tab

6.6 Startup Options

The **Startup** tab (Figure 6-5) specifies job-related startup options for a 1700 reader, including the default job and Online/Offline status.

As described previously in Section 4.1, a reader must have a job file loaded that is compatible with the default job, WAFID00.JOB.

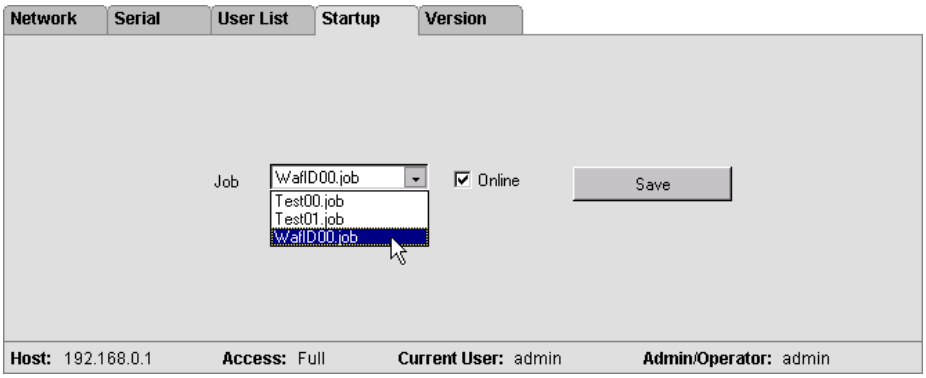

Figure 6-5: Startup tab

7 Native Mode Commands

In this section…

The In-Sight 1700 reader supports many Native Mode commands that allow the reader to be controlled from users' custom application programs over Ethernet or serial port.

NOTE When logging on to an In-Sight system through Telnet from a Unix-based platform, the In-Sight system's host name (or IP Address) and port number (usually 23) must be added to the command line. For example: >telnet is170060b 23. Supplying the port number disables the Unix username/password authentication and forces the Unix system to prompt you for User Name and password.

Below is a partial listing of the Native Mode commands typically used to control the 1700 remotely.

NATIVE MODE COMMANDS	
Abort Execution	Terminates the current execution of the WafID function within the spreadsheet.
Send Message	Sends an ASCII string to an In-Sight spreadsheet over a Native Mode connection, and optionally, triggers a spreadsheet Event.
Set Online	Sets the In-Sight system into Online or Offline mode.

PUT EXTENDED NATIVE MODE COMMANDS	
Put live	Turns live acquisition on/off.
Put portnum	Specifies the network port used by In-Sight to transfer data and live images.
Put watch	Returns the data contained in the specified cell when the cell is updated.

EVALUATE EXTENDED NATIVE MODE COMMANDS (ACTIONS)	
EV AcquireConfig	Acquires an image using a Config's light settings, but does not read.
EV ReadConfig	Reads using the specified Config.
EV TuneConfig	Tunes a specific Config and optionally, saves the optimized settings.
EV ResetStats	Reset all accumulated read statistics.

EVALUATE EXTENDED NATIVE MODE COMMANDS (GET AND SET)	
EV GetConfig	Settings information for the specified Config.
EV GetConfigAccept EV SetConfigAccept	The threshold Accept setting for a Config.
EV GetConfigAvgScore	The average raw response score of all reads that passed for a Config.
EV GetConfigCharHigh EV GetConfigCharWide EV SetConfigCharSize	The settings information for the Size setting.
EV GetConfigChecksum EV SetConfigChecksum	The index of the Checksum selection for a Config.
EV GetConfigColor EV SetConfigColor	The index of the Color selection for a Config.
EV GetConfigEnable EV SetConfigEnable	The status of the Enabled checkbox for a Config.
EV GetConfigFieldDef EV SetConfigFieldDef	The contents of the Field Definition setting for a Config.
EV GetConfigFieldString EV SetConfigFieldString	The contents of the Field String setting for a Config.
EV GetConfigHigh EV GetConfigWide	The Size settings for a Config.
EV GetConfigLightMode EV SetConfigLightMode	The index of the Light Mode selection for a Config.
EV GetConfigLightPower EV SetConfigLightPower	The Light Power selection for a Config.
EV GetConfigMark EV SetConfigMark	The index of the Mark selection for a Config.
EV GetConfigNumFailed	The number of failed reads for a Config.
EV GetConfigNumPassed	The number of passed reads for a Config.
EV GetConfigNumTuneFailed	The number of failed reads during a tune for a Config.
EV GetConfigNumTunePassed	The number of passed reads during a tune for a Config.
EV GetConfigOrcChar	The ASCII value of the indexed character in a read string.
EV GetConfigOrcCol	The column coordinate of the indexed character in a read string.
EV GetConfigOrcRow	The row coordinate of the indexed character in a read string.
EV GetConfigOrcVal	The raw response score of the indexed character in a read string.
EV GetConfigOrientation	The index of the Img Orientation setting for the specified Config.
EV GetConfigPassed	The pass/fail status of the specified Config for the most recent read.
EV GetConfigRegionRow EV GetConfigRegionCol EV GetConfigRegionHigh EV GetConfigRegionWide EV SetConfigRegion	The settings information for the Region setting.
EV GetConfigResult	The results of the most recent read performed by the specified Config.
EV GetConfigRetry EV SetConfigRetry	The index of the Retry setting for the specified Config.
EV GetConfigScore	The score for a Config during the most recent read.
EV GetConfigString	The character results for a Config during the most recent read.
EV GetConfigStringLen	The number of characters contained in the result string.
EV GetConfigTheta	The orientation of the mark for a Config.
EV GetConfigTryLog	The Retry status of the Config during the last read.
EV GetConfigTuneLog	The Retry and Tune status of the Config during the last read.
EV GetMSBuffer	The Machine Status data stored in one of 8 indexed buffers within the MachineStatus stack. If the index is 0, the current Machine Status is returned.

EVALUATE EXTENDED NATIVE MODE COMMANDS (GET AND SET)	
EV GetWaferAcqEnable EV SetWaferAcqEnable	The status of the Disable Acquire setting.
EV GetWaferAll	All results for the most recent read, and settings for all Configs.
EV GetWaferAvgScore	The average raw response scores for all Configs that passed.
EV GetWaferBestConfig	The index of the Config that passed during the last read.
EV GetWaferFixCol	The column coordinate of the fixture.
EV GetWaferFixRow	The row coordinate of the fixture.
EV GetWaferFixTheta	The orientation of the fixture.
EV GetWaferNumFailed	The number of failed reads for all Configs.
EV GetWaferNumPassed	The number of passed reads for all Configs.
EV GetWaferOrder EV SetWaferOrder	The index of the Read Order setting.
EV GetWaferSummary	A summary of the results for the most recent read.
EV GetWaferTimeout EV SetWaferTimeout	The total amount of time (in seconds) to allow for a read.

For more information on these commands, refer to the *In-Sight Guide & Reference* HTML Help file, included in the installation package.

7.1 Native Mode Commands

The following Native Mode commands are used to remotely control an In-Sight 1700 from user-designed software. Each command returns a Status Code, the number of characters (in bytes, including Carriage Returns and Line Feeds) in the output that follows, and the results.

7.1.1 Abort Execution

AE[2]

Terminates the current execution of the WafID function within the spreadsheet. Unlike most Native Mode commands, no status code is returned after the Abort Execution command is executed, but depending on the function that is terminated, other information may be returned.

Input: 2

Sample Input and Output

NOTE In this sample, Abort Execution causes the current read operation to terminate.

AE2

```
SM"READ"0
1
AE2
[UH587IX1CGC3,390.000,1.000]
```

7.1.2 Send Message

SM"*string*"[*Event*]

Allows In-Sight protocol commands (see Section 3.5.2: Input/Output) to be sent over a Native Mode connection to a 1700 reader as a text string, and optionally, triggers a spreadsheet Event.

Inputs: String, Event (Optional).

The Event codes are:

EVENT CODE	DESCRIPTION
(0 to 7)	Specifies a soft trigger (Soft 0, Soft 1, ... Soft 7).
8	Acquire an image and update the spreadsheet. This option requires the AcquireImage function's Trigger argument to be External or Manual.

NOTE The string must be set off with quotations marks.

Output: Status Code, Read Result.

The status codes are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-2	The command could not be executed.

NOTE The outputs for the read result depend on which of the Output String, Output Score, and Output Passed checkboxes are selected from the Options tab (see Section 3.5: Setting Options)

Sample Inputs and Outputs

SM"READ"0
1 [UH587IX1CGC3,398.000,1.000]
SM"TUNE(0)"0
1 [UH587IX1CGC3,391.000,1.000]

7.1.3 Set Online

SO[*int*]

Sets the In-Sight system into Online or Offline mode.

NOTE: This command cannot set the In-Sight system Online if it was previously set Offline manually through the user interface, or by a discrete input signal.

Inputs: **0** to set In-Sight Offline, and **1** to set In-Sight Online.

Output: Status Code.

The status codes are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-1	The value given for ***int*** is either out of range, or is not a valid integer.
-5	The communications flag was successful but the system did not go Online because the system is set Offline manually through the user interface or the Discrete I/O setting is off.

Sample Input and Output

SO 1
1

7.2 Put Extended Native Mode Commands

The following commands are used in conjunction with the Put extended Native Mode command to send information to the In-Sight spreadsheet and system. The information sent is dependent on the command that is specified.

7.2.1 Put Live

Put Live(<Input>)

Turns live acquisition on/off.

NOTES

- The system must be offline when using this command.
- The live image will not be displayed in the GUI or PC Host.

Inputs: **0** to turn off live acquisition mode, and **1** to turn on live acquisition mode.

Output: Status Code, # of bytes

The status codes are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-1	The input is invalid.
-2	The command could not be executed, or the system is online.

Sample Input and Output

NOTE In this sample, the first command puts the system into live acquisition mode, and the second command takes the system out of live mode.

PUT LIVE 1
1
PUT LIVE 0
1

7.2.2 Put PortNum

Put PortNum(<Input>)

Specifies the port that will be used by the In-Sight system for transferring data or images over the network.

NOTES

- The system must be offline when using the Portnum command.
- The PortNum command must be executed before another device can connect to the specified port.

Inputs: **0 to 65535** to specify the port number.

NOTE A valid Port assignment is any unused number between 0 and 65535, except for reserved ports.

Output: Status Code

The status codes are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-1	The port number is invalid.
-2	The command could not be executed, the system is online, or the specified port is already in use.

Sample Input and Output

PUT PORTNUM 3001
1

7.2.3 Put Watch

Put Watch(<Column><Row><Input>)

Returns the data contained in the specified cell each time the cell is updated.

NOTE	The PortNum command must be executed to specify a port where the information will be sent by the Watch command.

Inputs: Column, Row, Input

Output: Status Code

The status codes are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-2	The command could not be executed.

Sample Input and Output

PUT WATCH A000 1
1

7.3 Inputs and Outputs

The table below list the possible values of the settings that can be input and possible values of the settings and results data returned by the Evaluate Native Mode commands. These output values are enclosed in Extensible Markup Language (XML) tags (XML is a web document authoring language which allows users to create their own customized tags. For more information on the XML format, go to http://www.w3.org/XML).

SETTING	DESCRIPTION
<Accept>	The minimum response threshold for the raw reading score. 40 – 100 (default = 50)
<AcqEnable>	The status of the Disable Acquire setting. 0 = Disable 1 = Enable
<AcquireFlag>	Determines whether an image will be acquired when a read is performed. 0 = A read will be performed on the last image acquired. 1 = A read will be performed after a new image is acquired.
<AvgScore>	The average raw response score of all reads that passed for a Config. 0 – 100
<BestConfig>	The index of the Config which returns the highest score. 0 – 9
<Bright>	Determines whether Bright Field Light Mode settings will be tried during tuning. 0 = Disable Bright Field tuning 1 = Enable Bright Field tuning

SETTING	DESCRIPTION
<Char>	The ASCII value of the specified character in a read string.
<CharSize>	The settings information for the Size setting. High: 16 – 120 (default = 42) Wide: 8 – 480 (default = 20)
<CheckSum>	The method by which the read result from a character string will be validated to ensure reliability, and establishes the scoring basis for determining the pass/fail status of the read. 0 = Virtual 1 = SEMI 2 = SEMI with Virtual (default) 3 = BC 412 with Virtual 4 = IBM 412 with Virtual
<Col>	The column coordinate of the input region or the individual character in a string. 4 – 640
<Color>	The expected color of the mark to read. 0 = Black 1 = White 2 = Auto (default)
<Config>	The Config number (0-9).
<Dark>	Determines whether Dark Field Light Mode settings will be tried during tuning. 0 = Disable Dark Field tuning 1 = Enable Dark Field tuning
<Enable>	The status of the Enabled setting for the specified Config. 0 = Disable 1 = Enable
<FieldDef>	Specifies user-defined entries for the Field String. User-defined
<FieldString>	The number of characters contained in the character string or encoded in a barcode. alphanumerics (A-Z, 0-9), dashes (-), dots (.), spaces, and entries from FieldDef.
<Fixture>	The coordinates and orientation of the fixture. Col: 4 – 640 Row: 4 – 480 Theta: 0 – 359
<Flag>	Specifies whether tuning will be performed on a Config. 0 = Start tuning 1 = Continue tuning 2 = Accept current parameters
<High> (CharSize)	The height of a 2D symbol or the average height of the characters in a string, as measured in pixels. 16 – 120 (default = 30)
<High> (Region)	The height of the region (along the Y-axis) in which the wafer mark is expected to appear in the field of view. 4 – 180 (default = 100)
<Char Index>	Specifies the position number (zero-based) of a character within a string.
<LightMode>	Determines either a Bright Field or a Dark Field illumination effect on the mark. 0 = All lights are disabled 1 – 3 = The mark will appear dark on a light background 4 – 11 = The mark will appear light on a dark background
<LightPower>	The exposure time of the 1700's CCD imager, in milliseconds. 0.000-33.000 (default = 2.000)
<Mark>	The type of wafer mark the selected Config will read. 0 = 2D Sym, T7 Data Matrix 1 = BC, BC 412 2 = BC, IBM 412 3 = BC, IBM 412 (Base 35) 4 = Chars, SEMI 5 = Chars, IBM 6 = Chars, Triple

SETTING	DESCRIPTION
<NumFailed>	The number of failed reads for a Config. 0 – 99,999
<NumPassed>	The number of passed reads for a Config. 0 – 99,999
<NumTuneFailed>	The number of failed reads during a tune for a Config. 0 – 99,999
<NumTunePassed>	The number of passed reads during a tune for a Config. 0 – 99,999
<Order>	The order in which enabled Configs will be tried until a successful read can be obtained. 0 = Last Best (default) 1 = In Order (0-9)
<Orientation>	The index of the Img Orientation setting for the specified Config. 0 = Normal 1 = Mirrored horizontally 2 = Flipped vertically 3 = Rotated 180 degrees
<Passed>	The pass/fail status of the specified Config for the most recent read. 0 – 99,999
<ReadLog>	A record of the most recent read that passed. 0-9
<Region>	The region where the wafer mark is expected to appear in the field of view. Row and High: 4 – 480 Col and Wide: 4 – 640
<Retry>	The tuning behavior. 0 = Disable (default) 1 = Enable 2 = Enable & Apply
<Row>	The row coordinate of the input region or the individual character in a string. 4 – 480
<Score>	The average raw response scores for all Configs that passed. 0 – 400
<Size>	Specifies whether the mark size will be modified during tuning. 0 = Disable Size tuning 1 = Enable Size tuning
<String>	The character results from the read. alphanumerics (A-Z, 0-9), dashes (-), dots (.), and spaces
<StringLen>	The number of characters in the result string. 0 – 32
<Theta>	The orientation of the fixture. 0 – 359
<Timeout>	The total amount of time (in seconds) to allow for a read, including retries and tuning of enabled Configs. 0 – 60 (default = 30)
<TryLog>	The Retry status of the Config during the last read. 0 – 99,999
<TuneLog>	The Retry and Tune status of the Config during the last read. 0 – 99,999
<Value>	The raw response score of the specified character in a read string. 0 – 99,999
<WaflD>	References the WafID data structure in spreadsheet cell A4.
<Wide> (CharSize)	The width of a 2D symbol or the average width of the characters in a string, as measured in pixels. 8 – 80 (default = 15)
<Wide> (Region)	The width of the region (along the X-axis) where the wafer mark is expected to appear in the field of view. 4 – 640 (default = 500)

7.4 Evaluate Extended Native Mode Commands (Actions)

The following commands are used in conjunction with the Evaluate extended Native Mode command to remotely control an In-Sight 1700 from user-designed software. Each command returns a Status Code, the number of characters (in bytes, including Carriage Returns and Line Feeds) in the output that follows, and the results (in XML format).

The status codes for all Evaluate commands are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-2	The command could not be executed.

7.4.1 AcquireConfig

AcquireConfig(<WafID>,<Config>)

Acquires an image using the light settings in the specified Config. This command does not read.

Inputs: WafID, Config

Output: Status Code, # of bytes

Sample Input and Output

EV ACQUIRECONFIG(A4,0)
1 0

7.4.2 ReadConfig

ReadConfig(<WafID>,<Config>,<AcquireFlag>)

Reads using the specified Config.

Inputs: WafID, Config, AcquireFlag

Outputs: Status Code, # of bytes, Passed, String, Score, TryLog, TuneLog, LastRead, NumPassed, NumFailed, NumTunePassed, NumTuneFailed, AvgScore, High, Wide, Theta, Char, Value (Orc), Row (Orc), Col (Orc)

Sample Input and Output

EV READCONFIG(A4,0,0)

```
1
1702
<Result Id="0">
  <Passed>1</Passed>
  <String>6713H129S6A1</String>
  <Score>395</Score>
  <TryLog>0</TryLog>
  <TuneLog>0</TuneLog>
  <LastRead>10</LastRead>
  <NumPassed>10</NumPassed>
  <NumFailed>0</NumFailed>
  <NumTunedPassed>0</NumTunedPassed>
  <NumTuneFailed>0</NumTuneFailed>
  <AvgScore>95</AvgScore>
  <High>39</High>
  <Wide>20</Wide>
  <Theta>0</Theta>
  <Orc Id="0">
    <Char>54</Char>
    <Value>98</Value>
    <Row>52</Row>
    <Col>63</Col>
  </Orc>
  <Orc Id="1">
    <Char>55</Char>
    <Value>97</Value>
    <Row>51</Row>
    <Col>99</Col>
  </Orc>
  <Orc Id="2">
    <Char>49</Char>
    <Value>98</Value>
    <Row>50</Row>
    <Col>133</Col>
  </Orc>
  <Orc Id="3">
    <Char>51</Char>
    <Value>95</Value>
    <Row>52</Row>
    <Col>168</Col>
  </Orc>
  <Orc Id="4">
    <Char>72</Char>
    <Value>99</Value>
    <Row>51</Row>
    <Col>204</Col>
  </Orc>
  <Orc Id="5">
    <Char>49</Char>
    <Value>99</Value>
    <Row>51</Row>
    <Col>240</Col>
  </Orc>
  <Orc Id="6">
    <Char>50</Char>
    <Value>91</Value>
    <Row>52</Row>
    <Col>274</Col>
  </Orc>
  <Orc Id="7">
    <Char>57</Char>
    <Value>93</Value>
    <Row>51</Row>
    <Col>310</Col>
  </Orc>
  <Orc Id="8">
    <Char>83</Char>
    <Value>92</Value>
    <Row>53</Row>
    <Col>344</Col>
  </Orc>
  <Orc Id="9">
    <Char>54</Char>
    <Value>96</Value>
```

EV READCONFIG(A4,0,0)

```
    <Row>51</Row>
    <Col>381</Col>
  </Orc>
  <Orc Id="10">
    <Char>65</Char>
    <Value>93</Value>
    <Row>53</Row>
    <Col>415</Col>
  </Orc>
  <Orc Id="11">
    <Char>49</Char>
    <Value>96</Value>
    <Row>52</Row>
    <Col>452</Col>
  </Orc>
</Result>
```

Other ReadConfig Functions

GetConfigOrcChar(<WafID>,<Config>,<Char Index>)
GetConfigOrcRow(<WafID>,<Config>,<Char Index>)
GetConfigOrcCol(<WafID>,<Config>,<Char Index>)
GetConfigOrcVal(<WafID>,<Config>,<Char Index>)

7.4.3 TuneConfig

TuneConfig(<WafID>,<Config>,<Flag>,<Bright>,<Dark>,<Size>)

Tunes the specified Config. To accept the optimized settings when tuning is completed, resend the TuneConfig command a final time, setting the <Flag> input to "2".

NOTE This command does not do an exhaustive tune; it only does one iteration of settings. The command may need to be sent multiple times obtain optimized settings.

Inputs: WafID, Config, Flag, Bright, Dark, Size

Outputs: Status Code, # of bytes, NumRead, Passed (Current), String (Current), Score (Current), Passed (Best), Best String (Best), Best Score (Best)

Sample Input and Output

EV TUNECONFIG(A4,0,1,1,1,1)

```
1
282
<TuneStep Id="0" Percent="1">
  <NumRead>1</NumRead>
  <Current>
    <Passed>1</Passed>
    <String>6713H129S6A1</String>
    <Score>396</Score>
  </Current>
  <Best>
    <Passed>1</Passed>
    <String>6713H129S6A1</String>
    <Score>396</Score>
  </Best>
</TuneStep>
```

7.4.4 ResetStats

ResetStats(<WafID>)

Reset all accumulated read statistics.

Inputs: WafID

Outputs: Status Code, # of bytes

EV RESETSTATS(A4)
1 0

7.5 Evaluate Extended Native Mode Commands (Get)

The following commands are used to retrieve setting and read results from the Configs in a wafer ID job. Each command returns a Status Code, the number of characters (in bytes, including Carriage Returns and Line Feeds) in the output that follows, and the results (in XML format).

The status codes for all Evaluate commands are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
–2	The command could not be executed.

7.5.1 GetConfig

GetConfig(<WafID>,<Config>)

Returns the current settings for a Config.

Inputs: WafID, Config

Outputs: Status Code, # of bytes, Mark, Checksum, LightMode, LightPower, Orientation, Row (Region), Column (Region), High (Region), Wide (Region), High (Char), Wide (Char), FieldString, FieldDef, Color, Accept, Enable

Sample Input and Output

EV GETCONFIG(A4,0)

```
1
470
<Config Id="0">
  <Mark>4</Mark>
  <Checksum>2</Checksum>
  <LightMode>1</LightMode>
  <LightPower>2</LightPower>
  <Orientation>0</Orientation>
  <Region>
    <Row>280</Row>
    <Col>45</Col>
    <High>100</High>
    <Wide>500</Wide>
  </Region>
  <CharSize>
    <High>42</High>
    <Wide>22</Wide>
  </CharSize>
  <FieldString>**********CS</FieldString>
  <FieldDef></FieldDef>
  <Color>2</Color>
  <Accept>50</Accept>
  <Enable>1</Enable>
</Config>
```

Other GetConfig Functions

GetConfigMark(<WafID>,<Config>)
GetConfigChecksum(<WafID>,<Config>)
GetConfigLightMode(<WafID>,<Config>)
GetConfigLightPower(<WafID>,<Config>)
GetConfigRegionRow(<WafID>,<Config>)
GetConfigRegionCol(<WafID>,<Config>)
GetConfigRegionHigh(<WafID>,<Config>)
GetConfigRegionWide(<WafID>,<Config>)
GetConfigCharHigh(<WafID>,<Config>)
GetConfigCharWide(<WafID>,<Config>)
GetConfigFieldStr(<WafID>,<Config>)
GetConfigFieldDef(<WafID>,<Config>)
GetConfigColor(<WafID>,<Config>)
GetConfigAccept(<WafID>,<Config>)
GetConfigEnable(<WafID>,<Config>)
GetConfigRetry(<WafID>,<Config>)

7.5.2 GetConfigResult

GetConfig(<WafID>,<Config>)

Returns the results of the most recent read performed by the specified Config.

Inputs: WafID, Config

Outputs: Status Code, # of bytes, Passed, String, Score, TryLog, TuneLog, LastRead, NumPassed, NumFailed, NumTunePassed, NumTuneFailed, AvgScore, High, Wide, Theta, Char (Orc), Value (Orc), Row (Orc), Col (Orc)

Sample Input and Output

EV GETCONFIGRESULT(A4,0)

```
1
1701
<Result Id="0">
  <Passed>1</Passed>
  <String>6713H129S6A1</String>
  <Score>396</Score>
  <TryLog>1</TryLog>
  <TuneLog>0</TuneLog>
  <LastRead>10</LastRead>
  <NumPassed>4</NumPassed>
  <NumFailed>0</NumFailed>
  <NumTunePassed>0</NumTunePassed>
  <NumTuneFailed>0</NumTuneFailed>
  <AvgScore>96</AvgScore>
  <High>40</High>
  <Wide>21</Wide>
  <Theta>0</Theta>
  <Orc Id="0">
    <Char>54</Char>
    <Value>96</Value>
    <Row>51</Row>
    <Col>25</Col>
  </Orc>
  <Orc Id="1">
    <Char>55</Char>
    <Value>96</Value>
    <Row>51</Row>
    <Col>65</Col>
  </Orc>
  <Orc Id="2">
    <Char>49</Char>
    <Value>98</Value>
    <Row>52</Row>
    <Col>105</Col>
  </Orc>
  <Orc Id="3">
    <Char>51</Char>
    <Value>97</Value>
    <Row>53</Row>
    <Col>145</Col>
  </Orc>
  <Orc Id="4">
    <Char>72</Char>
    <Value>99</Value>
    <Row>53</Row>
    <Col>187</Col>
  </Orc>
  <Orc Id="5">
    <Char>49</Char>
    <Value>99</Value>
    <Row>54</Row>
    <Col>228</Col>
  </Orc>
  <Orc Id="6">
    <Char>50</Char>
    <Value>94</Value>
    <Row>54</Row>
```

EV GETCONFIGRESULT(A4,0)

```
    <Col>269</Col>
  </Orc>
  <Orc Id="7">
    <Char>57</Char>
    <Value>98</Value>
    <Row>55</Row>
    <Col>309</Col>
  </Orc>
  <Orc Id="8">
    <Char>83</Char>
    <Value>88</Value>
    <Row>56</Row>
    <Col>350</Col>
  </Orc>
  <Orc Id="9">
    <Char>54</Char>
    <Value>98</Value>
    <Row>56</Row>
    <Col>391</Col>
  </Orc>
  <Orc Id="10">
    <Char>65</Char>
    <Value>93</Value>
    <Row>58</Row>
    <Col>431</Col>
  </Orc>
  <Orc Id="11">
    <Char>49</Char>
    <Value>98</Value>
    <Row>57</Row>
    <Col>471</Col>
  </Orc>
</Result>
```

Other GetConfigResult Functions

GetConfigString(<WafID>,<Config>)
GetConfigStringLen(<WafID>,<Config>)
GetConfigScore(<WafID>,<Config>)
GetConfigPassed(<WafID>,<Config>)
GetConfigHigh(<WafID>,<Config>)
GetConfigWide(<WafID>,<Config>)
GetConfigTheta(<WafID>,<Config>)
GetConfigLastRead(<WafID>,<Config>)
GetConfigNumPassed(<WafID>,<Config>)
GetConfigNumFailed(<WafID>,<Config>)
GetConfigNumTunePassed(<WafID>,<Config>)
GetConfigNumTuneFailed(<WafID>,<Config>)
GetConfigAvgScore(<WafID>,<Config>)
GetConfigTryLog(<WafID>,<Config>)
GetConfigTuneLog(<WafID>,<Config>)

7.5.3 GetMSBuffer

GetMSBuffer (<Index>)

Returns the Machine Status data stored in one of 8 indexed buffers within the MachineStatus stack. If the index is 0, the current Machine Status is returned.

Input: Index

Output: MachineStatus, TimeAndDate, HostName, InSightModel, FirmwareVersion, BootTime, ActiveJob, JobLoadTime, Online, OperationalStatus, UserName, UserHostName, UserData.

Sample Input and Output

EV GETMSBUFFER(0)

```
1
540
<MachineStatus>
  <TimeAndDate>>08/15/2002 13:06:02</TimeAndDate>
  <HostName>MyHost</HostName>
  <InSightModel>1000</InSightModel>
  <FirmwareVersion>2.40.01</FirmwareVersion>
  <BootTime>08/15/2002 11:00:05</BootTime>
  <ActiveJob>FTP://SYSTEM1/MyJob.job</ActiveJob>
  <JobLoadTime>08/13/2002 13:00:00</JobLoadTime>
  <Online>0</Online>
  <OperationalStatus>MAINTENANCE</OperationalStatus>
  <UserName>admin</UserName>
  <UserHostName>SYSTEM1</UserHostName>
  <UserData>PASS,SCORE=95,X=242,Y=348</UserData>
</MachineStatus>
```

7.5.4 GetWaferAll

GetWaferAll(<WafID>)

Returns all results for the most recent read, and settings for all Configs.

Inputs: WafID

Outputs: Status Code, # of bytes, BestConfig, Timeout, Order, AcqEnable, NumPassed, NumFailed, AvgScore Row (Fixture), Col (Fixture), Theta (Fixture), Mark, Checksum, LightMode, LightPower, Orientation, Row (Region), Col (Region), High (Region), Wide (Region), High (Char), Wide (Char), FieldString, FieldDef, Color, Accept, Enable, Passed, String, Score, TryLog, TuneLog, LastRead, NumPassed, NumFailed, NumTunePassed, NumTuneFailed, AvgScore, High, Wide, Theta, Char (Orc) Value (Orc), Row, (Orc), Col (Orc)

Sample Input and Output

EV GETWAFERALL(A4)

```
1
23626
<Wafer>
```

EV GETWAFERALL(A4)

```
<BestConfig>0</BestConfig>
<Timeout>30</Timeout>
<Order>0</Order>
<AcqEnable>1</AcqEnable>
<NumPassed>4</NumPassed>
<NumFailed>0</NumFailed>
<AvgScore>96</AvgScore>
<Fixture>
  <Row>0</Row>
  <Col>0</Col>
  <Theta>0</Theta>
</Fixture>
<Config Id="0">
  <Mark>4</Mark>
  <Checksum>2</Checksum>
  <LightMode>1</LightMode>
  <LightPower>2</LightPower>
  <Orientation>0</Orientation>
  <Region>
    <Row>280</Row>
    <Col>45</Col>
    <High>100</High>
    <Wide>500</Wide>
  </Region>
  <CharSize>
    <High>42</High>
    <Wide>22</Wide>
  </CharSize>
  <FieldString>**********CS</FieldString>
  <FieldDef></FieldDef>
  <Color>2</Color>
  <Accept>50</Accept>
  <Enable>1</Enable>
</Config>
<Result Id="0">
  <Passed>1</Passed>
  <String>6713H129S6A1</String>
  <Score>396</Score>
  <TryLog>1</TryLog>
  <TuneLog>0</TuneLog>
  <LastRead>10</LastRead>
  <NumPassed>4</NumPassed>
  <NumFailed>0</NumFailed>
  <NumTunePassed>0</NumTunePassed>
  <NumTuneFailed>0</NumTuneFailed>
  <AvgScore>96</AvgScore>
  <High>40</High>
  <Wide>21</Wide>
  <Theta>0</Theta>
  <Orc Id="0">
    <Char>54</Char>
    <Value>96</Value>
    <Row>51</Row>
    <Col>25</Col>
  </Orc>
  <Orc Id="1">
    <Char>55</Char>
    <Value>96</Value>
    <Row>51</Row>
    <Col>65</Col>
  </Orc>
  <Orc Id="2">
    <Char>49</Char>
    <Value>98</Value>
    <Row>52</Row>
    <Col>105</Col>
  </Orc>
  <Orc Id="3">
    <Char>51</Char>
    <Value>97</Value>
    <Row>53</Row>
    <Col>145</Col>
  </Orc>
  <Orc Id="4">
    <Char>72</Char>
    <Value>99</Value>
```

EV GETWAFERALL(A4)

```
      <Row>53</Row>
      <Col>187</Col>
    </Orc>
    <Orc Id="5">
      <Char>49</Char>
      <Value>99</Value>
      <Row>54</Row>
      <Col>228</Col>
    </Orc>
    <Orc Id="6">
      <Char>50</Char>
      <Value>94</Value>
      <Row>54</Row>
      <Col>269</Col>
    </Orc>
    <Orc Id="7">
      <Char>57</Char>
      <Value>98</Value>
      <Row>55</Row>
      <Col>309</Col>
    </Orc>
    <Orc Id="8">
      <Char>83</Char>
      <Value>88</Value>
      <Row>56</Row>
      <Col>350</Col>
    </Orc>
    <Orc Id="9">
      <Char>54</Char>
      <Value>98</Value>
      <Row>56</Row>
      <Col>391</Col>
    </Orc>
    <Orc Id="10">
      <Char>65</Char>
      <Value>93</Value>
      <Row>58</Row>
      <Col>431</Col>
    </Orc>
    <Orc Id="11">
      <Char>49</Char>
      <Value>98</Value>
      <Row>57</Row>
      <Col>471</Col>
    </Orc>
  </Result>
  ... (<Config Id="1"> through <Config Id="9" omitted>)
</Wafer>
```

Other GetWafer Functions

GetWaferTimeout(<WafID>)
GetWaferOrder(<WafID>)
GetWaferAcqEnable(<WafID>)
GetWaferBestConfig(<WafID>)
GetWaferFixRow(<WafID>)
GetWaferFixCol(<WafID>)
GetWaferFixTheta(<WafID>)
GetWaferNumPassed(<WafID>)
GetWaferNumFailed(<WafID>)
GetWaferAveScore(<WafID>)
GetWaferString(<WafID>)

7.5.5 GetWaferSummary

GetWaferSummary(<WafID>)

Returns a summary of the results for the most recent read.

NOTE A ConfigLog will be returned for all Enabled Configs.

Inputs: WafID

Outputs: Status Code, # of bytes, BestConfig, Passed, String, Score, Row (Region), Col (Region), High (Region), Wide (Region), NumPassed, NumFailed, AvgScore, ReadLog, Passed (ConfigLog), String (ConfigLog), Score (ConfigLog), TryLog (ConfigLog), TuneLog (ConfigLog), NumPassed (ConfigLog), NumFailed (ConfigLog), NumTunedPassed (ConfigLog), NumTuneFailed (ConfigLog), AvgScore (ConfigLog)

Sample Input and Output

EV GETWAFERSUMMARY(A4)

```
1
746
<WaferSummary>
  <BestConfig>0</BestConfig>
  <Passed>1</Passed>
  <String>6713H129S6A1</String>
  <Score>396</Score>
  <Region>
    <Row>280</Row>
    <Col>45</Col>
    <High>100</High>
    <Wide>500</Wide>
  </Region>
  <NumPassed>4</NumPassed>
  <NumFailed>0</NumFailed>
  <AvgScore>96</AvgScore>
  <ReadLog></ReadLog>
  <ConfigLog Id="0">
    <Passed>1</Passed>
    <String>6713H129S6A1</String>
    <Score>396</Score>
    <TryLog>1</TryLog>
    <TuneLog>0</TuneLog>
    <NumPassed>4</NumPassed>
    <NumFailed>0</NumFailed>
    <NumTunedPassed>0</NumTunedPassed>
    <NumTuneFailed>0</NumTuneFailed>
    <AvgScore>96</AvgScore>
  </ConfigLog>
</WaferSummary>
```

7.6 Evaluate Extended Native Mode Commands (Set)

The following commands are used to change Config settings in a wafer ID job. Each command returns a Status Code, and the number of characters (in bytes, including Carriage Returns and Line Feeds) in the output that follows.

The status codes for all Evaluate commands are:

STATUS CODE	DESCRIPTION
1	The command was executed successfully.
0	Unrecognized command.
-2	The command could not be executed.

7.6.1 SetConfigAccept

SetConfigAccept(<WafID>,<Config>,<Accept>)

Sets the minimum response threshold for the raw reading score of the specified Config.

Inputs: WafID, Config, Accept

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGACCEPT(A4,0,50)
1 0

7.6.2 SetConfigCharSize

SetConfigCharSize(<WafID>,<Config>,<High>,<Wide>)

Sets the expected size of an individual character or 2D mark for the specified Config.

Inputs: WafID, Config, High, Wide

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGCHARSIZE(A4,0,40,20)
1 0

7.6.3 SetConfigChecksum

SetConfigChecksum(<WafID>,<Config>,<Checksum>)

Selects the method by which the read result from a character string will be validated to ensure reliability, and establishes the scoring basis for determining the pass/fail status of the read.

Inputs: WafID, Config, Checksum

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGCHECKSUM(A4,0,1)
1 0

7.6.4 SetConfigColor

SetConfigColor(<WafID>,<Config>,<Color>)

Sets the expected color of the wafer mark.

Inputs: WafID, Config, Color

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGCOLOR(A4,0,1)
1 0

7.6.5 SetConfigEnable

SetConfigEnable(<WafID>,<Config>,<Enable>)

Determines whether the specified Config will be used during the retry sequence at runtime.

Inputs: WafID, Config, Enable

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGENABLE(A4,0,1)
1 0

7.6.6 SetConfigFieldDef

SetConfigFieldDef(<WafID>,<Config>,<FieldDef>)

Defines the Field String when Mark specifies a character string or barcode.

NOTE	The FieldDef Input must be set off with quotation marks.

Inputs: WafID, Config, FieldDef

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGFIELDDEF(A4,0,"A=A;B=B")
1 0

7.6.7 SetConfigFieldString

SetConfigFieldString(<WafID>,<Config>,<FieldString>)

Specifies the number of characters contained in the character string or encoded in a barcode.

NOTE	The FieldString Input must be set off with quotation marks.

Inputs: WafID, Config, FieldString

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGFIELDSTRING(A 4,0,"********")**
1 0

7.6.8 SetConfigLightMode

SetConfigLightMode(<WafID>,<Config>,<LightMode>)

Specifies either a Bright Field or a Dark Field illumination effect on the mark.

Inputs: WafID, Config, LightMode

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGLIGHTMODE(A4,0,11)
1 0

7.6.9 SetConfigLightPower

SetConfigLightPower(<WafID>,<Config>,<LightPower>)

Controls the effective intensity of the LEDs on the mark by increasing the exposure time of the 1700's CCD imager.

Inputs: WafID, Config, LightPower

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGLIGHTPOWER(A4,0,25.123)
1 0

7.6.10 SetConfigMark

SetConfigMark(<WafID>,<Config>,<Mark>)

Specifies the type of wafer mark the selected Config will read.

Inputs: WafID, Config, Mark

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGMARK(A4,0,1)
1 0

7.6.11 SetConfigRegion

SetConfigRegion(<WafID>,<Config>,<Row>,<Col>,<High>,<Wide>)

Sets the region where the wafer mark is expected to appear in the field of view for the specified Config.

Inputs: WafID, Config, Row, Col, High, Wide

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGREGION(A4,0,150,60,100,500)
1 0

7.6.12 SetConfigRetry

SetConfigRetry(<WafID>,<Config>,<Retry>)

Specifies how the Config will be used during the retry sequence at runtime.

Inputs: WafID, Config, Retry

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETCONFIGRETRY(A4,0,1)
1 0

7.6.13 SetWaferAcqEnable

SetWaferAcqEnable(<WafID>,<AcqEnable>)

Disables image acquisition to allow a test read from the last image acquired, or from an image file, when the reader is offline. The Light Mode and Light Power settings are temporarily disabled.

Inputs: WafID, AcqEnable

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETWAFERACQENABLE(A4,0)
1 0

7.6.14 SetWaferOrder

SetWaferOrder(<WafID>,<Order>)

The order in which enabled Configs will be tried until a successful read can be obtained.

Inputs: WafID, Order

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETWAFERORDER(A4,0)
1 0

7.6.15 SetWaferTimeout

SetWaferTimeout(<WafID>,<Timeout>)

Specifies the total amount of time (in seconds) to allow for a read, including retries and tuning of enabled Configs.

Inputs: WafID, Timeout

Outputs: Status Code, # of bytes

Sample Input and Output

EV SETWAFERTIMEOUT(A4,45)
1 0

8 Specifications

In this section…

8.1 General Specifications

Table 8-1: In-Sight 1701 Wafer Reader General Specifications

SPECIFICATION		DESCRIPTION		
Configurations		• Vertical Mount w/ factory-set 10 mm Working Distance (P/N 800-5797-1) • Vertical Mount w/ factory-set 50 mm Working Distance (P/N 800-5798-1) • Optional Horizontal Mirror Mount (800-5796-1)		
Firmware		In-Sight version 2.40 and later		
Reading Capability		Supported Wafer Marks		Standards
		OCR	SEMI font	SEMI M12, M13, M1.15
			IBM font	N/A
			Triple font	N/A
		2D	Data Matrix™ (ECC 200, 8 x 32)	SEMI T7 and M1.15
		Barcode	BC 412 and IBM 412	SEMI T1-95
Memory	**Job/Program**	8MB non-volatile flash memory; Unlimited storage via remote network device		
	Image/Processing	16MB SDRAM		
Image	**Sensor**	1/3-inch CCD (5.80 x 4.92 mm, 6 mm diagonal)		
		1024 x 768 pixel display (307,200 sq. pixels, 4.65 x 4.65 µm)		
		Electronic shutter speed: 64 µs to 33 ms; Up to 18 frames per second		
	Acquisition	Rapid reset, progressive scan (supports partial scan), full-frame integration		
		256 grey levels (8 bits/sec)		
		Gain controlled by software		
Lighting/Optics		Field of View: 31 mm (W) x 23 mm (H) Working Distance: adjustable, w/ factory-set options of 10 or 50 mm (Vertical) Illumination Area: 31 mm (W) x 19 mm (H) (Nominal; depends on Light Mode) Red LEDs, 626 nm wavelength, w/ Bright Field and Dark Field modes Variable intensity controlled through software		
I/O*	**Trigger**	1 opto-isolated, acquisition trigger input		
		Remote software commands via Ethernet and RS232		
	Discrete Inputs	None built-in		
		8 inputs available using optional I/O Expansion Module (P/N 800-5758-1) Unlimited inputs using optional Ethernet I/O Module (P/N CIO-ENET-IN4)		
	Discrete Outputs	None built-in		
		8 outputs available using optional I/O Expansion Module (P/N 800-5758-1) Unlimited outputs using optional Ethernet I/O Module (P/N CIO-ENET-OUT4)		
	Status LEDs	1 Network Traffic, 1 Network Status, 1 Network Speed, 2 User-Configurable		
Communications	**Network**	1 Ethernet port, 10/100 BaseT, TCP/IP protocol. Supports DHCP (factory default) or static IP address. Manual reset switch disable DHCP and forces factory-assigned, static IP address.		
	Serial	1 RS-232C port (1200 to 115,200 baud rates)		
	Protocols	In-Sight, Native Mode and Electroglas		
Power		24 ± 10% VDC; 125mA (illumination off) to 200mA (illumination on)		
Mechanical	**Material**	Aluminum housing, black anodized		
	Mounting	Four 6.5 mm deep M4 threaded mounting holes (two per side)		
	Dimensions	116.7 mm (4.60 in) x 69.9 mm (2.75 in) x 57.6 mm (2.27 in) Horizontal configuration length: 141.3 mm (5.55 in)		
	Weight	416.7 g (14.7 oz)		
Environmental	**Temperature**	10 to 45°C (Operating), -10 to 65°C (Storage)		
	Humidity	10 to 90%, non-condensing (Operating and Storage)		
Certifications		CE, CUL		

* See Section 8.2: I/O Specifications for more information.

Table 8-2: In-Sight 1700 Wafer Reader General Specifications

SPECIFICATION		DESCRIPTION		
Configurations		• Vertical Mount (P/N 800-5748-10) • Horizontal Mount (P/N 800-5748-20)		
Firmware		In-Sight version 2.13 and later		
Reading Capability		Supported Wafer Marks		Standards
		OCR	SEMI font	SEMI M12, M13, M1.15
			IBM font	N/A
			Triple font	N/A
		2D	Data Matrix™ (ECC 200, 8 x 32)	SEMI T7 and M1.15
		Barcode	BC 412 and IBM 412	SEMI T1-95
Memory	**Job/Program**	4MB non-volatile flash memory; Unlimited storage via remote network device		
	Image/Processing	16MB SDRAM		
Image	**Sensor**	1/3-inch CCD (5.84 x 4.94 mm, 6 mm diagonal)		
		640 x 480 pixel display ((307,200 sq. pixels, 7.4 x 7.4 µm)		
		Electronic shutter speed: 64 µs to 33 ms; Up to 30 frames per second		
	Acquisition	Rapid reset, progressive scan (supports partial scan), full-frame integration		
		256 grey levels (8 bits/sec)		
		Gain controlled by software		
Lighting/Optics		Field of View: 25 mm (W) x 19 mm (H) Working Distance: 10 mm (Horizontal); 15 mm (Vertical) Depth of focus: ± 3 mm Illumination Area: 25 mm (W) x 10 mm (H) (Nominal; depends on Light Mode) Red LEDs, 626 nm wavelength, w/ Bright Field and Dark Field modes Variable intensity controlled through software		
I/O*	**Trigger**	1 opto-isolated, acquisition trigger input		
		Remote software commands via Ethernet and RS232		
	Discrete Inputs	None built-in		
		8 inputs available using optional I/O Expansion Module (P/N 800-5758-*x*) Unlimited inputs using optional Ethernet I/O Module (P/N CIO-ENET-IN4)		
	Discrete Outputs	None built-in		
		8 outputs available using optional I/O Expansion Module (P/N 800-5758- *x*) Unlimited outputs using optional Ethernet I/O Module (P/N CIO-ENET-OUT4)		
	Status LEDs	1 Network Traffic, 1 Network Status, 1 Network Speed, 2 User-Configurable		
Communications	**Network**	1 Ethernet port, 10/100 BaseT, TCP/IP protocol. Supports DHCP (factory default) or static IP address. Manual reset switch disable DHCP and forces factory-assigned, static IP address.		
	Serial	1 RS-232C port (1200 to 115,200 baud rates)		
	Protocols	In-Sight, Native Mode and Electroglas		
Power		24 ± 10% VDC; 125mA (illumination off) to 200mA (illumination on)		
Mechanical	**Material**	Aluminum housing, black anodized		
	Mounting	Four 6.5 mm deep M4 threaded mounting holes (two per side)		
	Dimensions	116.7 mm (4.60 in) x 69.9 mm (2.75 in) x 57.6 mm (2.27 in)		
	Weight	416.7 g (14.7 oz)		
Environmental	**Temperature**	10 to 45°C (Operating), -10 to 65°C (Storage)		
	Humidity	10 to 90%, non-condensing (Operating and Storage)		
Certifications		CE, CUL		

* See Section 8.2: I/O Specifications for more information.

8.2 I/O Specifications

The 1700 Wafer Reader features one built-in acquisition trigger input and two user-configurable LED outputs for general-purpose use.

8.2.1 Breakout Port Pin Assignments

Table 8-3 lists the pin assignment for each of the 8 signal lines of the In-Sight 1700 Breakout Port (labeled “24VDC”) according to each method of access.

Table 8-3: Breakout Port Pin Assignments

IN-SIGHT BREAKOUT PORT PIN	SIGNAL	BREAKOUT CABLE WIRE COLOR	BREAKOUT MODULE* TERMINALS	EXPANSION MODULE* TERMINALS
1	+24VDC	White-Green	6, 8, 10, 12, 14, 15, 16 (+24V)	+24V
2	Trigger +	Green	5 (TRG+)	TRG+
3	Trigger –	White-Orange	4 (TRG-)	TRG-
4	CTS	Blue	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
5	RTS	White-Blue	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
6	Serial Receive	Orange	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
7	Serial Transmit	White-Brown	RS232 serial (9-pin D-sub connector)	RS232 remote (9-pin D-sub connector)
8	Ground	Brown	1, 2, 3 (GND)	GND

* Refer to the *In-Sight Breakout Module Installation and Reference* (P/N 597-0008-xx) and the *In-Sight I/O Expansion Module Installation and Reference* (P/N 597-0013-xx) for more detailed information.

8.2.2 Acquisition Trigger Input

Table 8-4: Acquisition Trigger Input Specifications

SPECIFICATION	DESCRIPTION
VOLTAGE	ON 20 to 30V (24V nominal)
	OFF 0 to 3V (12V nominal threshold)
CURRENT	ON 0.9 to 1.3mA
	OFF <150µA
	Resistance ~22,000 Ohms
	For higher current add external resistor (for example, 2.2kΩ, 0.5W for 12mA) across inputs.
DELAY	250 µSec latency between leading edge of trigger and start of acquisition. Input pulse should be minimum of 1 ms wide.

The acquisition trigger input is opto-isolated. To trigger from an NPN (pull-down) type photo-detector or PLC output, connect pin 2 (TRG+) to +24V and connect pin 3 (TRG-) to the output of the detector. When the output turns ON, it pulls TRG- down to 0V, turning the opto-coupler ON. To trigger from a PNP (pull-up) photo-detector or PLC output, connect pin 2 (TRG+) to the output of the detector and connect pin 3 (TRG-) to 0V. When the output turns ON, it pulls TRG+ up to 24V, turning the opto-coupler ON.

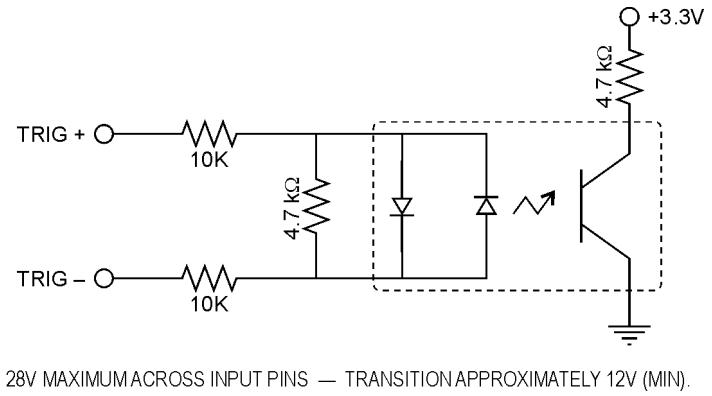

Figure 8-1: Acquisition Trigger Input Schematic

8.2.3 Status LEDs

As shown in Figure 8-2, the In-Sight 1700 reader provides six status LEDs; two LEDs are user-configurable outputs. The function of each LED is listed in Table 8-5.

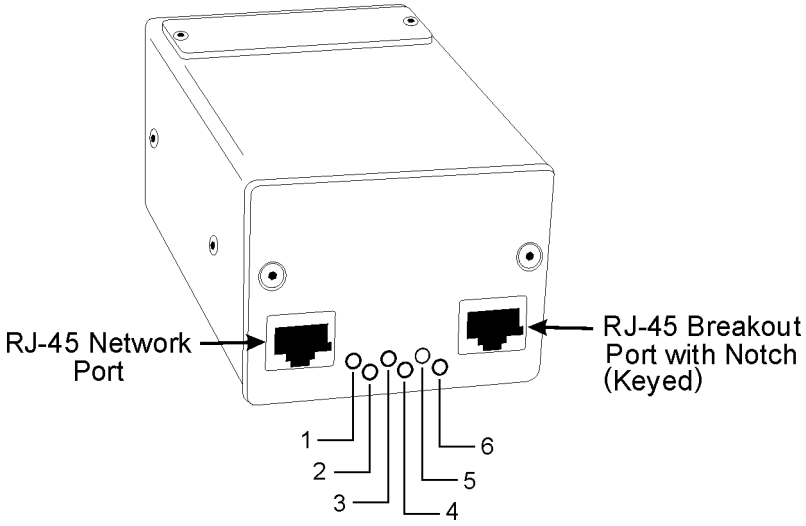

Figure 8-2: LED Outputs

Table 8-5: LED Function

LED NUMBER	LED COLOR	LED FUNCTION	DESCRIPTION
1	Red	Network Traffic	Flashes when receiving data.
2	Red	Network Status	On when connected to the network.
3	Red	Network Speed	On for 100Mbs network connection; off for 10Mbs.
4	Green	User-Configurable	User-configurable using Discrete Output Line 4 (Line 10 when using I/O Expansion Module).
5	Red	User-Configurable	User-configurable using Discrete Output Line 5 (Line 11 when using I/O Expansion Module).
6	Red	Power	On when power is connected.

The WriteDiscrete function (Input/Output-->Discrete) can be inserted in the spreadsheet job to control the state of the two user-configurable LEDs based on an event. The output Type can be specified in the **Discrete Output** dialog in the In-Sight PC Host (Figure 8-3).

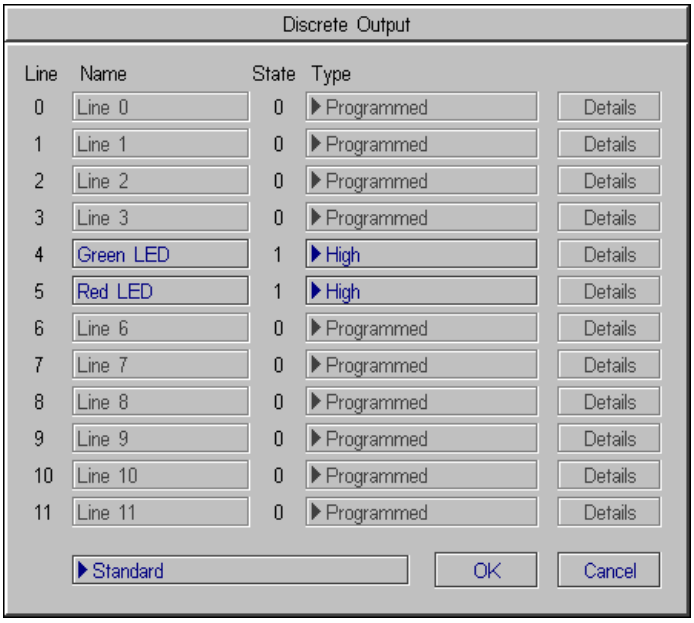

Figure 8-3: Default Discrete Output dialog in In-Sight PC Host

8.3 CAT5 Network Cable Specifications

Cognex-supplied, straight-pinned and crossover network patch cables meet CAT5/CAT5e specifications using 568-B standard wire pairing.

Table 8-6: CAT5/CAT5e Network Cable Wiring

STRAIGHT-PINNED		CROSSOVER	
RJ-45 Connector (A)	RJ-45 Connector (B)	Connector (A)	Connector (B)
1	1	1	3
2	2	2	6
3	3	3	1
4	4	4	5
5	5	5	4
6	6	6	2
7	7	7	8
8	8	8	7

Table 8-7: CAT5/CAT5e Network Cable 568-B Wire Pairs

PAIR #	WIRE PAIRS
1	4 — 5
2	1 — 2
3	3 — 6
4	7 — 8

8.4 Mechanical Specifications

The following sections present dimensional drawings for the In-Sight 1700 series vision sensors.

NOTE All dimensions are shown in millimeters (inches).

8.4.1 In-Sight 1701 Wafer Reader Dimensions

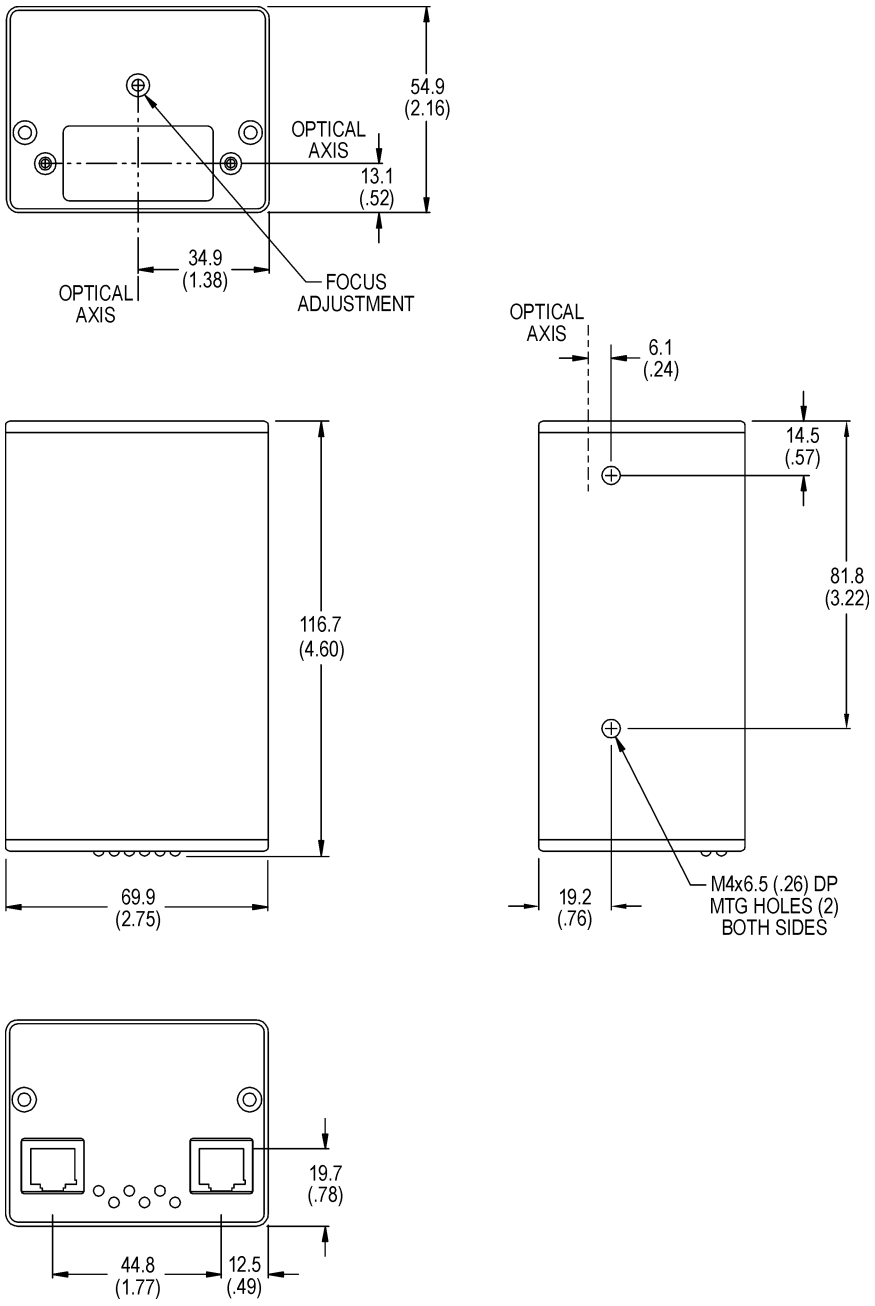

Figure 8-4: 1701 Wafer Reader Dimensions

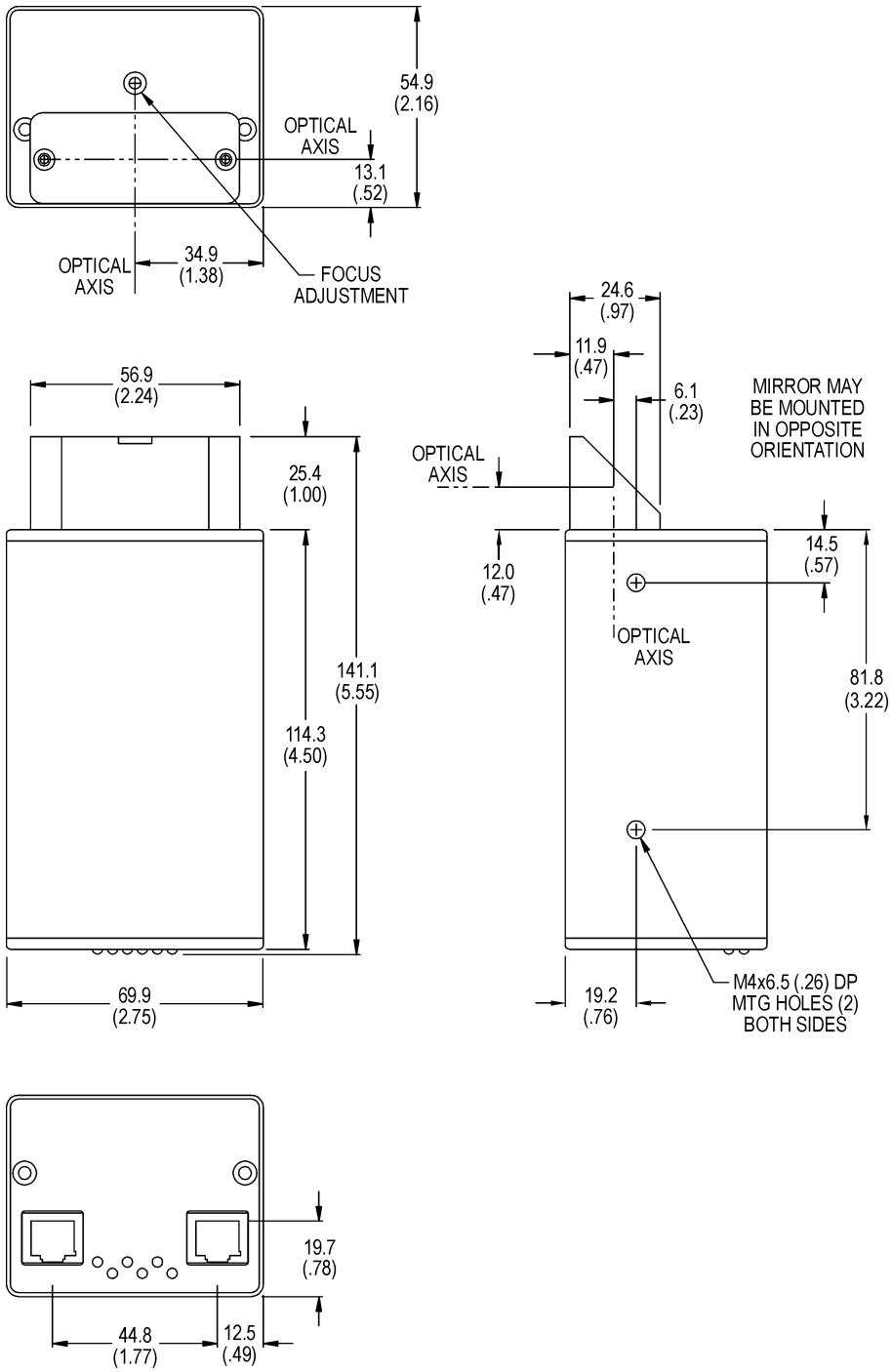

Figure 8-5: 1701 Wafer Reader Dimensions with Horizontal Mirror Mount

8.4.2 In-Sight 1700 Wafer Reader Dimensions

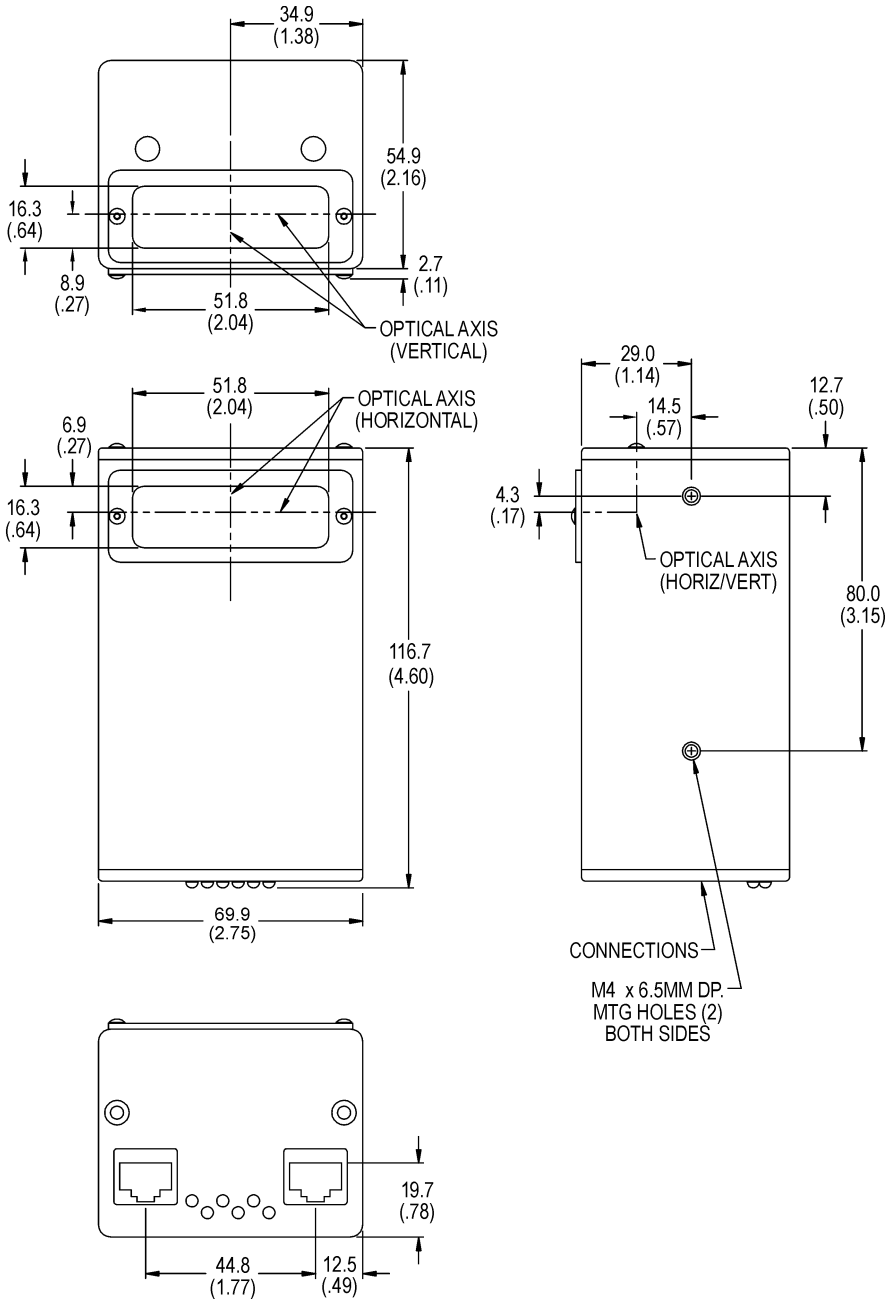

Figure 8-6: 1700 Wafer Reader Dimensions

Appendix A

The Default Job (WAFID00.JOB)

The Java applet, WAFID00.JAR, requires a compatible spreadsheet job file to be loaded on the 1700 reader to function correctly. By default, this job file is WAFID00.JOB. To connect to a 1700 from the browser interface, the reader's Startup settings must be configured to automatically load the default job, or another job that has been previously saved using the browser interface.

As noted in Section 4.1, advanced users may customize some cells in the spreadsheet of a browser interface-compatible job. In general, cells may be safely added to the spreadsheet. However, the predefined functions and formulas in the spreadsheet must not be rearranged, deleted, or otherwise changed in such a way as to break compatibility with the Java applet. And under no circumstance should the cells in Rows 21 through 49 (hidden by default) ever be modified.

Appendix B

Updating the Reader's Firmware

Install the In-Sight PC Host program, update the 1700's firmware, and then manually install the .JAR, .HTM, .JOB, and .SET files in flash memory.

After installing and running the In-Sight PC Host, as described in Section 2.3, follow these steps to update the 1700 reader's firmware:

NOTE This update process will erase all jobs. Make sure that all jobs are backed up on the network prior to starting the firmware upgrade.

1. Open the **System** menu and select **Logon**.
2. In the Logon dialog, browse through the list of In-Sight host names on the network and select the name of the 1700 reader to upgrade. Click **OK** to logon to the selected 1700.
3. While logged on to the 1700, open the **System** menu and select **Save & Load**.
4. In the Save & Load dialog, open the drop-down list of file types in the upper-left corner and select **Firmware**.
5. Click on **<Network>** to browse through the list of In-Sight host names on the network. Select the host name of the PC running the In-Sight PC Host program.
6. Select the **is1700.upd** (**is1701.upd** for 1701 reader) filename.
7. Click the **Load** ← button to begin the firmware update process.
8. A Warning dialog will appear. Verify the versions of firmware, then click **Yes**.

After the update process is complete, the 1700 will restart and the PC Host program will automatically log back on.

1. Open the System menu and select **Version** to confirm that the 1700 now has the correct firmware version installed.
2. Open the System menu again and select **Settings** ▸ .
3. From the Settings menu, select **Network**. Record the **IP Address** (you will need this to complete the steps in the following sections).
4. Close the In-Sight PC Host program and proceed to the next section (Install files to 1700 flash memory).

Install files to 1700 flash memory

After the 1700 reader's firmware has been updated, the .HTM, .JAR, .JOB and .SET files included in the installation package must be copied to the reader's flash memory before it can be accessed via web browser. The required files are copied into flash through an FTP login from a remote host on the network.

To copy required files from a web browser:

1 Open an FTP session and login to the target reader by typing **ftp://** followed by the reader's IP Address into the browser's Address bar (for example, ftp://192.168.0.1). A Login dialog appears (Figure B-0-1).

Figure B-0-1: FTP Login dialog

2 In the Login dialog, enter the default User Name **admin**, then click **OK** to login.

3 If the FTP login to the 1700 is successful, all of the files currently installed in In-Sight flash memory are displayed in the browser window, as shown in Figure B-0-2.

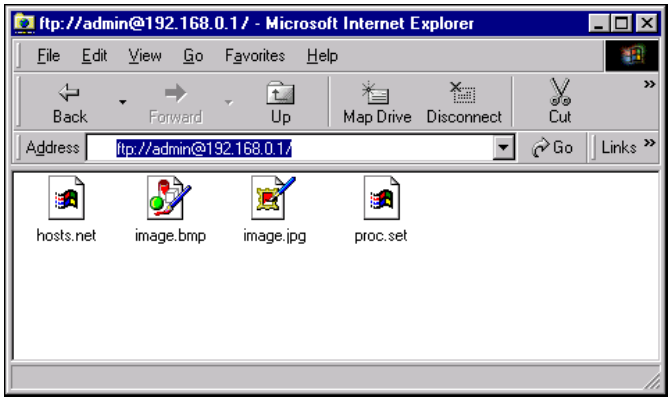

Figure B-0-2: Installed 1700 files

4 Locate the .HTM, .JAR, .JOB, and .SET files in the directory into which you previously installed the In-Sight PC Host (C:\InSight2\1700 by default). Copy and paste (or drag and drop) these files to the browser window, then refresh the view; the selected files have been copied to 1700 flash memory and now appear in the browser window, as shown in Figure B-0-3.

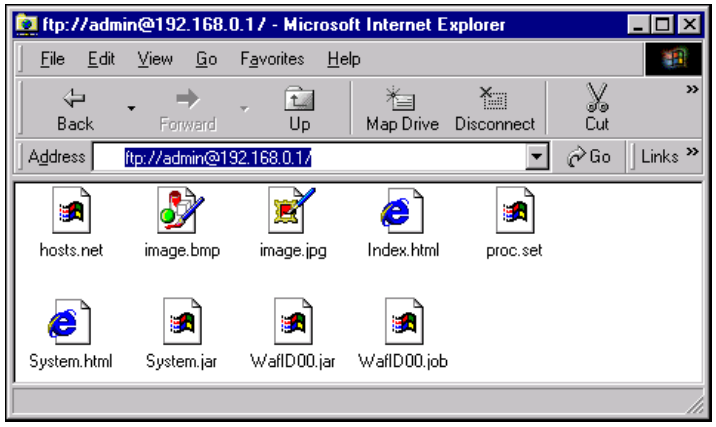

Figure B-0-3: Installed 1700 files

To FTP files from an FTP prompt (in Windows):

1 Open a DOS prompt and change the directory to C:\InSight2\1700. Open an FTP session and login to the target reader by typing **ftp** followed by the IP Address (for example, ftp 192.168.0.1), as shown in Figure B-0-4.

NOTE To connect to a 1700 using FTP from a non-Windows host, first copy the required files from the C:\InSight2 directory on the PC to the FTP server, then open the FTP session.

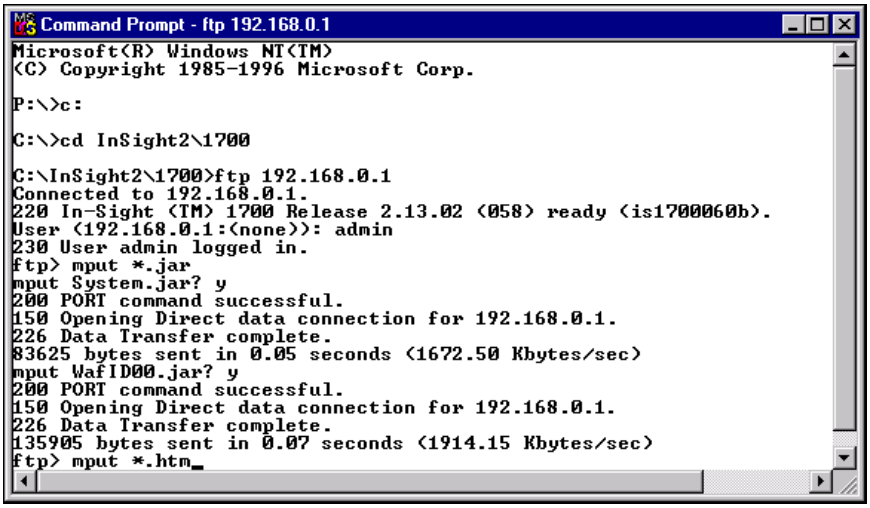

Figure B-0-4: FTP command prompt in Windows

2 Enter the default User Name, **admin**.

3 When logged in, copy the .HTM, .JAR, .JOB, and .SET files from their location on the FTP server to the 1700 by typing **mput** followed by the name of the file (for example, **mput *.jar** copies the two .JAR files).

4 After all files have been copied, close the FTP prompt.

Once the files have been copied to the reader's flash memory, load the default job into the spreadsheet using the PC Host's Save & Load dialog.

Appendix C

Configuring Microsoft Windows Network Settings

This section provides information on how to configure Microsoft Windows network settings to connect to a 1700 reader using the In-Sight PC Host program. The steps listed below and the example dialogs are specific to Windows NT 4.0. The exact steps required may vary slightly in Windows XP, 2000, Me, and 98SE.

To configure Windows network settings:

1 Verify the PC has a TCP/IP protocol installed.

2 Close all programs on the PC except Windows NT.

3 Click **Start**, click **Settings**, and then click on the **Control Panel** shortcut to open the Control Panel icon group.

4 Click the **Network** icon to open the Network dialog.

5 Select the **Protocols** tab (Figure C-0-1). If TCP/IP Protocol appears in this list, skip steps 0 and 7.

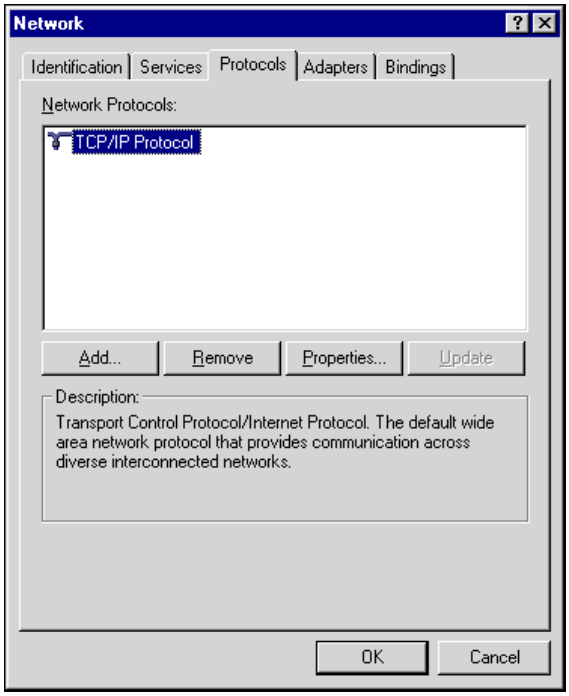

Figure C-0-1: Windows Network dialog, Protocols tab

6 If TCP/IP is not on the list of installed protocols, click **Add** to open the Select Network Protocol dialog (Figure C-0-2).

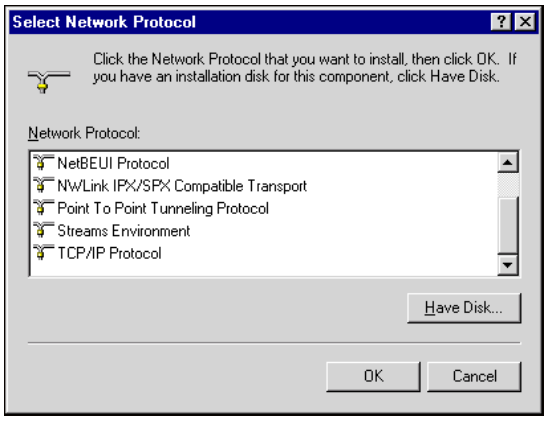

Figure C-0-2: Select Network Protocol dialog

7 Select **TCP/IP Protocol** and click **OK**. Windows NT will install the protocol and return to the Network dialog.

8 Configure the IP Address and Subnet Mask.

9 Highlight TCP/IP Protocol in the Protocols tab and click **Properties** to open the Microsoft TCP/IP Properties dialog (Figure C-0-3):

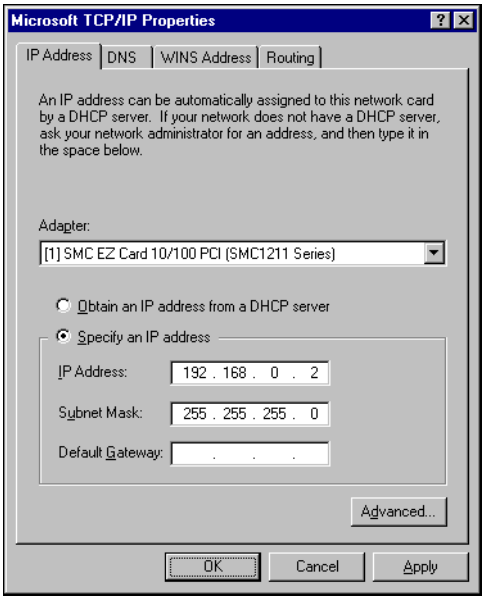

Figure C-0-3: Microsoft TCP/IP Properties Dialog

10 Click the Specify an IP address radio button. The IP Address and Subnet Mask fields, which are grayed-out when DHCP is enabled, become active.

11 Enter an appropriate Subnet Mask. The Subnet Mask defines which part of the 1700 reader's IP Address refers to the network and which part refers to the host. The network part of the IP address is the same for all hosts on the same subnet, and the remainder is unique to each host. The default Subnet Mask setting of 255.255.255.0 is usually appropriate.

12 Click OK twice, then restart Windows if prompted to do so.

Appendix D

Using the I/O Expansion Module

Before the I/O Expansion Module (P/N 800-5758) can be used, the In-Sight 1700 reader's settings must be configured to recognize the availability of the additional inputs and outputs, as well as the added serial hardware handshake capability.

To configure a 1700 reader to recognize the I/O Expansion Module:

1. Physically connect the I/O Expansion Module to the In-Sight 1700 reader, as described previously in Section 2.1.4: Connecting the I/O Expansion Module.
2. From your PC, open the In-Sight PC Host program and logon to the reader.
3. Open the **System** menu.

Figure D-0-1: System menu

4 Select **Settings** to open the Settings menu.

Figure D-0-2: Settings menu

5 Select **Discrete Output** to open the Discrete Output dialog.

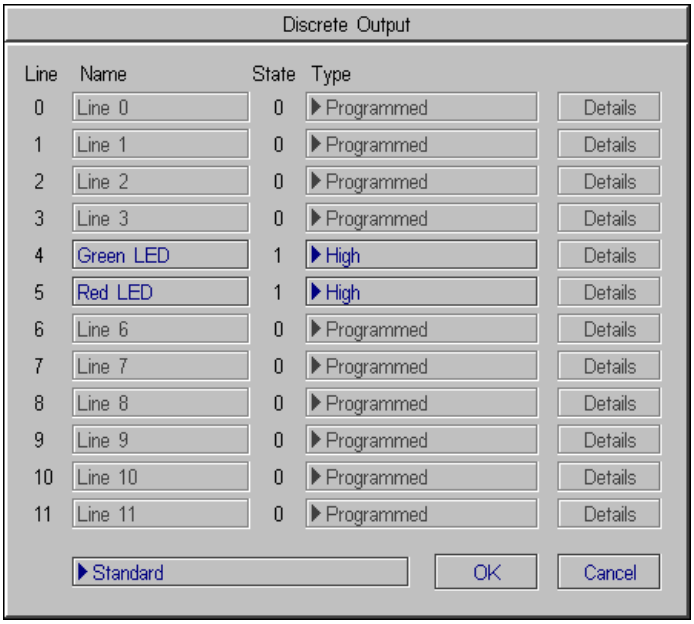

Figure D-0-3: Discrete Output dialog, default configuration

6 From the drop-down list beside the OK button, select **I/O Expansion Module**. The Discrete Output dialog will be automatically reconfigured to correspond to the I/O Expansion Module, as shown in Figure D-0-4.

NOTE When an existing .JOB file containing a WriteDiscrete function is loaded on an In-Sight 1700 reader to which the I/O Expansion Module has just been added, the **Start Bit** and **Number of Bits** parameters in WriteDiscrete must be changed to reflect the new configuration of the I/O lines. For example, the physical output lines 4 and 5 become lines 10 and 11 (Green and Yellow LEDs) when the I/O Expansion Module is enabled.

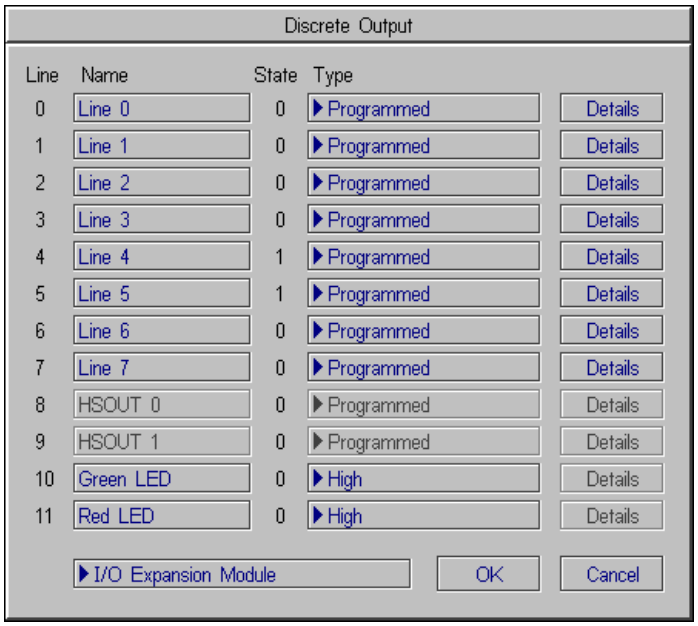

Figure D-0-4: Discrete Output dialog, I/O Expansion configuration

7 Select **OK** to copy the new settings to the 1700 reader's flash RAM.

NOTE An error message will appear if the I/O Expansion Module is not attached to the 1700 reader, and the Discrete Output dialog will return to its default configuration. Verify that the I/O Expansion Module is connected as described in Section 2.1.4, then repeat steps 1 – 7 as described above.

Alternatively, the sensor can be configured to use the I/O Expansion Module by opening the Discrete Input dialog and following steps 6 and 7, as described above.

Once the I/O Expansion Module is selected in either the Discrete Input or Discrete Output dialogs, it is automatically enabled for both inputs and outputs, and hardware handshaking may be used in serial communications.

Refer to the *In-Sight Guide & Reference* HTML Help file installed with the In-Sight PC Host for details on using the Discrete and Serial Input/Output functions in the In-Sight spreadsheet.

Appendix E

1701 Wafer Reader Installation Options

1701 Horizontal Mirror Attachment

The optional horizontal mirror attachment (P/N 800-5796) allows the reader to be installed in top or bottom-side reading applications where a low mounting profile is required.

The horizontal mirror attachment can be mounted face-up or face-down (see Figure E-0-1).

To attach the mirror mount:

1 Align holes of the mirror attachment to holes on the front plate of the 1701 reader.

2 Insert the two M3 X 14mm hex head screws (provided) through the mirror mount, into the front plate.

3 Tighten screws with a 2.5 mm Allen wrench.

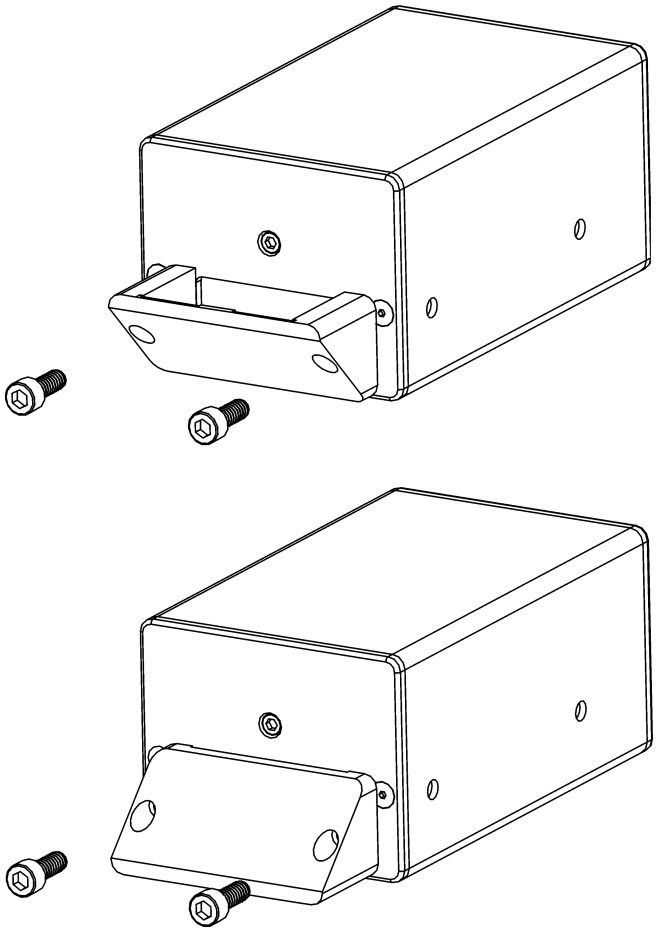

Figure E-0-1: Attaching the 1701 Horizontal Mirror Mount

As shown in Figure E-0-2, the horizontal mirror attachment lengthens the optical path by 23.9 mm. To compensate, the working distance of the reader in the horizontal configuration will be 23.9 mm closer to the wafer than a reader mounted vertically with the same focal setting. The working distance for the vertical configuration is measured from the bottom of the reader to the top of the wafer.

NOTE The Image Orientation may need to be adjusted, depending on the configuration of the reader and the mirror attachment sating. Refer to Section 3.4.8: Image Orientation for more information.

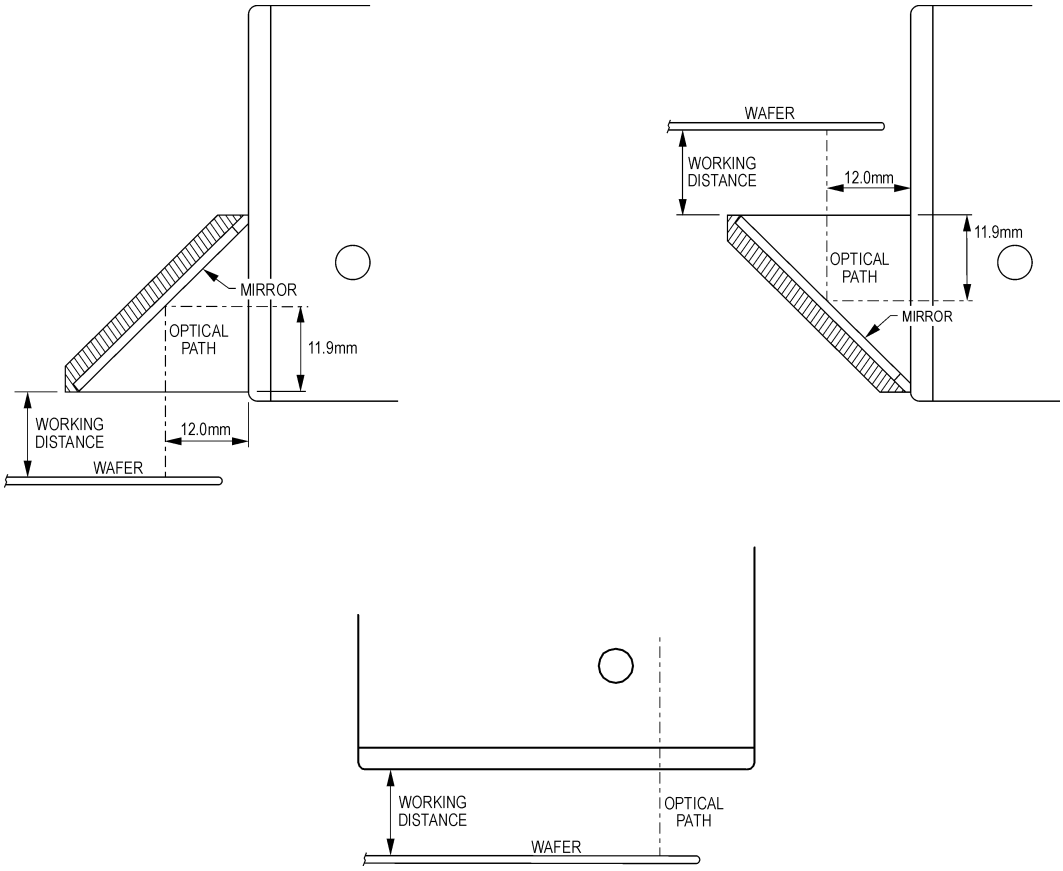

Figure E-0-2: Working Distances in Horizontal and Vertical Mounting Configurations

Table E-1 shows examples of the 1701 reader's vertical working distances and the corresponding horizontal working distances required if no focal adjustment is made.

Table E-1: Working Distances

VERTICAL WORKING DISTANCE (MM)	CORRESPONDING HORIZONTAL WORKING DISTANCE (MM)
5.0	N/A
10.0*	N/A
15.0	N/A
20.0	N/A
25.0	1.1
30.0	6.1
40.0	16.1
50.0*	26.1
60.0	36.1
70.0	46.1
80.0	56.1
* Indicates factory-set working distances	

Adjusting the Focus on the 1701

The recommended working distance range is 1 to 80 mm for the 1701 reader in the vertical position. If using the horizontal mirror mount, the recommended working distance range is 1 to 56.1 mm.

Once the working distance is established, the focus can be adjusted using the focus adjustment screw (M3 hex screw), located in the center of the 1701 reader's front face plate (see Figure E-0-3). To adjust the focus, use a 2.5 mm Allen wrench. Turn the focus adjustment screw clock-wise if the reader is moved closer to the wafer; turn the screw counter clock-wise if the reader is moved farther away from the wafer.

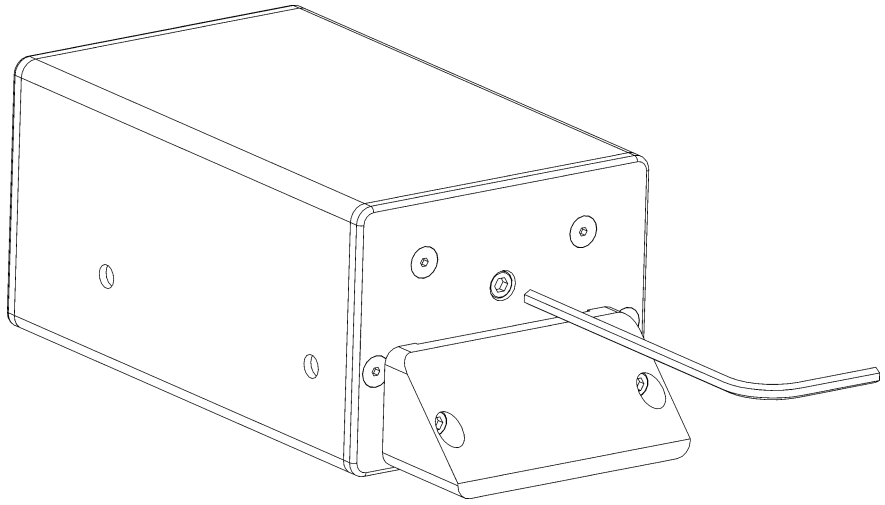

Figure E-0-3: Location of Focus Adjustment Screw

Image Artifacts

Under certain conditions, horizontal lines may be observed in the image (Figure E-0-4). These lines are artifacts of the reader's optical design. They are most visible at a working distance of approximately 30 mm, when the Light Mode setting is Dark Field (for more information of Light Modes, see Section 3.4.9). In most cases, these lines will have no impact on reading performance. If desired, position the mark in an area of the field of view that is free of artifacts. To reduce the intensity of the lines, the lighting can be optimized using the automated tuning process (Section 3.4.15).

Figure E-0-4: Image Artifact Example

Appendix F

1700 Wafer Reader Mount Conversion

The 1700 reader can be mounted either horizontally or vertically depending on the positions of the read window and light trap (see Figure F-0-1). The 1700 can be easily converted from one mounting configuration to the other. In the following example, a horizontal mount 1700 is converted to a vertical.

NOTE	If possible, perform these steps within a cleanroom environment (Class 1000 or better) at an electrostatic discharge (ESD)-safe work station. Use cleanroom-approved gloves to avoid fingerprints on the read window. If the conversion is not done in a cleanroom, there is a possibility of introducing "artifacts" on the optics. Also, depending on the Class of the cleanroom where the reader will be used, the reader may no longer meet Class specifications after the conversion has been done.

To convert the mount configuration:

1 Using a .050 inch Allen wrench, remove the two 2-56 x 3/16" button head screws that attach the light trap, and the two screws that attach the read window.

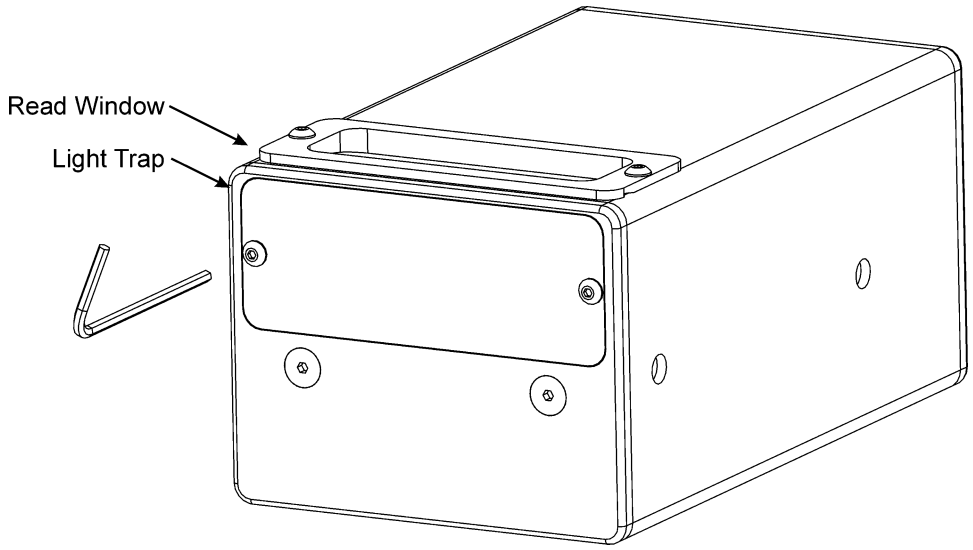

Figure F-0-1: Location of Light Trap and Read window (Horizontal Mount Configuration)

2 Remove the light trap and read window from the 1700 case.

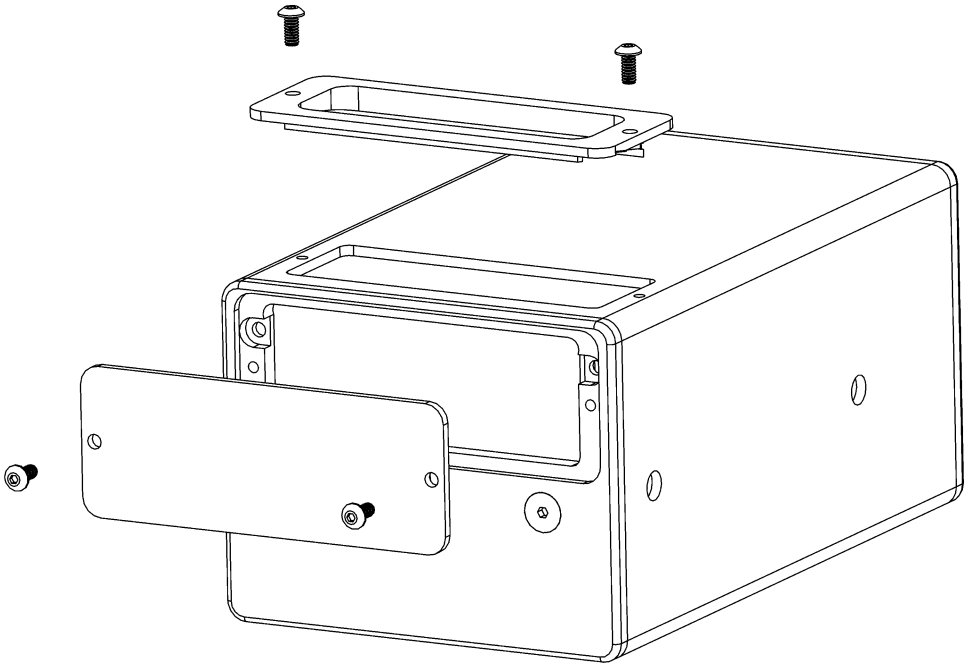

Figure F-0-2: Removing the Light Trap and Read window

3 Place the read window, with the top of the frame (thick edge of wedge) facing down, in the opening that was occupied by the light trap; place the light trap, with the top nearest to the back of the reader, in the other opening.

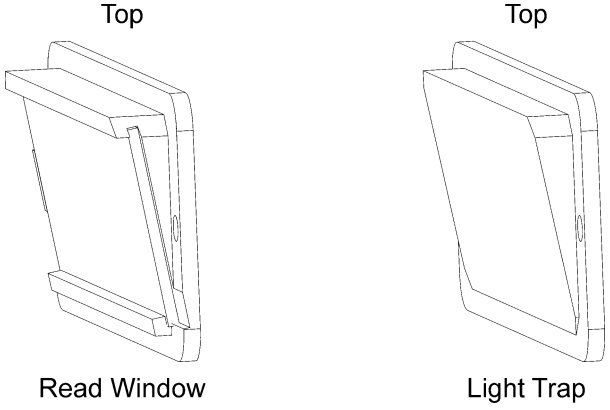

Figure F-0-3: Read Window and Light Trap Orientation

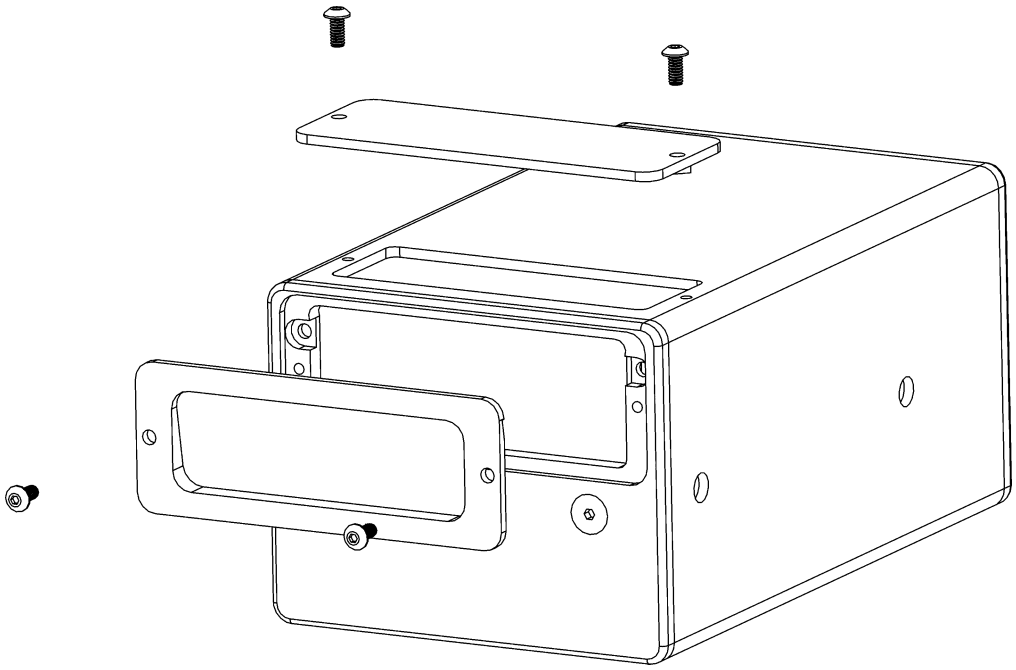

Figure F-0-4: Reattaching the Read window and Light Trap

4 Tighten all four screws, with a maximum torque of 2 inch-lbs.

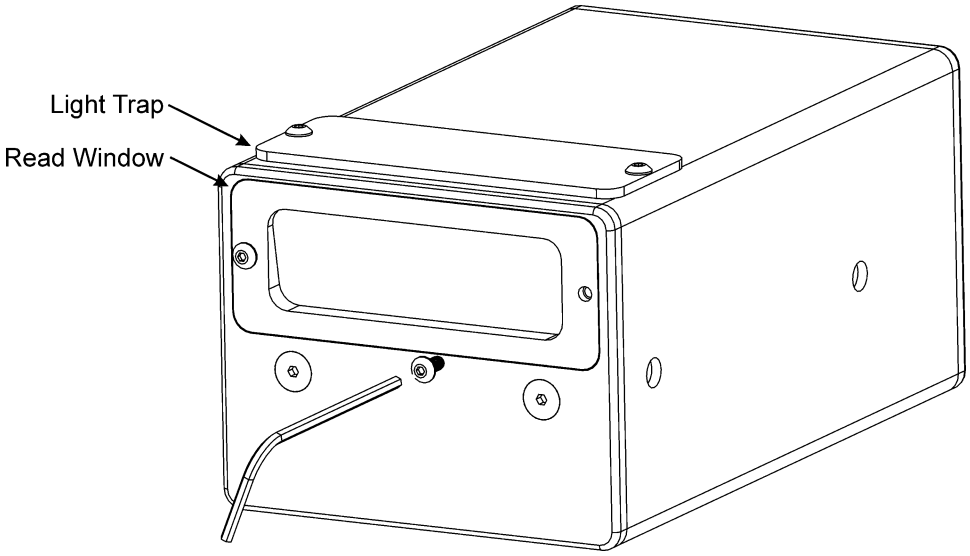

Figure F-0-5: Vertical Mount Configuration (Shown Horizontally)

Appendix G

Cleaning the Reader

To maintain optimal imaging and reading performance, keep the glass read window free of dust and fingerprints. To remove dust, use a pressurized air duster. If the window needs cleaning, use a cleaner approved for use on coated optics, such as the Lens Pen which is included in the Starter Accessories Kit, or a lens cleaning cloth. Do not use alcohol-based cleaning solutions, which will damage the anti-reflective coating on the window. Do not spray water or cleaning fluids directly onto the glass window, which could allow moisture to enter the case.

Appendix H

SEMI® Wafer Marking Specifications

The In-Sight 1700 identifies wafers marked according to the following specifications:

- **SEMI M1.15-1000 –** ***Standard For 300 mm Polished Monocrystalline Silicon Wafers (Notched).*** Combines elements of the SEMI T7 and SEMI M12 specifications for defining the characteristics and positioning of the rectangular 2D Data Matrix code symbol and the (optional) 12-character alphanumeric string marked on the back surface of 300 mm wafers.

- **SEMI T7-0997 –** ***Specification For Back Surface Marking of Double-Side Polished Wafers With A Two-Dimensional Matrix Code*****.** Defines the characteristics and positioning of the rectangular 2D Data Matrix code symbol marked on the back surface of 300 mm wafers.

- **SEMI M12-0998 –** ***Specification For Serial Alphanumeric Marking of the Front Surface Of Wafers*****.** Defines the characteristics and positioning of the 12-character alphanumeric string marked on the front surface of 100/125/150 mm (flatted) and 150/200 mm (notched) wafers.

- **SEMI M13-0998 –** ***Specification For Alphanumeric Marking Of Silicon Wafers*****.** Defines the characteristics and positioning of the 18-character alphanumeric string marked on 100/125/150 mm (flatted) and 150/200 mm (notched) wafers.

- **SEMI T1-95 –** ***Specification For Back Surface Bar Code Marking Of Silicon Wafers*****.** Defines the characteristics and positioning of the barcode marked on the back surface of 125 mm or larger wafers.

For copies of the complete specifications, visit the Semiconductor Equipment and Materials International (SEMI) organization at http://www.semi.org.

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