Upon receipt of the product and prior to initial operation, read these instructions thoroughly and retain for future reference.

**MOTOMAN INSTRUCTIONS**

- MOTOMAN XXXXXX INSTRUCTIONS
- DX100 INSTRUCTIONS
- DX100 OPERATOR'S MANUAL
- DX100 MAINTENANCE MANUAL
- MOTOCOM SDK FUNCTION MANUAL

The DX100 operator’s manual above corresponds to specific usage. Be sure to use the appropriate manual.

Part Number: 159584-1CD
Revision: 0
This system manual provides an overview of the YASKAWA PC-HMI Display. It gives general information about the unit, a description of its major components, and the procedures for installation, operation, and maintenance. Be sure to read and understand this manual thoroughly before installing and operating the PC-HMI Display.

General items related to safety are listed in Section 2 of the DX100 Controller Manual. To ensure correct and safe operation, carefully read the DX100 Controller Manual before reading this manual.

Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure that all covers and shields are replaced before operating this product.

The drawings and photos in this manual are representative examples, and differences may exist between them and the delivered product.

YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.

If such a modification is made, the manual revision number will also be revised.

If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.

YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the PC-HMI Display.

In this manual, the Notes for Safe Operation are classified as “WARNING,” “CAUTION,” “MANDATORY,” or “PROHIBITED.”

- **WARNING**
  Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

- **CAUTION**
  Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

- **MANDATORY**
  Always be sure to follow explicitly the items listed under this heading.

- **PROHIBITED**
  Must never be performed

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as "CAUTION" and "WARNING."
Definition of Terms Used Often in This Manual

The positioner usually consists of the controller, the Programming Pendant, and supply cables.

In this manual, the equipment is designated as follows:

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1 Introduction

This manual provides information for the Yaskawa PC-HMI Display. Section 14 – Illustrated Parts List contains parts lists and exploded views and performance specifications for the PC-HMI Display. Use this manual as a supplement with other system manuals to identify parts and locate performance specifications of all PC-HMI Display components, regardless of their application.

1.1 System Overview

The PC-HMI Display is an industrial grade PC with 15 in. color touch screen for use in manufacturing environments. Its low power, solid state design eliminates the need for fans or other items with moving parts. The embedded operating system provides a 4 GB locked partition to protect programs and files while 4 GB of flash memory is available for data storage.

A display application is provided to make it easy for plant personnel to update and program the data they desire on the screen. MotoCom is used to communicate a high level of information between the robot and display including; I/O status and names, jobs execution in realtime, set and actual weld data (including travel speed), and alarm history. A simple text file is used to list I/O, files or images to be displayed while MotoCom populates the formatted screen structure.

The PC-HMI Display utilizes the latest advancements in single-board PCs, solid-state data storage, and high temperature rated components, to ensure longevity. All of the circuit boards are coated with a conformal coating to protect the boards and chips from metallic dirt, dust and humidity. Fan-free convection cooling eliminates the need for air circulation and filters. Software stability and compatibility is provided via Windows® Embedded XP operating system. The embedded portion of the operating system provides a feature which allows a manager to “lock” a specified hard drive to prevent operators from loading their own applications, changing configuration settings, corrupting key operating system files or loading viruses. If any of these conditions occur, simply rebooting the machine returns it to a known good state. For applications requiring constant data storage, a separate 4 GB partition of the compact flash is available for storage. This “unlocked” drive allows files to be written, changed and even deleted with all modifications retained following power-down/reboot.

The steel enclosure (IP-34) has been designed with ruggedness, appearance and weight in mind. Weighing less than 22 lbs, the display can be mounted on an adjustable mounting arm (see option section for suggested mounting arms) or fixed in position using the standard 4-hole mounting pattern. External connections provided underneath the rear lip of the enclosure include two USB-A connectors and one CAT5 Ethernet connector. Protective sealing caps are provided for both the USB and CAT5 connectors to prevent dust from entering the enclosure when not in use. An 8-wire industrial M12 Ethernet connector provides communication to and from the robot controller. An 11-wire Turck connector provides power and spare conductors for user-defined connections. Two LED indicators on the front of the enclosure provide status indicators for both power and the flash-drive access.
1.2 Major Components

The PC-HMI Display includes the following major components –

- Steel enclosure (IP-34)
- Two USB-A connectors
- One CAT5 Ethernet connector
- 8-wire industrial M12 Ethernet connector
- 11-wire Turck connector

1.2.1 Optional Equipment

This manual documents a standard YASKAWA product. If your assembly is modified or incorporates optional equipment, you should refer to the Engineering Drawing Package and associated Bill of Materials (BOM) in addition to this manual. The Engineering Drawing Package and BOM are included with your shipment. Please refer to those documents, along with this manual, when troubleshooting or provisioning spare parts for your positioner assembly.

- Controller Ethernet pigtail (P/N 157941-x)
- Controller to display Ethernet cable (P/N 157943-x)
- Controller to display power cable (P/N 146886-x)
- Controller power pigtail (P/N 145944-x)
- Mounting arm - rotate/pivot only (P/N 158682-1)
- Mounting arm - single arm rotate/pivot (P/N 158682-2)
- Mounting arm - dual arm rotate/pivot (P/N 158682-3)

1.3 Reference Documentation

For additional information on individual components of the PC-HMI Display system, refer to the following documentation that is included with your system:

- Motoman Manipulator Manual
- Motoman DX100 Controller Manual (P/N 155494-1CD)
- Motoman Maintenance Manual for DX100 (P/N 155492-1CD)
- Motoman Operator’s Manual for your application
- Motoman DX100 Concurrent I/O Manual (P/N 155491-1CD)
- Motoman INFORM User’s Manual (P/N 155493-1CD)
- MotoCom SDK Function Manual (P/N 147324-1CD)
- Vendor manuals for system components not manufactured by Motoman
1.4 Customer Support Information

If you need assistance with any aspect of your PC-HMI Display, contact Motoman Customer Support at the following 24-hour telephone number:

(937) 847-3200

For routine technical inquiries, you can also contact Motoman Customer Support at the following e-mail address:

techsupport@motoman.com

When using e-mail to contact Motoman Customer Support, please provide a detailed description of your issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to your inquiry.

Please use e-mail for routine inquiries only. If you have an urgent or emergency need for service, replacement parts, or information, you must contact Motoman Customer Support at the telephone number shown above.

Please have the following information ready before you call:

• Accessory PC-HMI Display (158362-*)
• Controller DX100
• Software Version Access this information on the Programming Pendant’s LCD display screen by selecting {MAIN MENU} - {SYSTEM INFO} - {VERSION}
• Serial Number Located on the positioner data plate
• Sales Order Number Located on the positioner data plate
2.1 Contents Confirmation

Confirm the contents of the delivery when the product arrives.

2.1.1 Major Components
The PC-HMI Display includes the following major components –

- Steel enclosure (IP-34)
- Two USB-A connectors
- One CAT5 Ethernet connector
- 8-wire industrial M12 Ethernet connector
- 11-wire Turck connector

2.1.2 Optional Equipment
This manual documents a standard YASKAWA product. If your assembly is modified or incorporates optional equipment, you should refer to the Engineering Drawing Package and associated Bill of Materials (BOM) in addition to this manual. The Engineering Drawing Package and BOM are included with your shipment. Please refer to those documents, along with this manual, when troubleshooting or provisioning spare parts for your positioner assembly.

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- Mounting arm - rotate/pivot only (P/N 158682-1)
- Mounting arm - single arm rotate/pivot (P/N 158682-2)
- Mounting arm - dual arm rotate/pivot (P/N 158682-3)

2.1.3 Customer Supplied Items
The components must be supplied by the customer:

- Incoming power supply
2.2 Safeguarding

CAUTION

- The PC-HMI Display system should be installed by qualified personnel who are familiar with the installation and setup of a robotic system.

To insure safety, be sure to install safeguarding. It prevents unforeseen accidents with personnel and damage to equipment. The following is quoted for your information and guidance.

2.2.1 Responsibility for Safeguarding (ISO10218)

The user of a manipulator or robot system shall ensure that safeguards are provided and used in accordance with Sections 6, 7, and 8 of this standard. The means and degree of safeguarding, including any redundancies, shall correspond directly to the type and level of hazard presented by the robot system consistent with the robot application. Safeguarding may include but not be limited to safeguarding devices, barriers, interlock barriers, perimeter guarding, awareness barriers, and awareness signals.

2.3 PC-HMI Display Mounting Options

The PC-HMI Display can be mounted on an adjustable mounting arm (see optional equipment section for suggested mounting arms) or fixed in position using the standard 4-hole mounting pattern.

Fig. 2-1: Mounting Arm - Rotate/Pivot Only (P/N 158682-1)
2 Installation

2.3 PC-HMI Display Mounting Options

Fig. 2-2: Mounting Arm - Single Arm Rotate/Pivot (P/N 158682-2)

Fig. 2-3: Mounting Arm - Rotate/Pivot Only (P/N 158682-1)

Fig. 2-4: Mounting Hole Pattern

4X M5 X 0.8 THRU
2 Installation
2.3 PC-HMI Display Mounting Options
3 PC-HMI Display Specifications

3.1 Hardware Specifications

- **Display**
  - Screen size: 15.0 inch

- **Processor**
  - CPU Family: Intel® Atom™
  - CPU Frequency: 1.66 GHz

- **Memory**
  - Flash RAM: 8 GB
  - RAM: 2 GB

- **Operating System and Software**
  - OS Family: Windows® Embedded XP STD
  - Yaskawa Software: NX/DX Operator Station

- **Case**
  - Enclosure: Steel
  - IP Rating: IP-34
  - Dimensions: 410 x 92 x 319mm (WDH)
  - Weight: 22 lbs

- **Ports**
  - USB-A Ports: 2
  - CAT-5 Ethernet: 1
  - M12 Ethernet: 1

3.2 Configurable Display Parameters

The following table lists the configurable PC-HMI Display parameters.

<table>
<thead>
<tr>
<th>Displayed Image</th>
<th>Command</th>
<th>Description</th>
<th>Contact Series</th>
<th>Displayed</th>
<th>Settable</th>
<th>Text Descriptor Pulled From:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="ON" /></td>
<td><img src="image" alt="OFF" /></td>
<td>IN# Displays status of &quot;Universal Input&quot;</td>
<td>Universal Inputs</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>Controller's &quot;IONAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image" alt="ON" /></td>
<td><img src="image" alt="OFF" /></td>
<td>OUT# Displays status of &quot;Universal Output&quot;</td>
<td>Universal Outputs</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>Controller's &quot;IONAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image" alt="ON" /></td>
<td><img src="image" alt="OFF" /></td>
<td>SIN# Displays status of &quot;Specific Input&quot;</td>
<td>4****</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>HMI's &quot;4xxxNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image" alt="ON" /></td>
<td><img src="image" alt="OFF" /></td>
<td>SOUT# Displays status of &quot;Specific Output&quot;</td>
<td>5****</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>HMI's &quot;5xxxNAME.DAT&quot;</td>
</tr>
</tbody>
</table>
Table 3-1: Configurable Display Parameters

<table>
<thead>
<tr>
<th>Displayed Image</th>
<th>Command</th>
<th>Description</th>
<th>Contact Series</th>
<th>Displayed</th>
<th>Settable</th>
<th>Text Descriptor Pulled From:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Ein#" /></td>
<td>EIN#</td>
<td>Displays status of &quot;External Input&quot;</td>
<td>2****</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>Controller's &quot;EXIONAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image2" alt="Eout#" /></td>
<td>EOUT#</td>
<td>Displays status of &quot;External Output&quot;</td>
<td>3****</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>Controller's &quot;EXIONAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image3" alt="outb#" /></td>
<td>OUTB#</td>
<td>Sets status of &quot;B&quot; variable corresponding to a button press</td>
<td>Any Mode</td>
<td></td>
<td></td>
<td>Controller's &quot;VARNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image4" alt="B#" /></td>
<td>B#</td>
<td>Displays and allows setting of a &quot;B&quot; variable</td>
<td>8 Digit LED</td>
<td>Manage Mode</td>
<td></td>
<td>Controller's &quot;VARNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image5" alt="I#" /></td>
<td>I#</td>
<td>Displays and allows setting of a &quot;I&quot; variable</td>
<td>8 Digit LED</td>
<td>Manage Mode</td>
<td></td>
<td>Controller's &quot;VARNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image6" alt="D#" /></td>
<td>D#</td>
<td>Displays and allows setting of a &quot;D&quot; variable</td>
<td>Manage Mode</td>
<td></td>
<td></td>
<td>Controller's &quot;VARNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image7" alt="R#" /></td>
<td>R#</td>
<td>Displays and allows setting of a &quot;R&quot; variable</td>
<td>Manage Mode</td>
<td></td>
<td></td>
<td>Controller's &quot;VARNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image8" alt="AUX#" /></td>
<td>AUX#</td>
<td>Displays status of Auxiliary contact</td>
<td>7****</td>
<td>ON/OFF</td>
<td>Not Settable</td>
<td>HMI's &quot;7xxxNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image9" alt="AIN#" /></td>
<td>AIN#</td>
<td>Displays analog input status as voltage level -14V to +14VDC</td>
<td>8 Digit LED</td>
<td>Not Settable</td>
<td></td>
<td>Controller's &quot;IOMNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image10" alt="AOUT#" /></td>
<td>AOUT#</td>
<td>Displays analog output status as voltage level -14V to +14VDC</td>
<td>8 Digit LED</td>
<td>Not Settable</td>
<td></td>
<td>Controller's &quot;IOMNAME.DAT&quot;</td>
</tr>
<tr>
<td><img src="image11" alt="CTRL#" /></td>
<td>CTRL#</td>
<td>Control Inputs</td>
<td>8****</td>
<td>ON/OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image12" alt="TCPSPD#" /></td>
<td>TCPSPD#</td>
<td>Displays TCP speed based on fixed ratio of 1V = 50cm/min</td>
<td>8 Digit LED</td>
<td>Not Settable</td>
<td></td>
<td>Controller's &quot;IOMNAME.DAT&quot;</td>
</tr>
</tbody>
</table>
### Table 3-1: Configurable Display Parameters

<table>
<thead>
<tr>
<th>Displayed Image</th>
<th>Command</th>
<th>Description</th>
<th>Contact Series</th>
<th>Displayed</th>
<th>Settable</th>
<th>Text Descriptor Pulled From:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED w/ Value:</td>
<td>WLD#</td>
<td>Displays welding parameters based on scaling provided in welder condition file</td>
<td>8 Digit LED</td>
<td>Not Settable</td>
<td>Controller's &quot;IOMNAME.DAT&quot;</td>
<td></td>
</tr>
<tr>
<td>*******</td>
<td></td>
<td>Allows users to create a text label to be displayed on screen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NETIN#</td>
<td>Network Inputs</td>
<td>25*** ON/OFF</td>
<td>Not Settable</td>
<td>Not currently supported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NETOUT#</td>
<td>Network Outputs</td>
<td>35*** ON/OFF</td>
<td>Not Settable</td>
<td>Not currently supported</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The operator station software provides basic informational screens and graphics. These screens can be easily modified using a text editable file (see chapter 6 "Programming and Operation"). Yaskawa provides all operator stations configured with basic screens specific to the purchased cell assembly. Further customization can be achieved as outlined in the following sections.

Fig. 4-5: PC-HMI Display Overview

4.1 Screen Areas

The PC-HMI interface is divided into five areas. These distinct areas provide control and status information. Some areas are static and cannot be modified. While others are fully configurable from the Display.ini file.

4.1.1 Control/Status Area (Non-Configurable)

The Control/Status area is non-configurable. This area contains the control buttons and system status displays for the overall system.

Fig. 4-6: Control/Status Area
Master JBI
Calls the job configured as the master job in the controller. Currently configured job name is displayed within the button. If no job is currently selected, "None Set" is displayed. This button is active from any security mode as long as "Remote" mode is selected.

Servos
Pressing the Servos button causes servo power to toggle from its current state. If servo are "On", they turn "Off". If "Off" they turn "On". This button is active at any security level as long as "Remote" mode is set.

Start/Operating/Hold
Displays and sets the current status of the robot controller. During operation, pressing this button causes the currently executing job to "Hold". If in "Hold", pressing this button causes the executing job to resume. If a new job is selected and servo power is applied, the button press causes the job to begin execution.

Mode
Sets and displays the current status of the system. If in teach mode, it displays "Teach". When in remote mode, it displays either "Play Remote" or Teach Remote". It must display either "Play Remote" or "Teach Remote" in order for the button to active. When in "Play" mode it displays "Play."

Cycle
Displays and sets the current mode of operation (Auto, Step, or 1-Cycle). Controller must be in Remote mode for changes to take effect.

Active Cubes
Checks the status of all the available cubes. If the cube is configured with a comment and is active, the cube's comment appears along with it's number on the list. Once the cube is in-active, it is removed from the list.

Security Mode
Displays the current security mode of the robot controller (can not change from the operator's station). Security modes can only be changed from the teach pendant.

Active Job:
Displays the name of the job currently running as sub-task #1.

Job Line:
Displays the current line being executed in the job running as sub-task #1.
4.1.2 Dashboard (Configurable from Display.ini file)

The dashboard area is fully configurable from the Display.ini file. This area can contain weld status information, positioner data, and other system information as desired. The current time is always displayed at the top of the dashboard.

*Fig. 4-7: Dashboard Area*

4.1.3 Communication Area (Non-Configurable)

The communication area is non-configurable. This area contains the control buttons and status displays for the communication link with the controller.

*Fig. 4-8: Communication Area*

- **Close**
  Closes the communication link with the robot controller.

- **Open**
  Activates the communication link to the robot controller as configured in the Display.ini file.

- **Screen Update Rate**
  Displays the amount of time it takes to update the currently selected screen & tab. Depending on the selected tab and the amount of data displayed on the selected tab, the time can range from 300ms to 1.5 seconds on DX100 controllers and 500ms to 2.5 seconds on NX100 controllers.
Communication Status
Shows the current status of the communication link. When pressed, the communication link toggles between "Connected:" and "Pause."

4.1.4 Status Bar Display Area
Displays system status, errors and messages and provides details of button presses, as well as pass/fail status of functions.

Fig. 4-9: Status Bar Area

4.2 Tab Strip (Standard and Configurable)
The customizable tabs located across the bottom of the PC-HMI Display provide access to the specialized screens for each system feature.

Fig. 4-10: Tabs
4.2 Tab Strip (Standard and Configurable)

4.2.1 Standard Tabs

The following standard tabs are included with all systems. Basic configuration and setup is performed at Yaskawa prior to shipment and varies depending on the cell assembly, auxiliary equipment, & options purchased.

- **Main Tab**
  The main tab provides an overview of the entire system status; robot, positioner, welder status along with part counts. The main tab can monitor up to 24 pieces of information (12 right, 12 left) and an image file can be inserted in the center of the window.

  *Fig. 4-11: Main Tab*

- **Robot Status Tab**
  The robot status tab provides the status of the robot(s). The robot tab can monitor up to 24 pieces of information (12 right, 12 left) and an image file can be inserted in the center of the window. Basic configuration and setup is performed at Yaskawa prior to shipment and will vary depending on robots & options purchased.

  *Fig. 4-12: Robot Status Tab*
Welder Tab
The welder tab monitors power source related status such as ArcOn, ArcEstablish, set and actual weld parameters, travel speed. The welder tab can monitor up to 24 pieces of information (12 right, 12 left) and an image file can be inserted in the center of the window. Basic configuration and setup is performed at Yaskawa prior to shipment and will vary depending on the weld equipment & options purchased.

Fig. 4-13: Welder Status Tab

Job Tab
The job tab can display up to four jobs at once while running and constantly updates the cursor in realtime. Jobs can be selected from the PC-HMI Display in remote management mode. If the controller is taken out of Play mode and changes are made via the teach pendant, the changes will not be updated on the PC HMI until the robot controller is placed back in "Play" mode. This triggers the PC-HMI to download the latest changes and update the "Job" tab with the latest changes. No changes can be made to the "Job" tab configuration.

Fig. 4-14: Jobs Tab
Alarms Tab
In the event of an alarm, the “Alarm” tab provides a detailed explanation of the alarm and provides several solutions to help expedite the corrective action process. Alarm history can also be sent via e-mail to managers or maintenance personnel for notification purposes. No changes can be made to the “Alarm” tab configuration.

Fig. 4-15: Alarms Tab

System Info Tab
The system information tab provides basic information for the system including system software versions, boot ROM versions and system operating times. No changes can be made to the “System Info” tab configuration. The graphic which appears with this tab is specified as the “[SYSTEM PICTURE]” in the Display.ini file.

Fig. 4-16: System Information Tab
### Backup Tab

The Backup tab displays the file and backup time settings for the auto backup function. The auto backup function is configured using the Display.ini file. When configured for automatic backup, backup can be performed as frequently as once a day to once a week. Backups can include all jobs and any additionally specified files. The files can be stored locally on the unlocked “D” drive or a network drive in a folder with the current date. When an automatic backup is complete, an e-mail can be sent to an individual or team confirming the backup took place.

The [Perform Backup Now] button allows the operator to force a backup at any time. This can be helpful if significant system changes are made at various points during the day and a backup is desired.

No changes can be made to the "Backup" tab configuration. The “Backup” tab will not be displayed if disabled in the Display.ini file.

*Fig. 4-17: Automatic Backup Tab*

### Manuals Tab

The manuals tab provides access to local or networked manuals, drawings, reports or any other informational data. The files are specified along with their location to a link displayed on the HMI.

Displayed manuals are configured using the Display.ini file. A maximum of 24 manuals can be specified for display. When the desired manual is selected, it is launched using a built-in PDF viewer.

*Fig. 4-18: Manuals Tab*
4.2.2 External Apps Tab

The external applications tab provides access to other applications or tools loaded on the HMI. This tab allows operators to start up the applications without accessing the Windows “Start” menu or desktop. When an application or web-site is selected, it is launched in a separate window. The applications and/or websites are configured using the Display.ini file. A maximum of 24 external applications can be set-up.

Fig. 4-19: External Applications Tab

4.2.3 Job Select Tab

The "Job Select" tab allows an operator to select and execute various jobs based on a selection made at the HMI. The selection of various jobs can take place at any time during execution. However, the robot controller’s Master job must acknowledge the selection and begin execution of the job. The HMI-TRANSFER.JBI (system job) ensures that only one job per side is selected at a time. If multiple selections are made, the HMI-TRANSFER.JBI will clear all selections and wait for a single selection.

Fig. 4-20: Job Select Tab
The "Job Select" function uses the following variables:

\[
\begin{array}{ll}
B120 &= \text{Side A Job Sel#0} \\
B121 &= \text{Side A Job Sel#1} \\
B122 &= \text{Side A Job Sel#2} \\
B123 &= \text{Side A Job Sel#3} \\
B124 &= \text{Side A Job Sel#4} \\
B125 &= \text{Side A Job Sel#5} \\
B126 &= \text{Side A Job Sel#6} \\
B127 &= \text{Side A Job Sel#7} \\
B128 &= \text{Side A Job Sel#8} \\
B129 &= \text{Side A Job Sel#9} \\
B140 &= \text{Side B Job Sel#0} \\
B141 &= \text{Side B Job Sel#1} \\
B142 &= \text{Side B Job Sel#2} \\
B143 &= \text{Side B Job Sel#3} \\
B144 &= \text{Side B Job Sel#4} \\
B145 &= \text{Side B Job Sel#5} \\
B146 &= \text{Side B Job Sel#6} \\
B147 &= \text{Side B Job Sel#7} \\
B148 &= \text{Side B Job Sel#8} \\
B149 &= \text{Side B Job Sel#9}
\end{array}
\]

* Names displayed next to each button on the HMI can be changed by modifying the variable name next to the associated B-variable.

The following is an example of the a "Select Job" which calls an associated robot job based on the selection made at the HMI.

**SELECT-A.JBI**

```plaintext
NOP
'THIS JOB WILL CALL JOBS DEPENDING ON SELECTION
'ON HMI SCREEN FOR SIDE A
'REF B120 TO B129
CALL JOB:PART1 IF B120=1
CALL JOB:PART2 IF B121=1
CALL JOB:PART3 IF B122=1
CALL JOB:PART4 IF B123=1
CALL JOB:PART5 IF B124=1
CALL JOB:PART6 IF B125=1
CALL JOB:PART7 IF B126=1
CALL JOB:PART8 IF B127=1
CALL JOB:PART9 IF B128=1
CALL JOB:PART10 IF B129=1
INC I000
END
```

**SELECT-B.JBI**

```plaintext
NOP
'THIS JOB WILL CALL JOBS DEPENDING ON SELECTION
'ON HMI SCREEN FOR SIDE B
'REF B140 TO B149
CALL JOB:PART1 IF B140=1
CALL JOB:PART2 IF B141=1
CALL JOB:PART3 IF B142=1
CALL JOB:PART4 IF B143=1
CALL JOB:PART5 IF B144=1
CALL JOB:PART6 IF B145=1
CALL JOB:PART7 IF B146=1
CALL JOB:PART8 IF B147=1
CALL JOB:PART9 IF B148=1
CALL JOB:PART10 IF B149=1
INC I001
END
```
4.3 **AutoBackup and Mail**

The PC-HMI has the ability to perform a system backup at regularly scheduled intervals as frequently as once a day or as infrequently as once a week. The files backed-up are placed in a dated folder located at a user specified location. The location of that folder can be either locally on the PC-HMI's "D" drive (unlocked) or on an accessible mapped (fixed mapping required) network drive.

If an automated backup is not desired or a backup is needed immediately, a manual backup can take place by simply pressing the "Perform Backup Now:" button from the "Backup" tab.

From within the Yaskawa Operator Station application, no backup data can be modified, renamed, or deleted. Only viewing of what files and the status of individual files can be viewed.

4.3.1 **Screen Layout**

In the upper left-hand of the screen the user can see the Autoback setting specified within the Display.ini screen.

On the upper right-hand of the screen under "Recent Backups" the user can see and explore the dates on which various backups had occurred. Selecting one of the dates, causes the "Backup Details" in the lower left-hand side of the screen to update with the listing of files backed-up.

*Fig. 4-21: Backup*

The "Backup Details" can then be expanded to see file details.
4.3.2 Configuring the AutoBackup Function:

Locate the [AUTOBACKUP] portion of the "Display.ini" file

```
[AUTOBACKUP]
ENABLED = NO //YES or NO
DAYS = 2,3,4,5,6 //SUNDAY=1, SATURDAY=7
TIME = 10:15 AM //Must specify "AM" or "PM"
PATH = D:\SysBackup //Storage location
EMAIL = BackUpManager<backupmngr@YourCompany.com>//E-mail to:
JOBS = YES //YES or NO
CIOPRG.LST //Additional file#1
IONAME.DAT //Additional file#2
ALMHIST.DAT //Additional file#3
WELDER.DAT //Additional file#....
```

- "ENABLED =": Specifies if the automated backup function is set to function or not. Must be specified with a "YES" or "NO"
- "DAYS =": Specifies what days of the week the automated backup function is to function
  - Sunday = 1
  - Monday = 2
  - Tuesday = 3
PC-HMI Display

4.3 AutoBackup and Mail

- Wednesday = 4
- Thursday = 5
- Friday = 6
- Saturday = 7

"TIME =": Specifies at what time of the day the automated backup is to occur (recommend time when the system is most likely to not be in use as the automated backup function can cause delays in teach pendant responsiveness). Time must also include an "AM" or "PM" indication.

"PATH =": The location where the individual days backedup files are to reside. Files can either be placed on the "D" drive of the PC-HMI (as long as space is available) or on a mapped network drive where the PC-HMI has access rights.

"EMAIL =": The email address where at the completion of the AutoBackup an email will be sent indicating the status of the backup process.

"JOBS =": Indicates if all of the jobs are to included in the backup process or not. Must be specified with a "YES" or "NO". Specifying "YES" will gather all JBI files from the controller. Specifying "NO" will result in no JBI be backed up unless individual files are specified.

"Specific file backup": Specific files can be backed-up as specified directly following the "JOBS" label. Individual condition, data, parameter, or jobs can be specified and must be specified exactly as they are listed under the controller's "Ex. Memory" button.
4.4 Error Handling with the PC-HMI

The PC-HMI will notify the user anytime an alarm occurs and if configured will generate an email or text message notifying other plant personnel of the issue. The generated e-mail can be sent to personnel specified in the "Display.ini" and allows the operator to select various files from a list which can be attached.

4.4.1 Configuring the Alarm Mailing function

Locate the [MAIL] header in the "Display.ini" file. Directly below the [MAIL] header, the user can specify a number of personnel whom the operator can select to mail. The [ATTACHMENTS] header beings a listing of the various files that

[MAIL]
Shift 3 Mgr<shift3mnrg@YourCompany.com>
Motoman Support <techsupport@motoman.com>

[ATTACHMENTS]
ALL.PRM
ALMHIST.DAT
CIOPRG.LST
SYSTEM.SYS

[END]
5 PCI-HMI File & Folder Structure

The PC-HMI application resides in the "Program Files/Motoman/Yaskawa Operator Station" folder on the protected "C:" drive. This folder contains the following:

- Yaskawa Operator Station executable display application
- "Display.ini": configuration file
- "MotoCom32.dll": robot communication dll
- "CSV" folder - See below for details of contents
- "DAT&CND" folder - See below for details of contents
- "Images" folder - See below for details of contents
- "JBlis" folder - See below for details of contents
- "Manuals" folder - See below for details of contents
- miscellaneous other files

The various folders contain key data displayed when the "Yaskawa Operator Station.exe" is executing. The following details what the various folders contain.

5.1 CSV Folder

The CSV folder contains detailed descriptions and solutions for various alarms and errors. These comma separated files are used when an alarm or error occurs and the details need to be displayed on the PC-HMI. The error code sent from the robot controller to the HMI is cross referenced and details regarding the alarm or error are displayed based on the contents of these files. Modification of these files should not be common but if an alarm of error occurs which is not detailed, that specific alarm or error can be added to the proper file.

Fig. 5-24: CSV Folder
5.2 DAT&CND Folder

At boot-up, this folder contains a number of pre-configured files containing various signal names. The "Yaskawa Operator Station.exe" adds files once connection with the controller is established. Once connected, the folder contains files detailing IO names, register names, cube names, welder scaling, and robot system information. These files are accessed when updating the I/O screen, the active cube tree, and displaying weld settings. Modification to any of these files should not occur. Changes to these files should occur on the robot teach pendant so they are updated at the next start-up of the "Yakawa Operator Station.exe".

Fig. 5-25: DAT & CND Folder

5.3 Images Folder

The Images folder contains all of the graphics and buttons displayed on the PC-HMI. Logo's, images, and footers are all contained in this folder as is the standard graphics displayed with each button or indicator. Users can add their logos, pictures/graphics, and footers as desired to this folder. The files saved here must match the names referenced in the Display.ini file.

Fig. 5-26: Images Folder
5.4 JBIs folder

The JBIs folder is updated when the "Yakawa Operator Station.exe" executes. Every time a new robot job begins, the job is downloaded from the robot controller to the PC-HMI where it is referenced for displaying the job structure and current line in the "Job" tab. No modification of this folder is required.

Fig. 5-27: JBIs Folder

5.5 Manuals folder

The Manuals folder contains all documentation desired to be displayed from the "Manuals" tab. The PC-HMI comes with a PDF viewer (FoxIt) pre-installed. However, other file formats can be displayed (DWG drawings) if an appropriate file viewer is installed. Users should place additional manuals or reference information in this folder as needed.

Fig. 5-28: Manuals Folder
6 Programming and Operation

The PC-HMI display configuration can be customized by modifying the DX Display configuration file (Display.ini). The configuration or INI file is a simple text file with a basic structure that is editable by any script, application or text editor.

The Display.ini is the initialization file for the HMI display, essentially a settings file that specifies most of the user preferences.

The basic elements contained in the configuration file are properties. These properties have a name and value delimited by an equals sign (=). The properties are grouped into sections. These sections are identified by the surrounding brackets [SECTION].

Access to the Windows XP Embedded operating system can only be reached by being logged into the robot controller at "Management" level security. A "Minimize" button appears on the tab-strip when logged into the robot controller. Pressing the minimize button allows access to the Windows operating system.

The Yaskawa Operator Station application resides in the following folder: "C:\Program Files\Motoman\Yaskawa Operator Station". Within this folder resides the "Display.ini" file, the program file executable, and the all supporting files and folders containing user files such as photos, manuals, and all job folders.

Comments can be added to the "Display.ini" file but they must be added AFTER the display configuration setting. Comments are identified by "//" prior to the comment. Comments CAN NOT exceed the line where the "//" was initially placed.

**WARNING**

- It's important that you backup the Display.ini configuration file before you edit it.

Advice on editing

- Make a backup of the original Display.ini before editing.
- Be careful. Do not change a setting if you are unfamiliar with what it does.

Example of creating a user defined tooling tab:
6 Programming and Operation

6.1 Tabs

While the entire Yaskawa Operator Station application is fully customizable using the Display.ini configuration file, the following are some of the standard tabs and entries that are commonly preset at the Yaskawa factory. This is not an exhaustive list and your system may have entries and tabs not listed here. If you have any questions regarding your specific system, refer to your system drawings or contact Yaskawa customer support.

WARNING

All modifications to the PC-HMI Display are prevented from taking effect until "committed" to using the EWF manager application. See chapter 8 "Enhanced Write Filter (EWF)".

Tab Name as displayed on tab strip

Twelve items displayed on left side of screen

Twelve items displayed on right side of screen

Photo displayed in center of screen

File Edit Format View Help

//0 = SIDE A FIXTURE
//LEFT
1 = NA
2 = NA
3 = NA
4 = OUT#0017
5 = OUT#0018
6 = OUT#0019
7 = OUT#0020
8 = NA
9 = NA
10 = NA
11 = NA
12 = NA

Comments

//Fixture Clamp 1

//Fixture Clamp 2

//Fixture Clamp 3

//Fixture Clamp 4

//Fixture Clamp 5

//Fixture Clamp 6

//Fixture Clamp 7

//Fixture Clamp 8

//Fixture Clamp 9

//Fixture Clamp 10

//Fixture Clamp 11

//Fixture Clamp 12
### Table 6-2: Display.ini Settings

<table>
<thead>
<tr>
<th>Entry</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>[CONNECTION TYPE]*</td>
<td>Identifies connection type to the robot controller</td>
<td>256</td>
</tr>
<tr>
<td>[IP ADDRESS]*</td>
<td>IP address of the robot controller. Varies based on system config</td>
<td>192.168.255.1</td>
</tr>
<tr>
<td>[SCREEN]*</td>
<td>&quot;NORMAL&quot; or &quot;MAXIMIZED&quot;</td>
<td>MAXIMIZED</td>
</tr>
<tr>
<td>[COMM START DELAY]*</td>
<td>Delay time (in seconds) before communication opens with controller (0=manual start)</td>
<td>40</td>
</tr>
<tr>
<td>[SYSTEM TYPE]*</td>
<td>Identifies system as NX100 or DX100</td>
<td>DX100</td>
</tr>
<tr>
<td>[SYSTEM NAME]*</td>
<td>Text name for system followed by e-mail address</td>
<td>Varies based on system</td>
</tr>
<tr>
<td>[SYSTEM PICTURE]</td>
<td>A photo associated with the system</td>
<td>Varies based on system</td>
</tr>
<tr>
<td>[COMPANY LOGO]</td>
<td>Company logo photo path, displayed above tab photo</td>
<td>Varies based on system</td>
</tr>
<tr>
<td>[FOOTER]</td>
<td>Footer image, displayed below tab photo</td>
<td>Varies based on system</td>
</tr>
</tbody>
</table>

**HEADER**

**DASHBOARD**

| [DASHBOARD]*               | 8 entries                                                                   |                  |

**GENERAL STATUS TABS**

| TAB = JOB SELECT          | 24 (12 left and 12 right) entries and a center image.                      |                  |
| TAB = ROBOT STATUS        | 12 items on left & 12 items on right detailing robot status               |                  |
| TAB = WELDER              | 12 items on left & 12 items on right detailing welder status              | 10 jobs for side A 10 jobs for side B                                   |

**MANUALS**

| [MANUALS]*                | 24 (12 left and 12 right) links to manuals, prints and other data.        |                  |

**APPLICATIONS**

| [APPLICATIONS]*           | 24 (12 left and 12 right) links to applications or tools loaded on the HMI.|                  |

**AUTOBACKUP**

| [AUTOBACKUP]*             | ENABLED YES, NO DAYS XX:XX AM/PM PATH D:\SysBackup EMAIL BackUpManager <backupmngr@company.com> JOBS YES, NO |                  |

**MAIL**

| [MAIL]*                   | List of email addresses to send backup confirmation and other support details. |                  |

* Required within the Display.ini file, other items are not required.
<table>
<thead>
<tr>
<th>PC-HMI Display</th>
<th>Programming and Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Tabs</td>
</tr>
</tbody>
</table>

159584-1CD
7 Adding Graphics to Screens

The PC-HMI has been designed so that users can add their own graphics, logos, and part pictures. These files can be specified for each specific tab; however, only one main graphic can be entered per tab. The screens below detail the various graphics areas and the maximum size of the graphic for each area. Graphics can be any number of common formats including JPG, BMP, GIF, and others.

- Using common graphics tools (on an external PC or Laptop), graphics can be cropped, scaled, and even combined to generate the look desired for the screen.
- All graphics must be placed in the "Images" folder of the application in order for them to be displayed on the various tabs.

The following screen format applies to ALL tabs EXCEPT the following:

- Job
- Alarms
- System Info
- BackUp
- Manuals
- External Apps

Fig. 7-30: Main & User Created Tab Graphics

Logo Image: Located at top, Max size: 500 pixels (W) X 130 pixels (H)

Main Image: Located at center, Max size: 500 pixels (W) X 400 pixels (H)

Footer Image: Located at bottom, Max size: 500 pixels (W) X 33 pixels (H)
Adding photo images to the HMI can be done with relative ease but requires an external PC application to resize the photo to the required size. If cropping of the photo is required/desired, this should be done prior to resizing using another application.

Based on what portion of the screen the image is for, set the pixel size based on the following limits:

- Logo Image: 500W x 130H
- Main Image: 500W x 400H
- Footer Image: 500W x 33H
- System Image: 400W x 400H

Once the pictures have been cropped and resized on an external PC they need to be transferred to the PC-HMI's "Images" folder where the application can access them.

Once transferred onto the HMI, they will need to be "Committed" to memory prior to rebooting the HMI or they will be lost. Open the "Advantech EWF" application and commit the changes prior to rebooting the system.
Enhanced Write Filter (EWF)

The Enhanced Write Filter (EWF) is a security feature supported by Windows XP Embedded that provides the ability to write-protect a runtime image. By redirecting all write requests to RAM, preventing any damage that might be caused by unexpected power failure, vibration, or virus attack. To learn more about this particular feature of XP Embedded, read the Enhanced Write Filter section at the Microsoft Embedded Developer Center.

The Advantech EWF Manager utility is provided to help control the EWF settings. This application can be found in the start menu under the "Advantech" program files.

Fig. 8-32: EWF Manager

By default, EWF is enabled at the factory, thereby preventing modification to any data under C volume. To make modifications to the C volume, click the {Commit} button. Because EWF manager commands are executed on the next boot, you must reboot the system for a command to take effect.

Below are some instances when the EWF settings may need to be adjusted:

1. Installing a new application programs: disable EWF (requires reboot), install application & configure, re-enable EWF (requires reboot). Any data that this application uses will need to be stored on the "D" drive or elsewhere as it will not remain resident on the "C" following a reboot once EWF is re-enabled.

2. Making changes to the "Display.ini": reboot HMI (clears any viruses or unintended changes made since last reboot), make changes to "Display.ini", once changes are complete, open the Advantech EWF Manager and press "Commit" to store the changes.

CAUTION

- Running the Yaskawa Operator Station application without enabling the EWF function is strongly discouraged.
PC-HMI Display

Enhanced Write Filter (EWF)
Accessing the Windows Operating System:

The Yaskawa Operator Station application is set to auto launch at boot-up of the HMI. Once booted, the interface prevents operators from accessing the Windows XP operating system by not allowing the user to minimize or close the application.

However, there are three ways to override this security and gain access to the Windows desktop:

1. Boot the HMI and allow it to enter the operator interface application, once connected to the robot controller, change the robot controller's security level to Management. Once in "Management" two additional tabs appear on the tab-strip. "Terminate App" and "Minimize."

   • Terminate App: closes the connection with the robot controller and closes the MotoHMI Operator Interface application completely. Once the application is closed, access to the Windows Desktop is available.

   • Minimize: Minimizes the window occupied by the MotoHMI Operator Interface application. Once minimized, access to the Windows Desktop is available.

2. Another means to access the Windows operating system is to change the "[SCREEN]" setting in the "Display.ini" file. There are two predefined setting for the "[SCREEN]" setting:

   • MAXIMIZED: causes the application to start-up in a full-screen mode where there is no option to minimize or close the application. This setting is designed for everyday use where users are not intended to access the Windows operating system.

   • NORMAL: cause the application to launch in a non-full-screen mode where the user has the ability to minimize and close the application without having to connect the robot controller. This setting is helpful and designed for use only while designing & debugging.

3. Connect a USB keyboard to the MotoHMI on one of the available USB connectors. Once the keyboard is connected, pressing any of the Window's "hot keys" will bring-up the Windows task bar and "Start" menu. From there, various applications can be launched or terminated.
Accessing the Windows Operating System:
10 Calibrating the TouchScreen

The PC-HMI Display is calibrated prior to shipment from Yaskawa. However, if the touchscreen is relocated in relation to the LCD screen, recalibration of the touchscreen may be required. Symptoms indicating that a screen recalibration is required include:

- Pressing a control on the screen but a neighboring control is actuated
- Dragging your finger or the stylus across the screen, you notice the screen cursor does not track your finger properly. Instead the cursor tracks ahead, behind, above, or below your finger or the stylus

To perform a recalibration of the touchscreen, the eGalaxTouch application must be started from within Windows.

1. Access the Windows OS by one of the methods mentioned above in Section 5.3.
2. From the "Start" menu, select the TouchScreen Control --> Configure Utility application under the "Programs" list. The eGalaxTouch: USB Controller window appears.
3. Select the "Tools" tab.
4. Select the [4-points calibration] button.
5. At this point, a red dot appears at various locations on the screen.
6. Using the provided stylus, lightly press the stylus to the center of the red bull's-eye and hold the stylus in that location until the counter goes to zero. Remove the stylus from the screen and the red bull's-eye moves to the next location.
7. Once all 4 points are calibrated, Yaskawa suggests performing a "9 point linearization" which will further enhance the performance of the touchscreen.
8. The 9-point linearization is performed much like the calibration where the bull's-eye appears and needs to be pressed for several seconds while measurements are made. Perform this test just like the calibration. The "Draw Test" button allows you to draw on the screen and test the calibration just performed. Using the stylus, draw on the screen paying attention to response of the screen in relation to the stylus.
9. Accept or recalibrate the screen based on the results of your evaluation

10. When a satisfactory calibration has been achieved, close the "eGalax Touch" application ensuring you DO NOT contact the touchscreen while the application closes and communicates with the touch controller.
11 System Job

11.1 HMI-Transfer.jbi

The PC-HMI uses a "System Job" called "HMI-Transfer.jbi" to continually transfer select data between the PC-HMI and the robot controller. The HMI does not have direct access to registers but with the use of the "Data-Transfer" job, the contents of registers are transferred to I-variables where the contents can be read by the HMI. Not only is the "HMI-Transfer" job required to get the direct content of registers but it is also used to determine the following:

- AIN#
- AOUT#
- TCPSPD#
- WLD*#

```
/JOB
//NAME HMI-TRANSFER
//POS
///NPOS 0,0,0,0,0
///INST
///DATE 2011/11/05 05:49
///ATTR SC,RW,RJ,SY
////FRAME ROBOT
////LVARS 2,1,0,2,0,0,0,0 NOP
,
' Set LB001 based on the
' the following:
,
' Analog Welder = 0
' Miller Axcess DI = 1
' Lincoln ArcLinkXT = 2
SET LB001 0
,
*TOP
' ANALOG OUTPUTS FOLLOW
GETREG I200 MREG#(560)
GETREG I201 MREG#(561)
GETREG I204 MREG#(562)
GETREG I205 MREG#(563)
GETREG I208 MREG#(564)
GETREG I209 MREG#(565)
GETREG I212 MREG#(566)
GETREG I213 MREG#(567)
DELAY 10
,
IFTHEN LB001=0
  ' ANALOG WELDER FB
  ' SET SCALERS
  SET LR000 0.427246
  SET LR001 0.0427246
  ' R1 VOLTAGE FB
  GETREG L1000 MREG#(600)
  MUL L1000 LR000
  SET L220 L1000
```

11-1
R1 CURRENT FB
GETREG L1000 MREG#(601)
MUL L1000 LR001
SET I221 L1000
R2 VOLTAGE FB
GETREG L1000 MREG#(602)
MUL L1000 LR000
SET I224 L1000
R2 CURRENT FB
GETREG L1000 MREG#(603)
MUL L1000 LR001
SET I225 L1000
R3 VOLTAGE FB
GETREG L1000 MREG#(604)
MUL L1000 LR000
SET I228 L1000
R3 CURRENT FB
GETREG L1000 MREG#(605)
MUL L1000 LR001
SET I229 L1000
R4 VOLTAGE FB
GETREG L1000 MREG#(606)
MUL L1000 LR000
SET I232 L1000
R4 CURRENT FB
GETREG L1000 MREG#(607)
MUL L1000 LR001
SET I233 L1000
ENDIF
,
IFTHEN LB001=1
,AXCESS DI WELDER FB
,R1 Voltage
GETREG I220 MREG#(123)
,R1 Current
GETREG I221 MREG#(124)
,R2 Voltage
GETREG I224 MREG#(129)
,R2 Current
GETREG I225 MREG#(130)
,R3 Voltage
GETREG I228 MREG#(143)
,R3 Current
GETREG I229 MREG#(144)
,R4 Voltage
GETREG I232 MREG#(113)
,R4 Current
GETREG I233 MREG#(114)
ENDIF
,
IFTHEN LB001=2
,LINCOLN ARCLINK XT FB
,R1 Voltage
GETREG I220 MREG#(364)
,R1 Current
GETREG I221 MREG#(365)
,R1 WFS
GETREG I222 MREG#(366)
,R1 Feeder Amps

System Job

HMI-Transfer.jbi

```
GETREG 1223 MREG#(367)

'R2 Voltage
GETREG 1224 MREG#(384)
'R2 Current
GETREG 1225 MREG#(385)
'R2 WFS
GETREG 1226 MREG#(386)
'R2 Feeder Amps
GETREG 1227 MREG#(387)

'R3 Voltage
GETREG 1228 MREG#(404)
'R3 Current
GETREG 1229 MREG#(405)
'R3 WFS
GETREG 1230 MREG#(406)
'R3 Feeder Amps
GETREG 1231 MREG#(407)

'R4 Voltage
GETREG 1232 MREG#(424)
'R4 Current
GETREG 1233 MREG#(425)
'R4 WFS
GETREG 1234 MREG#(426)
'R4 Feeder Amps
GETREG 1235 MREG#(427)
ENDIF

DELAY 10
'GET TCP SPEED FOR RBTS
'R1
GETREG I216 MREG#(595)
'R2
GETREG I217 MREG#(596)
'R3
GETREG I218 MREG#(597)
'R4
GETREG I219 MREG#(598)
DELAY 10

'CHECK FOR MASTER JOB CALL
IF THEN B100=1
   SET B100 0
   PULSE OT#(2001) T=0.05
ENDIF

'SET THE AUTO/MANUAL
IF THEN B101=1
   DOUT OT#(2002) ON
ELSE
   DOUT OT#(2002) OFF
ENDIF

'SET THE STATUS OF CHECK MODE
IF THEN B102=1
   DOUT OT#(2003) ON
ELSE
```

11-3
DOUT OT#(2003) OFF
ENDIF
DELAY 10
'
'A–SIDE JOB SELECT
'CLEAR LOCAL VARIABLE:
SET LB000 0
'ADD B120–B129 TO SEE IF ONLY
'ONE JOB IS SELECTED:
ADD LB000 B120
ADD LB000 B121
ADD LB000 B122
ADD LB000 B123
ADD LB000 B124
ADD LB000 B125
ADD LB000 B126
ADD LB000 B127
ADD LB000 B128
ADD LB000 B129
'IF MORE THAN ONE JOB
'IS SELECTED, CLEAR ALL:
IFTHEN LB000>1
    SET B120 0
    SET B121 0
    SET B122 0
    SET B123 0
    SET B124 0
    SET B125 0
    SET B126 0
    SET B127 0
    SET B128 0
    SET B129 0
ENDIF
'
'B–SIDE JOB SELECT
'CLEAR LOCAL VARIABLE:
SET LB000 0
'ADD B140–B149 TO SEE IF ONLY
'ONE JOB IS SELECTED:
ADD LB000 B140
ADD LB000 B141
ADD LB000 B142
ADD LB000 B143
ADD LB000 B144
ADD LB000 B145
ADD LB000 B146
ADD LB000 B147
ADD LB000 B148
ADD LB000 B149
'IF MORE THAN ONE JOB
'IS SELECTED, CLEAR ALL:
IFTHEN LB000>1
    SET B140 0
    SET B141 0
    SET B142 0
    SET B143 0
    SET B144 0
    SET B145 0
    SET B146 0
11.2 Verifying Execution of HMI-Transfer.jbi

The system job should execute at all times to ensure proper interfacing with the MotoHMI. Execution of the "HMI-Transfer" job can be verified by pressing the "System Job" button from the "Job" menu when in "Management" mode.

When the Data-Transfer job is running properly, the line number should be changing quickly. If it is not, the job may be locked-up or stopped by logic contained in the job itself. Note the line number where the job has stopped. To enter the actual system job and edit it, it must be set "Manual" start-up and the controller's power must be cycled before the "Select System Job" button will appear in the "Job" menu. After making changes/ additions to the system job be sure the set it back to "Automatic" start-up and cycle power to ensure it is executing before proceeding with operation.

11.3 Making changes or Additions to HMI-Transfer Job:

Changes to the system job cannot be made until execution of the job is halted. To stop the job,

1. Press the "CTRL SYSTEM JOB" button on the job screen when in management mode.
2. Change the "Start Mode" setting from "Auto" to "Manual"
3. Reboot the robot controller (the job will no longer be executing)

Once in management mode, a "SELECT SYSTEM JOB" button appears which allows access to the job contents where they can be modified or added to.
11 System Job
11.3 Making changes or Additions to HMI-Transfer Job:
12 TCP Speed Display

The PC-HMI takes advantage of the "Proportional Speed Output" function which allows the PC-HMI to display the robot's TCP speed. This function requires a one-time setting which can be done in any robot job. The function requires the operator to specify the output signal scaling in regards to TCP speed. This scaling has been pre-determined and must just be implemented as follows to ensure the proper TCP speed is sent to the PC-HMI.

Scaling = 1V per 50cm/min (700cm/min max)

Add the following command for each robot job:
R1: ARATION A0#(35) BV=1.00 V=50 OFV=0.00
R2: ARATION A0#(36) BV=1.00 V=50 OFV=0.00
R3: ARATION A0#(37) BV=1.00 V=50 OFV=0.00
R4: ARATION A0#(38) BV=1.00 V=50 OFV=0.00

Fig. 12-33: Proportional Speed Setting
PC-HMI Display

TCP Speed Display
13 Maintenance and Inspection

13.1 General Cleaning

The PC-HMI Display requires only occasional cleaning to remove dust and welding by-products. Use compressed air or vacuum, and a soft cloth (if required).

---

**WARNING**

- Before maintenance or inspection, be sure to turn OFF the main power supply, and put up a warning sign. (ex. DO NOT TURN THE POWER ON.)
  Failure to observe this warning may result in electric shock or injury.

**CAUTION**

- Maintenance and inspection must be performed by specified personnel.
  Failure to observe this caution may result in electric shock or injury.
- For disassembly or repair, contact your Yaskawa representative.
13 Maintenance and Inspection

13.1 General Cleaning
14 Illustrated Parts List

14.1 Introduction

14.1.1 Arrangement
Appendix A is arranged as follows –
• Appendix A.1 – Introduction
• Appendix A.2 – Illustrated Parts List (IPL)

14.1.2 General
The Illustrated Parts List (IPL) identifies, describes, and illustrates detail parts of the PC-HMI Display.

14.1.3 Purpose
The IPL provides parts identification and descriptive information for use in provisioning, purchasing, storing, and issuing spare parts.

14.2 Illustrated Parts List (IPL)
The Illustrated Parts List contains illustrations (exploded views) and associated parts list tables that show detail parts of a particular component, assembly, or subassembly.

14.2.1 IPL Layout
The IPL is arranged so that the illustration (exploded view) for an assembly appears directly above the parts list table for that illustration. When this is not possible, due to a large illustration or an extensive parts list table, the parts list table is listed on the facing page. This format always attempts to present the illustration and its associated parts list table to the reader in one view, regardless of viewing format (PDF or printed).

14.2.2 Item Categories Not Included in the IPL
The following item categories are not included in the IPL –
• Standard hardware items (attaching parts) such as nuts, screws, washers, etc. These are commercially available to the customer.
• Bulk items and consumables such as wire, cable, sleeving, tubing, certain fluids, etc. These are commercially available to the customer.
• Permanently attached parts that lose their identity because they are welded, soldered, riveted, etc., to other parts, assemblies, or subassemblies.

14.2.3 Parts List Table Structure
Each figure’s parts list table contains the following data columns –

- FIGURE AND ITEM NUMBER
An entry in this column gives the item number for a part shown in the associated illustration (exploded view). The item number listed in this column is the same as the item number shown on the illustration. Item numbers on the illustration are identified by a circled number and leader line that points to the particular part (item) on the illustration.
1. **MOTOMAN PART NUMBER**
   An entry in this column gives the Motoman part number for an item. Refer to this number when ordering or referencing the part.

2. **DESCRIPTION**
   An entry in this column gives the description (nomenclature) for an item number or part number.

3. **QTY**
   An entry in this column gives the total quantity of an item or part number required for an assembly or subassembly in which the part appears. The quantity given in this column may or may not be the total quantity required for the complete end item. The letters "REF" in this column indicate a reference to the top assembly in the figure.

*Fig. 14-34: Front Enclosure Assembly*
Fig. 14-35: Touchscreen Overlay

TOUCHSCREEN OVERLAY, ITEM 7, MUST BE ORIENTED SO THAT RIBBON CABLE IS FACING FRONT OF ITEM 11 ENCLOSURE AS SHOWN.

Table 1 Front Enclosure Assembly

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>158314-1</td>
<td>DISPLAY,LCD,15&quot;,800 NITS,600:1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>158347-1</td>
<td>SPACER,STANDOFF,M4 X 0.7 X 25MM</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>137972-3</td>
<td>SCREW, PPH, M3 X 10, JIS B 1188 W/CAPTIVE LOCK WASHER</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>472361-2</td>
<td>NUT, LOCK, M4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>158337-1</td>
<td>CLAMP,GLASS,15IN PC HMI</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>158358-1</td>
<td>GASKET,1/16&quot; THK X 1/4&quot; WIDE</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>158318-1</td>
<td>INTERFACE,TOUCHSCREEN OVERLAY</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>158333-2</td>
<td>CABLE ASSY,LED POWER,GREEN</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>158333-1</td>
<td>CABLE ASSY,LED,HARDWARE,RED</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>158335-1</td>
<td>ENCLOSURE,FRONT,15&quot; PC-HMI</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 2 Internal Mounting Plate Assembly

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>158279-1</td>
<td>SPACER,STANDOFF,M2.5X0.45X8MM</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>132632-2</td>
<td>SCREW, PPH, M4x0.7 X 6</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>479154-4</td>
<td>TIE MOUNT</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>400828-1</td>
<td>TIE,CABLE,PLASTIC, 3 7/8&quot;</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>137146-2</td>
<td>SCREW,PPH,M4 X 8,JIS B 1188</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>137973-2</td>
<td>SCREW, PPH, M3 X 8</td>
<td>8</td>
</tr>
<tr>
<td>17</td>
<td>158366-1</td>
<td>SPACER, NYLON,ROUND, INSULATING</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>158313-2</td>
<td>DRIVER,LED,CC/CV,LCD BACKLIGHT</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>158317-2</td>
<td>POWER SUPPLY,60W,90-264VAC IN</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>158338-1</td>
<td>PANEL, MTG, INTERNAL,PC-HMI</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>158342-1</td>
<td>SCREW,PPH,M4 X 07 X 8</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>158309-2</td>
<td>BOARD, PC, MEMORY, 2G RAM,SBC</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>158308-2</td>
<td>BOARD, PC, MINI ITX, DUAL CORE</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>158319-2</td>
<td>INTERFACE, CONTROLLER, TOUCH</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>158343-1</td>
<td>SCREW, PPH, M2.5 X 0.45 X 4</td>
<td>2</td>
</tr>
</tbody>
</table>
Fig. 14-37: Internal Panel Mounting Assembly
### Table 3 Internal Panel Mounting Assembly

<table>
<thead>
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<th>ITEM NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>137973-1</td>
<td>SCREW,PPH,M3X5,JIS B 1188</td>
<td>3</td>
</tr>
<tr>
<td>27</td>
<td>158137-1</td>
<td>CABLE ASSY,TOUCH CONTROLLER</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>158311-1</td>
<td>CABLE ASSY,DUAL USB TO SBC,230MM</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>704148-23</td>
<td>CABLE,RJ45,CAT5E,PATCH,GREY</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>158136-1</td>
<td>CABLE ASSY,LCD,OP-STATION</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>158133-2</td>
<td>CONNECTOR,DUAL-ROW,2.54MM</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>158330-1</td>
<td>CABLE ASSY,LCD,POWER,SIGNAL</td>
<td>1</td>
</tr>
<tr>
<td>33</td>
<td>158315-1</td>
<td>CABLE ASSY,LCD BACKLIGHT,150MM</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>158310-1</td>
<td>BOARD,PC,MEMORY,8GIG CF FLASH</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>158341-1</td>
<td>SOFTWARE PACKAGE,OS INSTALL &amp; TEST SETUP</td>
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<td>36</td>
<td>158320-1</td>
<td>SOFTWARE,WINDOWS EMBEDDED,STD 2009</td>
<td>1</td>
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</tbody>
</table>

*Fig. 14-38: Rear Enclosure*
### Table 4 Rear Enclosure

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>Qty</th>
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<tbody>
<tr>
<td>37</td>
<td>158339-1</td>
<td>BRACKET,MTG,15&quot; PC-HMI</td>
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</tr>
<tr>
<td>38</td>
<td>137147-3</td>
<td>SCREW,PPH,M5X10,JIS B 1188</td>
<td>4</td>
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<tr>
<td>39</td>
<td>158340-2</td>
<td>HEAT SINK,ALUMINUM,EXTRUDED</td>
<td>1</td>
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<tr>
<td>40</td>
<td>137146-4</td>
<td>SCREW,PPH,M4X12,WCAPITIVE LOCK &amp; FLAT</td>
<td>24</td>
</tr>
<tr>
<td>41</td>
<td>158340-1</td>
<td>HEAT SINK,ALUMINUM,EXTRUDED</td>
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<tr>
<td>42</td>
<td>158334-1</td>
<td>CABLE ASSY,PUSHBUTTON,RESET</td>
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<td>43</td>
<td>158329-1</td>
<td>PLUG,ETHERNET,PANEL MNT</td>
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<td>44</td>
<td>158312-1</td>
<td>CONNECTOR,USB TYPE-A,PANEL MNT</td>
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<td>45</td>
<td>158305-1</td>
<td>COVER,ETHERNET CONNECTOR,IP68 SEALING CAP</td>
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<td>46</td>
<td>157942-1</td>
<td>CABLE,ETHERNET,8-WIRE,M12-RJ45</td>
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<tr>
<td>47</td>
<td>158493-1</td>
<td>CABLE ASSY,POWER WITH SPARES</td>
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<td>48</td>
<td>158336-1</td>
<td>ENCLOSURE,REAR,15&quot; PC-HMI</td>
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<tr>
<td>49</td>
<td>158357-1</td>
<td>PAD,THERMAL,150MMX150MMX3.0MM</td>
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<td>158443-4</td>
<td>LABEL,ROBOT,YASKAWA MOTOMAN</td>
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<td>51</td>
<td>158982-1</td>
<td>ACTUATOR,STYLUS,RUBBER TIPPED</td>
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<tr>
<td>52</td>
<td>134292-1</td>
<td>SCREW, PPH, M3 X 5</td>
<td>2</td>
</tr>
</tbody>
</table>
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YASKAWA

Specifications are subject to change without notice for ongoing product modifications and improvements.

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