



Human Machine Interface Application Specification

Global Common

SD-1020

ISSUED	July 01, 2004
REVISED	December 02, 2011

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1. SCOPE

- 1.1. The intent of this document is to provide specifications to Original Equipment (OEM) Manufacturers in their design of programmable operator interfaces, also known as Human-Machine Interfaces (HMI's). This document establishes common screen layouts for improved operator familiarity with equipment interfaces.
- 1.2. The screens listed on this document shall be standard in all equipment designed and built by OEMs. Modifications to these screens shall be done only when the application requires it.
- 1.3. These standard screens were developed for HMI's with only "touch screen" capabilities. Consequently, all functions are assigned to touch screen buttons.
- 1.4. HMI templates are located on nexteerdatabase.com for various HMI's called out on our preferred components list. These templates provide the basis for implementing the requirements stated in this document. In addition, these templates were created to work in conjunction with the PLC templates also located on the website.
- 1.5. This document is not intended for off-the-shelf equipment (SD-010) or for HMI's associated with CNC equipment, as those HMI's are typically equipment specific.
- 1.6. The general principles embodied in this specification are applicable to the different brands of HMI's currently available in the market.
- 1.7. The use of the word "shall" indicates requirements and the use of the word "should" indicates recommendations. The use of the word "may" indicates permission or allowance and the use of the word "can" indicates a possibility.

2. CONTROL FUNCTIONS EXTERNAL TO THE HMI

- 2.1. Some operator interface functions shall always be done by means of hardwired control devices. Typically, these include:
 - Master Start Pushbutton (Control Power On)
 - Master Stop Pushbutton (Control Power Off)
 - Control Power On Light
 - E-Stop Pushbutton(s)

3. HMI PART NUMBERS

- 3.1. The touch screen HMI models listed in the SD-007, Approved Components List, shall be used.

- 3.2. Any deviation from the above HMI model specifications and configuration requires the approval of the Nexteer Controls Engineer for the project.

4. PROGRAMMING SOFTWARE REQUIREMENTS

- 4.1. The software version specified in SD-007 shall be used.

5. GENERAL CONFIGURATION REQUIREMENTS

The following requirements are changes to default settings in Panelview Plus HMI's and apply to all other brand HMI's.

- 5.1. Screen-saver mode shall be turned off (disabled).
- 5.2. Cursor shall be turned off (disabled).
- 5.3. The application shall include a means of accessing the HMI's parameter/configuration menu. This feature is built into a Proface application. A "Goto Configure Mode" button for Allen Bradley HMI's would be used for this.
Note: This button should be password protected.

6. LANGUAGE REQUIREMENTS

- 6.1. There shall be two language options provided with the machine's HMI, one being English and the other being the native language of the machine's destination.
- 6.2. The language options shall be selectable from the Directory Screen, simply by pressing a button for the desired language. By pressing the desired language button all text in the application shall convert to the new language. Nexteer may have native plant site engineers available to assist in the translation requirements; however, the ultimate responsibility lies with the OEM. *Note: The HMI's on our preferred components list offer language change functionality that eliminates the need for redundant or duplicate screens to accomplish this feature.*

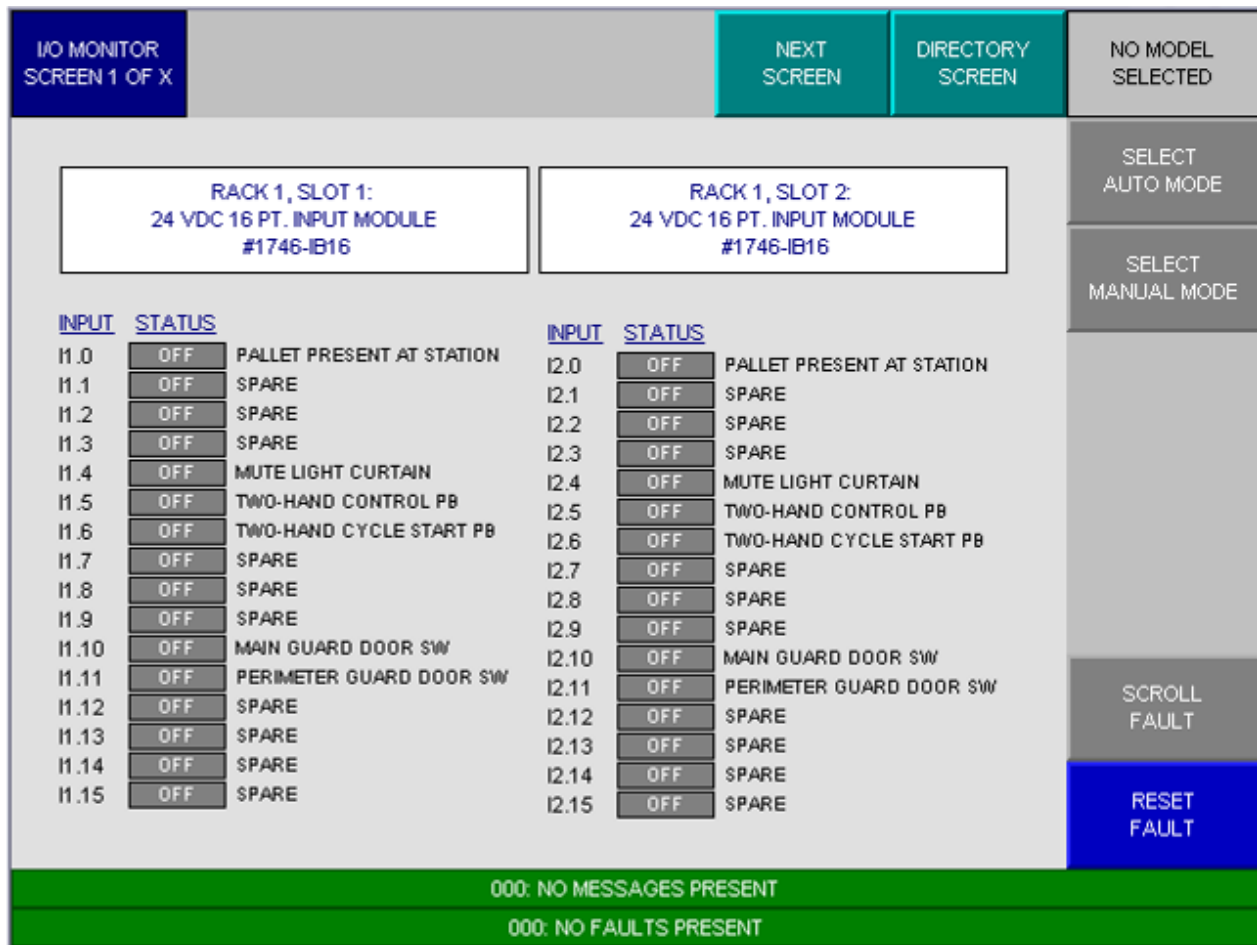
7. PASSWORDS

- 7.1. Password protection should not be required for common screens including commonly changed limits. Limits that an operator needs to change should be placed on the Change Limits Screen described in a later section.

- 7.2. Password protection is allowed for access to part recipe data, machine setup parameters, some counter resets, and any functions determined by Nexteer Engineer.

8. GENERAL SCREEN REQUIREMENTS

- 8.1. Pop-up Windows shall not be used. This does not apply to built-in pop-ups like keypads for settable values or password entry.
- 8.2. A screen displaying the OEM's address and phone number may be included in the Directory but shall be accessible only if selected by the operator.
- 8.3. All screens shall have their names put in a screen name box at the top, left-hand corner of the screen. When multiple screens are used for the same display function the screen name box shall also say "SCREEN X OF Y", where X and Y are integers. For example: "MANUAL CONTROL SCREEN 2 OF 3."
- 8.4. Date and time should not be displayed unless they are important to the process or the selected screen. The PLC time shall be displayed for this function, and not the HMI's internal clock.
- 8.5. When two screens for the same screen function are required, screen access pushbuttons, Previous Screen and Next Screen, shall be added to the right of the screen name box to navigate between the screens. When more than two screens are required, the pushbuttons shall operate as follows. If the first of three screens is being displayed, the Previous Screen pushbutton shall point to the third of the three screens. If the third of three screens is being displayed, the Next Screen" pushbutton shall point to the first of the three screens. (See *Screen Shot 1 of x for PLC I/O Showing Previous & Next Screen Selection below*).



Screen Shot: PLC I/O Showing Previous & Next Screen Selections

- 8.6. All screens shall have a Directory Screen pushbutton near the upper right-hand corner. The directory screen shall be accessible from every screen.
- 8.7. Fault and machine messages shall appear on every screen, unless specifically noted below.
- 8.8. Changes in machine state shall not be indicated by changes in color alone. Machine states (conditions) shall be indicated by both color and unique text.
- 8.9. The colors used for pushbuttons, pilot lights, and screens shall conform to the current version of IEC 60204-1. In the absence of clear direction, pushbuttons should be gray in color. Any exceptions to this rule will be illustrated through out this document.
- 8.10. Font size and type used should be consistent with that used in our sample templates. Minimum font allowed shall be Arial 8pt.
- 8.11. Pushbuttons shall be momentary. Maintained or latched pushbuttons shall not be used.

9. HMI DESCRIPTIONS

- 9.1. All descriptions used on the operator interface shall agree with the descriptions used in the PLC. For example, if the HMI has a pushbutton labeled "RAISE DRILL SLIDE", the PLC input bit description shall be "Raise Drill Slide HMI-PB".
- 9.2. Use of abbreviations should be avoided.

10. REQUIRED SCREENS

- 10.1. The following is a list of required screens. Other screens may need to be developed for process related control. Each screen and its objects will be described in detail in sections that follow.
 - Directory
 - Manual Control
 - Automatic Cycle
 - Counters
 - PLC Input/Output Monitor
 - Clean Touch-Screen

11. ADDITIONAL SCREENS

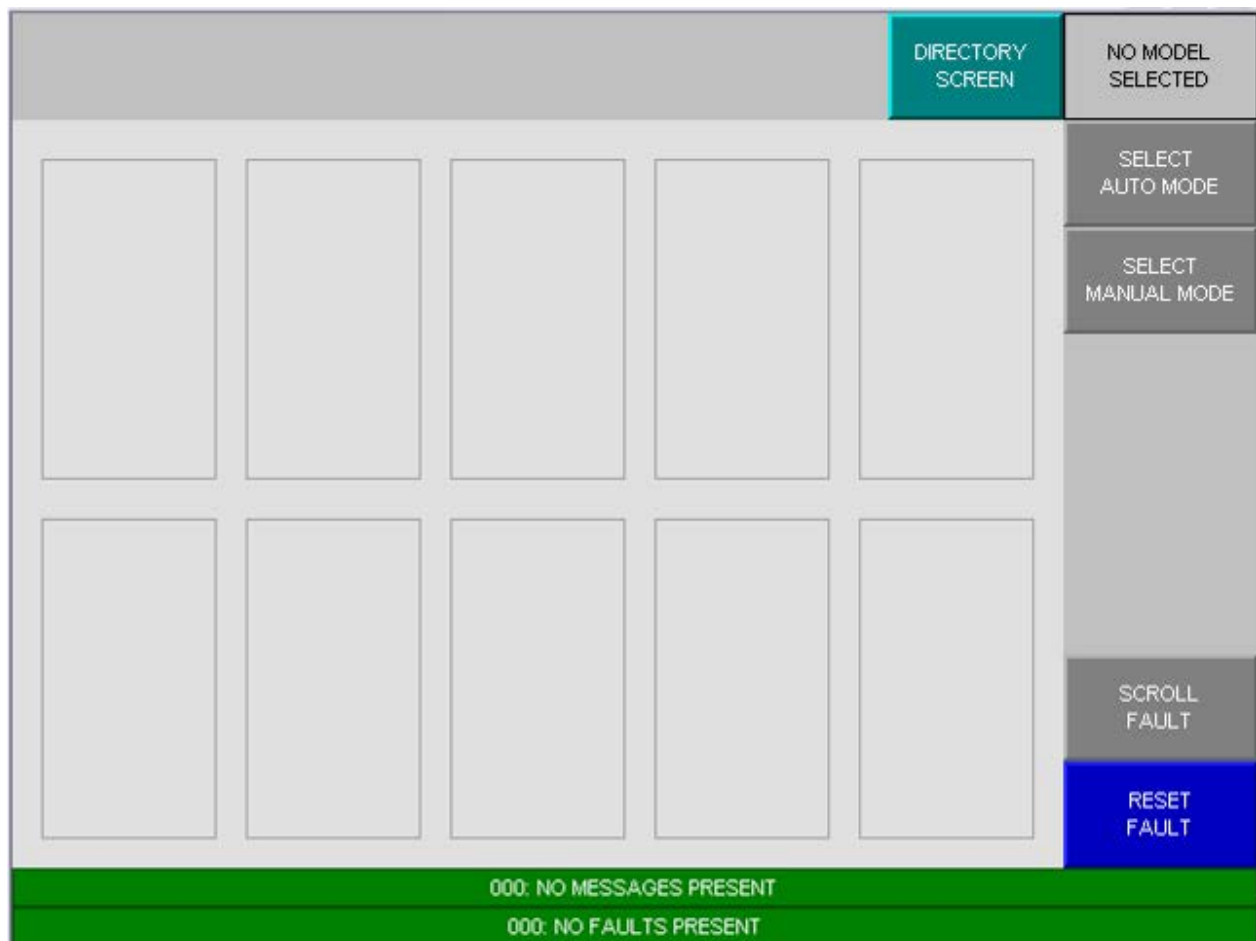
- 11.1. Additional screens may be required for process related control. Some examples of these screens are included in our sample templates. Contact the Nexteer Engineer to determine the applicable screens.

12. COMMON (GLOBAL) SCREEN FEATURES

- 12.1. The following display boxes, pushbuttons, and lights shall be present on all screens, except the Clean Screen. They shall have the same colors and appear at the same location on every screen. Any exceptions to this will be explained in the individual screen descriptions section. (See *Screen Shot below*)
 - Directory Screen Pushbutton
 - Current Model Text Object
 - Manual Mode Pushbutton

- Auto Mode Pushbutton
- Fault Messages Display
- Machine Messages Display
- Fault Reset Pushbutton
- Fault Scroll Pushbutton

Note: The HMIs in SD-007 provide a “Global” configuration feature to expedite the implementation of these common function buttons and message displays.



Screen Shot: Global Objects

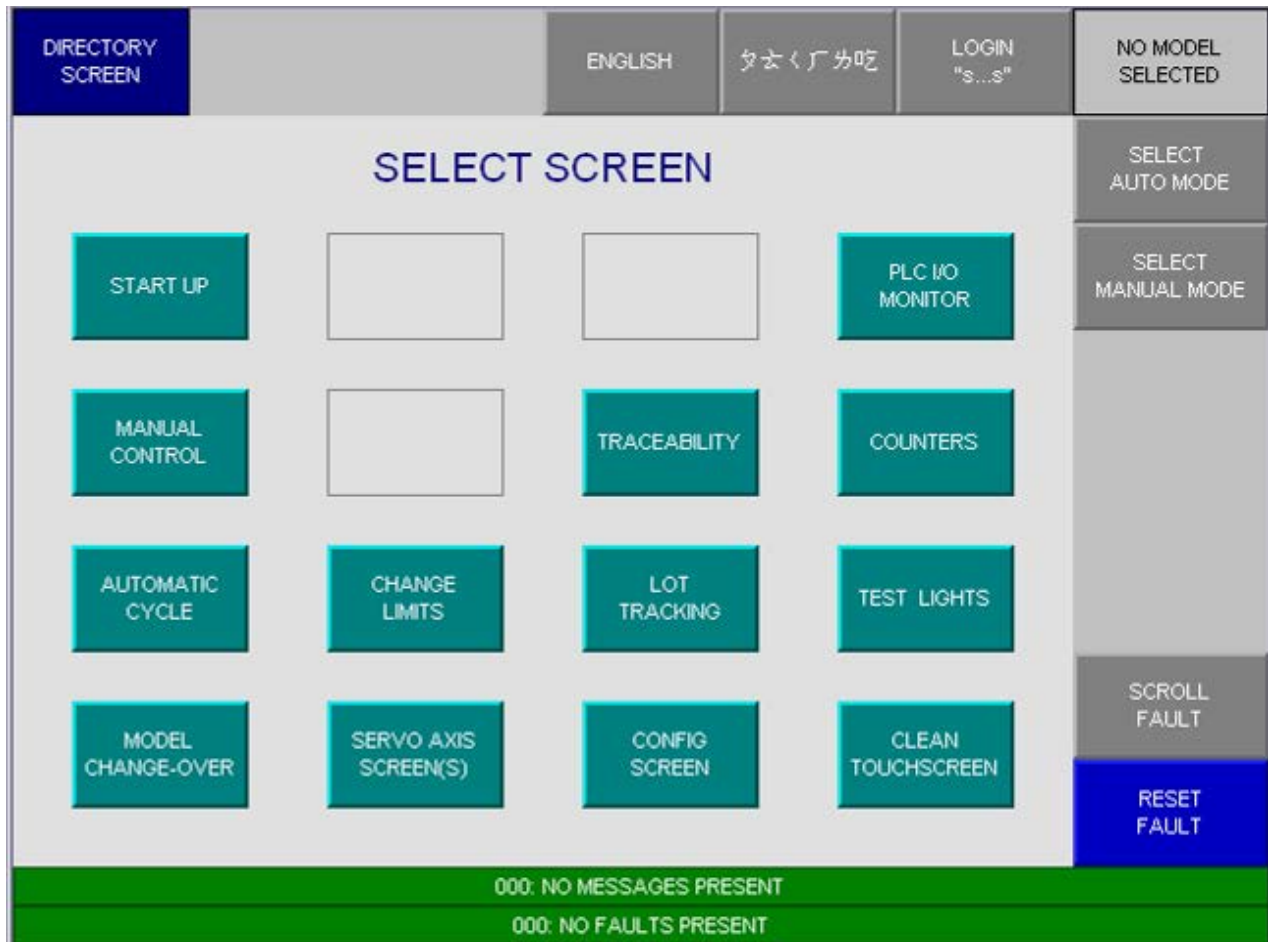
- 12.2. A pushbutton that provides access to the Directory Screen shall be provided. This shall be located to the right of the screen name box and to the left of the current model text object.
- 12.3. An indicator in the upper right-hand corner of the screen shall be provided to indicate the current model selected.

- 12.4. Two pushbuttons shall be provided for selecting the mode of the machine.
 - 12.4.1. A Manual Mode button shall be provided to request a change to manual mode. When manual mode is enabled in the PLC, the pushbutton shall change color and indicate "MANUAL MODE SELECTED". *Note: When manual mode is selected the PLC may command the HMI to display the first Manual Screen.*
 - 12.4.2. An Automatic Mode button shall be provided to request a change to automatic mode. When automatic mode is enabled in the PLC, the pushbutton shall change color and indicate "AUTOMATIC MODE SELECTED". *Note: When automatic mode is selected the PLC may command the HMI to display the Automatic Cycle Screen.*
- 12.5. A single-line fault indicator across the entire length of the bottom of the screen shall be provided.
 - 12.5.1. When no faults are present, the box shall have white text with a green background and the text "NO FAULTS PRESENT" indicated.
 - 12.5.2. When a fault is present, the box shall have white text with a red background and the specific fault indicated. *Typical example: "001: Emergency Stop Detected".*
 - 12.5.3. The fault text shall include the fault number for debug purposes.
 - 12.5.4. The logic requirements for fault control and display are covered in SD-1032.
- 12.6. If provided, a single-line machine message indicator shall be across the entire length of the screen just above the fault message indicator.
 - 12.6.1. When no messages are present, the box shall have white text with a green background and the text "NO MESSAGES PRESENT" indicated.
 - 12.6.2. When a message is present, the box shall have black text with a yellow background and the specific message indicated. *Typical message examples: "001: Bowl Feeder Low", "002: Part Conveyor Full", "003: Lube Level Low".*
 - 12.6.3. When control power is turned OFF, an "xxx: CONTROL POWER IS OFF" message shall be indicated.
 - 12.6.4. The message text shall include the message number for debug purposes.
 - 12.6.5. The logic requirements for message control and display are covered in SD-1032.

- 12.7. A Reset Fault pushbutton shall be provided to clear only the displayed fault and only if the conditions generating that fault no longer exist and the machine is out of cycle.
- 12.8. A Scroll Fault pushbutton shall be provided to allow an operator to scroll from one fault to another when multiple faults are present. However, it shall not reset the fault(s).

13. DIRECTORY SCREEN

- 13.1. This section refers to the *Directory Screen Shot* below



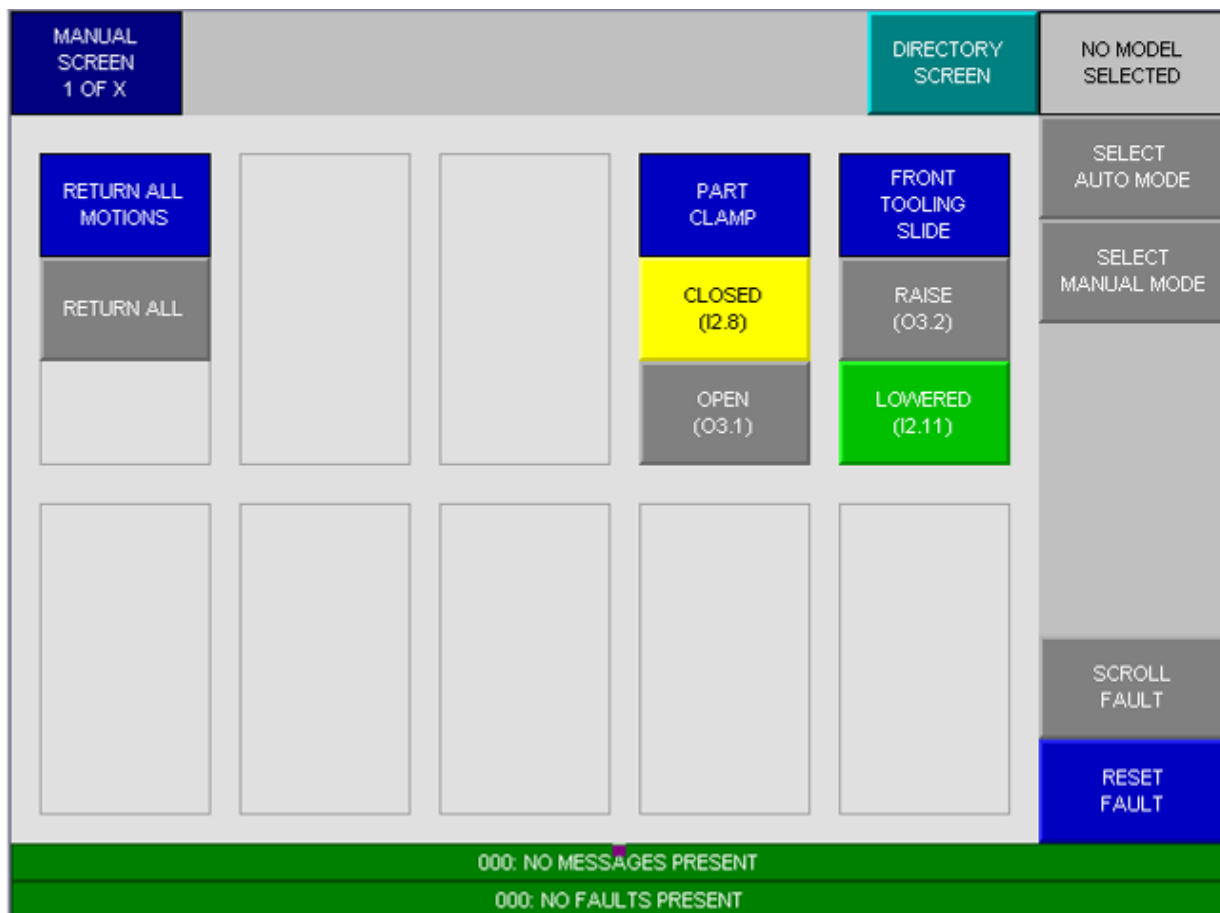
Screen Shot: Directory Screen

- 13.1. The HMI shall be programmed so upon power up the initial screen is the Directory Screen.
- 13.2. The screen name box, in the upper left-hand corner of the screen, shall contain the text "DIRECTORY SCREEN".

- 13.3. Screen change pushbuttons, with appropriate and descriptive labels, shall be provided to access all screens.
- 13.4. In the event that a screen function has multiple screens for that function, pressing the screen change pushbutton for that function shall take the user to the first of the multiple screens.
- 13.5. The Language Control buttons shall be shown to the right of the screen name box.
- 13.6. If an application requires password protection, user Login/Logout pushbuttons shall appear next to the language control buttons. The currently logged in user shall be displayed as text on these buttons. The user login shall be setup to be automatically logged out after a maximum of 5 minutes of inactivity.

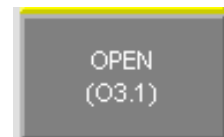
14. MANUAL CONTROL SCREEN

- 14.1. This section refers to the *Manual Screen Shot* below.



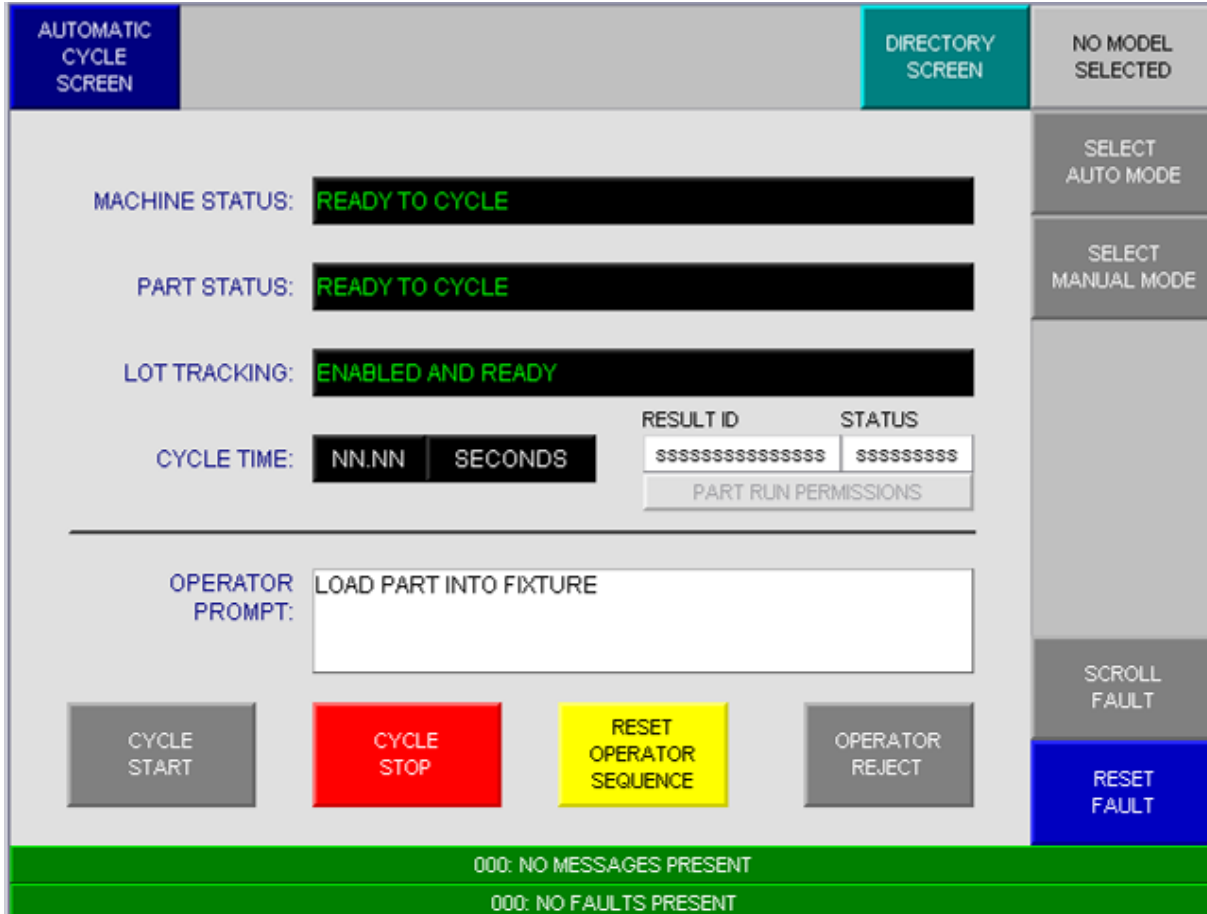
Screen Shot: Manual Screen

- 14.2. The screen name box, in the upper left-hand corner, shall contain the text "MANUAL CONTROL SCREEN 1 of x".
- 14.3. The typical manual function consists of three (3) objects grouped vertically. The behavior of each object shall be as follows:
- 14.4. The top object shall be a text object with description of the motion. The text and color of the tag shall be static.
- 14.5. The middle object shall be a momentary pushbutton and have two states based on the motion's sensor.
- 14.5.1. State "0" (sensor OFF) shall use white text on a gray background to indicate the motion is not at this position.
- 14.5.2. State "1" (sensor ON) shall use black text on a yellow background to indicate the motion has completed.
- 14.6. The bottom object shall be a momentary pushbutton and have two states based on the motion's sensor.
- 14.6.1. State "0" (sensor OFF) shall use white text on a gray background to indicate the motion is not at this position.
- 14.6.2. State "1" (sensor ON) shall use white text on a green background to indicate the motion has completed. This indicates the normal start (home) position.
- 14.7. The manual control functions should be organized based on the sequence of a normal automatic cycle of the machine.
- 14.8. Return All Motions pushbutton is used to return the machine to its home or start position. At a minimum, this button shall appear on the first manual screen.
- 14.9. A Test Lights pushbutton shall be provided on this screen, if it is necessary to provide a light test feature for hardwired pilot lights and/or operator indicator lights. This button shall appear on the first manual screen.



15. AUTOMATIC CYCLE SCREEN

15.1. This section refers to *Automatic Cycle Screen* below.




The screenshot shows the 'AUTOMATIC CYCLE SCREEN' interface. At the top left is a blue box labeled 'AUTOMATIC CYCLE SCREEN'. To its right is a teal box labeled 'DIRECTORY SCREEN'. Further right is a grey box labeled 'NO MODEL SELECTED'. Below these are two buttons: 'SELECT AUTO MODE' and 'SELECT MANUAL MODE'. The main area displays 'MACHINE STATUS: READY TO CYCLE' in green text on a black background, followed by 'PART STATUS: READY TO CYCLE' in green text on a black background, and 'LOT TRACKING: ENABLED AND READY' in green text on a black background. Below these is a 'CYCLE TIME' section with 'NN.NN' and 'SECONDS' in black boxes. To the right of this is a table with 'RESULT ID' and 'STATUS' headers, both containing '\$\$\$\$\$\$\$\$\$\$\$\$\$\$'. Below the table is a grey box labeled 'PART RUN PERMISSIONS'. A horizontal line separates this from the 'OPERATOR PROMPT' section, which shows 'LOAD PART INTO FIXTURE' in a white box. At the bottom are four buttons: 'CYCLE START' (grey), 'CYCLE STOP' (red), 'RESET OPERATOR SEQUENCE' (yellow), and 'OPERATOR REJECT' (grey). On the far right, there are two more buttons: 'SCROLL FAULT' (grey) and 'RESET FAULT' (blue). At the very bottom, a green bar contains the text '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

Screen Shot: Automatic Cycle

15.2. The screen name box, in the upper left-hand corner, shall contain the text "AUTOMATIC CYCLE SCREEN".

15.3. As a minimum, this screen shall indicate the following:

- 15.3.1. A Machine Status indicator that should include the following states. "FAULTED" in red text. "NOT AT HOME POSITION", "AUTOMATIC MODE NOT SELECTED", "PART NOT LOADED", and "IN CYCLE" in yellow text. "READY TO CYCLE" and "CYCLE COMPLETE" in green text.



A close-up of the 'MACHINE STATUS' indicator, showing the text 'MACHINE STATUS: READY TO CYCLE' in green on a black background.

- 15.3.2. A Part Status indicator that should include the following states. "REJECT" in red text. "NOT PRESENT" and "BEING PROCESSED" in yellow text. "PRESENT" and "ACCEPT" or "GOOD" in green text.



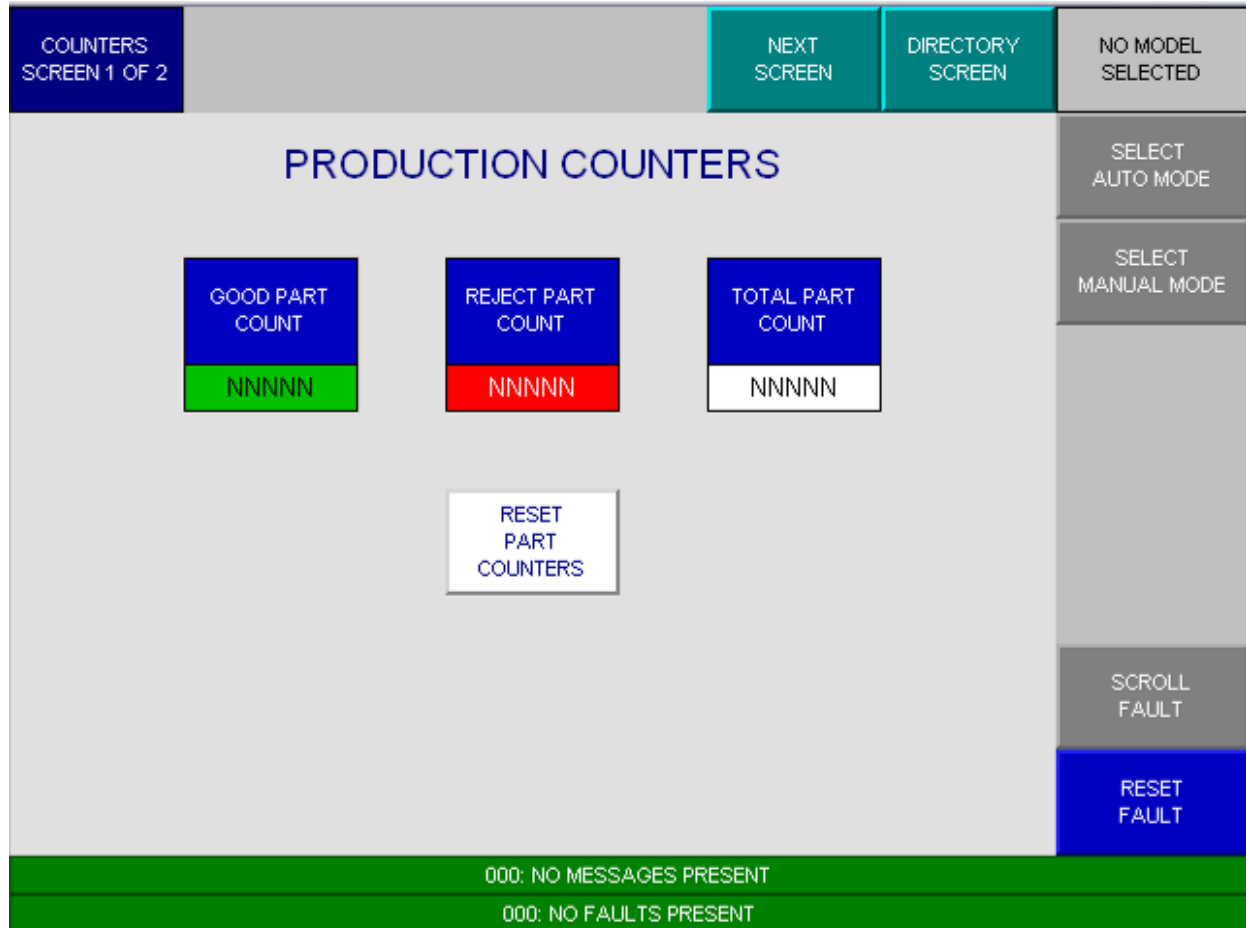
- 15.3.3. An overall machine Cycle Time numeric display labeled, “CYCLE TIME”
The last value of machine cycle time shall be displayed until the next cycle begins. The value should be to two decimal point accuracy as shown below.



- 15.4. Depending on the type of process, additional indicators or pushbuttons may be included. The following are some examples.
- 15.4.1. A Lot Tracking status indicator provides the operator with an indication on the status of material quantities being used to build the part. For example, “UPPER SHAFT LOW” in yellow text, “MAGNETS EMPTY” in red text. “ENABLED AND READY” in green text.
- 15.4.2. The Traceability status indicators: Result ID, Part Status, and Operation status indicator are added for application that require traceability or part tracking.
- 15.4.3. An Operator Prompt indicator giving instructions as to what needs to be done next. For example, “LOAD PART INTO FIXTURE”, “HIT CYCLE START SWITCH”, REMOVE PART FROM FIXTURE”, etc. The current prompt message shall be displayed until the process step is completed. Responses to incorrect process steps by operators shall not be displayed in this window. Fault message windows and machine message indicators shall be used for such communication. The prompt indicator messages shall be black text on white background.
- 15.4.4. A Reset Operator Sequence pushbutton is used to abort the process immediately and allows re-start of the sequence of operations. *Note: This typically applies to manually intensive assembly benches.*
- 15.4.5. An Operator Reject pushbutton is used to stop the processing of the part, assigns a reject status to the part and releases the part to the conveyor.
- 15.4.6. A Cycle Start pushbutton may be included on automatic cycling machines that do not have a hardwired start button.
- 15.4.7. A Cycle Stop pushbutton may be included to stop the machine at its normal start or home position at the end of its current cycle. *Note: This applies to continuous cycle machines.*
- 15.4.8. A Return All Motions pushbutton may be included to return the machine to its home or start position.

16. COUNTERS SCREEN

16.1. This section refers to *Counters Screen Shots* below.



The screenshot displays the 'COUNTERS SCREEN 1 OF 2'. At the top, there are navigation buttons: 'NEXT SCREEN' and 'DIRECTORY SCREEN'. To the right, a vertical menu includes 'NO MODEL SELECTED', 'SELECT AUTO MODE', 'SELECT MANUAL MODE', 'SCROLL FAULT', and 'RESET FAULT'. The main area is titled 'PRODUCTION COUNTERS' and features three large counters: 'GOOD PART COUNT' (displaying 'NNNNN'), 'REJECT PART COUNT' (displaying 'NNNNN'), and 'TOTAL PART COUNT' (displaying 'NNNNN'). Below these is a 'RESET PART COUNTERS' button. At the bottom, a green status bar shows '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

Screen Shot: Counters

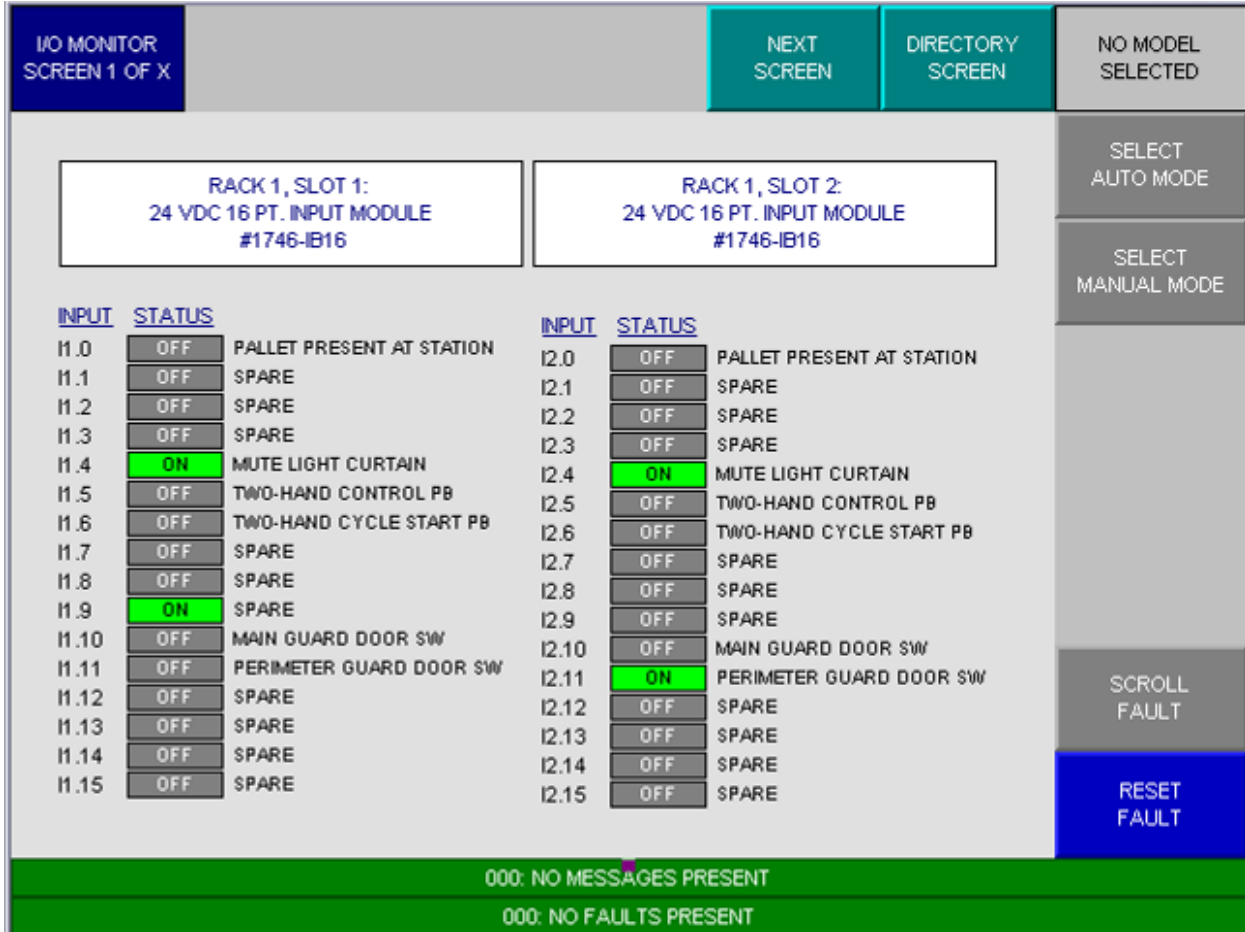
- 16.2. The screen name box, in the upper left-hand corner, shall contain the text "COUNTERS SCREEN".
- 16.3. This screen shall have the following reset-able counters: Good Parts, Reject Parts, and Total Parts.
- 16.4. Other reset-able counters may also be added to this screen or a separate screen as dictated by the process. See sample screen shot below.
 - 16.4.1. Tool cycle counters may be used to monitor tool life. If the count gets close to the set-point an alarm for tool replacement would be issued. This shall be reset-able as specified by the Nexteer Engineer.
 - 16.4.2. A separate Reset pushbutton for each Tool Cycle Counter shall be provided.

COUNTERS SCREEN 2 OF 2	PREVIOUS SCREEN		DIRECTORY SCREEN		NO MODEL SELECTED
<h3>TOOL COUNTERS</h3> <div> <div> <div>STATION 03 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 03 COUNTER</div> </div> <div> <div>STATION 04 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 04 COUNTER</div> </div> <div> <div>STATION 05 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 05 COUNTER</div> </div> <div> <div>STATION 06 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 06 COUNTER</div> </div> </div> <div> <div> <div>STATION 07 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 07 COUNTER</div> </div> <div> <div>STATION 08 TOOL CYCLES COMPLETED</div> <div>NNNNN</div> <div>RESET STATION 08 COUNTER</div> </div> <div></div> <div></div> </div>					SELECT AUTO MODE
					SELECT MANUAL MODE
					SCROLL FAULT
					RESET FAULT
000: NO MESSAGES PRESENT					
000: NO FAULTS PRESENT					

Screen Shot: Tool Counters

17. I/O MONITOR SCREEN

17.1. This section refers to *PLC I/O Monitor Screen Shots* below.



The screenshot displays the 'I/O MONITOR SCREEN 1 OF X'. It features two main sections for Rack 1, Slot 1 and Rack 1, Slot 2, both containing 24 VDC 16 PT. INPUT MODULE #1746-IB16. Each section lists 16 inputs (I1.0 to I1.15 and I2.0 to I2.15) with their status (OFF or ON) and a description. The status indicators are green for 'ON' and gray for 'OFF'. A 'RESET FAULT' button is visible on the right side. The bottom status bar shows '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

INPUT	STATUS	DESCRIPTION
I1.0	OFF	PALLET PRESENT AT STATION
I1.1	OFF	SPARE
I1.2	OFF	SPARE
I1.3	OFF	SPARE
I1.4	ON	MUTE LIGHT CURTAIN
I1.5	OFF	TWO-HAND CONTROL PB
I1.6	OFF	TWO-HAND CYCLE START PB
I1.7	OFF	SPARE
I1.8	OFF	SPARE
I1.9	ON	SPARE
I1.10	OFF	MAIN GUARD DOOR SW
I1.11	OFF	PERIMETER GUARD DOOR SW
I1.12	OFF	SPARE
I1.13	OFF	SPARE
I1.14	OFF	SPARE
I1.15	OFF	SPARE

INPUT	STATUS	DESCRIPTION
I2.0	OFF	PALLET PRESENT AT STATION
I2.1	OFF	SPARE
I2.2	OFF	SPARE
I2.3	OFF	SPARE
I2.4	ON	MUTE LIGHT CURTAIN
I2.5	OFF	TWO-HAND CONTROL PB
I2.6	OFF	TWO-HAND CYCLE START PB
I2.7	OFF	SPARE
I2.8	OFF	SPARE
I2.9	OFF	SPARE
I2.10	OFF	MAIN GUARD DOOR SW
I2.11	ON	PERIMETER GUARD DOOR SW
I2.12	OFF	SPARE
I2.13	OFF	SPARE
I2.14	OFF	SPARE
I2.15	OFF	SPARE

Screen Shot: PLC I/O Monitor

- 17.2. The screen name box, in the upper left hand corner, shall contain the text "PLC I/O MONITOR SCREEN."
- 17.3. The screen shall monitor and display the status of all inputs and outputs used by the PLC.
- 17.4. The status indicator shall have two states. State "0" (sensor OFF) shall use white text on a gray background. State "1" (sensor ON) shall use white text on a green background. *Note: The functional description for each I/O point is not required, but is allowed.*
- 17.5. Screens for each analog module shall be provided to indicate analog I/O values. The raw and scaled values shall be shown. The raw and scaled value ranges shall be shown.

I/O MONITOR SCREEN 3 OF X	PREVIOUS SCREEN	DIRECTORY SCREEN	NO MODEL SELECTED
---------------------------------	--------------------	---------------------	----------------------

RACK 1, SLOT 4:
4-CH CURRENT/VOLTAGE ANALG IN
#1769-IF4

INPUT I4[0] : Upper Press Stroke Distance
Distance (0-50.0 mm):
Raw Value A/D:

INPUT I4[0] : Upper Press Load
Distance (0-50.0 mm):
Raw Value A/D:

INPUT I4[0] : Lower Press Stroke Distance
Distance (0-50.0 mm):
Raw Value A/D:

INPUT I4[0] : Lower Press Load
Distance (0-50.0 mm):
Raw Value A/D:

SELECT
AUTO MODE

SELECT
MANUAL MODE

SCROLL
FAULT

RESET
FAULT

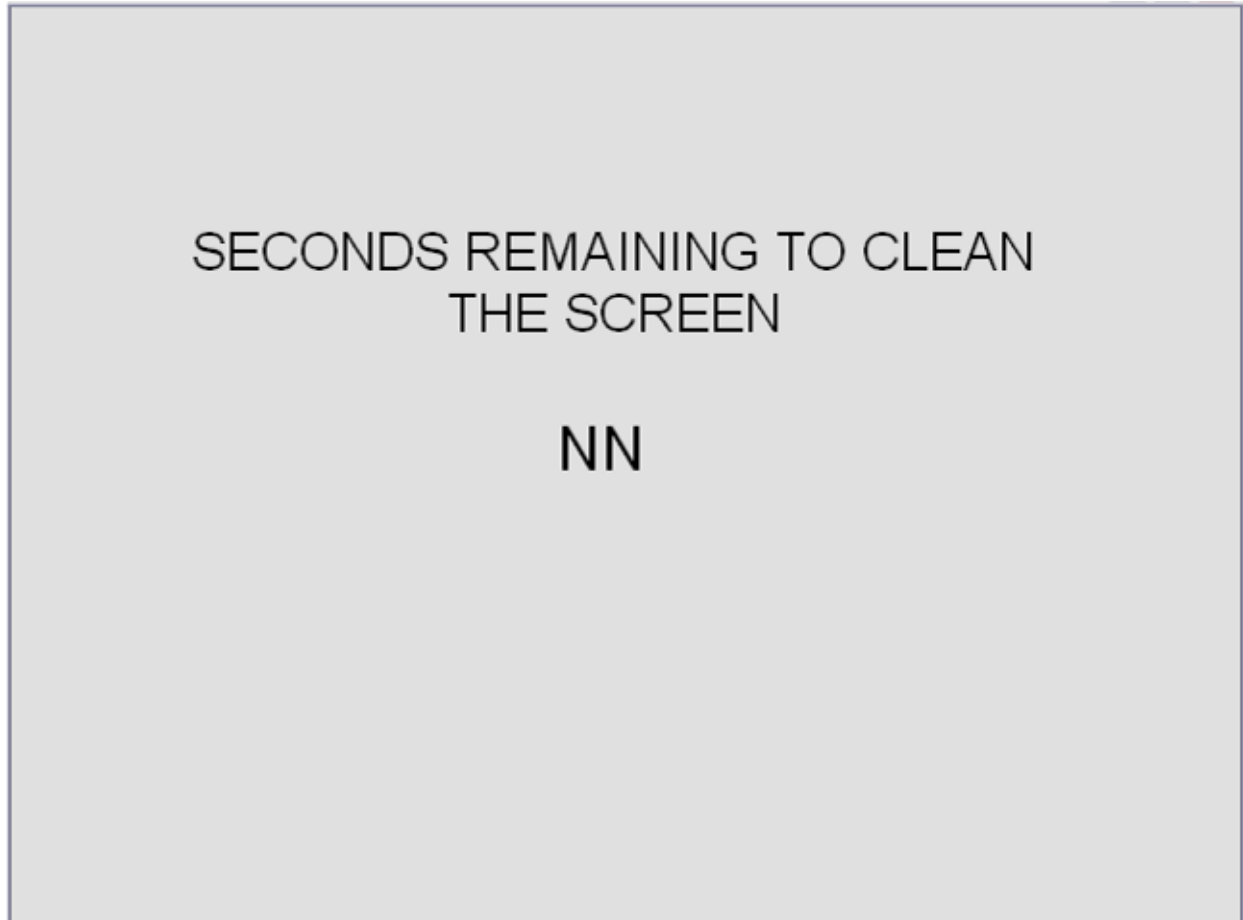
000: NO MESSAGES PRESENT

000: NO FAULTS PRESENT

Screen Shot: PLC Analog I/O Monitor

18. CLEAN TOUCHSCREEN SCREEN

18.1. This section refers to *Clean TouchScreen Screen Shot* below.

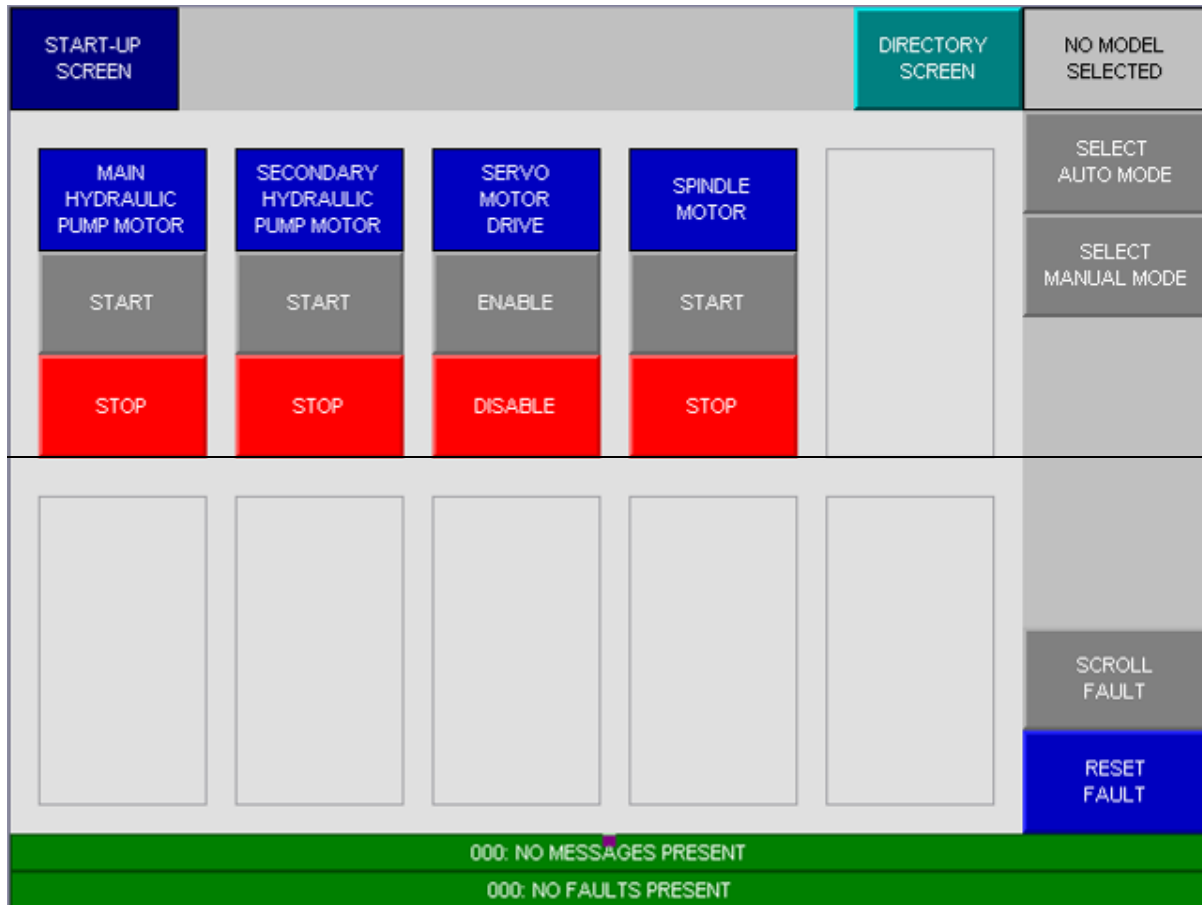


Screen Shot: Clean Touch Screen

- 18.2. This screen has no pushbuttons. Its purpose is to allow the operator to wipe the touchscreen clean with a cloth without accidentally operating an object on the screen.
- 18.3. The screen shall have a completely blank background with the following sentence centered on the screen: "SECONDS REMAINING TO CLEAN THE SCREEN:"
- 18.4. When the operator selects this screen from the Directory Screen, the PLC needs to initialize a count-down timer of 15 seconds. As the timer decreases towards zero, the number of remaining seconds shall be indicated as shown on the Clean Touch Screen above.
- 18.5. When the timer reaches zero seconds, the PLC shall command the HMI to return to the Directory Screen.

19. START-UP SCREEN

19.1. This section refers to *Start-Up Screen Shot* below.

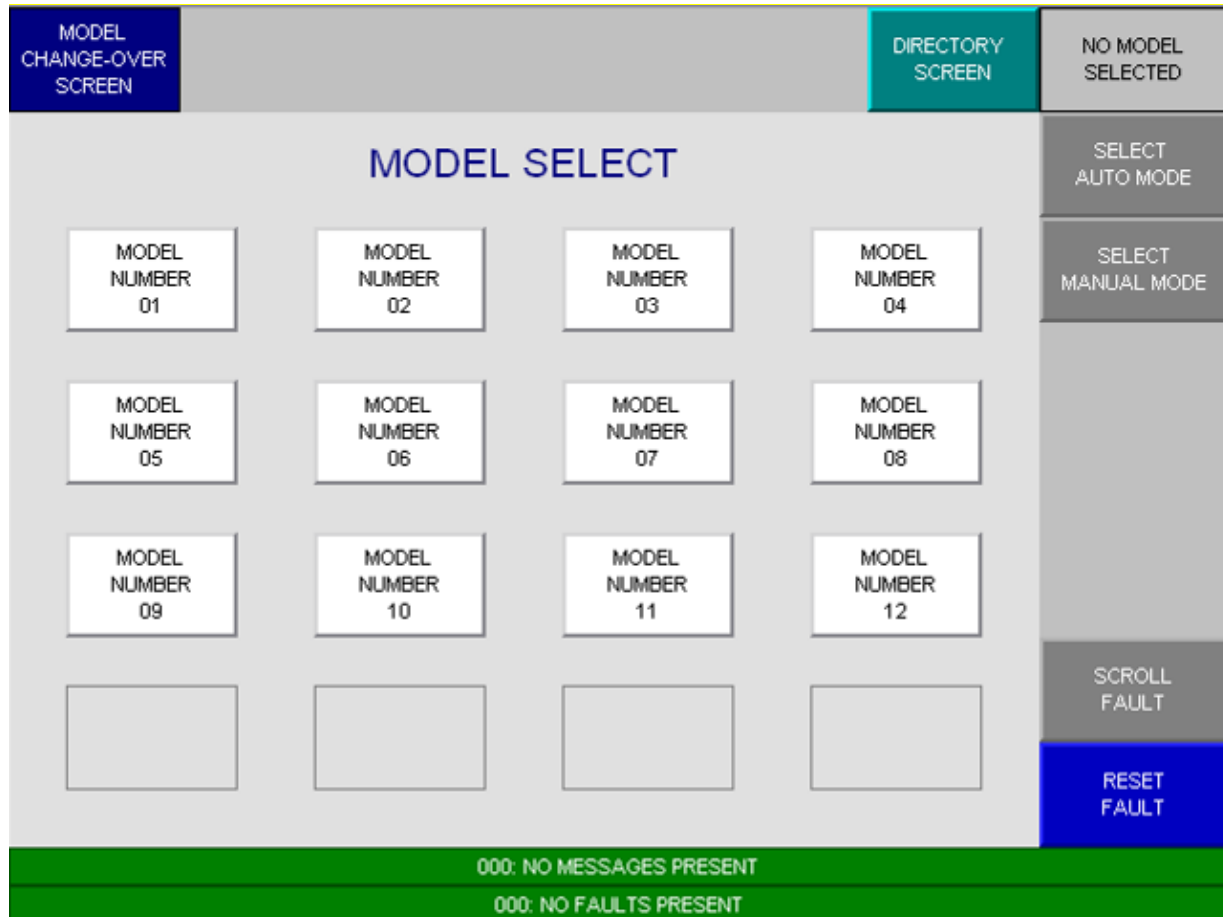


Screen Shot: Start-Up Screen

- 19.2. The screen name box, in the upper left-hand corner, shall contain the text "START-UP SCREEN."
- 19.3. The Start-Up Screen, whenever used, shall be the first screen in the Directory Screen layout hierarchy.
- 19.4. Start-stop functions are used to turn ON/OFF devices such as motors, variable frequency drives, servo drive amplifiers, etc. These devices are typically in one of three states: ON, OFF, or ERROR. (An error may occur, say, when the thermal overloads on a motor starter trip.)
- 19.5. Each Start/Stop function shall consist of three (3) objects grouped vertically together. The behavior of each object shall be consistent with the Manual Screen in section 14. *Note: In this case the STOP or DISABLE button does not indicate the status of the device, only the START or ENABLE button does.*

20. MODEL CHANGE-OVER SCREEN

20.1. This section refers to *Model Change-Over Screen Shot* below.



The screenshot shows a 'MODEL SELECT' screen. At the top left is a blue box labeled 'MODEL CHANGE-OVER SCREEN'. At the top right is a teal box labeled 'DIRECTORY SCREEN'. Below these is a large grey area with the title 'MODEL SELECT' in blue. This area contains a 4x4 grid of buttons labeled 'MODEL NUMBER 01' through 'MODEL NUMBER 12'. The bottom row of the grid contains four empty boxes. To the right of the grid is a vertical column of buttons: 'NO MODEL SELECTED', 'SELECT AUTO MODE', 'SELECT MANUAL MODE', 'SCROLL FAULT', and 'RESET FAULT'. At the bottom of the screen are two green status bars: '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

Screen Shot: Model Change-Over Screen

- 20.2. The screen name box, in the upper left-hand corner, shall contain the text "MODEL CHANGE-OVER SCREEN".
- 20.3. This screen shall be used to allow the operator to change from one model to another. In the event that only one model is produced on the equipment or changing from one model to another has no effect on the processing of the part, this screen will not be required.
- 20.4. The preferred method of model selection would be a series of labeled pushbuttons covering all models. Use descriptive labels like Ford Model xyz, Ford Model abc, GM L-Car. The actual part number stored in the PLC should be displayed on the button. In the case where there may be a need for more than 2 screens, a look up table or similar may be used.
- 20.5. A model change shall be allowed only when the machine is not in cycle.

21. CHANGE LIMITS SCREEN

21.1. This section refers to *Change Limits Screen Shot* below.

CHANGE LIMITS SCREEN 1 OF x				DIRECTORY SCREEN		NO MODEL SELECTED	
	NEW VALUE	CURRENT VALUE		NEW VALUE	CURRENT VALUE	SELECT AUTO MODE	
SPIINDLE SPEED (RPM)	#####	NNNN		####	NNNN		
PRESSURE LOW LIMIT (PSI)	###.#	NNNN		###.#	NNNN	SELECT MANUAL MODE	
PRESSURE HIGH LIMIT (PSI)	####	NNNN		####	NNNN		
PRESS FORCE (II)	###.#	NNNN		###.#	NNNN		
PRESS STROKE (MM)	####	NNNN		####	NNNN	ACCEPT DATA	
						SCROLL FAULT	
						RESET FAULT	
000: NO MESSAGES PRESENT							
000: NO FAULTS PRESENT							

Screen Shot: Change Limits Screen

- 21.2. The screen name box, in the upper left-hand corner, shall contain the text "CHANGE LIMITS SCREEN".
- 21.3. All numeric values displayed shall be read from the PLC.
- 21.4. This screen shall be used to allow the operator to view and change part number information and process control related parameters within pre-defined limits. The "New Value" button for each parameter shall access a data entry window. If within the pre-defined range, the new limits will be accepted and displayed. An "Accept Data" pushbutton shall be used to confirm the change.
- 21.5. An allowable min/max range for each value, when required, shall be maintained in the PLC and displayed when editing.

- 21.6. Parameters on this screen are intended to be read/write, so that the values may be adjusted. If it is desired to have the screen indicate values that cannot be changed, but need to be viewed, configure those parameters to be “read” only.
- 21.7. The name of each parameter shall be indicated. The units of measurement shall also be indicated.
- 21.8. Password protection of these parameters needs to be discussed with the Nexteer Engineer before implementation.
- 21.9. Parameter changes, on the currently running model, shall be allowed only when the machine is not in cycle.

22. TRACEABILITY SCREEN(S)

22.1. This section refers to *Traceability Screen Shots* below.

TRACEABILITY QUEUE SCREEN		TRACEABILITY STATION	DIRECTORY SCREEN	NO MODEL SELECTED
TRACEABILITY QUEUE				
	STATION ID	SERIAL #	FUNCTION	
[0]	●	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	NN
[1]	●	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	NN
[2]	●	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	NN
COMMUNICATIONS TIMING LAST: <input type="text" value="NNNNNNNNNN"/> MIN: <input type="text" value="NNNNNNNNNN"/> MAX: <input type="text" value="NNNNNNNNNN"/> AVERAGE (LAST ###): <input type="text" value="NNNNNNNNNN"/> <input type="button" value="RESET"/>				<input type="button" value="SELECT AUTO MODE"/> <input type="button" value="SELECT MANUAL MODE"/> <input type="button" value="SCROLL FAULT"/> <input type="button" value="RESET FAULT"/>
TRACEABILITY BUFFER <input type="button" value="NEW REQUEST"/> <input type="button" value="DATA READY"/> PLC ID: <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/> STATION ID: <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/> SERIAL #: <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/> FUNCTION: <input type="text"/> STA. NAME: <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/> STATUS: <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/> <input type="button" value="READ COMPLETE"/>				
000: NO MESSAGES PRESENT				
000: NO FAULTS PRESENT				

Screen Shot: Traceability Queue Screen

- 22.2. The screen name box, in the upper left-hand corner, shall contain the text "TRACEABILITY QUEUE SCREEN."
- 22.3. The Traceability Queue screen is intended to show the pending requests to/from the traceability PC, the current request Buffer the queue is working on, and the communications timing.
- 22.4. The Traceability Queue shall show the Station ID, Serial #, and the Function of the request.
- 22.5. The Communications Timing sections units are in milliseconds (msec). A reset button shall be present to allow resetting the values when desired.

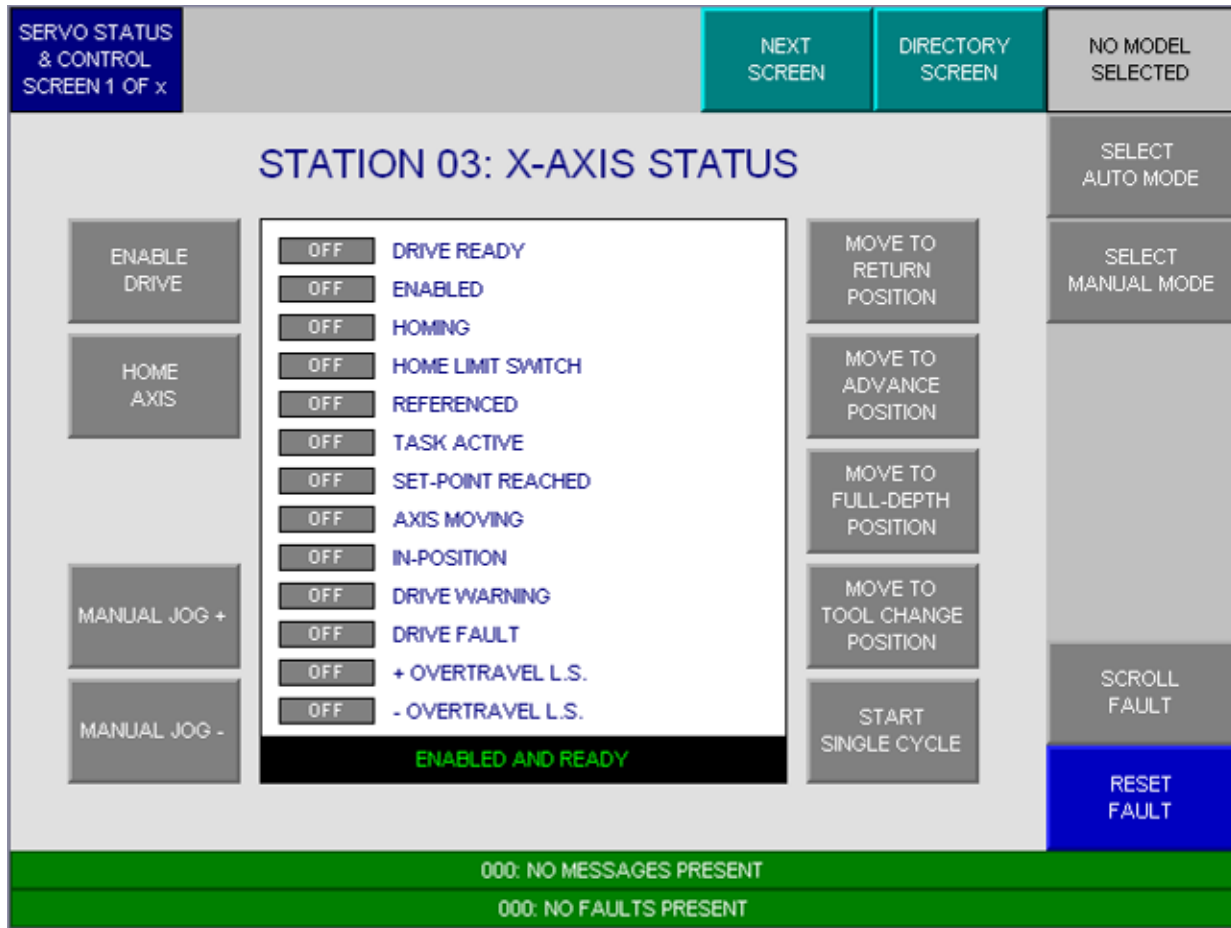
TRACEABILITY STATION SCREEN		TRACEABILITY QUEUE	DIRECTORY SCREEN	NO MODEL SELECTED
PLC ID <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="button" value="PART PRESENT"/>	SERIAL NUMBER <input type="text" value="XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"/>		<input type="button" value="SELECT
AUTO MODE"/>
STATION ID <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="button" value="BARCODE SCANNED"/>			<input type="button" value="SELECT
MANUAL MODE"/>
STATION NAME <input type="text" value="S...S"/>	PERMISSION TO RUN <input checked="" type="radio"/> REQUEST SENT <input checked="" type="radio"/> RESPONSE RECEIVED	RESULT ID <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	STATUS <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	
MODEL <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="button" value="PART RUN PERMISSIONS"/>			
LOOKUP IDs <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/> <input type="text" value="S...S"/>	III PROCESS / OWNERSHIP <input checked="" type="radio"/> REQUEST SENT <input checked="" type="radio"/> RESPONSE RECEIVED			
	<input type="button" value="OWNERSHIP STATUS"/>			
	STATION RESULTS <input checked="" type="radio"/> REQUEST SENT <input checked="" type="radio"/> RESPONSE RECEIVED	STATUS <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>		
	<input type="button" value="PART STATUS RESULT"/>			
	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="button" value="SCROLL
FAULT"/>
	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	
	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="text" value="S...S"/> <input type="text" value="XXXXXXXXXXXXXXXXXXXX"/>	<input type="button" value="RESET
FAULT"/>
000: NO MESSAGES PRESENT				
000: NO FAULTS PRESENT				

Screen Shot: Traceability Station Screen

- 22.6. The screen name box, in the upper left-hand corner, shall contain the text "TRACEABILITY STATION SCREEN."
- 22.7. The traceability station screen is provided for viewing traceability information and status for a specific station.
- 22.8. If there is more than one station on an assembly line or cell that is interfacing with a traceability system, there will need to be one of these screens for each Tracestation routine in the PLC program.
- 22.9. This screen is arranged in the sequence of a typical traceability application from top to bottom. Permission to Run would occur first, In Process/Ownership next, and then the Station Results written to the traceability system. This information is part specific and will be updated each cycle.
- 22.10. The information along the left side: PLCID, StationID, Station Name, Model, and LookupID's are all pertaining to the station this screen represents.

24. SERVO AXIS SCREEN(S)

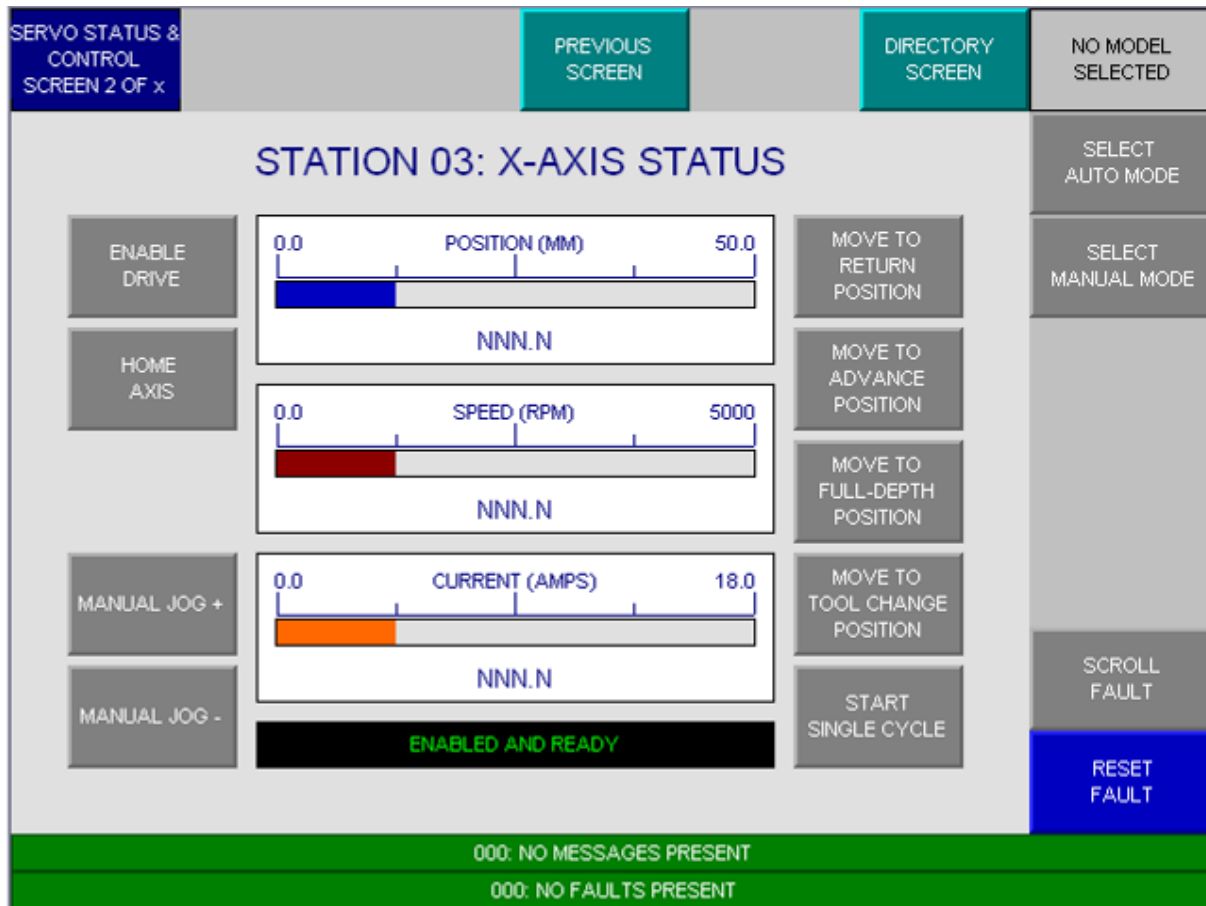
24.1. This section refers to *Servo Axis Screen Shots* below.



Screen Shot: Servo Axis Screen #1

- 24.2. The screen name box, in the upper left-hand corner, shall contain the text "SERVO STATUS & CONTROL SCREEN."
- 24.3. Allen Bradley servo drive screen templates should be used for servo axis screens. If these are not available, use the supplied Nexteer template screens.
- 24.4. The current position and velocity of the axis shall be indicated.
- 24.5. The status of important servo drive functions shall be indicated. These functions include such things as drive enabled, drive in position, etc.
- 24.6. Manual control functions for the servo slide shall appear on both screens. The pushbuttons for these functions shall indicate the functions status. The typical manual functions are as follows:

- 24.6.1. Jog axis plus (+) and minus (-). Indicate the actual direction that the slide moves or rotates.



Screen Shot: Servo Axis Screen #2

- 24.6.2. Move axis to Home position.
- 24.6.3. Move axis to some alternate position(s).

25. MULTIPLE STATION EQUIPMENT

- 25.1. This section applies to multiple station equipment where a main and remote control consoles are used. *Reference SD-1032 for Multiple Station Logic Requirements.*
- 25.2. Main control console shall have a screen(s) to indicate “STATION RETURNED” and “STATION CYCLED” indication for each station.
- 25.3. Manual control of any indexing or transfer mechanism shall be located at, but not limited to, the main control console.
- 25.4. Remote station consoles shall have the following screens. Each screen and its objects shall follow the applicable sections of this document.
- Directory
 - Manual Control
 - Automatic Cycle
 - Counters
 - Clean Touch-screen
 - PLC Input/Output Monitor
- 25.5. Each remote control console also requires the following functions as a minimum:
- Cycle Stop (For entire machine - required only on continuous cycle equipment)
 - Indication of Cycled (or Full Depth)
 - Manual/Off/Auto selection
 - On/Off control (For specific station devices e.g. spindles, pumps, feeders, etc.)
 - Run/By-pass control (For the entire station - As per Equipment Purchase Specification)
- 25.6. Additional screens may be required at remote station consoles for process related control. Consult the Nexteer Engineer to determine the applicable screens.

RECORD OF REVISIONS

Revision #	Date	Section	Description
001	1 JUL 2004	ALL	ORIGINAL ISSUE
002	15 DEC 2004	ALL	RECONCILED SCREEN COLORS TO NFPA 79, 2002 EDITION & CHANGED ALL THE SCREENS
003	15 DEC 2004	ALL	INCORPORATED SECTION 30, MULTIPLE STATION EQUIPMENT REQUIREMENTS (ORIGINALLY IN SD-004), AS A RESULT OF THE ELIMINATION OF SD-004 SPECIFICATION
004	15 DEC 2004	3	REMOVED MODBUS PLUS AS THE DEFAULT CONNECTION TO MODICON PLC. REPLACED WITH MODBUS
005	15 DEC 2004	ALL	RECONCILED THE SD-1020 DOCUMENTATION WITH THE NEW SCREENS AND ENHANCED CONSISTENCY OF LANGUAGE
006	15 DEC 2004	21	ADDED DESCRIPTION TO THE AUTOCYCLE SCREEN PB FUNCTIONS – ABORT, OPERATOR REJECT, CYCLE START, ETC
007	15 DEC 2004	23	ADDED AN ANALOG I/O SCREEN EXAMPLE
008	15 DEC 2005	3	MADE THE 7.5-INCH (TCP) OR 6.0-INCH (AB) THE DEFAULT HMI. PREVIOUSLY 10.5-INCH WAS THE DEFAULT. 10.5-INCH USAGE IS BY CONTROLS APPROVAL ONLY
009	15 DEC 2005	12	ADDED A NOTE TO ALERT OEMs USING AB HMI TO USE “MARK AS GLOBAL” FEATURE TO EXPEDITE COMMON PBs/LIGHTS DESIGN
010	15 DEC 2005	15.2,	REMOVED THE REQUIREMENT TO SWITCH TO AUTO SCREEN WHEN THE AUTO MODE IS SELECTED;
011	15 DEC 2005	15.3	REMOVED THE REQUIREMENT TO SWITCH TO MANUAL SCREEN WHEN THE MANUAL MODE IS SELECTED;
012	15 DEC 2005	23.6	ALLOWED THE USE OF THE DEFAULT I/O DESCRIPTIONS ON THE I/O SCREENS TO REDUCE INITIAL DESIGN TIME & MAINTENANCE
013	15 DEC 2005	31	ADDED STANDARD DELPHI-S HMI SCREEN TEMPLATES FOR THE ALLEN BRADLEY 10-INCH & 6-INCH HMIs
014	28 AUG 2008	All	BPI2 – REVIEW/EDIT OF ENTIRE DOCUMENT.
015	05 OCT 2009	TOC, 25	UPDATED ERROR IN TABLE OF CONTENTS, AND INFORMATION IN REFERENCES.
016	06NO09	All	COMPANY NAME UPDATED.
017	02DE11	All	BPI-5 – REVIEW/EDIT DOCUMENT TO ALIGN WITH UPDATED SD-1032 REWRITE.
018			
019			
020			