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# Operator and Maintenance Manual

Designed and Built For  
Sample Tube  
Part Number 4196783222

Customer Tool Number: Excel 212

Machine Serial No. 231961  
Manufactured Date  
February, 1991

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## Section 2

Design package includes the following:

- Assembly Diagrams
- Detail Prints
- Electrical Diagrams
- Pneumatic Diagrams
- Floor Plan Diagram

## Electrical Installation and Lock-out / Tag-out Locations:



**Rear View of machine**

### ***Electrical Installation:***

Wire electrical disconnect to an 460 Volt / 3 phase electrical supply.

Note: The machine incoming power is fused at 10 amps.

### ***Electrical Lock-out / Tag-out:***

Turn disconnect to “Off “position and attach OSHA approved device to electrical disconnect

## Pneumatic Installation and Lock-out / Tag-out



### ***Pneumatic Installation:***

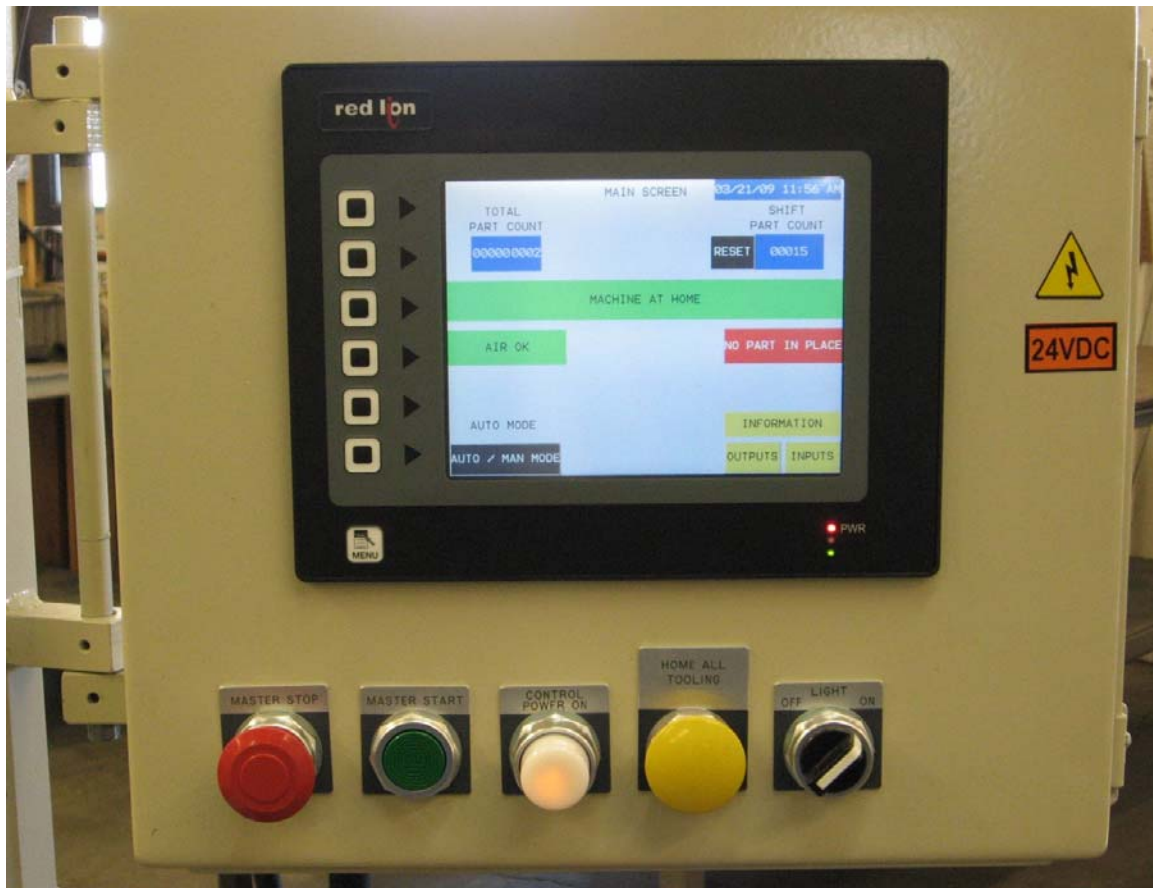
Connect incoming air supply to shut off valve supplied. Turn disconnect to “On” position.

Note: Incoming air supply should be capable of delivering a constant 85 P.S.I or greater air pressure.

### ***Pneumatic Lock-out / Tag-out:***

Turn disconnect to “Off” position and attach OSHA approved device to pneumatic disconnect

## Machine Controls:



**Operator terminal**

### ***Operator Terminal:***

The machine is supplied with the following hardwired devices: Master Stop (emergency stop), Master Start, Control Power On, Home All Tooling, Light On-Off Selector Switch .

The Terminal also includes a Red Lion programmable operator screen

## ***Hardwired Devices:***

### **“Master Stop” pushbutton**

Removes control power to the inputs and outputs of the PLC. The Operator terminal will display a “Control power off - Turn control power on” message.

### **“Master Start” pushbutton**

This button will reset the safety relay and control power will be restored if the master stop button is not depressed (locked on) and there is power to the machine.

### **“Control Power On” indicator light**

When the control power is on, the indicator will be illuminated.

1. note: Pushing the indicator will test the light bulb. If the light does not illuminate when the button is pushed, the bulb is bad.

### **“Home All Tooling” pushbutton**

This button will latch the machine sequence controller into “rest” mode.

Initiate the reset cycle by activating the button. After initiating the “Home All Tooling” reset cycle, the machine controller will automatically return all tooling to home position.

Note:

1. The “Home All Tooling” pushbutton is disabled if either the light curtain is disturbed or the “Master Stop” pushbutton is activated (locked on).
2. Button will not activate unless the machine is out of run mode

### **“Light Off / On” selector switch**

The switch is used to turns the overhead light on and off.

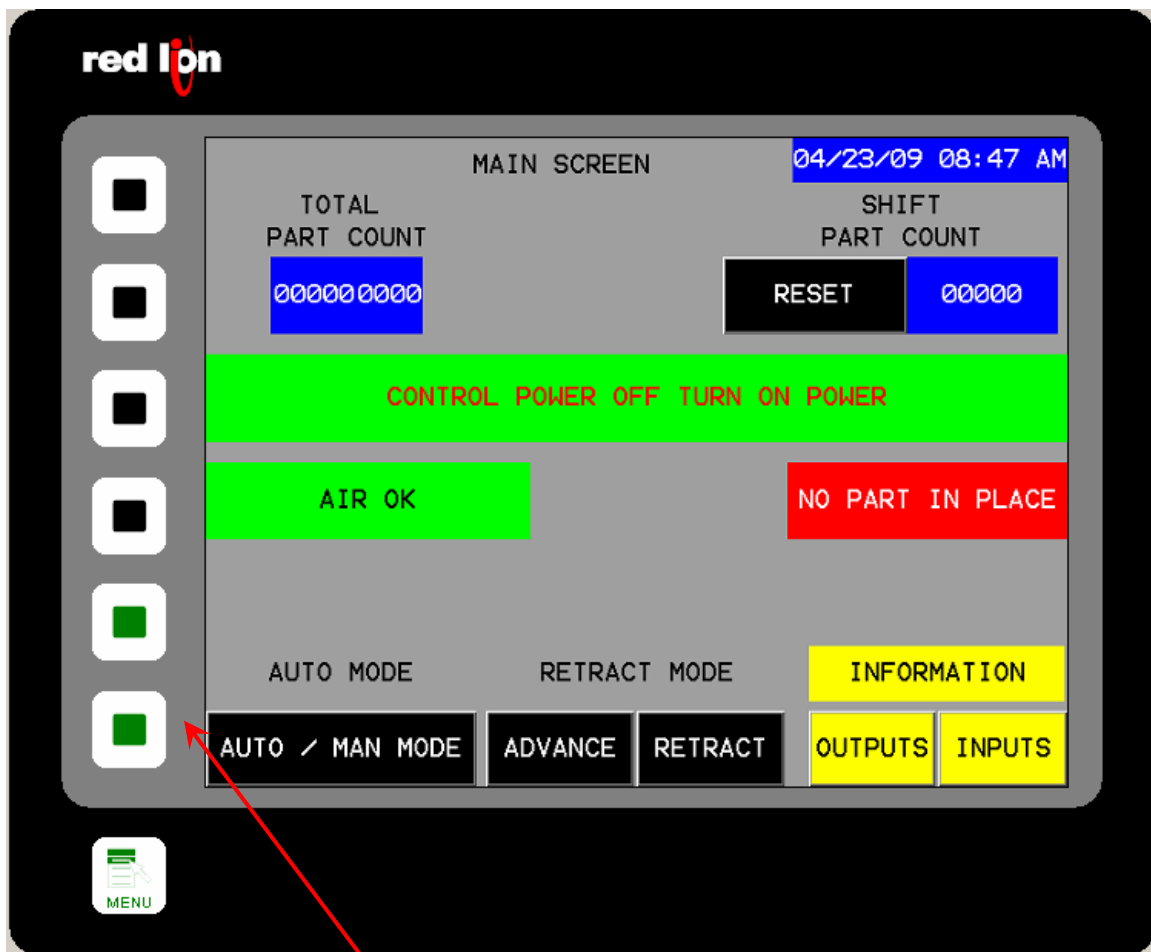
### **“Palm Button”**

When activated, starts the machine cycle.



## Red Lion Programmable Operator Terminal:

### Main Screen



#### Screen Description:

Language  
Selectors

This screen contains operator information.  
Screen also displays current date and time.

Left Side Buttons:

Menu button:

Located on the lower left hand side of the terminal.  
Goes to the main screen when selected.

Language Selector:

Top button sets terminal to display English.  
Bottom button sets terminal to display Spanish.

## **Displayed Indicators:**

### ***Shift Counter:***

In “auto” mode, the counter increments once each time a complete part is bent

### ***Total Part Counter:***

In “auto” mode, the counter increments once each time a complete part is bent. The counter can not be reset.

### ***Air Pressure Indicator:***

Displays “Air Ok” if supplied air pressure is above 65 psi.

Displays “Low Air ” if supplied air pressure is below 65 psi.

### ***Part Indicator:***

Displays “Part in place” if a straight tube is loaded correctly.

Displays “No part in place” if a tube is not present or loaded in correctly.

### ***Machine Mode Indicator:***

Displays “Auto Mode” if the machine is selected to run in automatic load

Displays “Manual Mode” if the machine is selected to run in manual mode.

### ***Advance / Retract Mode Indicator:***

Displays “Advance Mode” if the machine sequence is progressing forward

Displays “Retract Mode” if the machine sequence is progressing backward.

- Note: indicator is only displayed when the manual mode is selected.

## **Buttons:**

### ***Reset:***

This button resets the “Shift Counter”.

### ***Auto / Manual:***

Toggles machine mode between automatic and manual modes.

- Mode selection can only be changed when the machine is at the home position.

### ***Advance:***

When manual machine mode is selected:

- The sequence will advance forward if the palm button is held on.
- Note: indicator is only displayed when the manual mode is selected.



***Retract:***

When manual machine mode is selected:

- The sequence will advance retract if the palm button is held on.
- Note: indicator is only displayed when the manual mode is selected.

***Screen Navigation (lower right hand corner):***

Outputs:

Goes to the 1<sup>st</sup> output screen when selected.

Inputs:

Goes to the 1<sup>st</sup> input screen when selected.

**Operator Messages:*****Control Power Off Turn on Power***

The “Master Stop” button must be pulled out and the “Master Start” button must be pressed to turn on control power.

- The message is displayed when the “Master Stop” button has been depressed and or the machine has just been powered up.
- Turning on control power will energize the machine controller’s inputs and outputs.

***Machine at Home***

This message is displayed when the machine cycle is at the home position and a part is not detected in the tooling.

***Machine Running***

The machine is in auto mode and the automatic cycle has been initiated and is in progress.

***Cycle Incomplete Select Palm Button or Home All Tooling***

This message appears when the light curtain has been disturbed while the automatic cycle was in progress. The operator must re-initiate the cycle with the “Palm Button” to continue, or depress the “Home All Tooling” button.

***Light Curtain Blocked***

This message is displayed when the light curtain is blocked and the machine is not in cycle.

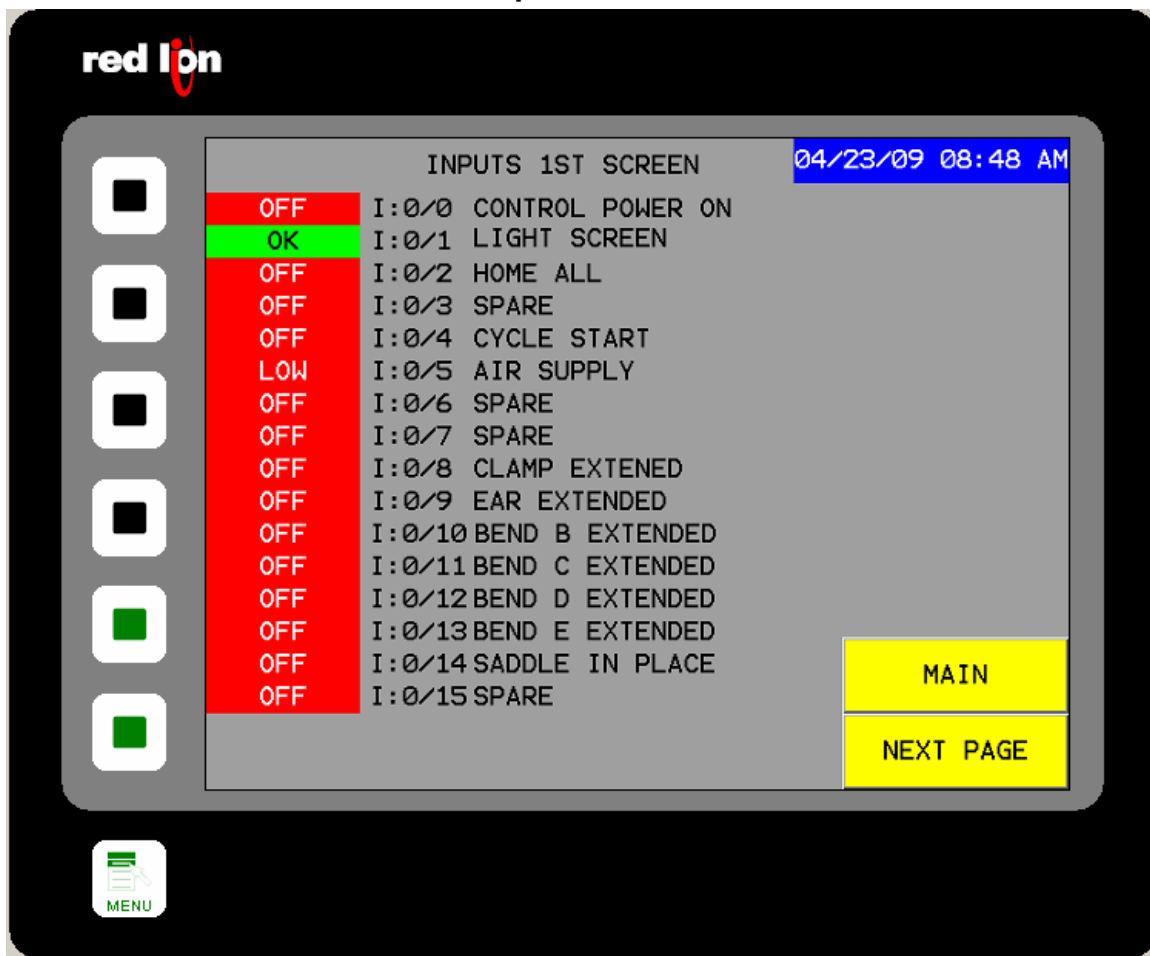
***Remove Part***

This operator message is generated in due to the back checking of the part sensors. The part sensor must change states once every cycle i.e. the part must be seen by the part sensors then become clear before the next cycle can occur.

***Press Palm Button to Start Cycle***

The operator has loaded the correct part and the machine is ready for auto cycle.

## Input Screen 1



### Screen Description:

This screen displays the actual state of PLC inputs and is for trouble shooting purposes only.

### Buttons

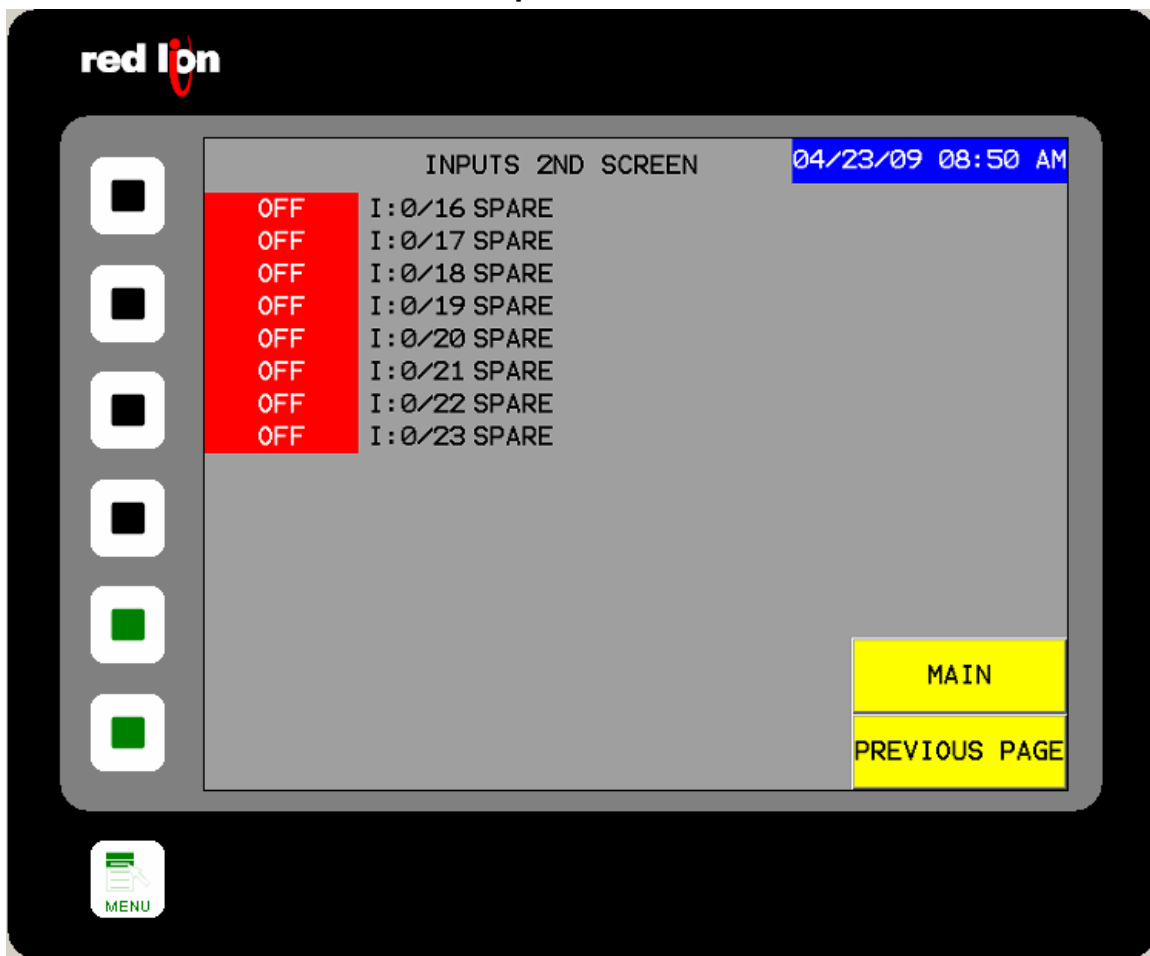
#### *Main:*

This button returns the operator to the main operator screen.

#### *Next Page:*

This button will take the operator to the next input screen.

## Input Screen 2



### Screen Description:

This screen displays the actual state of PLC inputs and is for trouble shooting purposes only.

### Buttons

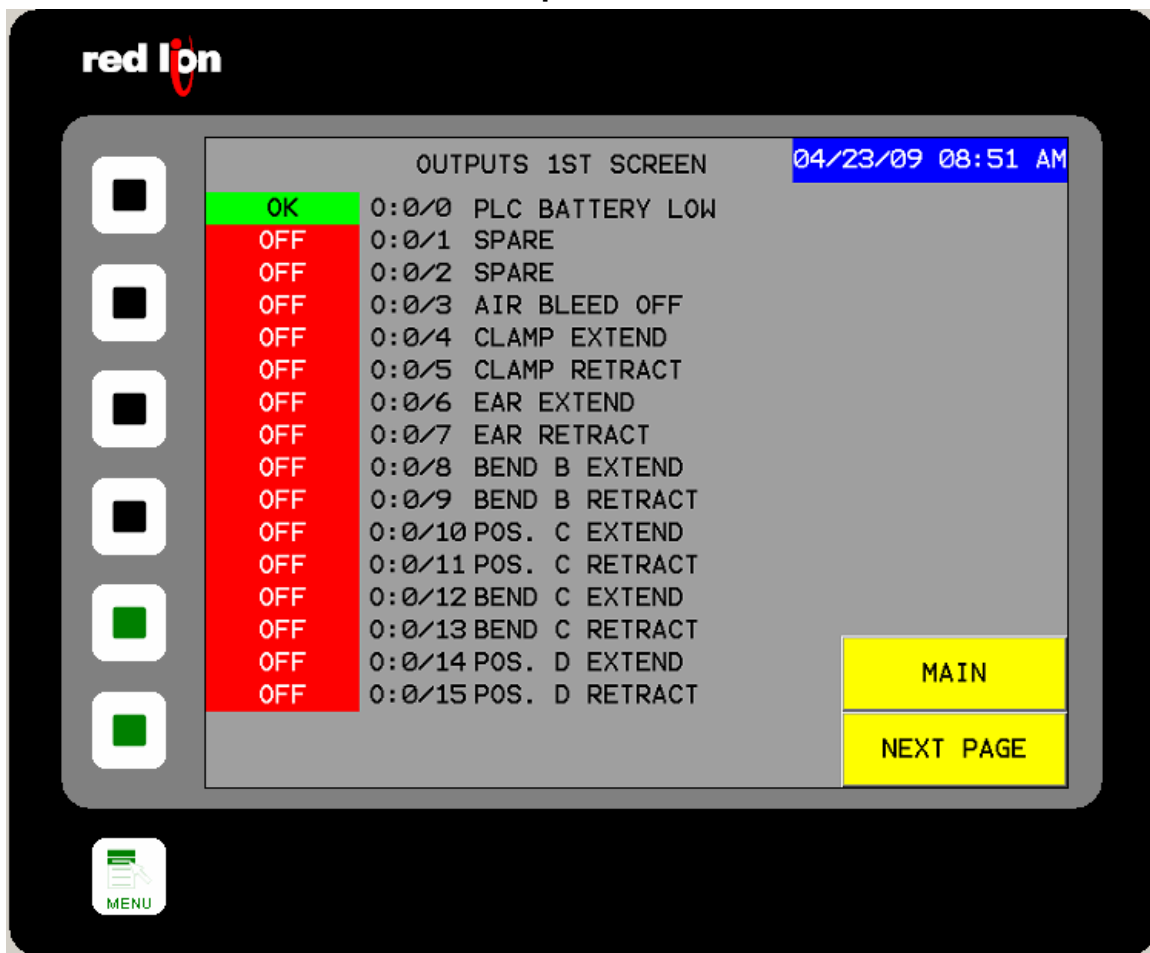
#### *Main:*

This button returns the operator to the main operator screen.

#### *Previous Page:*

This button will take the operator to the previous input screen.

## Output Screen 1



### Screen Description:

This screen displays the actual state of PLC outputs and is for trouble shooting purposes only.

### Buttons

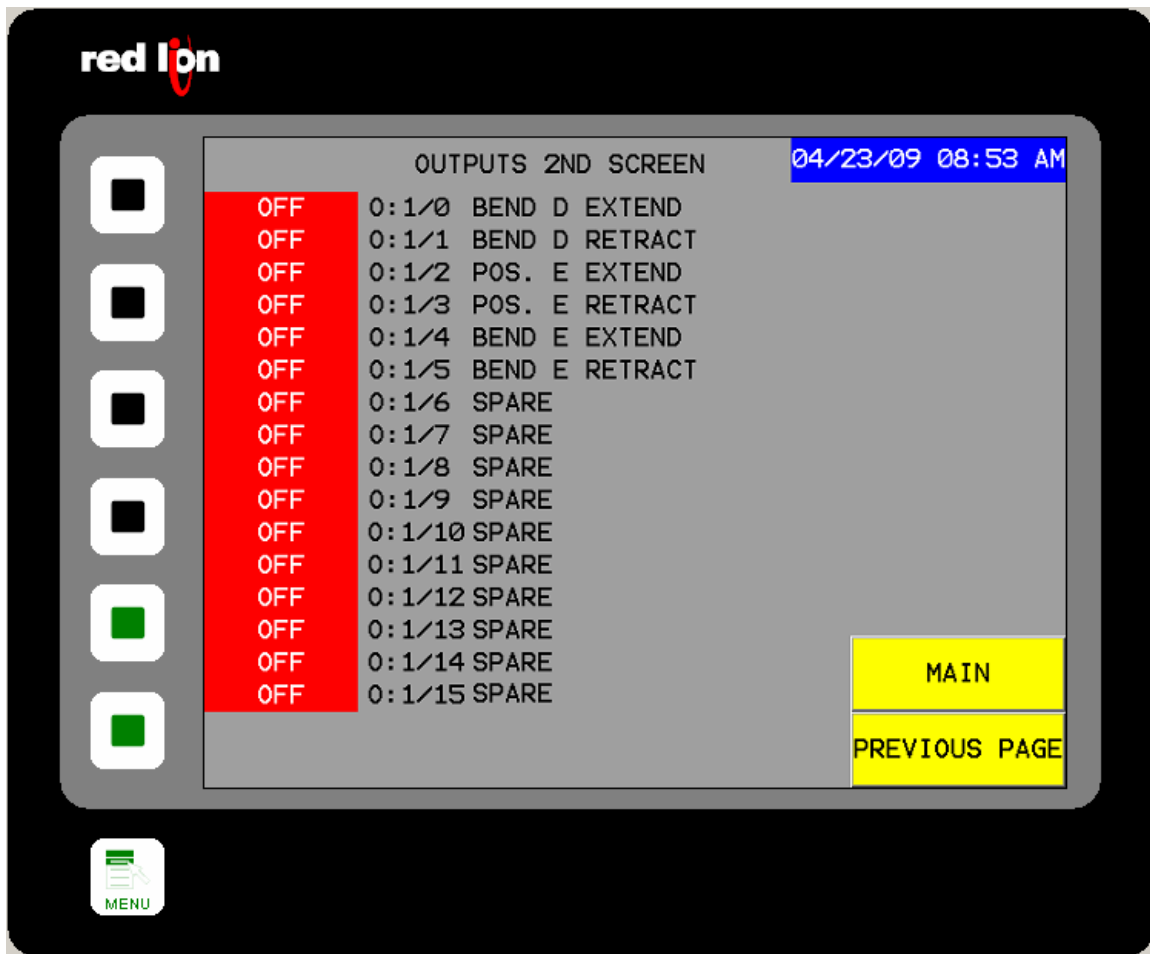
#### **Main:**

This button returns the operator to the main operator screen.

#### **Next Page:**

This button will take the operator to the next output screen.

## Output Screen 2



### Screen Description:

This screen displays the actual state of PLC outputs and is for trouble shooting purposes only.

### Buttons

#### *Main:*

This button returns the operator to the main operator screen.

#### *Previous Page:*

This button will take the operator to the previous output screen.

## **Operator Startup:**

The following instructions assume the machine has been commissioned and is ready for operation i.e. air and electrical power has been applied to the machine and correct tooling is installed.

The following will step through the operator start-up functions:

- Release the Master Stop button.
- Depress the Master Start button.
- Depress the Home All Tooling button to latch on the automatic reset mode.

## **Modes of Operation:**

### **Automatic Mode:**

1. Using the operator terminal: from the main screen place machine in auto mode. Machine must be at home state before placing into auto mode.
2. When the part is loaded correctly, the operator terminal will display " Press Palm Button to Start Cycle".
3. Initiate a cycle start with the "Palm Button" switch.
4. The machine automatically bends the completed part.

### **Manual Mode:**

1. Using the operator terminal: from the main screen place machine in manual mode. Machine must be at home state before placing into manual mode.
2. Hold the Palm Button down to initiate machine motion

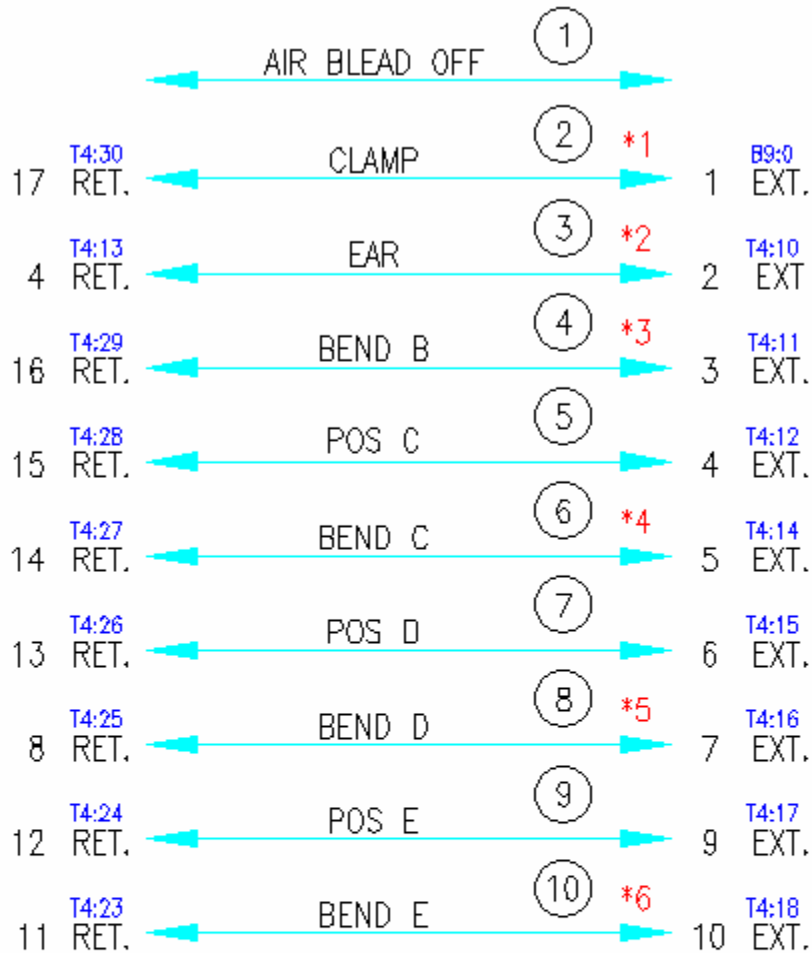
## Machine Cycle Time and Sequence:

### Cycle Time:

Machine cycle time is approximately 5 seconds. Operator time required for loading the machine is not included.

### Machine Sequence:

A graphical representation for the correct machine sequence is shown below.



#### RESET CONDITIONS (NO.)

- 1) Pos E is back before Pos. D

#### EXTENDED CYLINDERS (NAME)

- 1) EAR

#### EXTRA SWITCHES

- 1) 12mm for saddle detect

## Maintenance:

### ***Recommended Maintenance:***

#### *Daily*

- Keep rolls and bend wipers free of any build up.
- Grease machine, 2 pumps of a grease gun, every 1500 production Cycles.

#### *Weekly*

- Check and clean filters if necessary on main air supply.
- Drain water from surge tank

#### *Light Curtain*

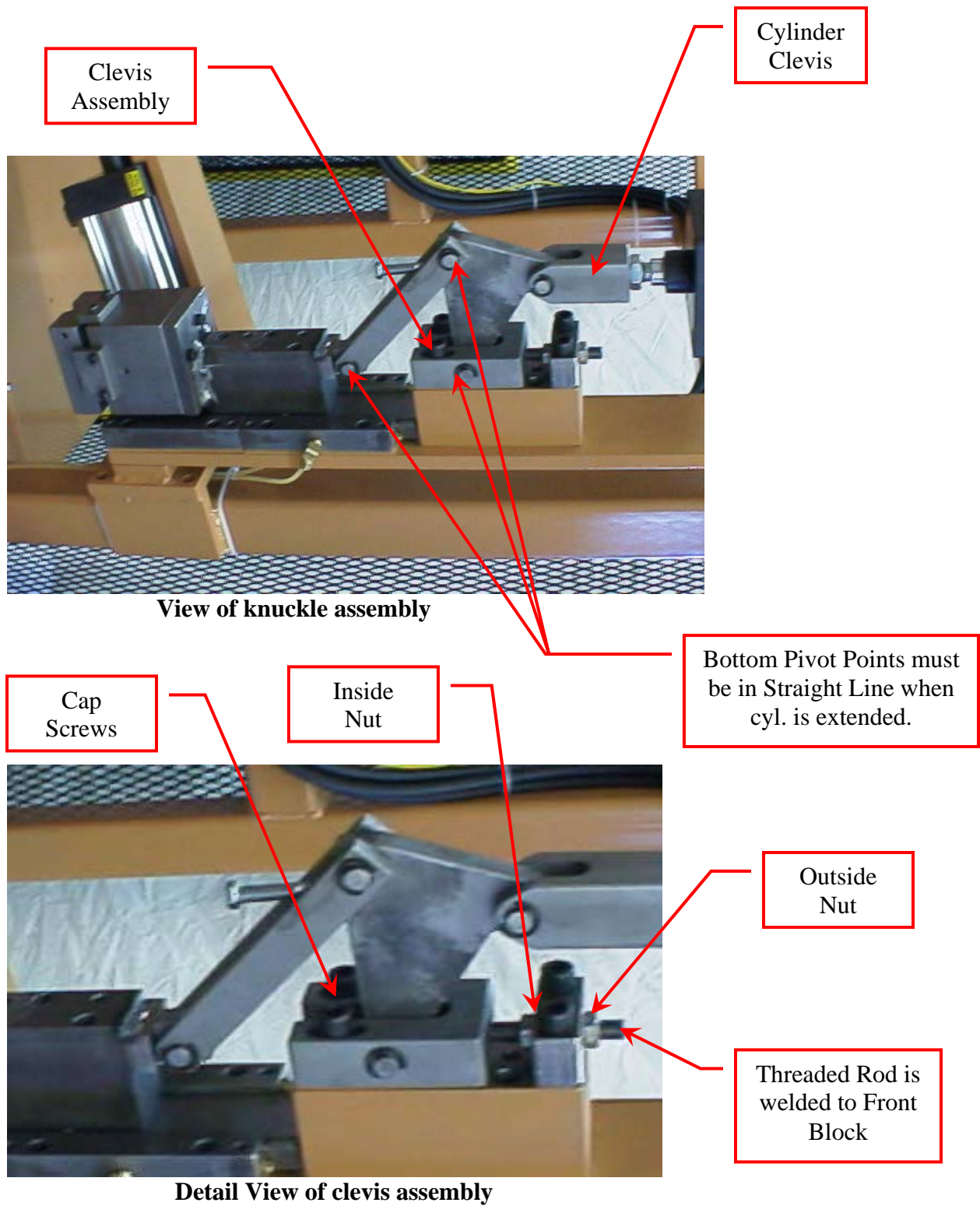
- Follow the suggested maintenance written in the light curtain manual provided.

## Oil and Lubricants:

<i>Used In:</i>	<i>Catalog. No.</i>	<i>Brand</i>
Lubricator Oil:	Tellus Oil 32.....	Shell
Grease Lines:	Mobil LUX .....	Mobil
1. Description: Number 1 grease as defined by the National Grease Lubricating Institute		



## Knuckle Adjustments:



### ***Increasing Slide Travel:***

To increase the slide travel, complete the following sequence. If necessary, refer to photos on previous page.

- Loosen cap screws
- Loosen outside nut
- Rotate inside nut clockwise forcing the clevis block forward
- Re-tighten outside nut
- Re-tighten cap screws
- Extend cylinder
- Inspect bottom pivot points
  - The bottom pivot points must be in a straight line. The knuckle pivot detail will hit dead stop
- If the bottom pivot points are not in a straight line, adjust the cylinder clevis
  - Loosen jam nut on cylinder rod
  - Rotate cylinder rod to force the clevis away from the cylinder
  - When the pivot points end up in a straight line, re-tighten the cylinder jam nut
- If the bottom pivot points are in a straight line, no adjustment is required to the cylinder clevis

### ***Decreasing Slide Travel:***

To decrease the slide travel, complete the following sequence. If necessary, refer to photos on previous page.

- Loosen cap screws
- Loosen inside nut
- Rotate outside nut counter-clockwise pulling the clevis block backwards
- Re-tighten outside nut
- Re-tighten cap screws
- Retract cylinder
- Inspect the rear reposition of the slide to insure there is no tooling interferences
- If the slide does not travel back far enough, adjust the cylinder clevis as follows
  - Loosen jam nut on cylinder rod
  - Rotate cylinder rod to bring the clevis closer to the cylinder
  - Re-tighten cylinder jam nut

- Extend cylinder
- Inspect bottom pivot points
- The bottom pivot points must be in a straight line. The knuckle pivot detail will hit dead stop
- If the bottom pivot points are not in a straight line, adjust the cylinder clevis as follows
  - Loosen jam nut on cylinder rod
  - Rotate cylinder rod to force the clevis away from the cylinder
  - When the pivot points end up in a straight line, re-tighten the cylinder jam nut
- If the slide travels far enough to prevent any tooling interferences no other adjustment is required

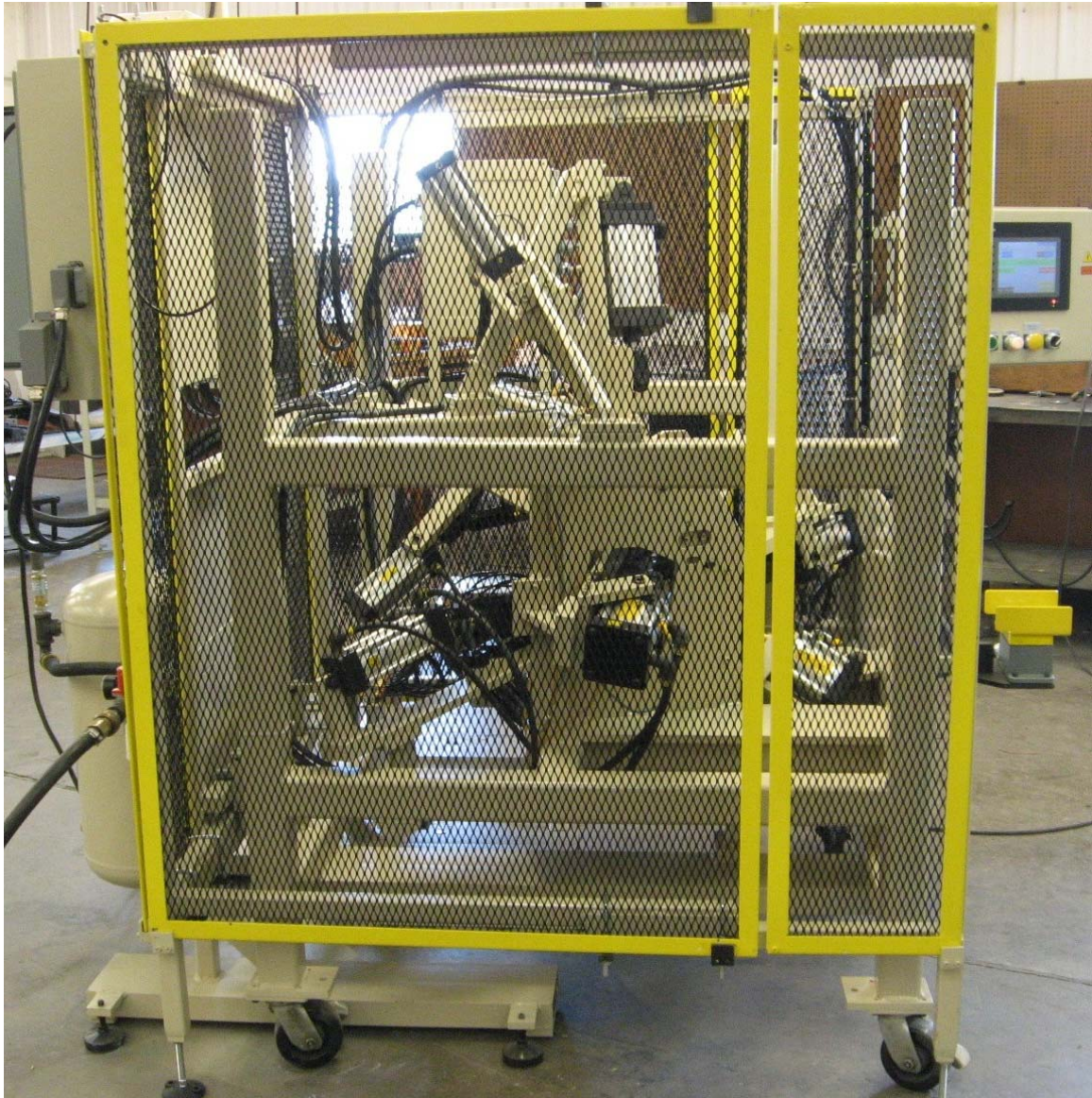
## **Machine Guarding:**

To prevent injury, do not operate machine unless all guards are installed correctly.



**Front View of Machine**





**Left Side View of Machine**

**Not shown  
Right Side View of Machine**





**Rear View of Machine**