



*In manufacture
and Retrofit
Machine Tool
Specialists*

**Deburring Machine
Operator Manual
Publication No. 267P0002
Earl M. Jorgensen Company
Date: 5-07-02 Revision: A**

516

IMPORTANT: Read this manual before operating the machine. The information contained in this manual is unique to the Deburring Machine.

Table of Contents

OPERATOR'S PANEL DESCRIPTION	2
PLC Panel	2
Pushbuttons Panel	4
MACHINE OPERATIONS	5
Automatic Operation	5
Manual Operation	6
Fixture Drive Speed Adjustment	7
ALARM MESSAGES	9

Chapter 1

Operator's Panel Description

The operator's panel includes a PLC panel (which includes a two line text display and function/selection buttons) which provides most of the pushbuttons for machine operation and, in addition, there are three hardwired pushbuttons.

PLC Panel

The PLC panel has five basic displays: **Deburr Machine** (power on and diagnostics); **Left Head** (manual operation of the Left Drill Head); **Right Head** (manual operation of the Right Drill Head); **Fixture Drive** (manual operation of the clamping fixture motor drive); and **Auto Mode** (automatic operation). Each display has two lines of text; the display's name is always shown on the top text line. The operator uses the arrow up and down buttons to view these five displays, and the "Enter" button to actually select a display for operation. The following is a description of each display and the associated PLC panel buttons.

Deburr Machine:

1. The Deburr Machine display is displayed at power on.
 - a) The bottom line of text will show the status of the machine: "E-Stop active" or "Machine Ready". If "E-Stop active" is display, release the [EMERGENCY STOP] pushbutton to change status to "Machine Ready". Once "Machine Ready" is displayed, the machine is ready for manual or automatic operations.
2. Press the arrow right button to view the PLC inputs/outputs diagnostic display. The current status of the PLC I/O points are shown. Note, the right most bit is equivalent to I1 on the top line and Q1 on the bottom line. This diagnostic screen will only show an active bit and the lower order bits, refer to the following example.
 - a) Diagnostic Example: Assume input bits I2, I4, I6, I8, and I12 are on; and only output bit Q2 is on. The following display results:

Inputs	100010101010
Outputs	10

Left Head:

Press the arrow up or down buttons, on the PLC panel, to find any of the five basic displays.

1. The Left Head display is used for manual operation/setup of the Left Drill Head.
 - a) The bottom line of text will show the status of the Left Drill Head: "Advanced" or "Retracted", if it is presently on one of these two limit switches. Both Heads must be at the "Retracted" position before starting automatic cycle.
2. Press the "Enter" button to select this head for manual operations; note the display will show the top text line "Left Head - Active", indicating it is selected.
 - a) To view the following details of the associated function buttons, press the right arrow button; press the right arrow again or press the left arrow button to return to the Left

Head display. Function buttons used when the Left Head (or Right Head) display is "active" are as follows:

- "F1" Starts the Drill head motor, which must be running to move the head.
- "F6" Stops the Drill head motor.
- "F5" Advances the Drill head towards the fixture.
- "F10" Retracts the Drill head away from the fixture.

Right Head:

Press the arrow up or down buttons, on the PLC panel, to find any of the five basic displays.

1. The Right Head display is used for manual operation/setup of the Right Drill Head.
 - a) The bottom line of text will show the status of the Right Drill Head: "Advanced" or "Retracted", if it is presently on one of these two limit switches. Both Heads must be at the "Retracted" position before starting automatic cycle.
2. Press the "Enter" button to select this head for manual operations; note the display will show the top text line "Right Head - Active", indicating it is selected.
 - a) To view the following details of the associated function buttons, press the right arrow button; press the right arrow again or press the left arrow button to return to the Right Head display.
 - "F1" Starts the Drill head motor, which must be running to move the head.
 - "F6" Stops the Drill head motor.
 - "F5" Advances the Drill head towards the fixture.
 - "F10" Retracts the Drill head away from the fixture.

Fixture Drive:

Press the arrow up or down buttons, on the PLC panel, to find any of the five basic displays.

1. The Fixture Drive display is used for manual operation/setup of the fixture.
 - a) The bottom line of text will show the status of the Fixture Unit: "Clamped" or "Unclamped". The fixture must be at the "Unclamped" position before starting automatic cycle.
2. Press the "Enter" button to select this unit for manual operations; note the display will show the top text line "Fixture Drive - Active", indicating it is selected.
 - a) To view the following details of the associated function buttons, press the right arrow button; press the right arrow again or press the left arrow button to return to the Fixture Drive display.
 - "F5" Drives the fixture in the forward direction (direction during Auto Mode).
 - "F10" Drives the fixture in the reverse direction.

Auto Mode:

Press the arrow up or down buttons, on the PLC panel, to find any of the five basic displays.

1. The Auto Mode display is used for starting automatic operation.
 - a) The bottom line of text will show the status of the Auto Mode: "Not Ready", "Cycle Permit" or "Cycle Active". Refer to the Machine Operations chapter, Automatic Operation section for further details.
2. Press the "Enter" button to select this mode of operation; note the display will show the top text line "Auto Mode - Active", indicating it is selected.
 - a) To view the associated auto mode displays, **Parts Total** and **Dwell Timer**, press the right arrow button; press the left arrow button to return to the Auto Mode display.
 - b) The **Parts Total** display shows the current number of cycles the machine has executed. Text instructions are shown on this screen to reset this Parts Total. Press the "Enter" button to request reset to zero; the display will respond "ESC = EXIT, ENTER = RESET". Press "Enter" again to reset Parts Total to zero or "ESC" to cancel this request.
 - c) The **Dwell Timer** display shows the current "Dwell Time" setting; used during automatic cycle when the Drill Heads reach their individual advance limit switch. Press the "Enter" button to change the current setting; use the function/numeric buttons to type a new value; then press "Enter" again to activate change. Note, each unit is equal to .01 sec; therefore, a setting of 100 = 1.00 seconds.
3. When the status on the bottom text line shows "Cycle Permit", press the [CYCLE START] pushbutton to initiate automatic operation.

Pushbuttons Panel

There are three hardware pushbuttons in addition to the PLC panel; the following is a description of each:

Emergency Stop Pushbutton:

Stops all motors. Release the [EMERGENCY STOP] pushbutton to return to a "Machine Ready" status.

Cycle Start Pushbutton:

Initiates automatic operation, when the "Auto Mode" display is "active", and the Drill Heads and Fixture are in the proper starting position. Refer to the Machine Operations chapter, Automatic Operation section for further details.

Cycle Stop Pushbutton:

Halts automatic operation at the end of a completed cycle, the Fixture will be unclamped and the Drill Heads retracted.

Chapter 2

Machine Operations

Automatic Operation

Automatic Operation Notes

1. Automatic cycle is initiated by the [CYCLE START] pushbutton, when the Auto Mode display is “Active”, and the machine is in the “Cycle Permit” state. Once automatic cycle is initiated the bottom text line will change to “Cycle Active”; if this text shows “Not Ready”, refer to item #2.
 - a) Pressing the right arrow button, from the Auto Mode display, will display the “Parts Total” counter; total parts count can be reset to zero from this display.
 - b) Pressing the right arrow button a second time, from the Auto Mode display, will display the “Dwell Timer” setting; dwell time can be adjusted from this display.
2. “Cycle Permit” must be displayed on the Auto Mode display before automatic cycle will start. The system checks for the following four items when the [CYCLE START] pushbutton is pressed and displays an alarm, if “Not Ready”.
 - a) Operator Doors must be closed.
 - b) Left Head “Retracted” – must be active. The Left Drill Head can be returned to its retract limit switch via the Left Head display, manual operations. Refer to the Manual Operations section for details.
 - c) Right Head “Retracted” – must be active. The Right Drill Head can be returned to its retract limit switch via the Right Head display, manual operations. Refer to the Manual Operations section for details.
 - d) Fixture Drive “Unclamped” – must be active. The fixture can be moved to the unclamped position via the Fixture Drive display, manual operations. Refer to the Manual Operations section for details.
3. Pressing the [CYCLE STOP] pushbutton or running out of parts will automatically stop the cycle at the “Cycle Permit” state (both heads retracted and the fixture unclamped).

Automatic Operation Sequence

1. When automatic cycle is started, both Drill Heads and the Fixture drive motors will start.
2. When the fixture clamped limit switch is active both Drill Heads will advance.
3. Each Drill Head will dwell (“Dwell Timer”) after reaching its advance limit switch.
4. The Drill Heads will independently return to their retract limit switch, after dwelling.
5. The fixture drive will perform an unload/load while unclamping; then the cycle repeats.

Manual Operation

Manual operations are performed from the following PLC displays: **Left Head** (manual operation of the Left Drill Head); **Right Head** (manual operation of the Right Drill Head); and **Fixture Drive** (manual operation of the clamping fixture motor drive). Press the arrow up or down buttons, on the PLC panel, to find any of these displays. Each unit can be operated manually, but only one at a time.

Left Head and Right Head Operation

Press the arrow up or down buttons, on the PLC panel, to select the Left head or Right Head displays.

1. Activate the drill head after selecting the display by pressing the “Enter” button. The display will show “xxxxx Head – Active”, this enables the associated function buttons for manual operations. Note, pressing the arrow up/down buttons will deactivate the selected head, and turn off the associated drill head motor, if running.
2. Once a drill head is “Active” the following functions buttons will manually operate it:
 - “F1” Starts the Drill head motor, which must be running to move the head.
 - “F6” Stops the Drill head motor.
 - “F5” Advances the Drill head towards the fixture.
 - “F10” Retracts the Drill head away from the fixture.
3. Press the “F1” button first to start the drill head motor, the motor must be running to move the head. Press “F6” button or the [CYCLE STOP] pushbutton to stop the motor.
4. The “F5” button (Head Advance) is only active when the Fixture Drive is at its “Clamped” position. The head can be pulsed in small increments by momentarily pressing this button; or if you press and hold this button the head will automatically stop at its advance limit switch. Note, the setting of the “decel rod” will cause the drill head to feed at slow rate, according to the setting of the manually adjustable feedrate valve.
5. The “F10” button is always available to retract the head. The head can be pulsed in small increments by momentarily pressing this button; or if you press and hold this button the head will automatically stop at its retract limit switch. Note, the drill heads always retract at full speed.
6. Press the “F6” button or the [CYCLE STOP] to stop the drill head motor, once it is retracted; the “Retracted” state is required for the drill heads before automatic cycle can be started.

NOTE: Both Drill Heads must be at their “Retracted” position to start automatic cycle.

Fixture Drive Operation

Press the arrow up or down buttons, on the PLC panel, to select the Fixture Drive display.

1. Activate the Fixture Drive after selecting the display by pressing the “Enter” button. The display will show “Fixture Drive - Active”, this enables the associated function buttons for manual operations. Note, pressing the arrow up/down buttons will deactivate the Fixture Drive, and turn off the motor, if running.
2. Once the Fixture Drive is “Active” the following functions buttons will manually operate it; but both drill heads must be “Retracted” first to enable the Fixture Drive motor.
 - “F5” Drives the fixture in the forward direction (direction during Auto Mode).
 - “F10” Drives the fixture in the reverse direction.
3. The “F5” button will run the Fixture Drive motor in the normal direction, same as automatic cycle. The Fixture Drive motor can be moved in small increments by momentarily pressing this button or press and hold this button to continuously move. Note, the drill heads must be “Retracted” to enable the fixture motor.
4. The “F10” button will run the Fixture Drive motor in the reverse direction. **Caution: running in the reverse direction could cause damage to the auto loading mechanism.** Note, the drill heads must be “Retracted” to enable the fixture motor.

NOTE: The Fixture Drive must be at its “Unclamped” position to start automatic cycle.

Fixture Drive Speed Adjustment

The Fixture Drive Unit is a Baldor Series 15J Inverter Control. It is possible to change the Fixture Drive motor speed used during automatic cycle; the adjustable setting is from 15Hz to 40Hz. The manual speed is set at the minimum speed setting of 15Hz. This Baldor Controller is located inside the electrical panel.

Caution: Only a qualified electrical technician should open this panel.

The typical display on the Baldor Controller is shown below:

OFF	0V	0RPM
REM	0.0A	0.00HZ

The “REM” in the lower left corner is required to run, press the “Local” button to change between local control (LOC) and remote control (REM).

Programming a speed change on the Baldor Controller, settable range is 15Hz to 40Hz:

1. Press the "PROG" button, the display will show:

PRESS ENTER FOR PRESET SPEEDS

2. Press the "ENTER" button, the display will show:

PRESET SPEED #1 P: 22.00HZ

3. Press the "ENTER" button again to adjust the current value (originally set to 22HZ), the display will show:

PRESET SPEED #1 <u>0</u> 22.0HZ

45HZ 5-22

Use the "SHIFT" button to move the blinking cursor to the digit to be changed then use the Up and Down Arrow buttons to increment the selected digit.

4. Press the "ENTER" button to store the new value (ie 19.0HZ), the display will show:

PRESET SPEED #1 P: 19.00HZ

Exiting after programming a speed change on the Baldor Controller:

5. To exit, press the Arrow Down button, the display will show:

PRESS ENTER FOR MENU EXIT

6. Press the "ENTER" button, the display will show:

PRESS ENTER FOR PRESET SPEEDS

7. Press the Arrow Down button again, the display will show:

PRESS ENTER FOR PROGRAMMING EXIT

8. Press the "ENTER" button, the display will return to the typical display:

OFF	0V	0RPM
REM	0.0A	0.00HZ

NOTE: The Fixture Speed Adjustment is complete, the unit is ready to run.

Chapter 3

Alarm Messages

Alarm messages will automatically appear on the PLC display when active. The “ESC” button on the PLC panel is used for resetting an alarm, and the display will return to its previously selected display.

MESSAGE	COMMENT
Right Head motor feedback error.	The Right Head motor was commanded to start, but input I1 did not go on.
Left Head motor feedback error.	The Left Head motor was commanded to start, but input I2 did not go on.
Fixture Motor Drive unit error.	Input I3 is off, indicating a problem with the fixture drive unit. Turn off main power for approx. 10 seconds to reset this variable speed drive unit.
Operator doors are not closed.	Input I10 must be on before starting automatic cycle; front and rear doors must be in place.
Right Head advance error.	The Right Head motor was commanded to advance, but input I5 did not go on; this alarm will only occur in automatic cycle.
Right Head retract error.	The Right Head must be retracted before starting auto cycle. This alarm can also be caused, in auto cycle, if the head is not at retract when the fixture unclamps. Input I6 must be on, and I5 off.
Left Head advance error.	The Left Head motor was commanded to advance, but input I7 did not go on; this alarm will only occur in automatic cycle.
Left Head retract error.	The Left Head must be retracted before starting auto cycle. This alarm can also be caused, in auto cycle, if the head is not at retract when the fixture unclamps. Input I8 must be on, and I7 off.
Fixture clamp switch error.	The Fixture Drive must be at unclamp position before starting auto cycle. This alarm can also be caused, in auto cycle, if the fixture clamp switch (Input I9) does not cycle within 10 secs.

MESSAGE	COMMENT
System I/O error.	This is an internal PLC fault bit, turned off main power to reset error.
No parts present cycle stop error.	Input I14 must be on to continue automatic cycle. It is possible to run one part at a time without this input on, by pressing the [CYCLE START] pushbutton each time.