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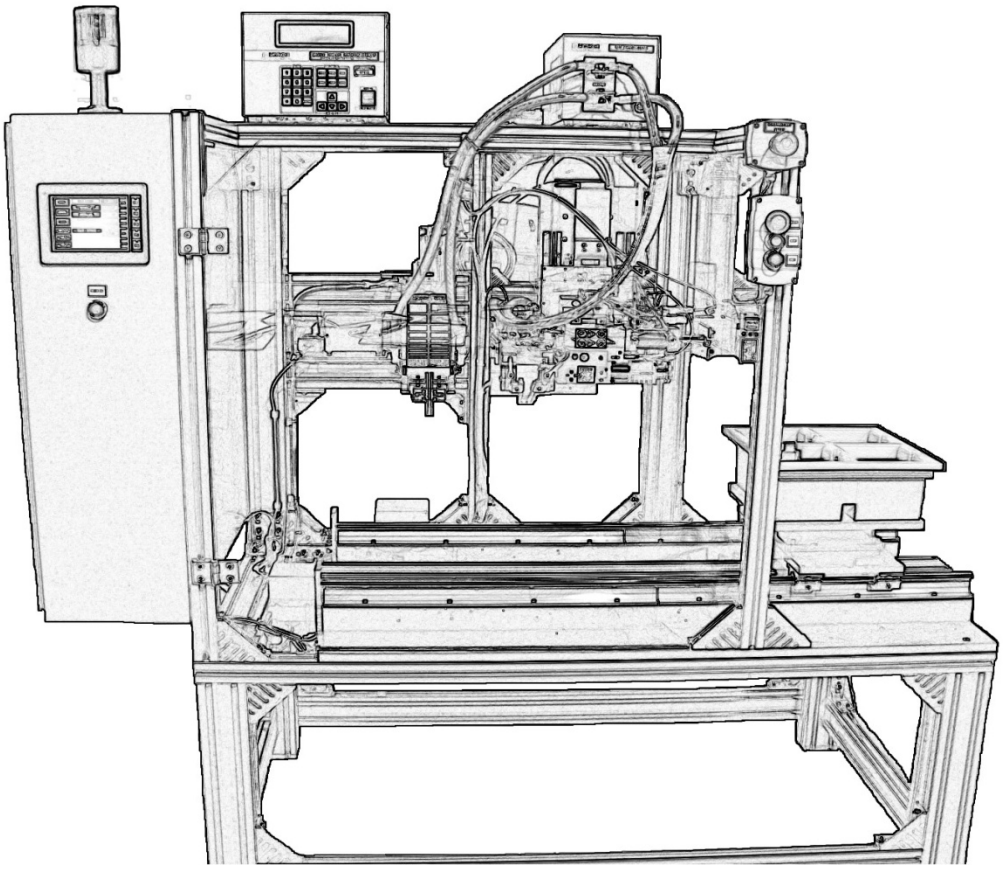

Automated Battery Welder
User's Manual

Introduction

This manual provides information to setup and operate the Automated Battery Welder. The following is a series of sections that describe in detail each machine component and its operation.

About The Machine

The Automated Battery Welder is a PLC controlled three axis electric driven positioning machine. Its design allows for the automatic positioning of a battery to be welded by a MIYACHI welder that has been integrated into this system. As a complete unit this machine produces precisely positioned welds in a safe and efficient manner.

Theory of Operation

The battery to be welded is manually loaded onto the machine. After the cycle is started the battery is positioned under one of two welder heads. There are three or six weld positions under the pincer welder head and two weld positions under the parallel welder head. Upon completion of the cycle the battery is manually removed from the machine.

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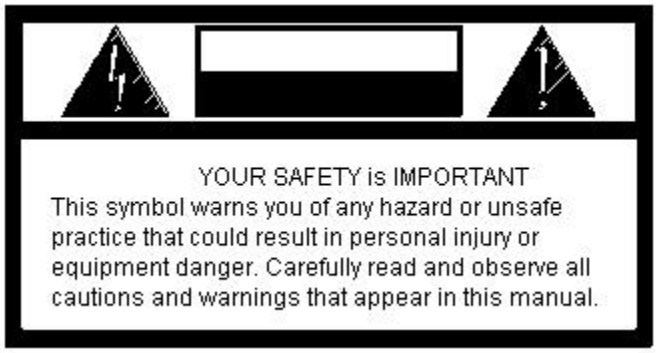
Safety Requirements



To avoid possible injury, and to operate the equipment in a safe and efficient manner, please observe the following safety measures.

Do not operate any of the system components before they are installed.

Verify the proper tooling is installed and setup is complete.

Any unauthorized modifications to the control circuitry or other parts of the system could cause damage to the equipment and / or injury to the operator.

Unauthorized modifications may also void the equipment warranty.

Do not operate this equipment with its cover(s) / guards off. If it becomes necessary to remove the equipment cover(s) / guards, first turn off power at disconnect and follow company lock-out procedures.

Do not operate this equipment without an equipment grounding connection.

Other safety requirements are included in this manual where they apply.

Description

System

Line Voltage, MCP only (cord and plug connected)	120Vac, 1Phase, 60Hertz, 20Amp
Supply Air Pressure	100psi,
Regulated Air Pressure	80psi,
Control Voltage	24Vdc,

MCP Enclosure

The main control panel is located of the left side of the machine.

Mounted inside the MCP enclosure are the following components.

- *Automation Direct* PLC
- *Sprecher+Schuh* Load Switch
- *Automation Direct* Relays
- *Automation Direct* misc. terminal blocks
- *Automation Direct* 5mm x 20mm fuse holders
- *Bussmann* midget fuse holders
- *Safemaster* E Stop Relay
- *RHINO* Industrial DC Power Supply
- *Allen Bradley* Solid State Relay
- *Oriental Motor* Linear Motion Controller
- *Oriental Motor* Hollow Rotary Actuator Driver

The Operator Interface Panel and the “Power On” pushbutton is mounted on the right side of the MCP enclosure.

- Operator Interface Panel – is a touch screen to be used by the operator to view machine status and to control machine function.

- Power On Pushbutton – blue illuminated momentary pushbutton used to apply power to the system. With supply power connected and main disconnect switch closed operation of this pushbutton energizes the E-stop relay. Output power is turned on.

Mounted on top of the MCP enclosure is a red beacon to indicate machine status.

- Indicator Beacon – red beacon is not illuminated when machine is operating normally, red beacon is flashing when a machine alarm is active, red beacon is on steady when Stop Mode is active.

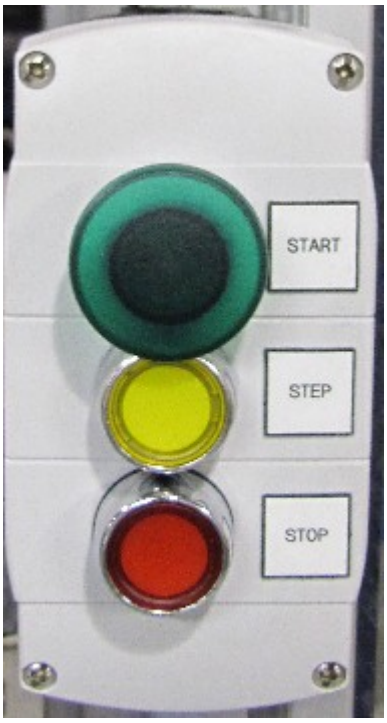
Mounted on the top right corner of the MCP enclosure door is the main disconnect switch operator handle.

- Main Disconnect Switch – yellow and red rotary operator handle connected to the main disconnect switch provides the ability to lock out power in the off (rotated counter clockwise) position. When turned on (rotated clockwise) power is supplied to the system.

  Note: **The MIYACHI Welder is connected to a separate power source and disconnect switch.**

Enclosure should not be opened before turning off power and disconnecting power plug.

Mounted on the top front side of the machine guarding are a three pushbutton station and an emergency stop pushbutton station.



- Start Pushbutton – green illuminated momentary mushroom head pushbutton used to reset initialization alarms, reset drive alarms, reset machine alarms, reset machine Stop Mode, initiate machine start of cycle, and advance machine control sequence one step while in Step Mode.

- Step Pushbutton – yellow illuminated maintained pushbutton used to active machine sequence Step Mode.

- Stop Pushbutton – red illuminated maintained pushbutton used to activate machine Stop Mode.

Stop Mode is not the same as an EMERGENCY STOP. It is a software controlled operation pause. Personnel should <u>not</u> work on any part of the machine while it is in Stop Mode.

- Emergency Stop Pushbutton – red non-illuminated mushroom head maintained pushbutton. When this button is pressed the E-stop relay is de-energized, output power is turned off. This pushbutton must be pulled out to reset.

Mounted on front of the machine is a second three pushbutton station used for manual welder control.

- Selector Switch – is a maintained switch used to select between the manual control of the Pincer or Parallel welder. For manual control to be enabled the system must be in Maintenance Mode and have Manual Weld On selected.

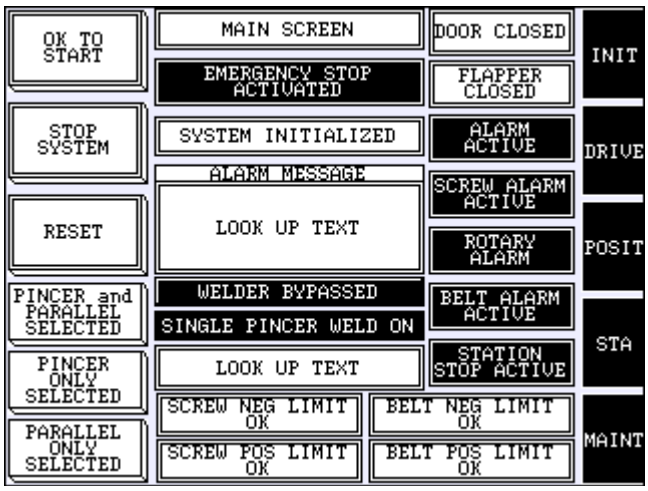
- Hold Pushbutton – is an illuminated maintained pushbutton. This pushbutton is used to actuate the welder tips to the hold position. The indicator will begin to flash when conditions are satisfied to permit welder Hold. The indicator is on steady when Hold is active. For control to be enabled the system must be in Maintenance Mode and have Manual Weld On selected.

- Fire Pushbutton – is an illuminated momentary pushbutton. This pushbutton is used to fire the welder. The indicator will begin to flash when conditions are satisfied to permit the welder to fire. For control to be enabled the system must be in Maintenance Mode, Manual Weld On must be selected and the welder Hold activated.

Operator Interface

The operator interface panel is an *Automation Direct* C-more 6” Micro-Graphic Panel (touch screen).The following are the display screens with corresponding descriptions.

Main Screen



Status Indicators

- Emergency Stop Status
- Machine Initialization Status
- Welder Bypass Status
- Single or Double Pincer Weld Selection
- Maintenance Mode (only visible when Maintenance Mode is active)
- Screw Drive Negative Limit Status (only visible if limit is activated)
- Screw Drive Positive Limit Status (only visible if limit is activated)
- Belt Drive Negative Limit Status (only visible if limit is activated)
- Belt Drive Positive Limit Status (only visible if limit is activated)
- Safety Door Status
- Flapper Status
- Machine Alarm Status (only visible if alarm active)
- Screw Drive Alarm Status
- Rotary Drive Alarm Status
- Belt Drive Alarm Status
- Station Stop Status (only visible if Station Stop Mode is active)

Look Up Text:

- Displays active alarm description
- Displays current Style selected

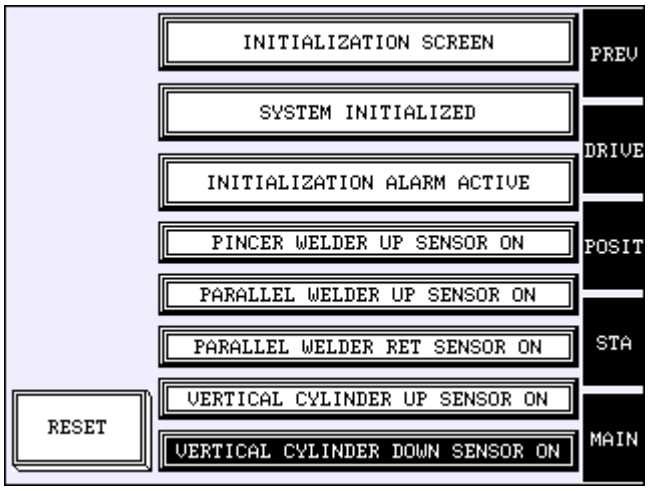
Touch Cell Control:

- System Start
- System Stop
- Alarm Reset
- Select Pincer and Parallel Weld
- Select Pincer Only Weld
- Select Parallel Only Weld

Screen Change Touch Cell or Button:

- F1 or INIT Screen Change to Initialization Screen
- F2 or DRIVE Screen Change to Drive Status Screen
- F3 or POSIT Screen Change to Position Screen (password protected)
- F4 or STA Screen Change to Station Status Screen
- F5 or MAINT Screen Change To Control Screen (password protected)

Initialization Screen



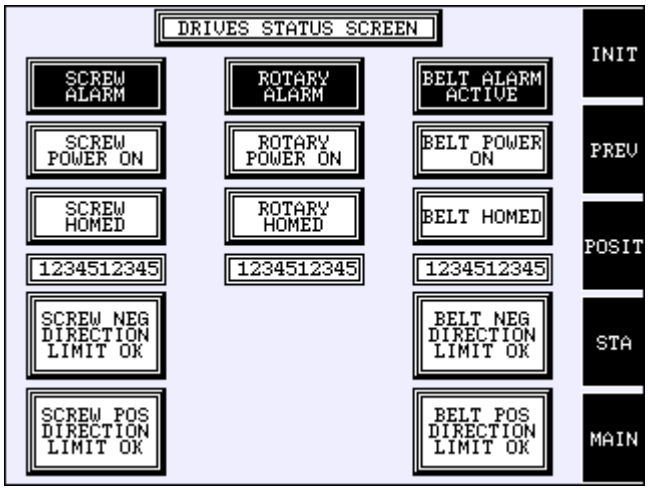
Status Indicators:

- Initialization Status
- Initialization Alarm Status (only visible if alarm is active)
- Pincer Welder Head Up Sensor Status
- Parallel Welder Head Up Sensor Status
- Parallel Welder Head Retract Sensor Status
- Vertical Cylinder Up Sensor Status
- Vertical Cylinder Down Sensor Status

Screen Change Touch Cell or Button:

- F1 or PREV Screen Change to Previously Viewed Screen
- F2 or DRIVE Screen Change to Drive Status Screen
- F3 or POSIT Screen Change to Position Screen (password protected)
- F4 or STA Screen Change to Station Status Screen
- F5 or MAIN Screen Change to Main Screen

Drive Status Screen



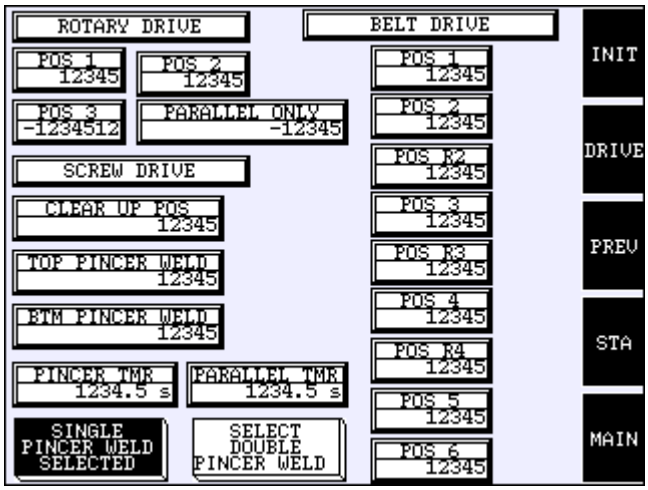
Status Indicators:

- Screw Drive Alarm Status
- Screw Drive Power On Status
- Screw Drive Homed Status
- Screw Drive Position Numeric Display
- Screw Drive Negative Limit Sensor Status
- Screw Drive Positive Limit Sensor Status
- Rotary Drive Alarm Status
- Rotary Drive Power On Status
- Rotary Drive Homed Status
- Rotary Drive Position Numeric Display
- Belt Drive Alarm Status
- Belt Drive Power On Status
- Belt Drive Homed Status
- Belt Drive Position Numeric Display
- Belt Drive Negative Limit Sensor Status
- Belt Drive Positive Limit Sensor Status

Screen Change Touch Cell or Button:

- F1 or INIT Screen Change to Initialization Screen
- F2 or PREV Screen Change to Previously Viewed Screen
- F3 or POSIT Screen Change to Position Screen (password protected)
- F4 or STA Screen Change to Station Status Screen
- F5 or MAIN Screen Change to Main Screen

Position Entry Screen (Password Protected Screen) PW = 7140



Numeric Entry Touch Cells:

- Rotary Drive Position 1 set point
- Rotary Drive Position 2 set point
- Rotary Drive Position 3 set point
- Rotary Drive Position for Parallel Weld Only Position set point
- Screw Drive Clear Up Position set point
- Screw Drive Top Pincer Weld Position set point
- Screw Drive Bottom Pincer Weld Position set point
- Pincer Weld Duration Timer preset
- Parallel Weld Duration Timer preset
- Belt Drive Position 1 set point
- Belt Drive Position 2 set point
- Belt Drive Reverse Position 2 set point
- Belt Drive Position 3 set point
- Belt Drive Reverse Position 3 set point
- Belt Drive Position 4 set point
- Belt Drive Reverse Position 4 set point
- Belt Drive Position 5 set point
- Belt Drive Position 6 set point

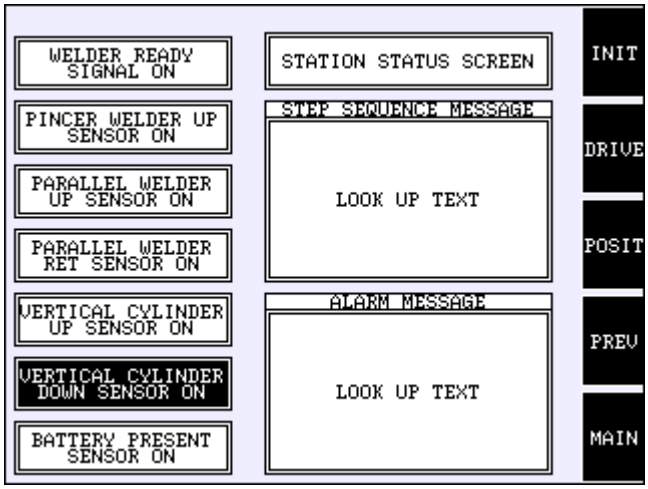
Touch Cell Control:

- Select Single Pincer Weld
- Select Double Pincer Weld

Screen Change Touch Cell or Button:

- F1 or INIT Screen Change to Initialization Screen
- F2 or DRIVE Screen Change to Drive Status Screen
- F3 or PREV Screen Change to Previously Viewed Screen
- F4 or STA Screen Change to Station Status Screen
- F5 or MAIN Screen Change to Main Screen

Station Screen



Status Indicators:

- Welder Ready Signal Status
- Pincer Welder Head Up Sensor status
- Parallel Welder Head Up sensor status
- Parallel Welder Head Retract sensor status
- Vertical Cylinder Up sensor status
- Vertical Cylinder Down sensor status
- Battery Present Sensor Status

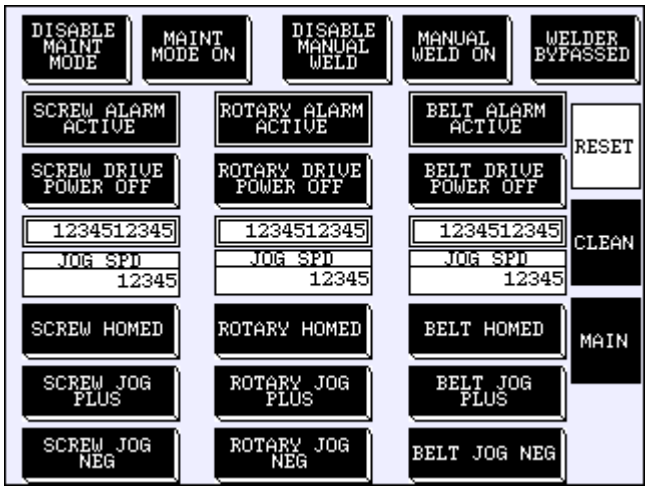
Look Up Text:

- Description of Current Sequence Step
- Description of Current Station Alarm

Screen Change Touch Cell or Button:

- F1 or INIT Screen Change to Initialization Screen
- F2 or DRIVE Screen Change to Drive Status Screen
- F3 or POSIT Screen Change to Position Screen (password protected)
- F4 or PREV Screen Change to Previously Viewed Screen
- F5 or MAIN Screen Change to Main Screen

Maintenance Screen (password protected) PW = 7140



Status Indicators:

- Screw Drive Alarm Status
- Rotary Drive Alarm Status
- Belt Drive Alarm Status

Numeric Indicators:

- Screw Drive Current position
- Rotary Drive Current Position
- Belt drive Current Position

Numeric Entry Touch Cell:

- Screw Drive Jog Speed set point
- Rotary Drive Jog Speed set point
- Belt Drive Jog Speed set point

Touch Cell Control:

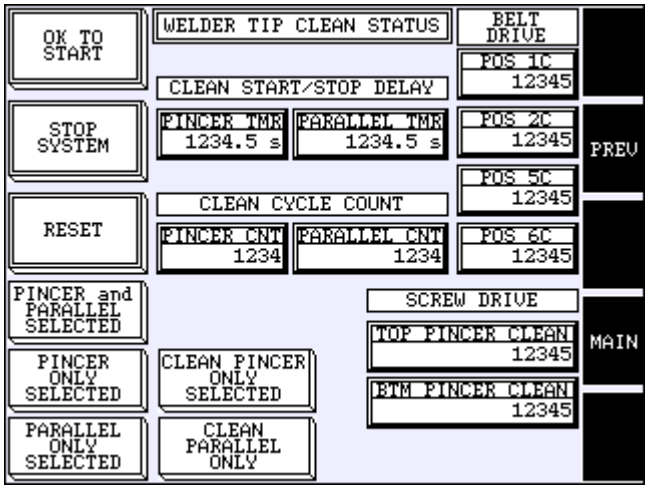
- Welder Bypass Mode Select
- Maintenance Mode Enable (only visible when Maint. Mode not active)
- Maintenance Mode Disable (only visible when Maintenance Mode active)
- Enable Manual Weld (only visible when Maintenance Mode is active)
- Disable Manual Weld (only visible when Maintenance Mode is active)
- Screw Drive Power Relay Control
- Rotary Drive Power Relay Control
- Belt Drive Power Relay Control
- Home Screw Drive
- Jog Screw Drive Plus Direction
- Jog Screw Drive Negative Direction
- Home Rotary Drive
- Jog Rotary Drive Plus Direction

- Jog Rotary Drive Negative Direction
- Home Belt Drive
- Jog Belt Drive Plus Direction
- Jog Belt Drive Negative Direction

Screen Change Touch Cell or Button:

- F2 or RESET used for Alarm Reset
- F3 or CLEAN Screen Change to Welder Tip Clean Screen
- F4 or MAIN Screen Change to Main Screen

Welder Tip Clean Status Screen



Touch Cell Control:

- System Start
- System Stop
- Alarm Reset
- Select Pincer and Parallel Weld
- Select Pincer Only Weld
- Select Parallel Only Weld
- Select Pincer Only Tip Cleaning
- Select Parallel Only Tip Cleaning

Numeric Entry Touch Cell:

- Pincer Clean Start / Stop Delay Timer preset
- Parallel Clean Start / Stop Delay Timer preset
- Pincer Clean Cycle Counter preset
- Parallel Clean Cycle Counter preset
- Belt Drive Clean position 1 set point
- Belt Drive Clean position 2 set point
- Belt Drive Clean position 5 set point

- Belt Drive Clean position 6 set point
- Screw Drive Clean Top position set point
- Screw Drive Clean Bottom position set point

Screen Change Touch Cell or Button:

- F2 or PREV Screen Change to Previously Viewed Screen
- F4 or MAIN Screen Change to Main Screen

Setup

Initial Position Settings

Rotary Drive	Position 1	Position 2	Position 3	Position 3 Parallel Only	
	4,500	9,000	13,500	-4,500	
Screw Drive	Clear Position	Top Weld Position	Bottom Weld Position		
	4,700	7,598	8,139		
Belt Drive	Position 1	Position 2	Position 3	Position 4	Position 5
	13,495	13,642	13,642	13,642	15,758
Belt Drive		Reverse Position 2	Reverse Position 3	Reverse Position 4	Position 6
		13,495	13,495	13,495	18,838

General Adjustments

1. Refer to *Miyachi* User's Manual for any Welder adjustments.
2. Drive Positions – All of the Weld Positions may be changed from the Position Screen of the Operator Interface Panel.
    a. Rotary Drive Position Limits
        i. Position 1 — 0 to 18,000
        ii. Position 2 — 0 to 18,000
        iii. Position 3 — 0 to 18,000
        iv. Position 3 (Parallel weld only) — -18,000 to 0

    b. Screw Drive Position Limits
        i. Clear Position — 0 to 9,800
        ii. Top Weld Position (double Pincer only) — 0 to 9,800
        iii. Bottom Weld Position — 0 to 9,800

    c. Belt Drive Position Limits
        i. All Belt Positions Limits are the same — 0 to 19,000

Operation

Overview

The Automated Battery Welder has been designed for ease of use by employing software that controls the operation and cycle of the machine. This reduces time for setup and the possibility of problems. Each Weld cycle requires a battery to be manually loaded and unloaded.

This section will cover the sequence of operation of the machine from power up to a complete shutdown.

Startup

Caution: Before proceeding with the machine power up ensure that machine is clear of personnel and that all affected personnel are notified.

Pre Power up Check

Check that the main disconnect switch is off.
Check that all safety guarding, flapper and door are in position and secure. Release the red Stop pushbutton.

Powering On the Machine

Open air supply valve to machine (min. 80 psi.).
Plug power cord securely into properly rated outlet (min.120vac 15amp).
Turn on main disconnect switch located on the main control panel (rotate switch handle clockwise). The processor will now have power and the program will start.
Turn on the Miyachi Welder (Supply power source disconnect is separate from the automation power source, Welder power switch is located in rear of unit)
Pull emergency stop mushroom head pushbutton out.

Note: Before pressing blue Power On pushbutton check position of Horizontal Belt Drive. Drive nest should be located off of the home sensor in the direction of the welders. Manually move Drive if needed.

Press the blue Power On pushbutton located on the main control panel. Output power will now be supplied to the machine and the blue Power On pushbutton indicator will light.

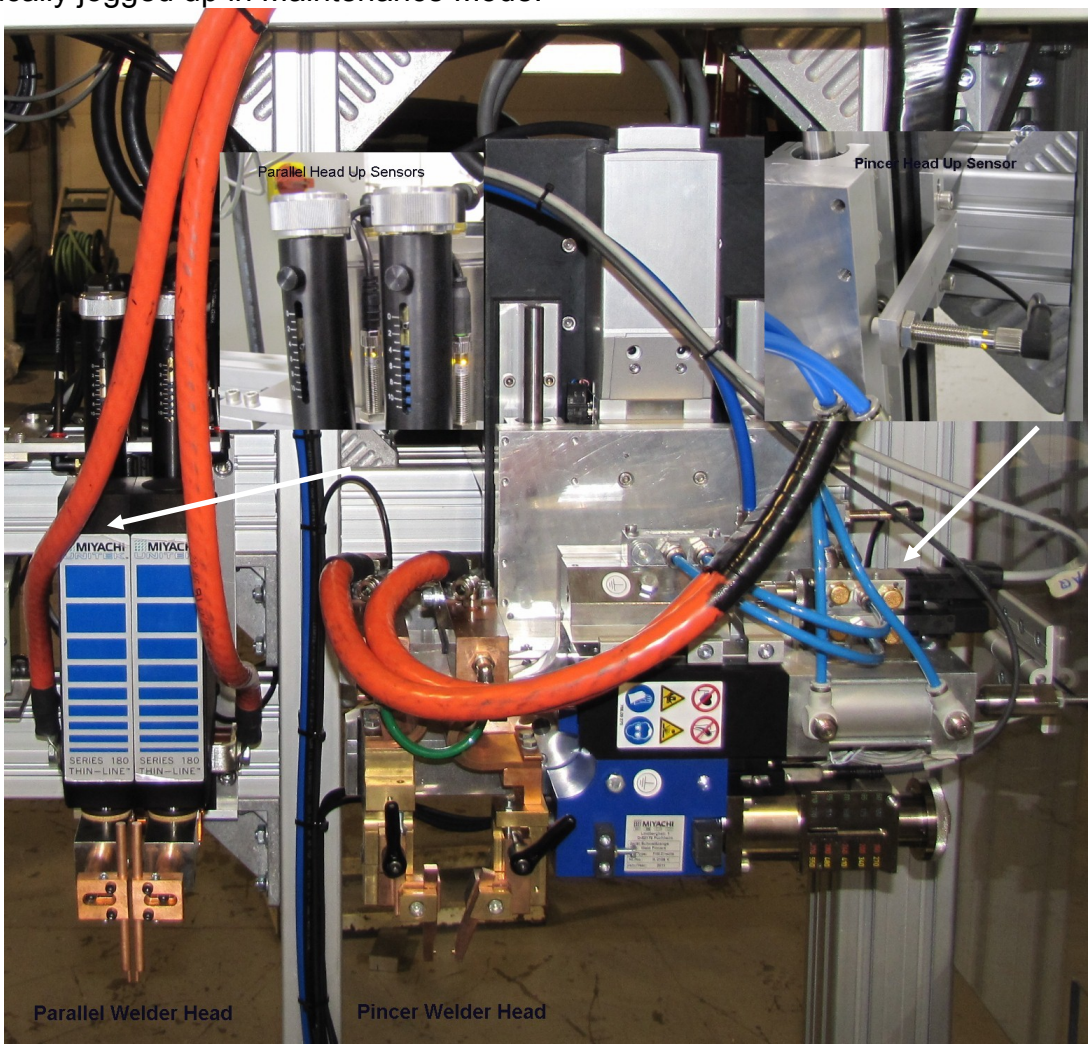
Reset Machine Stop and Alarms

Reset any machine Stop or Alarm conditions by selecting the flashing RESET touch cell located on the Main screen of the operator interface panel or by pressing the flashing green START mushroom head pushbutton.

Initialization

On power up, the following sensor conditions are checked: the Parallel Welder head up sensor On, the Parallel Welder head retract sensor On, the vertical cylinder up sensor On, the vertical cylinder down sensor Off and the Pincer Welder head up sensor On. When the conditions of these sensors are satisfied the Initialization is complete.

Note: if the Pincer Weld Head up sensor is off the Vertical Screw Drive will need to be electrically jogged up in Maintenance Mode.



Reset Machine Stop and Alarms

Reset any machine Stop or Alarm conditions by selecting the flashing RESET touch cell located on the Main screen of the operator interface panel or by pressing the flashing green START mushroom head pushbutton.

Note: The Rotary, Vertical screw and Horizontal belt drives will become energized after the machine is reset and will be electrically held in place. (The Vertical Screw drive is held in place by a mechanical brake when drive is de-energized).

Select System

Select system style from the Main and Clean screens of the operator interface panel. The style may only be changed when the system is stopped.
There are five styles to choose:

Pincer Weld and Parallel Weld
Pincer Weld Only
Parallel Weld Only
Pincer Clean Only (Clean Screen Only)
Parallel Clean Only (Clean Screen Only)

Ok to Start Machine

When conditions are satisfied the OK to Start touch on the Main and Clean Screen of the operator interface panel will begin to flash.
The following conditions need to be satisfied:
System Powered Up – emergency stop relay energized
System Initialized – Parallel Welder head up sensor on
Parallel Welder head retract sensor on
Vertical cylinder up sensor on
Vertical cylinder down sensor off
Pincer Welder head up sensor on
System Style selected – any Style selected
Maintenance Mode Disabled – Maintenance Mode is not active
Rotary Drive Alarm Off
Horizontal Belt Drive Alarm Off
Vertical Screw Drive Alarm Off
Stop Mode Off – Stop pushbutton released, flapper and door closed and reset

(The next operation motion will occur!)

Start System

To Start the system select the flashing OK to Start touch cell located on the Main screen of the operator interface panel. The drive homing sequences will begin.

Drive Homing Sequence

Vertical Screw Drive will begin homing as soon as the system is started.

Rotary Drive will begin homing after the:

Parallel Welder head up sensor is on
Parallel Welder head retract sensor is on
Vertical cylinder up sensor is on
Vertical cylinder down sensor is off
Pincer Welder head up sensor is on

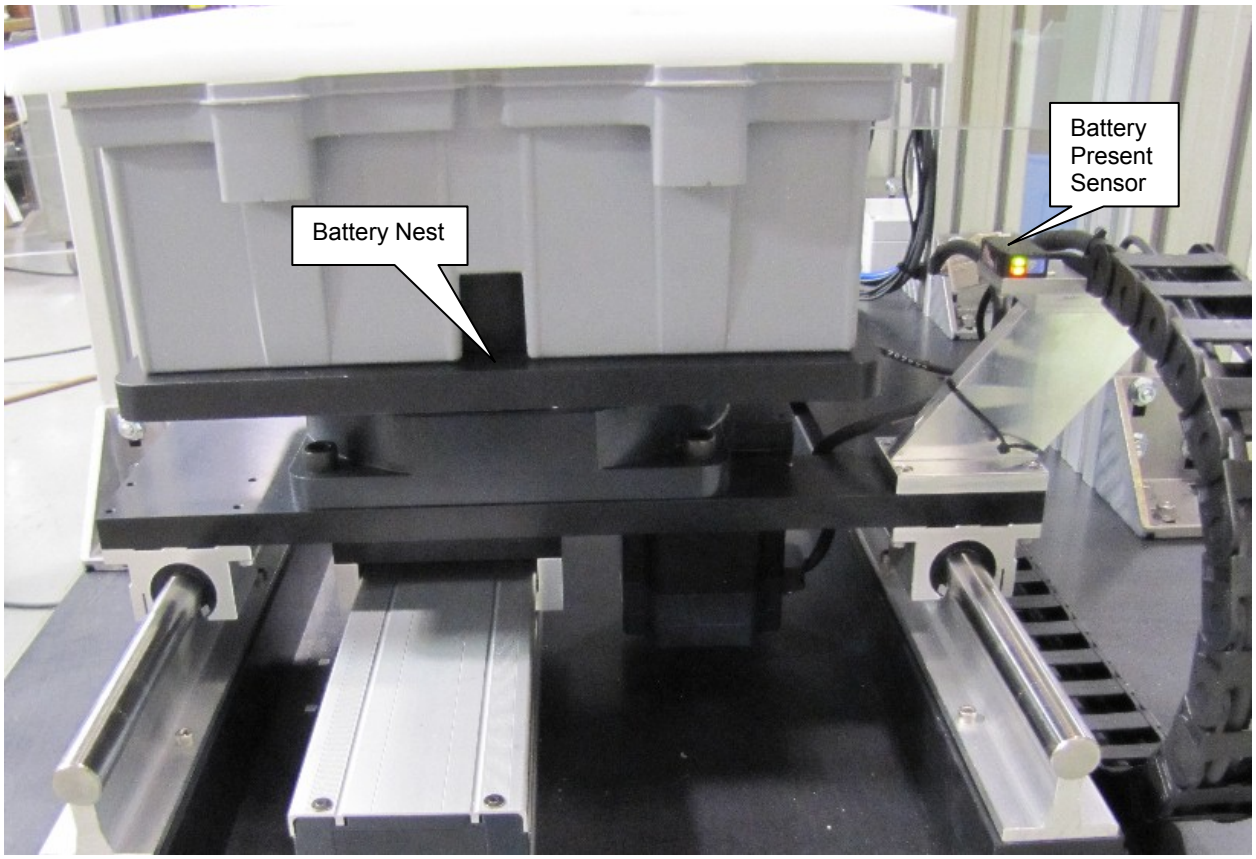
Horizontal Belt Drive will begin homing after the:

Parallel Welder head up sensor is on
Parallel Welder head retract sensor is on
Vertical cylinder up sensor is on
Vertical cylinder down sensor is off
Pincer Welder head up sensor is on
Rotary Drive is homed.

Modes of Operation

Cycle Run Weld Mode

Cycle Run Weld Mode can be enabled by selecting any of the three weld styles and then by placing a battery on the battery nest and pressing the illuminated green Start mushroom head pushbutton located at the pushbutton station. In Cycle Run Weld Mode the machine is cycled and the battery is positioned to each of the set positions. After the cycle is complete the battery is returned to the load position awaiting removal. The battery present sensor on the nest must detect the battery being removed and another battery being loaded (present) before another cycle is permitted to be started. The illuminated green Start mushroom head pushbutton will need to be pushed to start a new cycle.



Cycle Run Clean Mode

Cycle Run Clean Mode can be enabled by selecting any of the two tip cleaning styles, then by placing the cleaning fixture on the battery nest and pressing the illuminated green Start mushroom head pushbutton located at the pushbutton station. In Cycle Run Clean Mode the machine is cycled and the cleaning fixture is positioned to each of the set positions. After the cycle is complete the cleaning fixture is returned to the load position. The cleaning fixture does not need to be removed from the battery nest before a new cycle is restarted. The illuminated green Start mushroom head pushbutton will need to be pushed to start a new cycle.

Stop Mode

Stop Mode is activated by pressing the red Stop pushbutton at the pushbutton station, activating the flapper, opening the front safety door or by activating any of the drive over travel limit switches. In Stop Mode the machine will stop all motion and all drive power will be turned off. To deactivate Stop Mode if the Stop pushbutton was pressed, release pushbutton, if the flapper was activated ensure it is returned to its proper position and if the front safety door was opened close the door and then press the green flashing Start mushroom head pushbutton. The drive homing sequence will then begin.

System Stop Mode

System Stop Mode can be activated by pressing the STOP SYSTEM touch cell located on the Main screen of the operator interface panel. In System Stop Mode the machine will stop all motion although the drive power will remain on. To deactivate System Stop Mode select the flashing Ok to Start touch cell located on the Main screen of the operator interface panel. The drive homing sequence will then begin.

NOTE: If the Run cycle is in progress when Stop Mode is activated the current cycle is aborted and the cycle will need to be restarted.

Machine Stop Mode is not the same as EMERGENCY STOP. It is a software controlled operation pause. Personnel should <u>not</u> work on any part of the machine while it is in Stop Mode.

Step Mode

Step Mode can be enabled by pressing the yellow Step maintained pushbutton located at the pushbutton station. In Step Mode the machine cycle is stepped through each operation. The flashing green Start mushroom head pushbutton located at the pushbutton station is used to advance to the next step, the green Start mushroom head pushbutton must be released then pressed again after the completion of each sequence step. To disable Step Mode release the illuminated yellow Step pushbutton at any time.

Maintenance Mode

The Maintenance Mode function can only be enabled while in System Stop Mode. To enable Maintenance Mode select the MAINT touch cell or F5 key from the Main screen on the operator interface panel.**(Maintenance Mode is password protected 7140)**. Then select the ENABLE MAINT MODE touch cell on the Maintenance screen of the operator interface panel. In Maintenance Mode each of the drives can be moved with the various control touch cells. Maintenance Mode must be disabled before Cycle Run Mode can be started. To disable Maintenance Mode from the Maintenance Screen of the operator interface panel select DISABLE MAINT MODE touch cell.

Caution should be used when manually moving drive.

Manual Weld Mode

The Manual Weld Mode function can only be enabled while Maintenance Mode is on. To enable Manual Weld Mode first enable Maintenance Mode (see Maintenance Mode) then from the Maintenance Screen on the operator interface panel select ENABLE MANUAL WELD touch cell. The touch cell will then display MANUAL WELD ON. With the Manual Weld Mode on the manual weld three button control station is now enabled. The selector switch is used to select between manual control of the PINCER and PARALLEL weld heads, the green HOLD maintained pushbutton will begin to flash. Depressing the HOLD pushbutton will move the selected welder head tips to the weld hold position without firing the welder, the HOLD indicator will be on steady and the green FIRE pushbutton indicator will begin to flash. Pressing the FIRE momentary pushbutton will fire the selected welder. To disable Manual Weld Mode from the Maintenance Screen of the operator interface panel select DISABLE MANUAL WELD touch cell. The Manual Weld touch cells are only visible when Maintenance Mode is on.

Caution should be used when manually welding.

Shutdown

Emergency Shutdown
There is one Emergency Stop mushroom head pushbutton on this machine and it is located at the battery load side of the machine. Output power to the machine is turned off immediately when the Emergency Stop mushroom head pushbutton is pressed.

Normal Shutdown
To have a normal controlled shutdown wait until the machine has completed its cycle. Next press the red Stop pushbutton to enable Stop Mode. Then press the machine Emergency Stop pushbutton. This will turn off all output power. Turn off the Miyachi welder and then turn off main disconnect switch located on the main control panel (rotate switch handle counter clockwise). Close the main air supply valve.

If maintenance is being performed on the machine unplug the power cord and disconnect air supply.

Personnel should NOT work on any part of the machine
With power or air is applied.

STYLE Selection

This Machine has the capability to run five different styles of operation. There are three weld styles that can be selected from the Main of Clean screens of the operator interface panel and there are two tip clean styles that can be selected from the Clean screen of the operator interface panel. Style changes can only be made when the system is stopped.

Style 1 PINCER and PARALLEL - The machine will perform the Pincer Weld and Parallel Weld operations in one cycle.

Style 2 PINCER ONLY – The machine will only perform the Pincer Weld operation in one cycle.

Style 3 Parallel Only – The machine will only perform the Parallel Weld operation in one cycle.

Style 4 Pincer Clean Only – The machine will perform an automated Pincer tip cleaning operation for the set number of cycles. The Pincer Clean cycle is the up and down motion of the Vertical Screw Drive with the Pincer tips closed on the cleaning fixture.

Style 5 Parallel Clean Only – The machine will perform an automated Parallel tip cleaning operation for the set number of cycles. The Parallel Clean cycle is the in and out motion of the Horizontal Belt Drive with the Parallel tips closed on the cleaning fixture.

Pincer Weld Selection

There are two variations for the number of times the Pincer Weld is activated per position. The selection change can be from the password protected Position Entry screen of the operator interface panel (password 7140). The selection change can only be made when the system is stopped.

Single Pincer Weld – The Pincer Welder is only activated once per position. The Pincer Welder is activated a total of three times per cycle.

Double Pincer Weld – The Pincer Welder is activated twice per position. The distance between the welds can be adjusted from the Position Entry screen of the operator interface panel. The Pincer Welder is activated a total of six times per cycle.

Weld Sequence of Operation

The following is a step by step description of the sequence of operation of the machine.
Note: PLC Address reference in parenthesis ( ).
If any of the step conditions are not met the machine will fault. The red beacon located on top of the main control panel, the green Start mushroom head pushbutton indicator and the Reset touch cell located on the main screen of the operator interface panel will begin to flash. The corresponding alarm message will be displayed on the look up text box on the Main and Station screens of the operator interface panel. Pressing the green Start pushbutton or flashing Reset touch cell will reset the machine fault and retry the same step.

Step 0 Check Home Wait WORK On

Check Pincer Welder head up sensor is on (X6).
Check Parallel Welder head up sensor is on (X7).
Check Parallel Welder head retract sensor is on (X12).
Check Vertical Cylinder up sensor is on (X16).
Check Vertical Cylinder down sensor is off (X17)
Check Rotary drive is home.
Check Horizontal Belt drive is home.
Check Vertical Screw drive is home or style "Parallel Only" is selected.

After a delay if condition not met, alarm message "Check Home Sensors and Positions" will be displayed

Step 0 Set Welder Schedule Selection
Wait Battery Loaded to Nest and green Start Mushroom Head pushbutton pressed

Wait battery present sensor on (X5).

Wait illuminated green Start mushroom head pushbutton (X4) to be pressed.

Welder Schedule Selection:

Turn off Welder Schedule Bit 0 (Y1)
Turn on Welder Schedule Bit 1 (Y2)

Step 1 Check Style

If style Parallel Only is not selected continue to Step 2.

If style Parallel Only is selected go to Step 25.

Step 2 Move Horizontal Belt in to Position 1 and Wait, Set Welder Schedule Selection

Move Horizontal Belt in to Position 1

Wait for Horizontal Belt drive at Position 1.

After a delay if condition not met, alarm message "Horz Belt Not at Position 1" will be displayed

Welder Schedule Selection:

Turn on Welder Schedule Bit 0 (Y1)
Turn off Welder Schedule Bit 1 (Y2)

Step 3 Move Vertical Screw to bottom Pincer Weld Position and Wait

Move Vertical Screw down to bottom Pincer Weld Position

Wait for Vertical Screw at bottom Pincer Weld Position.

After a delay if condition not met, alarm message "Vert Screw Not at Btm Pincer Weld Position" will be displayed

Step 4 Move Horizontal Belt in to Position 2 and Wait

Move Horizontal Belt in to Position 2

Wait for Horizontal Belt at Position 2

After a delay if condition not met, alarm message "Horz Belt Not at Position 2" will be displayed

Step 5 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal is Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 6 Wait Welder Ready Signal On

Wait for Welder Ready Signal to be On (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Did Not Activate" will be displayed

Step 7 Continue to next Step or Return for second Weld
When Double Pincer Weld is selected:

After first Pincer Weld, Move Vertical Screw up to Top Pincer Weld Position

Wait for Vertical Screw at Top Pincer Weld Position.
If Double Pincer Weld is selected: After first Pincer Weld Return to Step 5 for second weld.

After second Pincer weld Move Horizontal Belt out to Reverse Position 2
Wait for Horizontal Belt at Reverse Position 2

When Single Pincer Weld is selected:

After first Pincer Weld, Move Horizontal Belt out to Reverse Position 2
Wait for Horizontal Belt at Reverse Position 2
If Single Pincer Weld is selected: After first Pincer Weld continue to Step 8

After a delay if condition not met, alarm message "Horz Belt Not at Reverse Position 2 or Vert Screw Not at Top Pincer Weld Position" will be displayed

Step 8 Move Vertical Screw to Clear Position and Check Sensor

Move Vertical Screw up to Clear Position

Wait for Vertical Screw at Clear Position

Check Pincer Welder head up sensor On (X6)

After a delay if condition not met, alarm message "Vert Screw Not at Clear Position or Pincer Welder Up Sensor Did Not Activate" will be displayed

Step 9 Rotate Rotary clock-wise to Position 1 and Wait

Rotate Rotary clock-wise to Position 1

Wait Rotary at Position 1

After a delay if condition not met, alarm message "Rotary Not at Position 1" will be displayed

Step 10 Move Vertical Screw to bottom Pincer Weld Position and Wait

Move Vertical Screw down to bottom Pincer Weld Position

Wait for Vertical Screw at bottom Pincer Weld Position

After a delay if condition not met, alarm message "Vert Screw Not at Btm Pincer Weld Position" will be displayed

Step 11 Move Horizontal Belt in to Position 3 and Wait

Move Horizontal Belt in to Position 3

Wait for Horizontal Belt at Position 3

After a delay if condition not met, alarm message "Horz Belt Not at Position 3" will be displayed

Step 12 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal is Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 13 Wait for Welder Ready Signal On

Wait for Welder Ready Signal to be On (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Did Not Activate" will be displayed

Step 14 Continue to next Step or Return for second Weld
When Double Pincer Weld is selected:

After first Pincer Weld, Move Vertical Screw up to Top Pincer Weld Position

Wait for Vertical Screw at Top Pincer Weld Position.

If Double Pincer Weld is selected: After first Pincer Weld Return to Step 12 for second weld.

After second Pincer weld Move Horizontal Belt out to Reverse Position 3
Wait for Horizontal Belt at Reverse Position 3

When Single Pincer Weld is selected:

After first Pincer Weld, Move Horizontal Belt out to Reverse Position 3
Wait for Horizontal Belt at Reverse Position 3

If Single Pincer Weld is selected: After first Pincer Weld
Continue to Step 15

After a delay if condition not met, alarm message "Horz Belt Not at Reverse Position 3 or Vert Screw Not at Top Pincer Weld Position" will be displayed

Step 15 Move Vertical Screw to Clear Position and Check Sensor

Move Vertical Screw up to Clear Position

Wait for Vertical Screw at Clear Position

Check Pincer Welder head up sensor On (X6)

After a delay if condition not met, alarm message "Vert Screw Not at Clear Position or Pincer Welder Up Sensor Did Not Activate" will be displayed

Step 16 Rotate Rotary clock-wise to Position 2 and Wait

Rotate Rotary clock-wise to Position 2

Wait Rotary at Position 2

After a delay if condition not met, alarm message "Rotary Not at Position 2" will be displayed

Step 17 Move Vertical Screw to bottom Pincer Weld Position and Wait

Move Vertical Screw down to bottom Pincer Weld Position

Wait for Vertical Screw at bottom Pincer Weld Position

After a delay if condition not met, alarm message "Vert Screw Not at Btm Pincer Weld Position" will be displayed

Step 18 Move Horizontal Belt in to Position 4 and Wait

Move Horizontal Belt in to Position 4

Wait for Horizontal Belt at Position 4

After a delay if condition not met, alarm message "Horz Belt Not at Position 4" will be displayed

Step 19 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal is Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 20 Wait for Welder Ready Signal On

Wait for Welder Ready Signal to be On (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Did Not Activate" will be displayed

Step 21 Continue to next Step or Return for second Weld
When Double Pincer Weld is selected:

After first Pincer Weld, Move Vertical Screw up to Top Pincer Weld Position

Wait for Vertical Screw at Top Pincer Weld Position.

If Double Pincer Weld is selected: After first Pincer Weld Return to Step 19 for second weld.

After second Pincer weld Move Horizontal Belt out to Reverse Position 4

Wait for Horizontal Belt at Reverse Position 4

When Single Pincer Weld is selected:

After first Pincer Weld, Move Horizontal Belt out to Reverse Position 4

Wait for Horizontal Belt at Reverse Position 4

If Single Pincer Weld is selected: After first Pincer Weld
Continue to Step 22

After a delay if condition not met, alarm message "Horz Belt Not at Reverse Position 4 or Vert Screw Not at Top Pincer Weld Position" will be displayed

Step 22 Move Vertical Screw to Clear Position and Check Sensor

Move Vertical Screw up to Clear Position

Wait for Vertical Screw at Clear Position

Check Pincer Welder head up sensor On (X6)

After a delay if condition not met, alarm message "Vert Screw Not at Clear Position or Pincer Welder Up Sensor Did Not Activate" will be displayed

Step 23 Set Welder Schedule Selection
If style Pincer Only is selected Move Vertical Screw Home and continue to Step 24

Move Vertical Screw up to Home Position

If style Pincer Only is not selected Move Vertical Screw Home, Move Horizontal Belt in to Position 5, Rotate Rotary to Position 3 and Wait

Move Vertical Screw up to Home Position

Move Horizontal Belt in to Position 5

Move Rotary clock-wise to Position 3

Wait Rotary at Position 3

After a delay if condition not met, alarm message "Rotary Not at Position 3" will be displayed

Wait Horizontal Belt at Position 5

After a delay if condition not met, alarm message "Horz Belt Not at Position 5 " will be displayed

Welder Schedule Selection:

Turn off Welder Schedule Bit 0 (Y1)
Turn on Welder Schedule Bit 1 (Y2)

Step 24 If style Pincer and Parallel Weld is not selected go to Step 44

If style Pincer and Parallel Weld is selected Wait Horizontal Belt at Position 5

Wait Horizontal Belt at Position 5

No alarm

Step 25 If style Parallel Weld Only is not selected continue to Step 26

If style Parallel Weld Only is selected Move Horizontal Belt in to Position 5 and Wait

If style Parallel Weld Only is selected:

Move Horizontal Belt in to Position 5

Wait for Horizontal Belt at Position 5

After a delay if condition not met, alarm message "Horz Belt Not at Position 5" will be displayed

Step 26 If style Parallel Weld only is not selected continue to Step 27

If style Parallel Weld Only is selected Rotate Rotary counter clockwise to Position 3 and Wait

Rotate Rotary counter-clockwise to Position 3

Wait Rotary at Position 3

After a delay if condition not met, alarm message "Rotary Not at Position 3 "will be displayed

Step 27 Lower Vertical Cylinder and Check Vertical Up Sensor

Turn on solenoid (Y13)

Check Vertical Up sensor Off (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Still On" will be displayed

Step 28 Check Vertical Cylinder Down Sensor

Check Vertical Down sensor On (X17)

After a delay if condition not met, alarm message "Vertical Cylinder Down Sensor Did Not Activate" will be displayed

Step 29 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal to be Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 30 Wait for Welder Ready Signal On and Check Sensors

Wait for Welder Ready Signal to be On (X11)

Check Parallel Welder head up sensor On (X7)
Check Parallel Welder head retract sensor On (12)

After a delay if condition not met, alarm message "Welder Ready Signal or Parallel Welder Up Sensor or Parallel Welder Retract Sensor Did Not Activate" will be displayed

Step 31 Move Horizontal Belt in to Position 5A

Wait for Horz Belt at Position 5A

After a delay if condition is not met, alarm message “Horz Belt Not at Positon 5A” will be displayed

Step 32 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal to be Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 33 Wait for Welder Ready Signal On and Check Sensors

Wait for Welder Ready Signal to be On (X11)

Check Parallel Welder head up sensor On (X7)
Check Parallel Welder head retract sensor On (12)

After a delay if condition not met, alarm message "Welder Ready Signal or Parallel Welder Up Sensor or Parallel Welder Retract Sensor Did Not Activate" will be displayed

Step 34 Raise Vertical Cylinder and Check Vertical Up Sensor

Turn off solenoid (Y13)

Check Vertical Cylinder Up sensor On (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Did Not Activate" will be displayed

Step 35 Move Horizontal Belt in to Position 6

Wait for Horz Belt at Position 6

After a delay if condition not met, alarm message "Horz Belt Not at Position 6" will be displayed

Step 36 Lower Vertical Cylinder and Check Vertical Up Sensor

Turn on solenoid (Y13)

Check Vertical Up sensor Off (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Still On" will be displayed

Step 37 Check Vertical Cylinder Down Sensor

Check Vertical Down sensor On (X17)

After a delay if condition not met, alarm message "Vertical Cylinder Down Sensor Did Not Activate" will be displayed

Step 38 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal is Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 39 Wait for Welder Ready Signal On and Check Sensors

Wait for Welder Ready Signal to be On (X11)

Check Parallel Welder head up sensor On (X7)
Check Parallel Welder head retract sensor On (X12)

After a delay if condition not met, alarm message "Welder Ready Signal or Parallel Welder Up Sensor or Parallel Welder Retract Sensor Did Not Activate" will be displayed

Step 40 Move Horizontal Belt in to Position 6A

Wait for Horz Belt at Position 6A

After a delay if condition is not met, alarm message “Horz Belt Not at Positon 5A” will be displayed

Step 41 Turn on Welder and Check Ready Signal Off

Turn on Welder Hold relay (Y12)
Turn on Welder Fire relay (Y3)

Check Welder Ready Signal is Off (X11)

After a delay if condition not met, alarm message "Welder Ready Signal Still On" will be displayed

Step 42 Wait for Welder Ready Signal On and Check Sensors

Wait for Welder Ready Signal to be On (X11)

Check Parallel Welder head up sensor On (X7)
Check Parallel Welder head retract sensor On (X12)

After a delay if condition not met, alarm message "Welder Ready Signal or Parallel Welder Up Sensor or Parallel Welder Retract Sensor Did Not Activate" will be displayed

Step 43 Raise Vertical Cylinder and Check Vertical Up Sensor

Turn off solenoid (Y13)

Check Vertical Cylinder Up sensor On (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Did Not Activate" will be displayed

Step 44 Rotate Rotary to Position 4 and Wait

Rotate Rotary to clock-wise to Position 4

Wait for Rotary at Position 4

After a delay if condition not met, alarm message "Rotary Not at Position 4" will be displayed

Step 45 Rotate Rotary to Home Position and Wait

Rotate Rotary to Home Position

Wait for Rotary at Home Position

After a delay if condition not met, alarm message "Rotary Not at Home Position" will be displayed

Step 46 Move Horizontal Belt to Position 7 and Wait

Move Horizontal Belt out to Position 7

Wait for Horz Belt at Position 7

After a delay if condition not met, alarm message "Horz Belt Not at Position 7" will be displayed

Step 47 Move Horizontal Belt to Home Position and Wait

Move Horizontal Belt out to Home Position

Wait Horizontal Belt at Home Position

After a delay if condition not met, alarm message "Horz Belt Not at Home Position" will be displayed

Step 48 Wait Battery Removed from Nest

Check Battery Present Sensor Off (X5)

Step 49 Pulse Cycle Done and Wait

Pulse Done Bit on

Wait for Work Bit Off

Step 50 Restart

Tip Clean Sequence of Operation

The following is a step by step description of the sequence of operation of the machine.
Note: PLC Address reference in parenthesis ( ).
If any of the step conditions are not met the machine will fault. The red beacon located on top of the main control panel, the green Start mushroom head pushbutton indicator and the Reset touch cell located on the main screen of the operator interface panel will begin to flash. The corresponding alarm message will be displayed on the look up text box on the Main and Station screens of the operator interface panel. Pressing the green Start pushbutton or flashing Reset touch cell will reset the machine fault and retry the same step.

Step 0 Check Home Wait WORK On

Check Pincer Welder head up sensor is on (X6).
Check Parallel Welder head up sensor is on (X7).
Check Parallel Welder head retract sensor is on (X12).
Check Vertical Cylinder up sensor is on (X16).
Check Vertical Cylinder down sensor is off (X17)
Check Rotary drive is home.
Check Horizontal Belt drive is home.
Check Vertical Screw drive is home or style "Parallel Only" is selected.

After a delay if condition not met, alarm message "Check Home Sensors and Positions" will be displayed

Step 0 Set Welder Schedule Selection
Wait Cleaning Fixture Loaded to Nest and green Start Mushroom Head pushbutton pressed

Wait battery present sensor on (X5).

Wait illuminated green Start mushroom head pushbutton (X4) to be pressed.

Welder Schedule Selection:

Turn off Welder Schedule Bit 0 (Y1)
Turn on Welder Schedule Bit 1 (Y2)

Step 1 Check Style

If style Clean Parallel Only is not selected continue to Step 2.

If style Clean Parallel Only is selected go to Step 16.

Step 2 Move Horizontal Belt in to Position 1C and Wait, Set Welder Schedule Selection

Move Horizontal Belt in to Position 1C

Wait for Horizontal Belt drive at Position 1C.

After a delay if condition not met, alarm message "Horz Belt Not at Position 1C" will be displayed

Welder Schedule Selection:

Turn on Welder Schedule Bit 0 (Y1)
Turn off Welder Schedule Bit 1 (Y2)

Step 3 Move Vertical Screw to bottom Pincer Clean Position and Wait

Move Vertical Screw down to bottom Clean Position

Wait for Vertical Screw at bottom Clean Position.

After a delay if condition not met, alarm message "Vert Screw Not at Btm Clean Position" will be displayed

Step 4 Move Horizontal Belt in to Position 2C and Wait

Move Horizontal Belt in to Position 2C

Wait for Horizontal Belt at Position 2C

After a delay if condition not met, alarm message "Horz Belt Not at Position 2C" will be displayed

Step 5 Turn on Welder Hold and Wait Welder Hold

Turn on Welder Hold relay (Y12)

Wait Welder Hold relay On (Y12)

Step 6 Wait Start Delay

Wait Start Delay Timer Done to be On

Step 7 Move Vertical Screw to Top Pincer Clean Position and Wait

Move Vertical Screw up to Top Clean Position

Wait for Vertical Screw at Top Clean Position

After a delay if condition not met, alarm message "Vert Screw Not at Top Clean Position" will be displayed

Step 8 Move Vertical Screw to Bottom Pincer Clean Position and Wait

Move Vertical Screw up to Bottom Clean Position

Wait for Vertical Screw at Bottom Clean Position

After a delay if condition not met, alarm message "Vert Screw Not at Btm Clean Position " will be displayed

Step 9 Increment Pincer Clean Cycle Counter 1 count and Check Done

Increment Pincer Cycle Counter by 1

Check if Pincer Cycle Counter done bit On

If Pincer Cycle Counter is not done Go To Step 7

If Pincer Cycle Counter is done Continue to Next Step 10

Step 10 Turn off Welder Hold and Wait Welder Hold

Turn off Welder Hold relay (Y12)

Wait Welder Hold relay Off (Y12)

Step 11 Wait Stop Delay

Wait Stop Delay Timer Done to be On

Step 12 Move Horizontal Belt out to Position 1C and Wait,

Move Horizontal Belt in to Position 1C

Wait for Horizontal Belt drive at Position 1C.

After a delay if condition not met, alarm message "Horz Belt Not at Position 1C" will be displayed

Step 13 Move Vertical Screw to Clear Position and Check Sensor

Move Vertical Screw up to Clear Position

Wait for Vertical Screw at Clear Position

Check Pincer Welder head up sensor On (X6)

After a delay if condition not met, alarm message "Vert Screw Not at Clear Position or Pincer Welder Up Sensor Did Not Activate" will be displayed

Step 14 Move Vertical Screw Home and Wait

Move Vertical Screw to Home Position

Wait for Vertical Screw at Home Position

After a delay if condition not met, alarm message "Vert Screw Not at Home Position" will be displayed

Welder Schedule Selection:

Turn off Welder Schedule Bit 0 (Y1)
Turn on Welder Schedule Bit 1 (Y2)

Step 15 Check Style

If style Clean Pincer Only is not selected continue to Step 16.

If style Clean Pincer Only is selected go to Step 27.

Step 16 Move Horizontal Belt in to Position 5C and Wait

Move Horizontal Belt in to Position 5C

Wait Horizontal Belt at Position 5C

After a delay if condition not met, alarm message "Horz Belt Not at Position 5C" will be displayed

Step 17 Lower Vertical Cylinder and Check Vertical Up Sensor

Turn on solenoid (Y13)

Check Vertical Up sensor Off (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Still On" will be displayed

Step 18 Check Vertical Cylinder Down Sensor

Check Vertical Down sensor On (X17)

After a delay if condition not met, alarm message "Vertical Cylinder Down Sensor Did Not Activate" will be displayed

Step 19 Turn on Welder Hold and Wait Welder Hold and Sensor

Turn on Welder Hold relay (Y12)

Wait for Welder Hold relay On (Y12)

Wait for Parallel Welder head up sensor Off (X7)

Wait for Parallel Welder head retract sensor Off (X12)

Step 20 Wait Start Delay

Wait Start Delay Timer Done to be On

Step 21 Move Horizontal Belt in to Position 6C

Wait for Horz Belt at Position 6C

After a delay if condition not met, alarm message "Horz Belt Not at Position 6C" will be displayed

Step 22 Move Horizontal Belt out to Position 5C and Wait

Move Horizontal Belt out to Position 5C

Wait Horizontal Belt at Position 5C

After a delay if condition not met, alarm message "Horz Belt Not at Position 5C" will be displayed

Step 23 Increment Parallel Clean Cycle Counter 1 count and Check Done

Increment Parallel Cycle Counter by 1

Check if Parallel Cycle Counter done bit On

If Parallel Cycle Counter is not done Go To Step 21

If Parallel Cycle Counter is done Continue to Next Step 24

Step 24 Turn off Welder Hold, Wait and Check Sensors

Turn off Welder Hold relay (Y12)

Wait for Welder Hold relay Off (Y12)

Check for Parallel Welder head up sensor Off (X7)

Check for Parallel Welder head retract sensor Off (X12)

After a delay if condition not met, alarm message "Parallel Up or Retract Sensors Did Not Activate" will be displayed

Step 25 Wait Stop Delay

Wait Stop Delay Timer Done to be On

Step 26 Raise Vertical Cylinder and Check Vertical Up Sensor

Turn off solenoid (Y13)

Check Vertical Cylinder Up sensor On (X16)

After a delay if condition not met, alarm message "Vertical Cylinder Up Sensor Did Not Activate" will be displayed

Step 27 Move Horizontal Belt to Position 7 and Wait

Move Horizontal Belt out to Position 7

Wait for Horz Belt at Position 7

After a delay if condition not met, alarm message "Horz Belt Not at Position 7" will be displayed

Step 28 Move Horizontal Belt to Home Position and Wait

Move Horizontal Belt out to Home Position

Wait Horizontal Belt at Home Position

After a delay if condition not met, alarm message "Horz Belt Not at Home Position" will be displayed

Step 29 Pulse Cycle Done and Wait

Pulse Done Bit on

Wait for Work Bit Off

Step 30 Restart

Diagnostics

Overview
This section identifies various faults and errors that are detected by the system. Error conditions will be indicated with a message on the operator interface panel and red beacon on top of the main control panel.

Conditions

Proximity and Photo Optic Sensors

Pincer Welder Head Up Proximity Sensor

At various steps in the operation the position of the Pincer welder head is checked to be up. If the Pincer welder head is not in the up position when required the machine will fault. The Reset touch cell located on the Main, Maintenance and Clean screens of the Operator Interface panel, the green Start push button of the three button station and the red Beacon located on top of the Main Control Panel will flash indicating a fault. A corresponding alarm message will be displayed on the Main and Station screen of the Operator Interface Panel. Pressing and Reset touch cell or the green Start push button will reset the fault and retry the step.

Parallel Welder Head Up Proximity Sensor

At various steps in the operation the position of the Parallel welder head is checked to be up. If the Parallel welder head is not in the up position when required the machine will fault. The Reset touch cell located on the Main, Maintenance and Clean screens of the Operator Interface panel, the green Start push button of the three button station and the red Beacon located on top of the Main Control Panel will flash indicating a fault. A corresponding alarm message will be displayed on the Main and Station screen of the Operator Interface Panel. Pressing and Reset touch cell or the green Start push button will reset the fault and retry the step.

Parallel Welder Head Retract Proximity Sensor

At various steps in the operation the position of the Parallel welder head is checked to be retracted. If the Parallel welder head is not in the retract position when required the machine will fault. The Reset touch cell located on the Main, Maintenance and Clean screens of the Operator Interface panel, the green Start push button of the three button station and the red Beacon located on top of the Main Control Panel will flash indicating a fault. A corresponding alarm message will be displayed on the Main and Station screen of the Operator Interface Panel. Pressing and Reset touch cell or the green Start push button will reset the fault and retry the step.

Parallel Welder Vertical Cylinder Proximity Sensor

At various steps in the operation the position of the Parallel welder vertical cylinder is checked to be either up or down. If the Parallel welder vertical cylinder is not in the correct position when required the machine will fault. The Reset touch cell located on the Main, Maintenance and Clean screens of the Operator Interface panel, the green Start push button of the three button station and the red Beacon located on top of the Main Control Panel will flash indicating a fault. A corresponding alarm message will be displayed on the Main and Station screen of the Operator Interface Panel. Pressing and Reset touch cell or the green Start push button will reset the fault and retry the step.

Over-travel Limit Photo Optic Sensors

At each end of travel of the Vertical Screw Drive and Horizontal Belt Drive are over-travel limit sensors. If at any time an over-travel sensor is activated the associated drive will stop motion and Stop Mode will be activated. The status of these sensors is displayed on the Main and Drive Status screens.

Battery Present Photo Optic Sensor

Mounted to the battery nest is a battery present sensor. This sensor is used to permit the start and end of each cycle. The sensor must be activated to permit the starting of a cycle. In weld mode the sensor must be deactivated to permit the completion of the cycle.

Appendices

Overview

This section provides a fuse list, a device list and an input and output list.

Replacement Fuse List

AC Fuse Number	Edison	Type	Destination
FU1	EDCC20	Midget	Main Power Circuit
FU2	EDCC2	Midget	PLC Circuit
FU3	EDCC6	Midget	DC Power Supply Circuit
FU4	EDCC15	Midget	Convenience Outlet Circuit
FU5	EDCC10	Midget	Rotary Drive
FU6	EDCC7	Midget	Horizontal Belt Drive
FU7	EDCC7	Midget	Vertical Screw Drive
DC Fuse Number	Bussman	Type	Destination
FU1D1	BK/GMA-2A	5mm x 20mm	E-Stop Relay Circuit
FU2D1	BK/GMA-2A	5mm x 20mm	Input Device Circuit
FU3D1	BK/GMA-2A	5mm x 20mm	Operator Interface C-More Micro
FU4D1	BK/GMA-2A	5mm x 20mm	Output Device Circuit
FU5D1	BK/GMA-2A	5mm x 20mm	Drive Logic Circuit

PLC Input Slot 0 Device List

Address	Tag Name	Description	Device detail
			[Welder Pin#] “Tag Name”
X0	ESR_4	Safemaster E Stop Relay LG5924-48-61-24	Normally Closed contact 4
X1	FLAPPER	Hinge Safety Switch	SCHMERSAL
X2	STOP	Red STOP Maintained Pushbutton	Normally closed contact
X3	STEP	Yellow STEP Maintained Pushbutton	Normally open contact
X4	START	Green START Momentary Pushbutton	Normally open contact
X5	BATTPRES	Photo sensor	Keyence PZM-12
X6	PINCERUP	Pincer Weld Head Up Sensor	Auto Direct AE1-AN-AF
X7	PARALLELUP	Parallel Weld Head Up Sensor	Auto Direct AE1-AN-AF
X10	DOOR	Non-locking Safety Door Switch	COMPEPI SP2K20W02
X11	WELDREADY	Welder Ready Signal Relay K2	[6] “Run State” [13] “1000”
X12	PARALLELRET	Parallel Welder Head Retract Sensor	Auto Direct AE1-AN-AF
X13	WELD_SELECT	Weld Selector Switch 0=Pincer 1=Parallel	Normally open contact
X14	WELDHOLD_PB	Green Maintained Pushbutton Weld Hold	Normally open contact
X15	WELDFIRE_PB	Green Momentary Pushbutton Weld Fire	Normally open contact
X16	VERTUP	Parallel Vertical Cylinder Up Sensor	QE-022-NS-11L
X17	VERTDN	Parallel Vertical Cylinder Down Sensor	QE-022-NS-11L
			[Drive Pin#] “Tag Name”
X20	ENDMOV_ROT	Rotary Drive End of Move Signal	[29] “END”
X21	ALARM_ROT	Rotary Drive Alarm Signal	[25] “ALARMOUT”
X22	ENDMOV_BELT	Horizontal Belt Drive End of Move Signal	[4] “END”
X23	ALARM_BELT	Horizontal Belt Drive Alarm Signal	[2] “ALM”
X24	NEGLIM_BELT	Horizontal Belt Negative Over Travel Sensor	Omron PAD6-SB (n.c.)
X25	POSLIM_BELT	Horizontal Belt Positive Over Travel Sensor	Omron PAD6-SB (n.c.)
X26	ENDMOV_SCREW	Vertical Screw Drive End of Move Signal	[4] “END”
X27	ALARM_SCREW	Vertical Screw Drive Alarm Signal	[2] “ALM”
X30	NEGLIM_SCREW	Vertical Screw Negative Over Travel Sensor	Omron PAD6-SB (n.c.)
X31	POSLIM_SCREW	Vertical Screw Positive Over Travel Sensor	Omron PAD6-SB (n.c.)
X32			
X33			
X34			
X35			
X36			
X37			

PLC Output Slot 1 Device List

Address	Tag Name	Description	Device detail
			[Welder Pin#] “Tag Name”
Y0	ALARMLA	Red Beacon Mounted on Main Control Panel	
Y1	WELD_SCHBIT0	Weld Schedule 1 select Pincer Weld Head	[1] “weld.sched.0”
Y2	WELD_SCHBIT1	Weld Schedule 2 select Parallel Weld Head	[2] “weld.sched.1”
Y3	WELD_FIRE	Trigger Welder to Fire Relay CR4	Foot Switch Connection
Y4	WELD_INHIBIT	Welder Inhibit Signal	[9] “weld.inhibit”
Y5	PWR_ROT	Rotary Drive Power Relay CR1	
Y6	PWR_BELT	Horizontal Belt Drive Power Relay CR2	
Y7	PWR_SCREW	Vertical Screw Drive Power Relay CR3	
Y10	STARTLA	Green START Pushbutton Indicator	Sprecher schuh D7-N3G
Y11	STOPLA	Red STOP Pushbutton Indicator	Sprecher schuh D7-N7R
Y12	WELD_HOLD	Trigger Welder to Hold Relay CR5	Foot Switch Connection
Y13	VERT_SV	Parallel Welder Vertical Cylinder Solenoid	
Y14	HOLDPB_LA	Welder Hold Pushbutton Green Indicator	
Y15	FIREPB_LA	Welder Fire Pushbutton Green Indicator	
Y16			
Y17			

PLC Stepper Slot 2 Device List

Address	Tag Name	Description	Device detail
Slot 2			[Drive Pin#] “Tag Name”
1A	ASG1_ROT	Rotary Motor Encoder Channel A	[15] “ASG1”
1B	BSG1_ROT	Rotary Motor Encoder Channel B	[13] “BSG1”
1C	HOMSNS_ROT	Rotary Home Sensor	Omron PAD6-SB (n.o.)
1D			
1M	24vdc		
2A	ASG1_BELT	Belt Motor Encoder Channel A	[20] “ASG1”
2B	BSG1_BELT	Belt Motor Encoder Channel B	[21] “BSG1”
2C	HOMSNS_BELT	Belt Home Sensor	Omron PAD6-SB (n.o.)
2D			
2M	24vdc		
C0	PLS_ROT	2KΩ resistor in series	[12] “PLS”
Y0	0vdc		
C1	DIR_ROT	2KΩ resistor in series	[10] “DIR”
Y1	0vdc		
C2	FP_BELT		[32] “FP”
Y2	0vdc		
C3	RP_BELT		[35] “RP”
Y3	0vdc		

PLC Stepper Slot 3 Device List

Address	Tag Name	Description	Device detail
Slot 3			[Drive Pin#] “Tag Name”
1A	ASG1_SCREW		[20] “ASG1”
1B	BSG1_SCREW		[21] “BSG1”
1C	HOMSNS_SCREW		Omron PAD6-SB (n.o.)
1D			
1M	24vdc		
2A			
2B			
2C			
2D			
2M			
C0	FP_SCREW		[32] “FP”
Y0	0vdc		
C1	RP_SCREW		[35] “RP”
Y1	0vdc		
C2			
Y2	0vdc		
C3			
Y3	0vdc		