



# Injection Molder

## Setup & Operational Manual

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A general build of the ECHO series manual, first series distributed.

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Build up of Table of Contents and added How To's.

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Fixed some errors in the calibration section, updated some wire numbers, and replaced some screen shots with new.



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## **Section 1 – UNCRATING & INSTALLATION**

## **INTRODUCTION**

The IPC injection mold press utilizes a Windows based microprocessor Eurotherm MACO Compact Controller.

It is recommended that the production engineer read this manual and the Eurotherm manual, and become familiar with the overall machine operation.

Any machine subjected to continuous production work may develop malfunctions.

## **MACHINE INSPECTION**

After uncrating, visually inspect machine for possible shipping damages. If damage is found, notify your carrier immediately. The machine should be stored in a dry area of the plant until installation. A plastic tarp to cover is recommended.

## **MACHINE PLACEMENT AND LEVELING**

The machine has mounting holes at the bottom of each leg. Anchor bolts or leveling devices may be used through the holes, if needed.

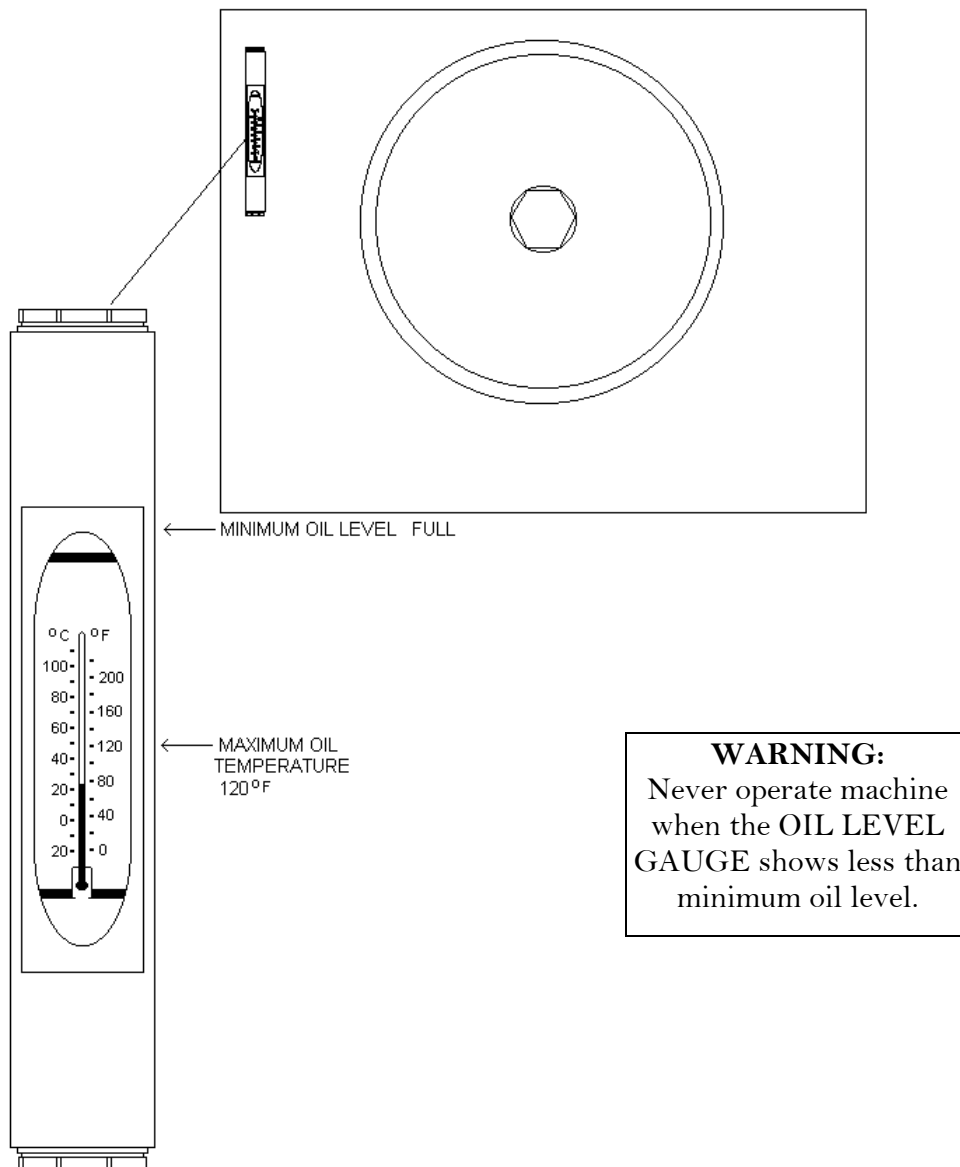
## **HYDRAULIC FLUID**

Each machine has been thoroughly tested at the factory under actual operating conditions. However, prior to shipping, the hydraulic oil was drained.

The oil filler cap is located at the rear of the machine. Add approximately 50 gallons of MOBIL DTE 25 ANTI-WEAR HYDRAULIC OIL.

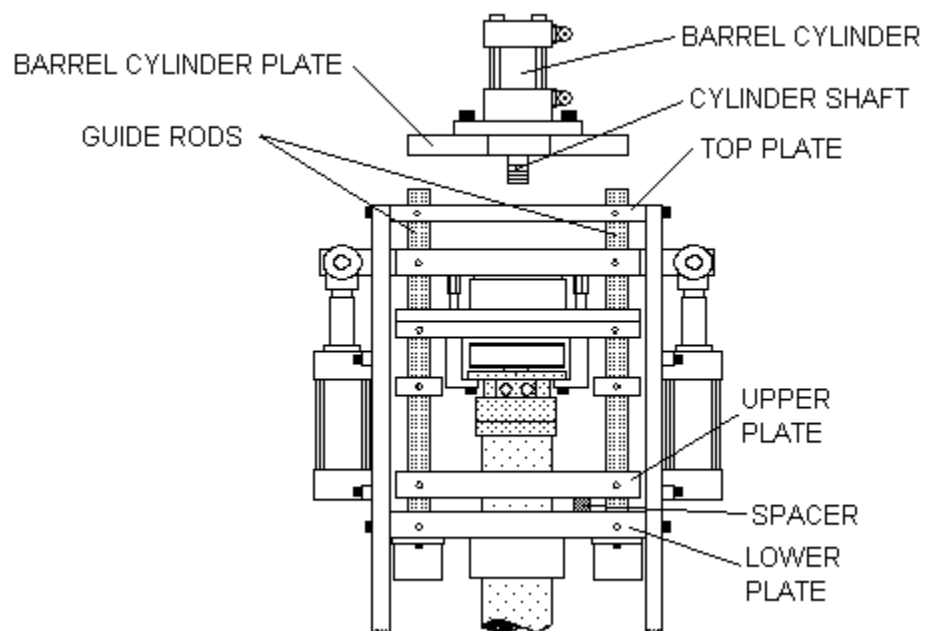
The dual function oil gauge measures both oil level and oil temperature. It is located at the front lower left side of the machine.

**The pump must be primed before starting the motor.**



## BARREL CYLINDER INSTALLATION (OPTIONAL)

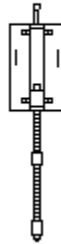
1. Position the barrel cylinder on the top plate so that the cylinder shaft lines up with the threaded hole.
2. Tighten the cylinder shaft onto the top plate with a  $7/8$  open end wrench. Make sure that the small  $5/16$ " holes in the barrel cylinder plate lines up with the guide rods.
3. Now install and tighten the two  $5/16$  screws through the barrel cylinder plate and into the end of the guide rods.



## SHOT SIZE SENSOR INSTALLATION

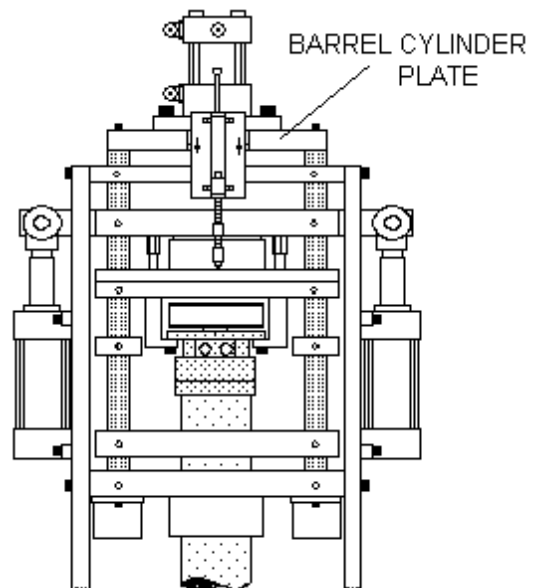
- 1) Carefully unpack the shot size sensor.

SHOT SIZE SENSOR



- 2) Attach the shot size sensor to the barrel cylinder plate, with two 10/32 screws and two washers.

- 3) Attach the cable to the shot size sensor connector. Make sure the cable is not in the way of the hoses.
- 4) Adjust the shot size sensor so that it is square with the machine and that the tip is “just” touching the screw housing plate.



## **POWER REQUIREMENTS**

This machine can be connected to any of the following:

This Echo model needs 208v or 240v 40 amp 3 phase service with a neutral and a ground.

480v, 20 amp 3 phase service with ground and optional 3 KVA transformer.

If optional transformers were not ordered with machine, wiring should be performed by a qualified individual who is familiar with all local electrical codes for standard industrial installation.

## **ELECTRICAL INSTALLATION**

Electrical installation should be performed by a qualified individual who is familiar with all local electrical codes for standard industrial installation.

### **INSTALLATION WITH A TRANSFORMER**

If the machine has the optional 3 KVA transformer and your 3 phase service is 208v, 240v, or 480v:

1. Connect the 3 phase to the top of the main disconnect.
2. The primary of the transformers should be wired for 208 volts, 240 volts, or 480 volts, depending on your service. The secondary of the transformers should be wired for 240 volts with the neutral output connected to the machine ground and neutral terminal in the controller enclosure.
3. The motor controller setting should be adjusted to; 22 amps for a 208v or 240v connection, 11 amps for a 480v connection.
4. Connect ground to cabinet.
5. Follow the procedures on "Testing Electrical Installation"

### **INSTALLATION WITH 208V**

If the machine does not have the 3KVA transformer option and the 3 phase service is 208 volts:

1. Connect the 3 phase to L1, L2, and L3 on the main wireway.
2. The motor controller setting should be adjusted to 22 amps.
3. Connect ground to ground terminal strip just left of main disconnect.
4. Connect neutral to neutral terminal strip just left of main disconnect.
5. Follow the procedures on "Testing Electrical Installation".



## INSTALLATION WITH 240V

If the machine does not have the 3KVA transformer option and the 3 phase service is 240 volts:

1. Connect the 3 phase to the top of L1, L2, and L3 of the wireway.
2. **The B Phase (Wild Phase) should be connected to the center terminal (L2).**
3. The motor controller setting should be adjusted to 22 amps.
4. Connect ground to ground terminal strip.
5. Connect neutral to the neutral terminal strip.
6. Follow the procedures on "Testing Electrical Installation".

## **TESTING ELECTRICAL INSTALLATION**

### **ELECTRICAL START UP**

When starting the machine for the first time, or when moving the machine to a new location, the following procedures should be followed:

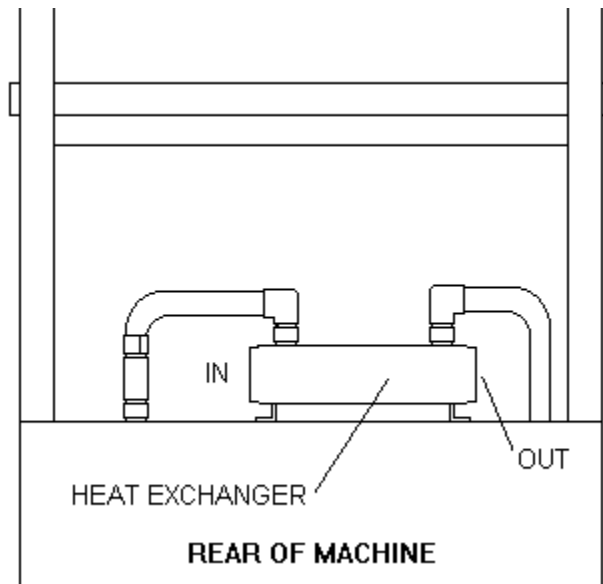
1. Ensure all the circuit breakers are in the off position.
2. Turn the main disconnect switch to the on position.
3. The pump must be primed before the next step.
4. Bump the motor around by pressing the white contact pins on the motor starter and then releasing them. Use a flashlight to observe the rotation of the fan on the motor. It must rotate in a clockwise direction.
5. If the motor is rotating backwards, turn off power going to the machine and then reverse the outer two wires of the feed-in on L1 and L3. And re-prime the pump. Turn on power. Repeat step 3 to observe proper operation of the motor.

### **CIRCUIT BREAKER START UP**

1. The first breaker to turn on is Power Supply circuit breaker (Far right 3A AC double pole). After turning it on, the light on the power supply should be on. Once it is on, check for 24 VDC between any wire 1580 (+) and wire 1581 (-).
2. The next breaker to turn on is for the Maco Controller (second from left, 3A DC).
3. Then turn on the Op Station breaker (far left 2A DC).
4. You may now turn the remaining circuit breakers on.

## **WATER HEAT EXCHANGER FOR OIL COOLING (STANDARD)**

The water heat exchanger should be connected to a water cooling system if the oil temperature exceeds 120 degrees Fahrenheit.



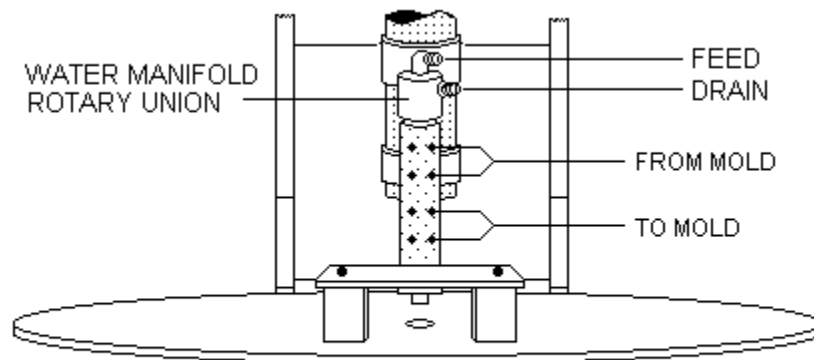
## **AIR HEAT EXCHANGER FOR OIL COOLING (OPTIONAL)**

The air heat exchanger is an optional installation that requires no additional hookups.

## WATER MANIFOLD WITH ROTATING UNION (OPTIONAL)

DO NOT USE SOLID PIPE when installing water lines from molds to water ports. Only use FLEXIBLE HOSE.

Do not install hose taut, and do not use any exterior bracing which would prevent the housing from moving.



Connect a water feed to the hose labeled FEED, and a water drain to the hose labeled DRAIN.

**WARNING:** Do not turn the water on until the water union is connected to the necessary device/s.

### DISCONNECTING DEVICES FROM WATER

- 1) Turn off water.
- 2) Relieve pressure from water lines.
- 3) Blow out water lines. This is necessary to prevent water from leaking down into the table.
- 4) Disconnect water lines from device/s.

## INSTALLATION OF POWER FOR MOLD HEATER CAROUSEL (OPTIONAL)

The mold heater carousel disconnect cabinet is located on the right side of the upper frame.

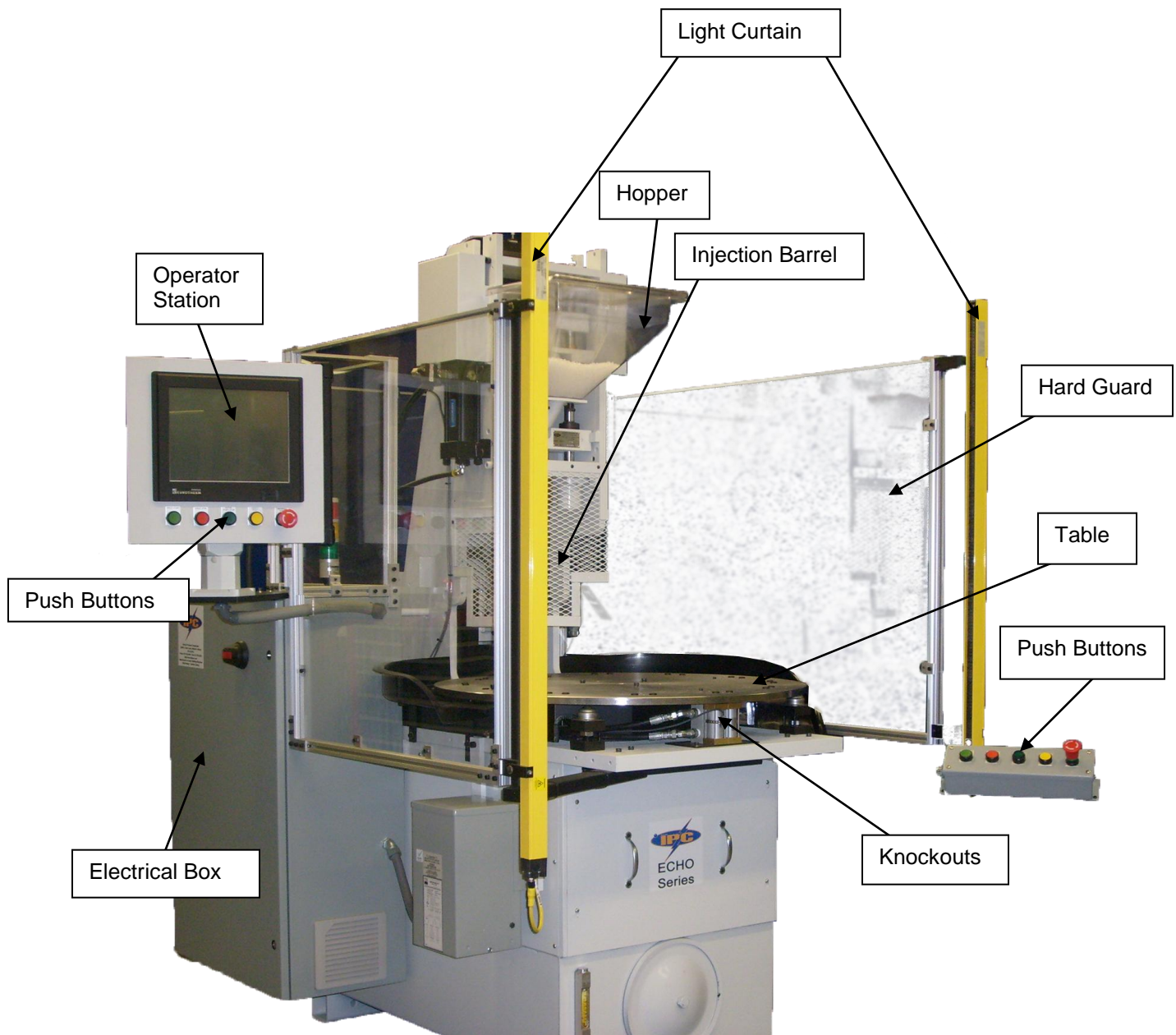
- 1) Connect a 240 volt 30 amp 3 phase service to L1, L2, and L3.
- 2) Connect ground to cabinet.





## **Section 2 - SYSTEMS**

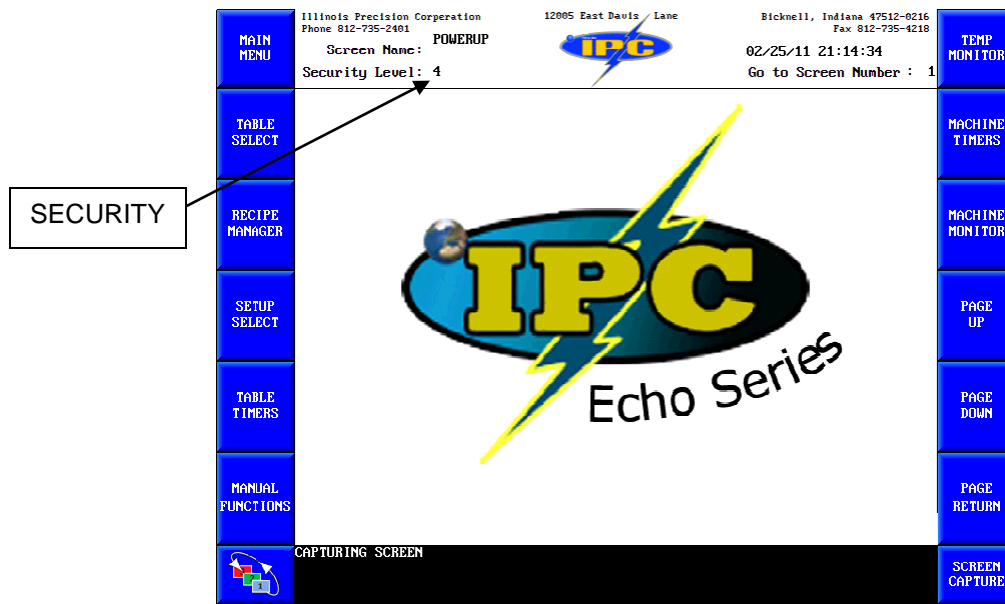
## COMPONENT LAYOUT





## DISPLAY

As delivered, the controller will power up displaying a screen similar to Figure 1.



## SECURITY

On power up, security is at the default level (Level 1). Security levels are established when programming screens.

The setpoint entry area for the security code is located on the title bar of every screen. If it is necessary to change the security level, press the security entry number, and type in the code for the security level desired. An asterisk will appear for each character entered. Use the plus/minus key for any dashes contained in the security code. Pressing Enter/Accept will cause the security to change to the level indicated.

Level 1 is the lowest security level. Operating at Level 1 allows the least access to the controller. Level 4 is the highest user security level. Operating at Level 4 allows the most access to the controller.

Only screens with a security level equal to or less than the operating security level will be accessible.

If operating at Security Level 1, only Security Level 1 screens (or Paths) appear.  
If operating at Security Level 2, only Security Level 1 & 2 screens (or Paths) appear.  
If operating at Security Level 3, only Security Level 1, 2 & 3 screens (or Paths) appear.  
If operating at Security Level 4, Security Level 1, 2, 3 & 4 screens (or Paths) appear.

Note that once a screen is displayed, only those setpoints can be changed which have an assigned security level less than or equal to the operating security level.

## MOVING THROUGH THE SCREENS

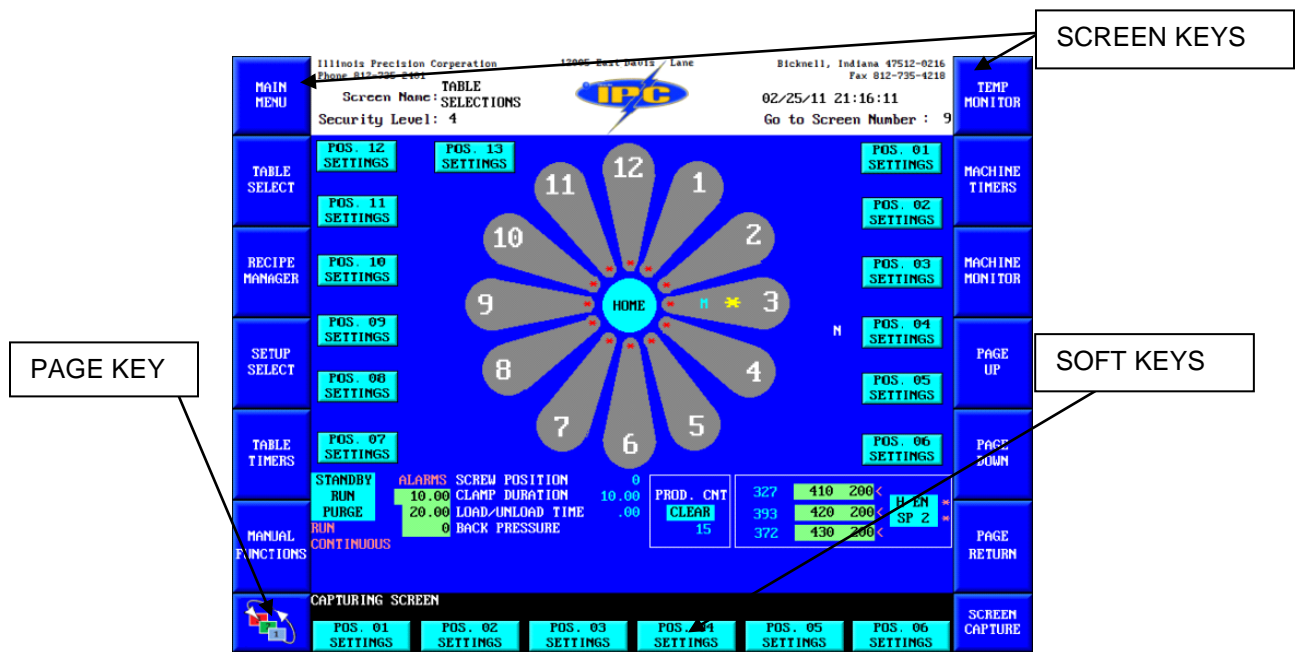
Screens are divided into two major groups - system screens and user screens.

System screens contain information relating to general system operation and troubleshooting. From any system screen, the Screen Up or Screen Down key can be used to step through the continuous loop of all system screens. Keep in mind that security level affects which system screens appear (at Security Level 4 all system screens appear). System screen soft keys are red.

User screens contain information relating to specific functions and applications. From any user screen, the Screen Up or Screen Down key can be used to step through the continuous loop of all user screens. The security level affects which user screens and paths appear (at Security Level 4 all user screens appear). User screen soft keys are teal.

## SOFT KEYS

The Soft keys are a group of 6 keys located on the bottom center of the display, all of which are the same size.



Pressing a Soft Key will cause the screen identified by that path to appear on the display. Pressing a special function key will cause the action to occur which is described by the label.

There are three different "pages" of Soft Keys. The first two pages are for paths within the user screen set. The third layer is for paths into the system screen set.

A screen will always first appear with page 1 paths (if there are any) showing. Pressing the "Page" key (the slightly larger key to the left of the Soft Keys) once will cause the page 2 Soft Keys (if there are any) to appear. Pressing the Page key a second time will cause the page 3 Soft Keys - which contain the system paths (if there are any) to appear.

Note that page 3 Soft Keys are the only means of accessing the system screen set. Paths from one screen set to the other cannot be programmed.

Note that the security level will affect which Soft Keys of each page will appear. For instance, if the controller is operating at security level 2, the ONLY Soft Keys which will appear will be paths to screens with Level 1 or Level 2 security. The security level of a screen (as well as its path) is determined by the screen.

## **SCREEN KEYS**

Screen keys are a vertical group of keys located on the left and right of the screen. These keys will direct you to the most widely used screens in the system.

### **Page Up; Page Down**

These two keys are used to move through the continuous loop of all system screens or all user screens. Pressing the Screen Up key once will increment (i.e., Screen 1 to Screen 2) the display to the next screen in the loop for which there is adequate security. Pressing the Screen Down key once will decrement (i.e., Screen 9 to Screen 8) the display to the next screen in the loop for which there is adequate security.

### **Page Return**

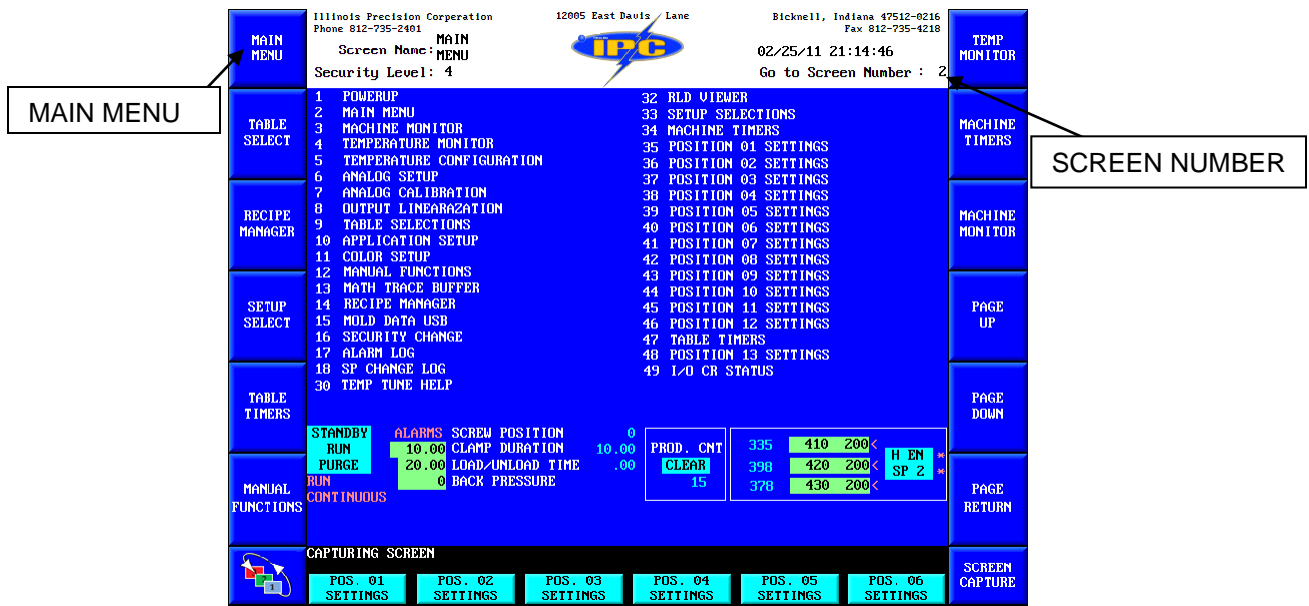
The Page Return key is used to toggle to the previous screen. This key is especially useful when it is necessary to examine or compare two screens which do not have a path directly to one another.

## **SCREEN CAPTURE**

The Screen Capture key is used to take a complete screen shot of the active screen and all variables. The file is saved on the compact flash. Please reference the Eurotherm manual for more details.

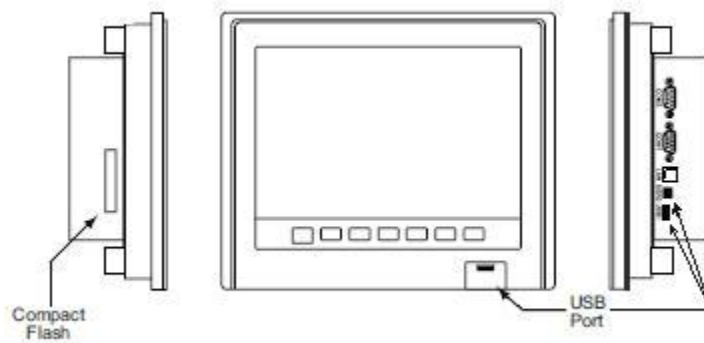
## SCREEN NUMBER

The Go to Screen Number setting shows you the page number of the active screen. It is also accessible. By selecting this number and entering in the number of the screen you wish to access it will make that screen active. Note that the security level will affect which screen will be accessible. The list of screens is provided on the Main Menu screen.



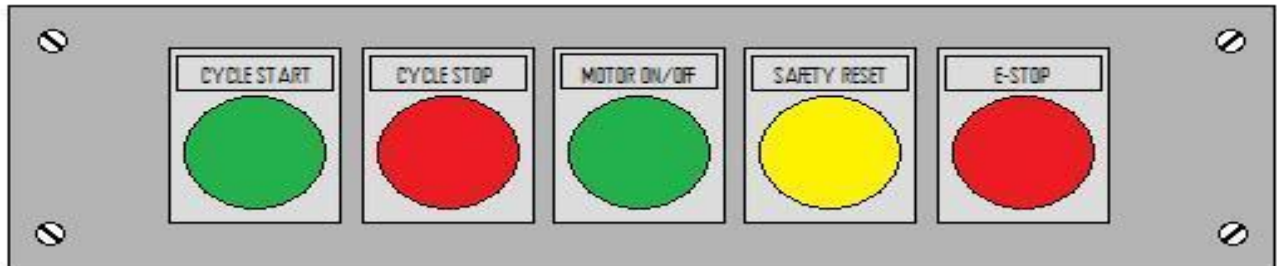
## USB & MEMORY STICK PORTS

There are several ports located on the Operator Station for added ease of access to files and recipes, or for loading and unloading programs. Controller specs recommend that you use Sandisk USB Cruzer Micro series (1G through 4G) USB Sticks. The compact flash card is currently a 2G SanDisk Compact Flash Ultra II. Note, it is important to get the “Ultra II” since it is a higher speed version than the standard model - slower write speeds could cause problems.



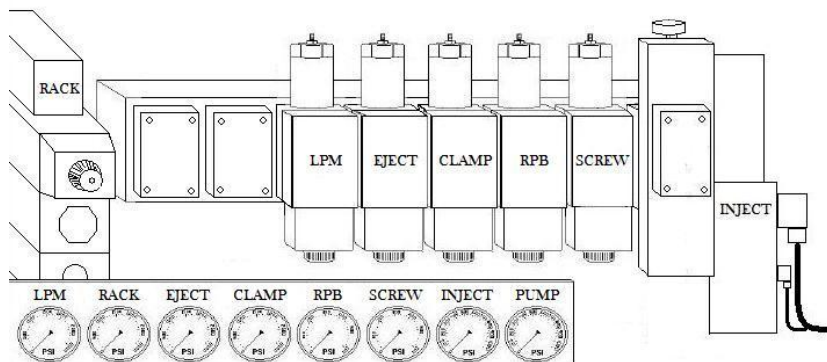
## OPERATOR CONTROLS

The operating controls are grouped in a separate box as well as on the Operator Station.



## HYDRAULIC CONTROLS

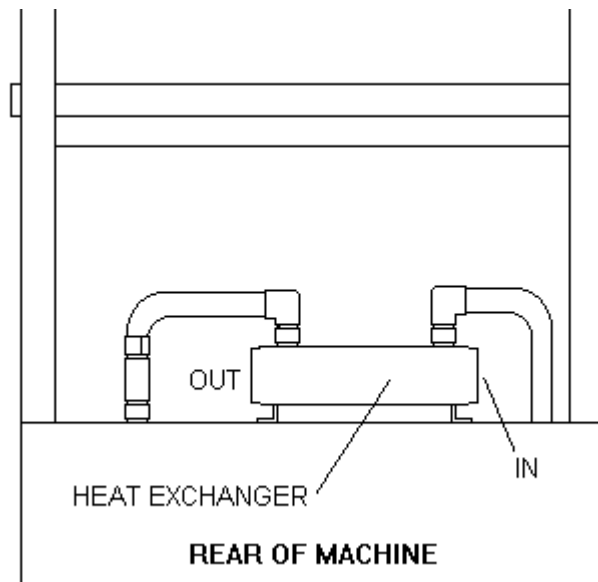
The hydraulic valves and gauges are grouped on the right side of the machine. Each machine is shipped with hydraulic settings calibrated for a "typical" operation. Adjustment is normally not necessary. (Figure shows side panel open)



The snubber valve on the back of each gauge should only be opened when making adjustments or troubleshooting. This will help extend the life of the gauges.

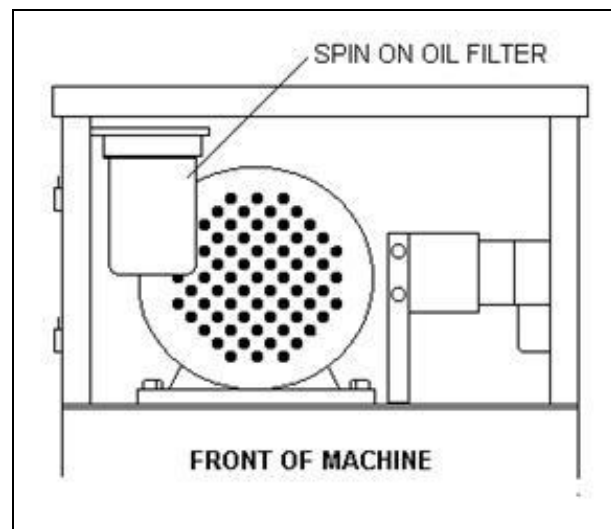
## LOCATION OF HEAT EXCHANGER

The Heat exchanger is located at the rear of the hydraulic power unit.



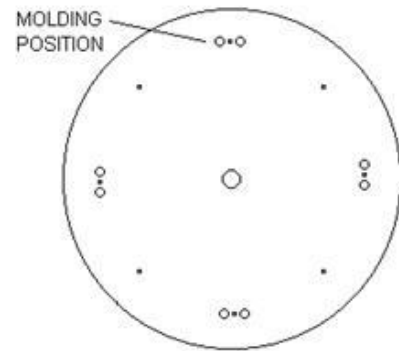
## LOCATION OF THE OIL FILTER

The spin-off oil filter is located on the left side, as seen from the front of the machine.



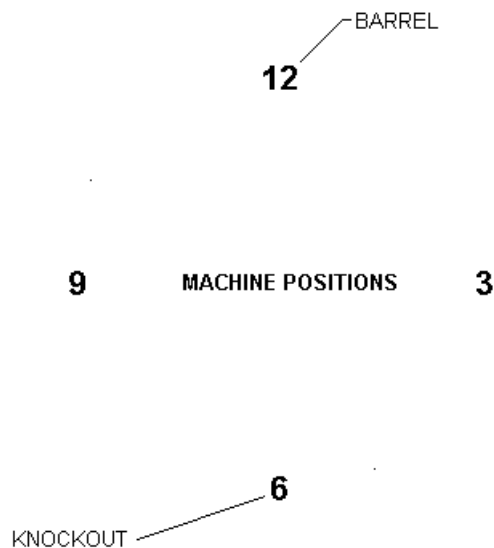
## ROTARY MOLD TABLE

The rotary mold table is divided into four areas or positions, referred to as table positions, where one or more molds may be mounted. These table positions are fixed and rotate as the table rotates (normally in a CCW direction). Each table position has pre drilled holes for mold mounting and mold knockout pins.



## MACHINE POSITION VS TABLE POSITION

An important difference must be made between table position as defined above and machine position, which refers to the *location of equipment on the machine or location of the rotating mold* when the operator is standing directly in front of the machine.



For example:

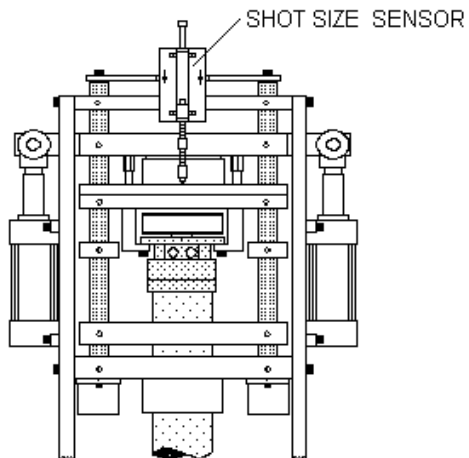
The barrel or injection position is referred to as machine position 12

The knock-out position is referred to as machine position 6

The rotary table with a mold mounted on any table position may rotate, stop, and resume rotating to any one of the 4 machine positions.

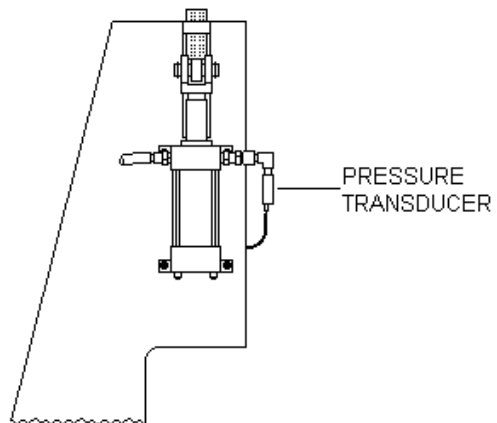
## SHOT SIZE SENSOR

The shot size sensor is mounted to the top of the guide rods on the rear of the machine.



## PRESSURE TRANSDUCER

The pressure transducer is mounted on the left side of the machine on the injection cylinder.





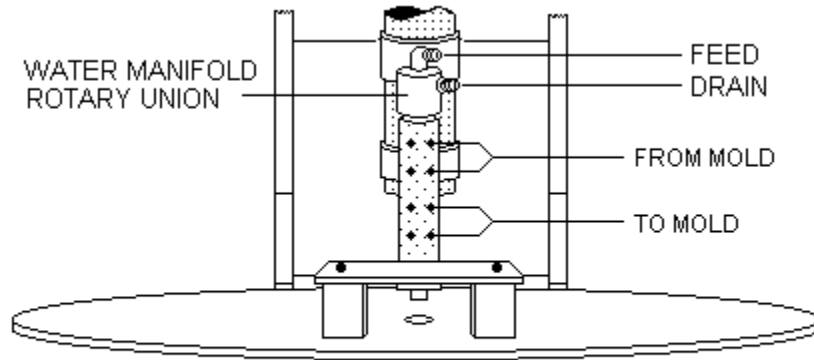
## SPRUE TRIMMER

The Sprue trimmer uses an air cylinder with a tool steel blade to remove plastic residue left at the top of the mold fill hole.



## WATER MANIFOLD WITH ROTATING UNION (OPTIONAL)

The water manifold located in the center of the table allows for proper mold cooling. Do not use any exterior bracing which would prevent the housing from rotating.



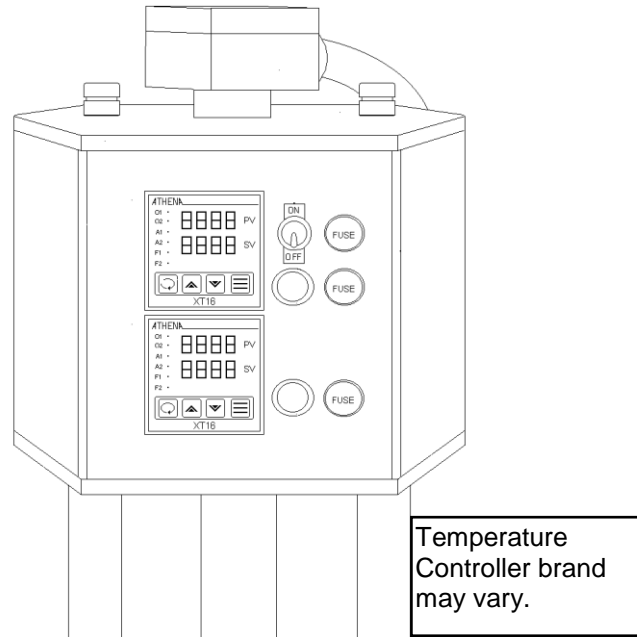
## MOLD HEATING CARROUSEL (OPTIONAL)

The Mold Heating Carrousel can independently heat and control up to eight molds. Each mold has its own power ON/OFF control switch. Depending on the chosen option, each mold could have one or two temperature controllers.

When the Control Switch is moved to the "ON" position, the Temperature Controllers will now control the heat of the mold.

Pressing the Temperature Controller's "Δ" button will raise the temperature setting. Likewise, pressing the "∇" button will lower the temperature setting. For more information, refer to the Temperature Controller Manual.

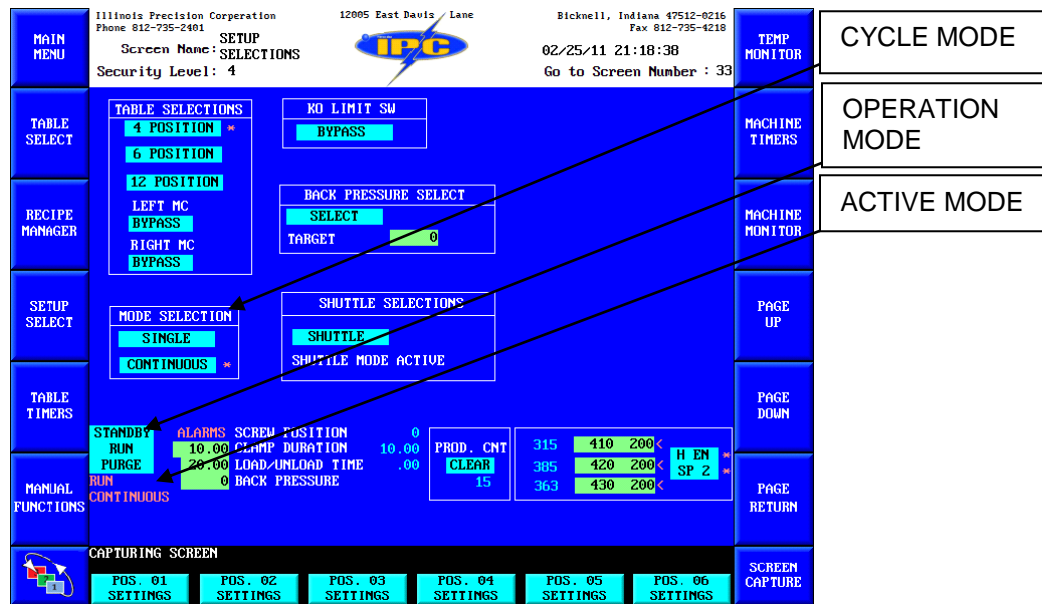
Note: The light just below the switch and the output LED on the Temperature Controller should be on together and off together.





## **Section 3 – SCREEN SET-UP PROCEDURES**

## MODES OF OPERATION



### CYCLE MODES

The machine is capable of running in two types of cycle modes; Single or Continuous.

#### SINGLE

Single cycle rotates the table one position with each press of the Cycle Start button.

#### CONTINUOUS

Continuous cycle rotates the table automatically. With the activation of the Cycle Start button the table will rotate continuously until the Cycle Stop is pressed or the light curtain is broken.

### OPERATION MODES

The machine has four types of Operational Modes; Standby, Run, Purge, or Manual.

#### STANDBY

In Standby mode, the machine will not inject, but all table functions are still active. You may cycle the table safely without any flow of plastic.

#### RUN

In Run mode, the machine will inject plastic when a selected position is under the barrel. It will follow the injection profile for that position and set the shot size for the next position selected to mold. If no position is selected the machine will default to the #1 positions Shot size. Upon exiting from the barrel position, the mold will Trim and Knockout, if selected to, and stop at the Unload/Load position for the amount of time specified.

## PURGE

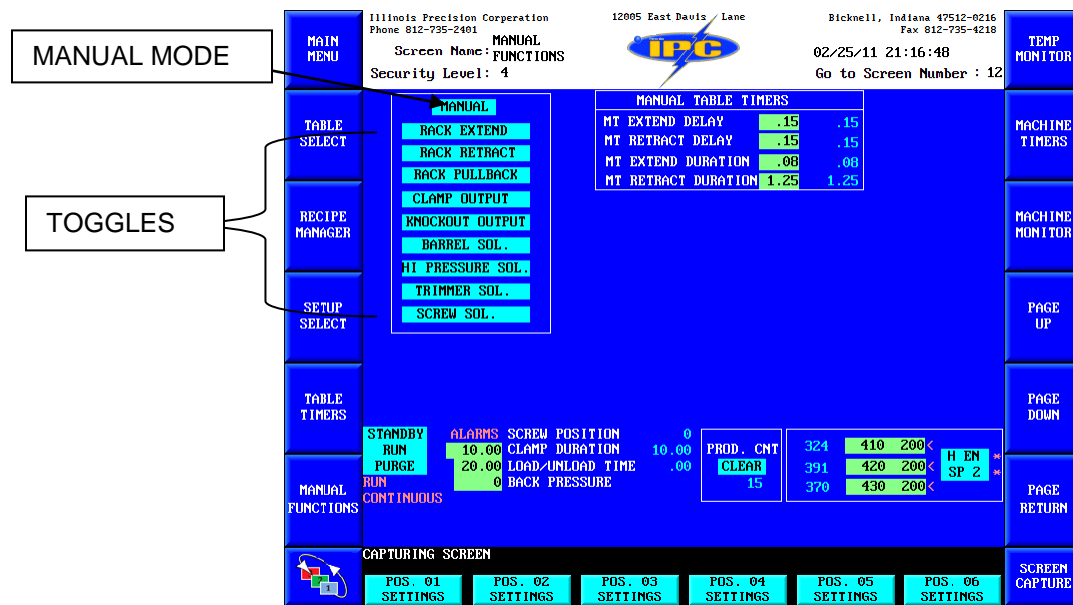
In Purge mode, all table functions cease and upon pressing of the Cycle Start button the machine will cycle through the injection profile of the current position on the barrel. The shot size will return to the position of the mold under the barrel.

Usually performed on the Purge Block Supplied

## MANUAL

To access the Manual mode you must first select the Manual Functions screen. Upon selection of Manual mode, selecting Cycle Start will move the table in increments of a rotation, (Usually one tooth of the Main Gear). This is beneficial in realigning the table or installing/uninstalling a mold or purge block.

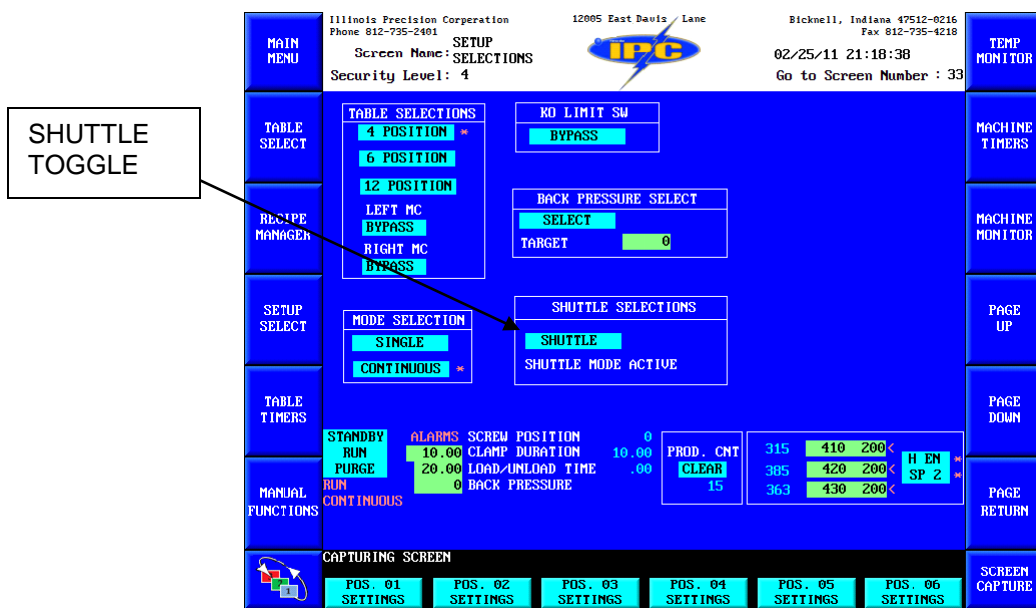
Also while in Manual mode, Selecting and holding the individual toggles on the Manual Functions screen will activate that specific solenoid for the duration of the hold. All toggles work by holding the toggle except the Knockout toggle which will cycle with just a press and release of the toggle.



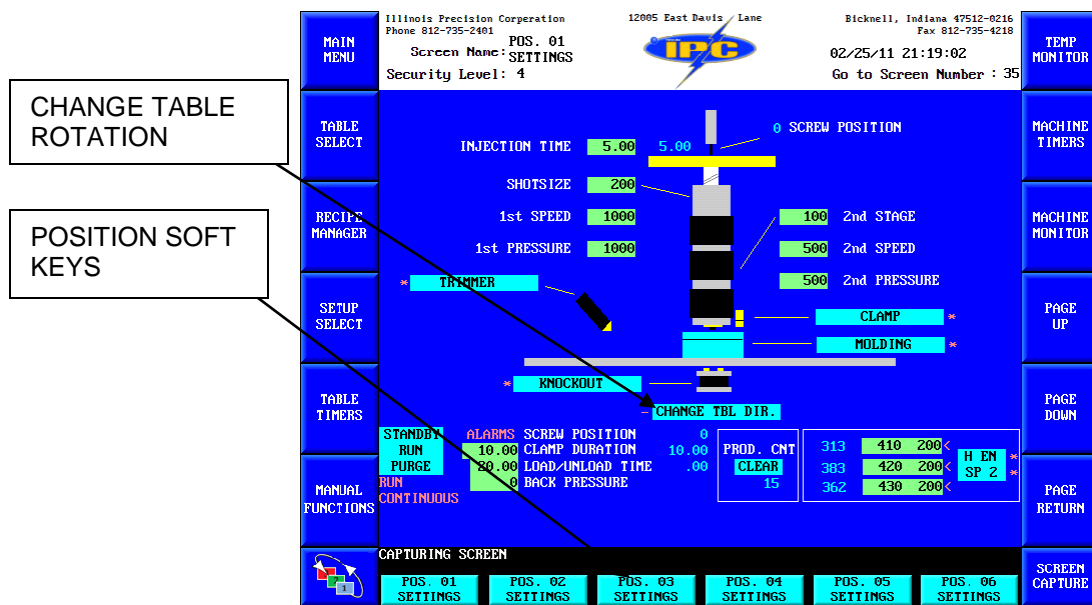
## SHUTTLE MODE

Shuttle mode is a setup that allows the machine to rotate 180 degrees to the barrel and then back to the Unload/Load position following the reverse path. It is beneficial if your leads, molds, or inserts are too long to safely rotate past the Top Frame. You may only use shuttle mode across two mold positions 180 degrees apart and may only shuttle them with injection on the right side of the table rotation.

To set up shuttle mode you must first turn on the Shuttle function by selecting the Shuttle toggle on the Setup Selections Screen.



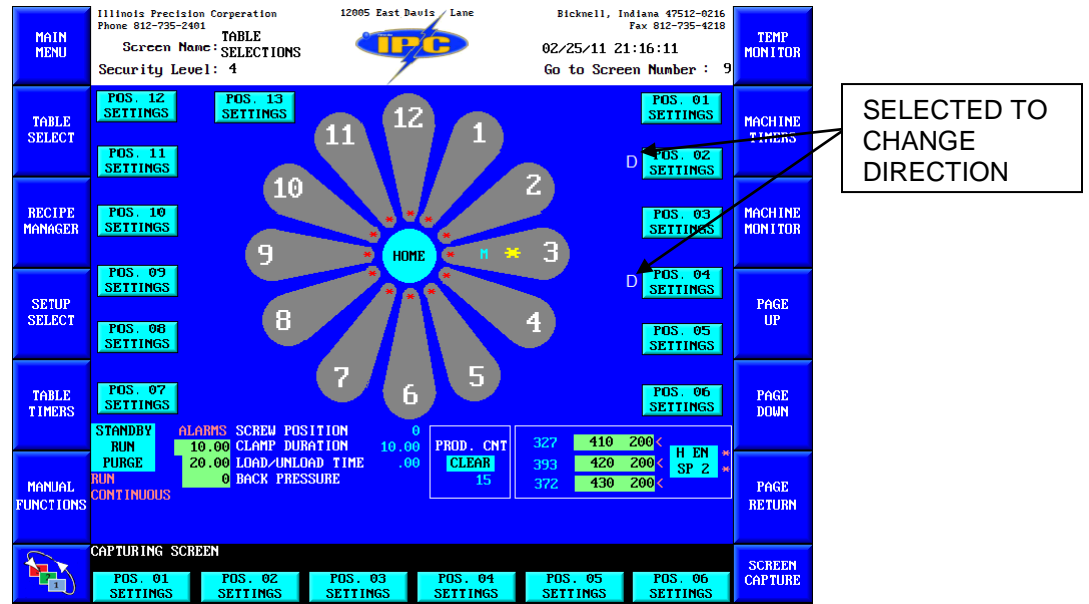
Place the barrel on the position between your two pivot positions. Then by accessing the individual pivot positions by pressing the Soft Keys along the bottom of the page, select Change Table Rotation.



In Standby mode, check your rotation and function of Shuttle. Be sure that the rotation is utilized on the right side of the machine and that Shuttle is working properly.



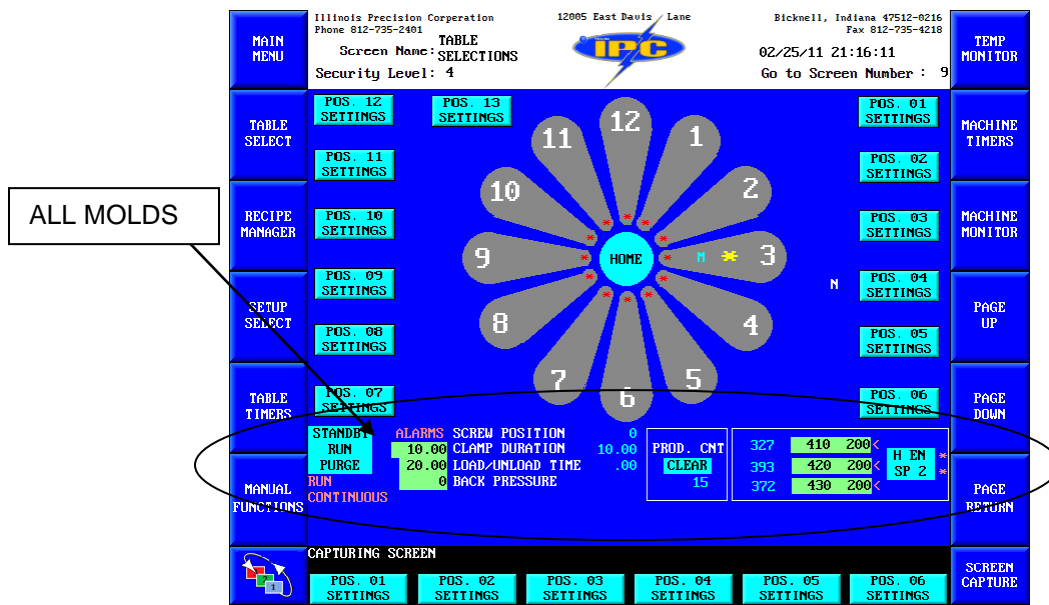
From the Table Selections screen you will see a “D” on your individual pivot position representing the positions selected to change direction.



## TABLE SELECTIONS

Individual machines are set up at the factory for 4, 6, or 12 stations. Depending on how many stations you have determines the amount of molds you are allowed to run.

The Table Selection screen is the main screen for mold set ups and while running.



The center daisy dial and along the outer edges provides you information and toggles for properly setting up your machine.

## ALL MOLDS MINI SCREEN

Along the bottom of most the screens there's an All Molds mini screen. This mini screen gives you access to parameters, information, modes, and toggles related to all positions or molds.

### CLAMP DURATION

Clamp Duration gives you a value and a setpoint for the amount of time the clamp will be engaged during a molding process. This time is universal and has to be the same for every mold. Think of this time as your overall process time. Injection occurs within this time and the table will not rotate until this time expires, unless the clamp is not enabled. If the clamp is not enabled then the Injection Time denotes the overall process time.

## LOAD/UNLOAD TIME

The Load/Unload time designates how long an operator is allowed to be within the light curtain during the load/unload process without tripping an alarm and having to reset the safeties before the cycle can begin again. The Unload/Load position is at the 6 o'clock table position. This time is only beneficial in Continuous mode. Pressing Cycle Start while the safeties are clear will cancel this time and allow the table to continue rotating back to the injection position.

## SCREW POSITION

Screw position gives the operator an analog value of the current linear position of the screw. This value will relate to the shot size setting of the next position to mold, position 1 if no position is selected to mold, or the current position in Purge mode.

## BACK PRESSURE

If Back Pressure is enabled, this setpoint will put added pressure on the injection cylinders while the screw is recovering. The max pressure setting for Back Pressure is 100 PSI. Enable/Disabling of Back pressure is done on the Setup Selections screen.

Illinois Precision Corporation  
Phone 812-735-2401  
12005 East Davis / Lane  
Bicknell, Indiana 47512-0216  
Fax 812-735-4218  
02/25/11 21:18:38  
Go to Screen Number : 33

Screen Name: SETUP SELECTIONS  
Security Level: 4

MAIN MENU  
TABLE SELECT  
RECIPE MANAGER  
SETUP SELECT  
TABLE TIMERS  
MANUAL FUNCTIONS

TABLE SELECTIONS  
4 POSITION \*  
6 POSITION  
12 POSITION  
LEFT MC  
BYPASS  
RIGHT MC  
BYPASS

MODE SELECTION  
SINGLE  
CONTINUOUS \*

BACK PRESSURE SELECT  
SELECT  
TARGET 0

SHUTTLE SELECTIONS  
SHUTTLE  
SHUTTLE MODE ACTIVE

TABLE TIMERS

STANDBY	ALARMS	SCREW POSITION	CLAMP DURATION	LOAD/UNLOAD TIME	BACK PRESSURE
10.00	10.00	0	10.00	0	0
20.00	20.00	0	10.00	0	0

PROD. CNT 315 410 200  
385 420 200  
363 430 200

CLEAR 15

H EN SP 2

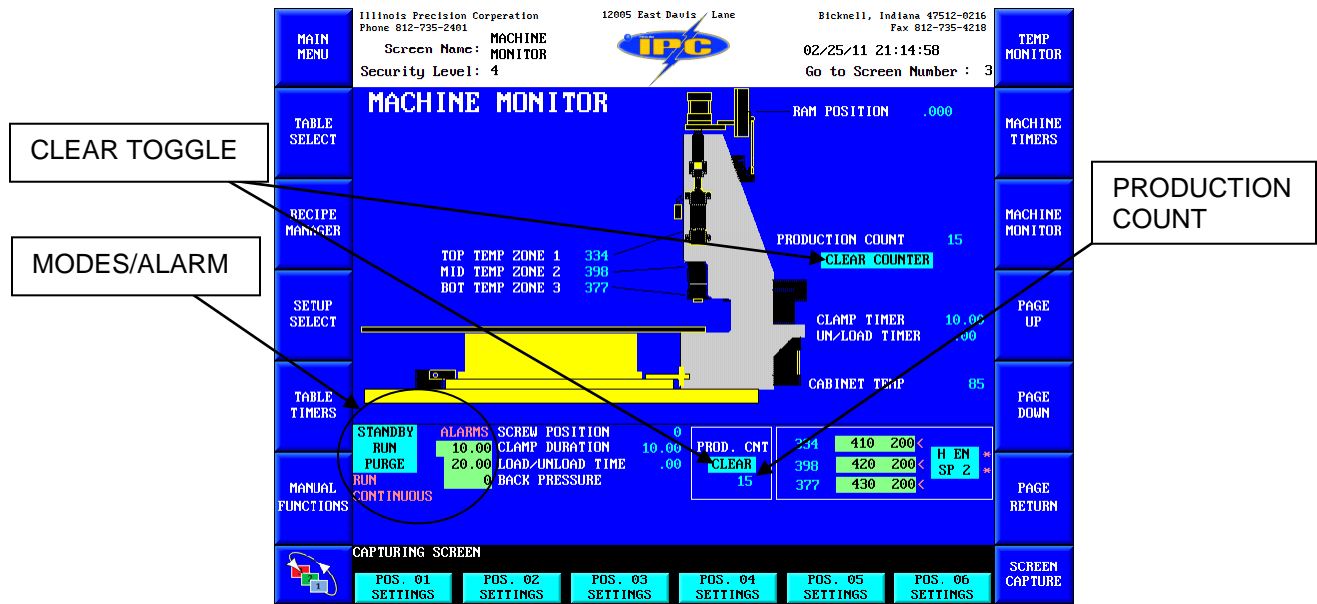
POS. 01 SETTINGS POS. 02 SETTINGS POS. 03 SETTINGS POS. 04 SETTINGS POS. 05 SETTINGS POS. 06 SETTINGS

SCREEN CAPTURE

TEMP MONITOR  
MACHINE TIMERS  
MACHINE MONITOR  
PAGE UP  
PAGE DOWN  
PAGE RETURN

## PROD. CNT (PRODUCTION COUNTER)

The Production Counter is a number representation of the amount of injection cycles that has been performed. It can be easily reset by the Clear toggle and is located on the Machine Monitor screen as well.



## MODES

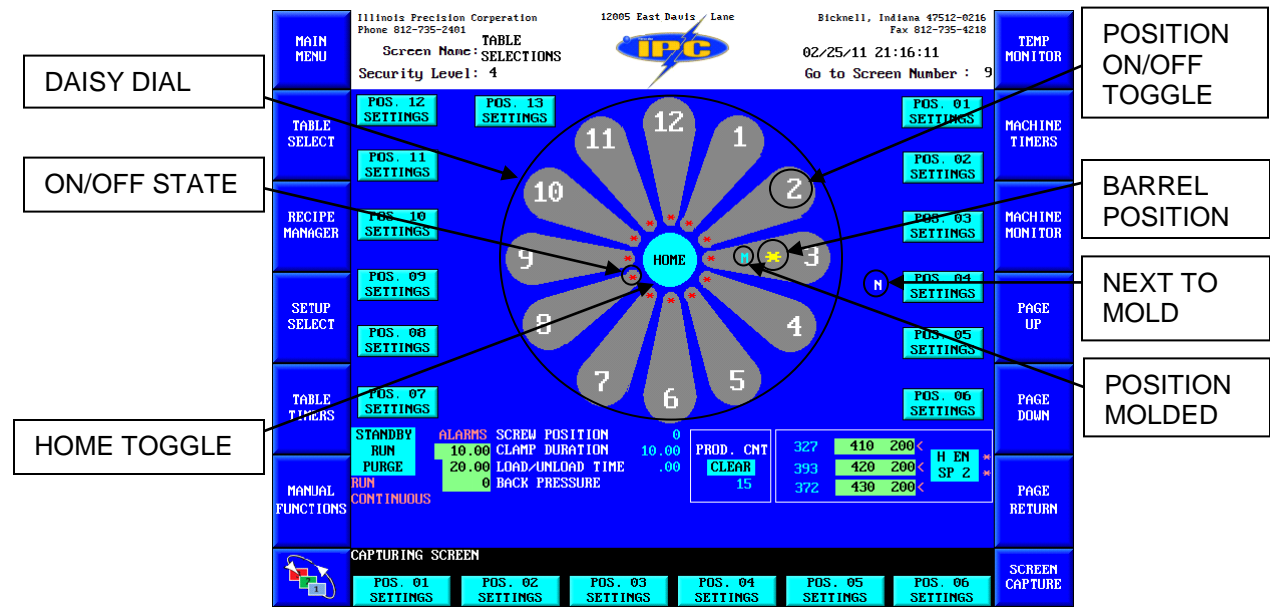
All Operation modes but Manual mode are accessible on this mini screen. There is also a visual display of what Operational and Cycle modes are active.

## ALARM

This alarm warning specifies that an alarm exists on the machine. The Alarm warning will stay active until the alarm is corrected and the Alarm Reset button is pushed.

## DAISY DIAL

The center daisy dial located on the Table Selection screen is a call back to the display on our model HS2V machine and operates relatively the same, to aid for easy integration for customers with operational knowledge of those units.



The number representation equals a mold position. Position 2 can easily be turned off/on by selecting the number of that mold.

By selecting the mold # a corresponding red asterisk \* will be displayed showing that mold is selected to mold (On State).

The yellow asterisk \* denotes what position currently resides under the barrel, Machine Position 12.

The blue "M" M denotes the position has molded and will Trim and Knockout, if that function is enabled for that position. It also activates the Unload/Load timer when in the Unload/Load position. The "M" will not clear until that position Unloads/Loads.

Also on this screen and relative to table position selection is the Next To Mold "N". This "N" will cycle around from position to position, keeping track of the next mold selected. This aids the operator and the controller in determining the next position selected and the next Shotsize to recover to.

It will set Shotsize to the 1<sup>st</sup> Shotsize of the next mold selected, Position 1's 1<sup>st</sup> Shotsize if no mold is selected to mold, or the 1<sup>st</sup> Shotsize of the current position under the barrel if in Purge mode.

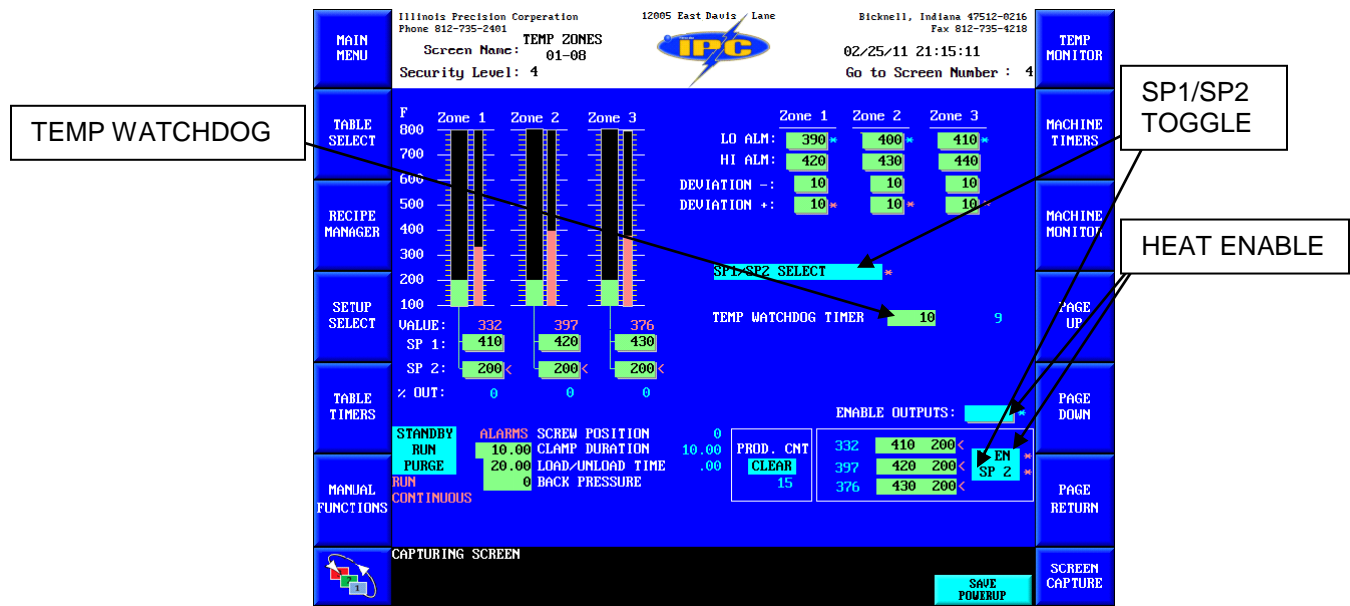
The Home toggle will reset, when pressed, the position under the barrel, Table Position 12, currently to Position 1. When the machine powers up the position under the barrel automatically gets set to Position1. But, if the table becomes misaligned and the position becomes off, this toggle will reset to the process #1.

**The optimal setup allows the machine to be power upped and shut down with the #1 position under the barrel. This cancels the need to Home the machine for each cycle of power.**

## HEATS

The machine heats are displayed on the All Molds mini screen as well as on the Temp Monitor screen.

There are three zones of heats, top(1), middle(2), and bottom(3); feed, metering, and nozzle respectively. Each zone has a settable Low, High, Deviation +/- Alarm, and Second Setpoint.



### H EN (HEAT ENABLE)

To enable/disable the heats select the H EN or Enable Outputs toggle. Once the heats are enabled they will start to climb to setpoint; visually referenced by the bar graphs, Heat Values, and % outs.

### SP1/SP2

There are two Setpoints for the heats. SP1 is the main Setpoint and should be set at the main operational heat. SP2 is a secondary setpoint that is utilized when operation is suspended, but allowing the heats to drop to room temperature is not desired, or if the Watchdog Timer reaches its setpoint. Toggle between the two Setpoints by the SP1/SP2 toggles.

## **TEMP WATCHDOG**

This counter allows for the disabling of SP1 after an extended period of time. It's based in minutes and will toggle the heats setpoint from SP1 to SP2 if no injection occurs within its time base. It will vector to the Alarm Log screen. Upon selecting Safety Reset SP2 will reset to SP1.

## **LO ALARM**

This setpoint is a low alarm warning for the heats that restricts the operation of an injection/purge cycle from beginning until its setpoints are reached across all heat zones. It will vector you to the Alarm Log screen if the operator tries to purge or inject before it clears

## **HI ALARM**

This setpoint is a high alarm warning for the heats that does not restrict any operation, but will vector you to the error screen until the alarm is cleared.


## **DEV +/- (DEVIATION +/- ALARM)**

These setpoints are a secondary warning alarm for the heats, if needed. These alarms will not vector you to the Alarm Log screen or restrict any operations, but will give you an ALARM warning on the mini screen as well as a Red Light alarm. A value of 0(Zero) will disable the alarm.


Also accessible is a Manual Temp Tune screen. This page is beneficial if it ever becomes necessary to design a unique PID for the heats. It also allows access to individual SP2 toggles, being able to toggle a single zone to SP2 while keeping the other zones at SP1.

**Generally, the Compact Maco has a tight tolerance of PID tune already. Leaving the tuning function to Autotune is recommended.**



MAIN MENU	Illinois Precision Corporation Phone 812-735-2401 Screen Name: <b>TEMP TUNE</b> Security Level: 4			12005 East Davis Lane 	Bicknell, Indiana 47512-0216 Fax 812-735-4218 02/25/11 21:15:23 Go to Screen Number : 5	TEMP MONITOR
	TABLE SELECT	Zone 1   Zone 2   Zone 3 PROPORTIONAL: 30   30   30 RESET: .16   .16   .16 RATE: 60   60   60 RETUNE: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ZERO RESET: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				MACHINE TIMERS
RECIPE MANAGER	MANUAL % OUT: .0   .0   .0 HEAT CYC TIME: 20   20   20 COOL CYC TIME: 1   1   1 COOL OUT LIMIT: .0   .0   .0				MACHINE MONITOR	
SETUP SELECT	AUTOTUNE (#1): 0   0   0 OUTPUT DISABLE: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> OUTPUT MODE (#2): 0   0   0 SPREAD: 0   0   0				PAGE UP	
TABLE TIMERS	DEVIATION +: 10   10   10 DEVIATION -: 10   10   10 2ND SP SELECT: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> HBO TIMER: 0   0   0				PAGE DOWN	
MANUAL FUNCTIONS	AUTO-COMP ENABLE: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> ENABLE OUTPUTS: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> T/C CONFIG: 0 JF   0 JF	NOTE #1 AUTOTUNE = 0 MANUAL PID = 1	NOTE #2 HEAT =0 ON/OFF=3 WATER =1 OIL =4 FAN =2 MANUAL=5			PAGE RETURN
CAPTURING SCREEN						SCREEN CAPTURE
						SAVE POWERUP

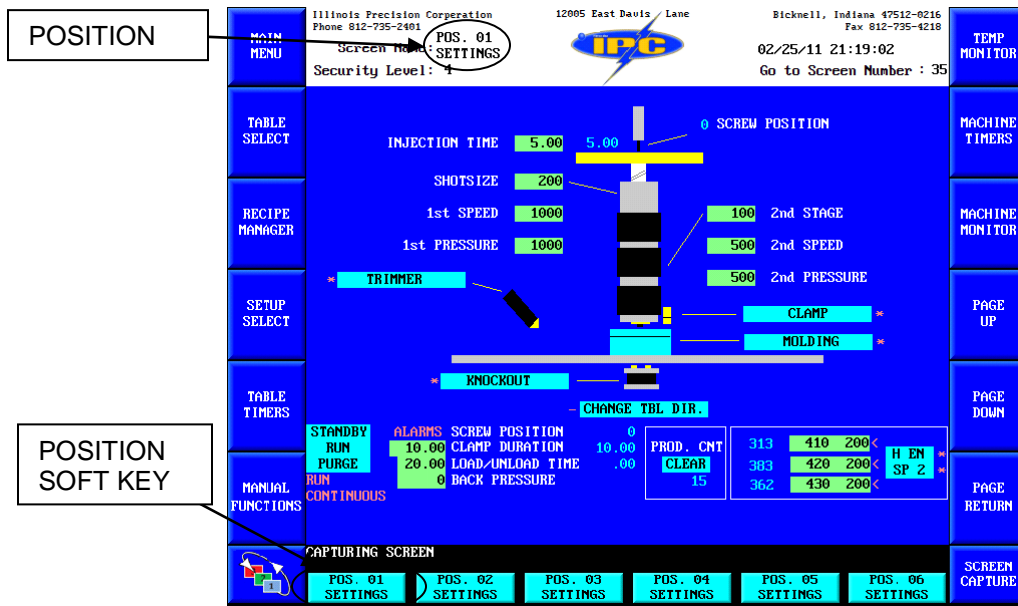
But, a Temp Tune Help screen and Eurotherm Maco CD is available to help guide setup, if need be.

MAIN MENU	Illinois Precision Corporation Phone 812-735-2401 Screen Name: <b>TEMP TUNE</b> Security Level: 4			12005 East Davis Lane 	Bicknell, Indiana 47512-0216 Fax 812-735-4218 02/25/11 21:18:13 Go to Screen Number : 30	TEMP MONITOR
	TABLE SELECT	PROPORTIONAL: the amount of influence the error will have on the output RESET: will continue to change the output until there is no error RATE: amount of output based upon the rate of change of the input <u>ABOVE ARE ONLY ACTIVE WHEN LOOP IS SET TO MANUAL TUNING</u> RETUNE: re loads factory defaults to auto tuning PB/Reset/Rate				MACHINE TIMERS
RECIPE MANAGER	ZERO RESET: control relay to clear accumulated auto tuned Reset MANUAL % OUT: percent of output 0-100% when loop set to manual output HEAT CYC TIME: in seconds of one period of power ON and power OFF				MACHINE MONITOR	
SETUP SELECT	AUTOTUNE (#1): see note # 1 on tuning page OUTPUT DISABLE: control relay to disable individual alarms and control outputs OUTPUT MODE (#2): see note #2 on tuning page SPREAD: in ON/OFF cooling # of degrees above SP to turn on cooling				PAGE UP	
TABLE TIMERS	DEVIATION +: warning alarm for # degrees above SP DEVIATION -: warning alarm for # degrees below SP 2ND SP SELECT: control relay to select SP 2 for individual zones				PAGE DOWN	
MANUAL FUNCTIONS					PAGE RETURN	
CAPTURING SCREEN						SCREEN CAPTURE
						SAVE POWERUP

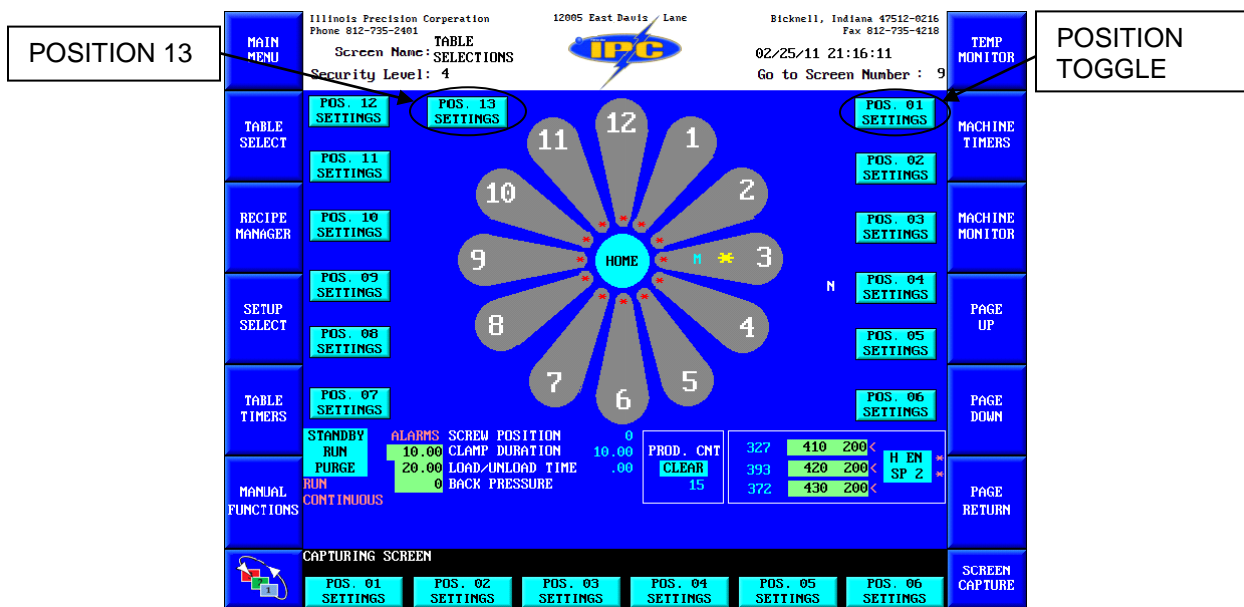
## INJECTION PROFILE

The process of setting up the injection profile is similar to our HS2V model Injection Molders. There are two stages of Injection Pressure and Injection Speed that can be utilized across two Shotsize settings.

All values are references and should be treated as such.



Each mold position on the table has a corresponding injection process screen. The screen name in the main title bar describes which positions profile is currently active. You can access individual positions by page 1 & 2 of the Soft Keys on most screens and from the Table Selection screen from the position toggles on the outer edges.

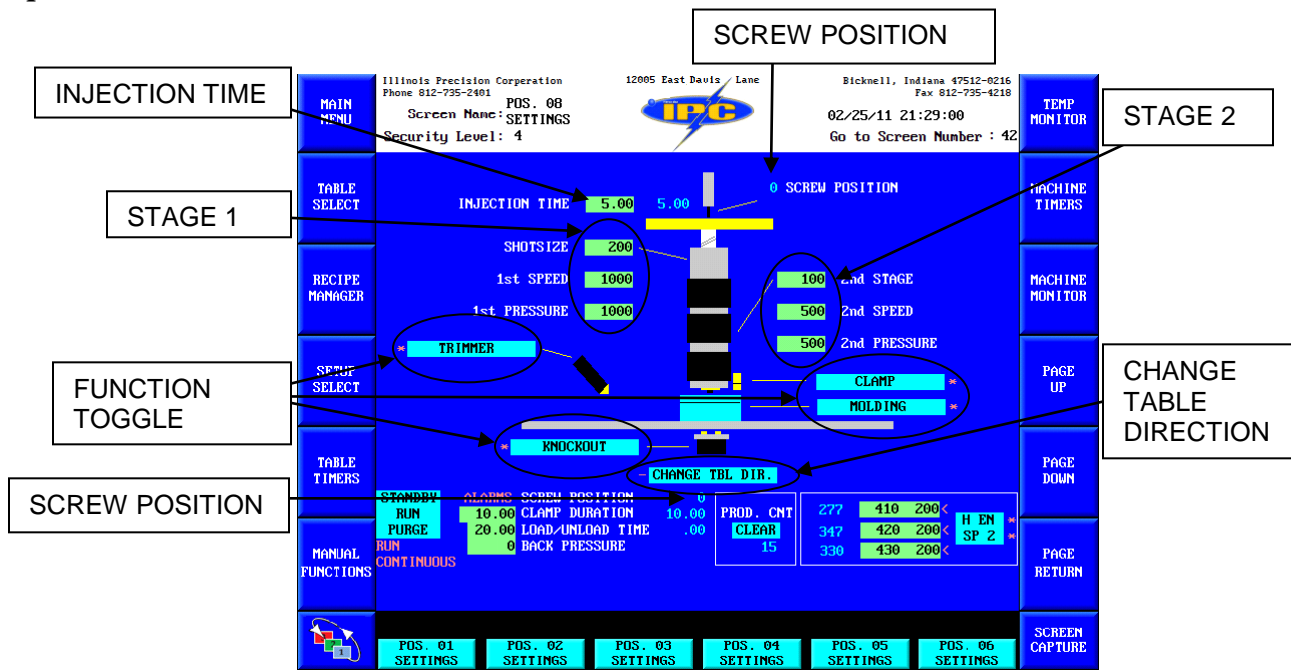


### **POSITION 13**

On the Table Selection screen there is an extra Position toggle labeled Position 13 Settings. This position is beneficial in quick process changes across multiple molds with the same variables. Any values, other than zero, entered on the Position 13 Settings page will be sequentially copied to all molds upon selecting Enter/Accept. A zero value has to be entered on an individual injection process screen. All Injection Process variables, besides Change Table Direction, are easily copied to every mold.

## SETTING UP A PROFILE

Calibrations of positions, pressures, and speeds should be performed regularly at scheduled intervals. Being out of calibration will not affect machine operation, only your process variables. Calibration will be discussed in a later section.



Broken down into 2 Stages, the injection profile has Stage 1 along the left side of the screen and Stage 2 across the right. Both may be implemented, but if only one is desired use Stage 1 located on the left, zero out Stage 2.

The process at which injection runs is as follows;

Stage1 Shotsize, 1<sup>st</sup> Shotsize, is the maximum height of the screw recovery. The process will run from 1<sup>st</sup> Shotsize at 1<sup>st</sup> Speed until it reaches 1<sup>st</sup> Pressure at which time it will hold that pressure until 2<sup>nd</sup> Stage Shotsize is reached. It will follow 2<sup>nd</sup> Speed from 2<sup>nd</sup> Shotsize until it reaches 2<sup>nd</sup> Pressure and hold for the remaining duration of Injection time. When the Injection Time times out recovery resets the Shotsize to the 1<sup>st</sup> Shotsize of whatever position is selected to mold next, Position 1's 1<sup>st</sup> Shotsize if no mold is selected to mold, or the 1<sup>st</sup> Shotsize of the current position under the barrel if in Purge mode.

Note, if 2<sup>nd</sup> Shotsize is utilized but is not reached then the process will never transfer to Stage 2. It will continue to hold in Stage 1 until the Injection Time times out.

Note, If the Injection Time is too low some of the process may also be bypassed.

## **SHOTSIZE**

This value is your linear position of the screw and references centigrams, 5670 Centigrams maximum for a 2 ounce machine and 2835 Centigrams maximum for a 1 ounce.

Depending on your process, it should closely reference the Screw Position value located in your mini screen or at the top of the Position screen. Screw speed, plastic, heats, and other variables may cause a slight difference in these two numbers.

## **SPEED**

This value is a reference number used to represent centigrams per second, maximum setting of 4000(4000 centigrams per second). Use this value to increase the speed of injection so that the entered pressure is reached sooner.

## **PRESSURE**

This value is the pressure destination of the Stage utilized. This value can be referenced via the Injection Gauge. It represents Pressure per Square Inch (PSI). Maximum value is 1800 PSI, factory max machine pressure.

## **INJECTION TIME**

This set point is the total amount of time the machine is allowed to complete the injection process, Stage 1 and/or 2, and hold pressure before recovery begins.

This timer needs to be adequate enough to allow time for both stages to occur if utilizing both stages.

If the clamp is disabled the table will not move until Injection Time is finished.

## **TRIMMER/KNOCKOUT/CLAMP/MOLDING**

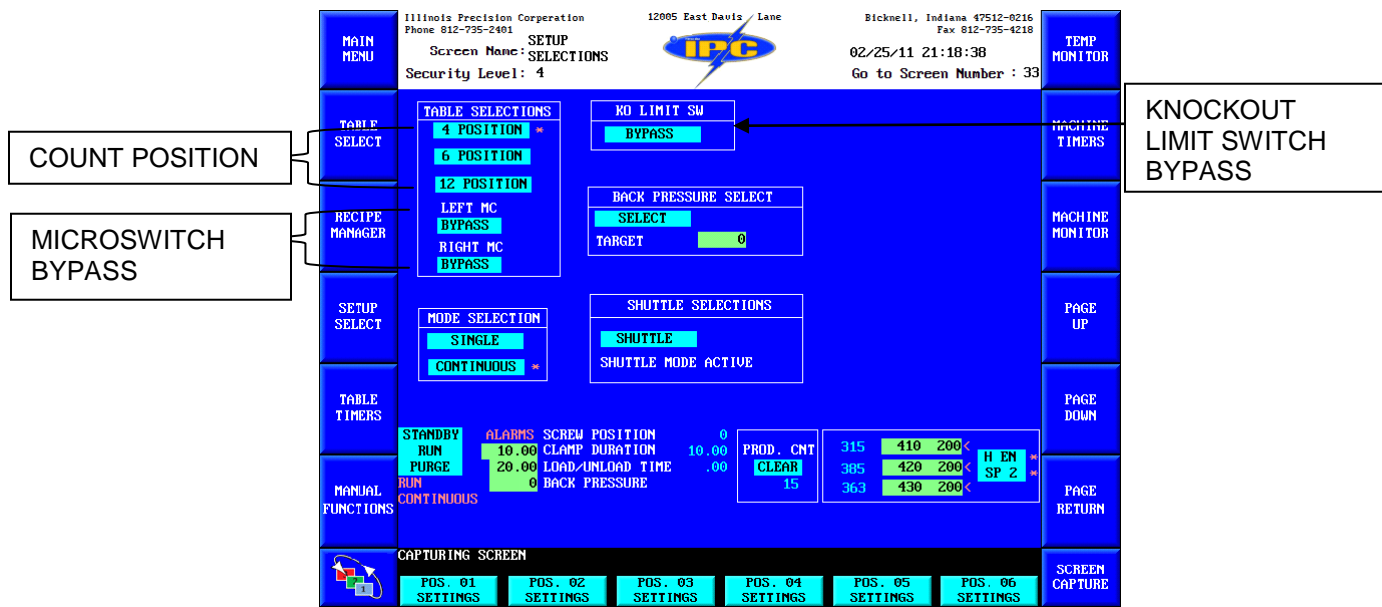
These toggles enable/disable that specific function on individual molds.

## **CHANGE TBL DIR (CHANGE TABLE DIRECTION)**

If running in Shuttle mode, this toggle designates if this position is a pivot point. For it to be functional the machine must be in Shuttle mode and another position 180 degrees off should also be selected to Change Table Direction. If activated, a corresponding “D” will display on the Table Selection screen beside the Position toggles that represent that position.

## SETUP SELECTIONS

The Setup Selections screen gives you access to several bypasses and setup toggles. Some have already been discussed in other chapters related to their specific functions. Please reference those chapters for specifics on those functions.



### COUNT POSITION

This function relates to the table count. By selecting an optional Position (4, 6, or 12) the count will change accordingly.

**This option is predetermined at the factory by the design of the table and should not be altered.**

### LEFT MC BYPASS (LEFT MICROSWITCH BYPASS)

This toggle bypasses the left microswitch located under the table, if the switch becomes misaligned or malfunctions. If bypassed, the table will rotate using the Extend Duration timers located on the Table Timers screen.

### RIGHT MC BYPASS (RIGHT MICROSWITCH BYPASS)

This toggle bypasses the right microswitch located under the table, if the switch becomes misaligned or malfunctions. If bypassed, the table will rotate using the Retract Duration timers located on the Table Timers screen.

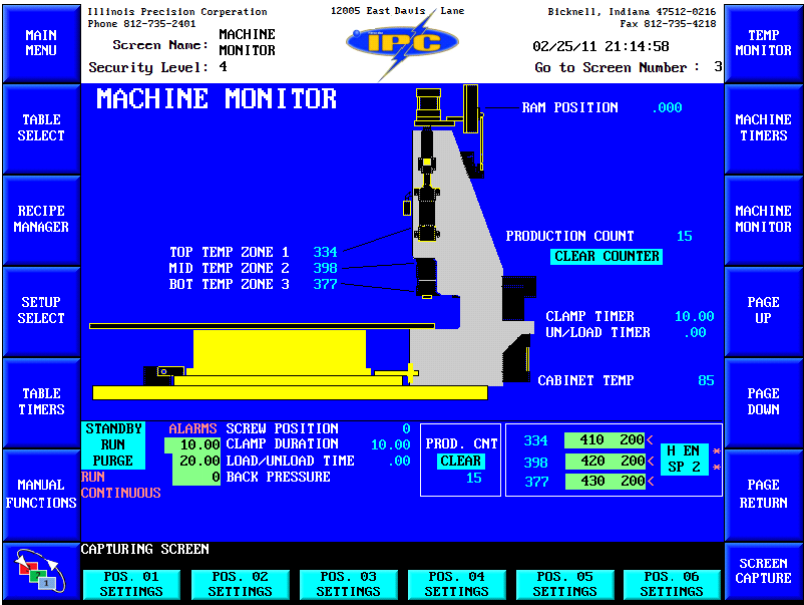
### **KO LIMIT SW (KNOCKOUT LIMIT SWITCH BYPASS)**

This toggle bypasses the Knockout limit switch located on the Knockout cylinders, if it malfunctions. If bypassed, the Knockouts will run for the time specified by the Knockout Duration timer located on the Machine Timers screen.

MACHINE MONITOR

The Machine Monitor screen gives you an easy reference point to several process and machine values as well as the Production Count and the Production Clear toggle. All values on this screen are values only, not setpoints, and are unchangeable from this screen.


This screen is for reference use only





## I/O CR STATUS

Specifically designed for troubleshooting and verification purposes, this screen gives the operator access to current on/off states of the Inputs and Outputs in the system, as well as Logic Address #'s, and CR state verifications. Accompanied with a print out of the machines logic, the RLD Viewer screen, or the Eurotherm Logics program troubleshooting of system malfunctions becomes even easier.

MAIN MENU	Illinois Precision Corporation Phone 812-735-2401 Screen Name: I/O AND CR STATUS Security Level: 4				12005 East Davis Lane 		Bicknell, Indiana 47512-0216 Fax 812-735-4218 02/25/11 21:29:59 Go to Screen Number : 49		TEMP MONITOR
	TABLE SELECT	CR NUM	5001 TOP HEAT 5002 MIDDLE HEAT 5003 BOTTOM HEAT 5004 MOTOR ENABLE 5005 RACK PULL BACK SOL 5006 CLAMP SOL 5007 KNOCKOUT SOL 5008 BARREL SOL 5009 HIGH PRESSURE SOL 5010 TRIMMER SOL 5011 SCREW SOL 5012 RACK EXTEND SOL 5013 RACK RETRACT SOL 5014 SERVO CARD ENABLE 5015 HYDRAULIC MOTOR RUN LIGHT 5016 SAFETY RESET LOAD/UNLOAD	0001 MOTOR STOP/START PB 0002 HYDRAULIC MOTOR RUNNING 0003 CYCLE START PB 0004 CYCLE STOP PB 0005 BARREL DOWN LIMIT 0006 YELLOW FLAG 0007 KNOCKOUT HIGH LIMIT 0008 RIGHT RACK MICRO SWITCH 0009 LEFT RACK MICRO SWITCH 0010 BARREL UP OVER TRAVEL 0011 RESET PB 0012 LIGHT CURTAIN OK 0013 ALL SAFE 0014 ALL NOT SAFE 0015 ESTOP # 1 0016 ESTOP # 2			MACHINE TIMERS		
RECIPE MANAGER									MACHINE MONITOR
SETUP SELECT									PAGE UP
TABLE TIMERS									PAGE DOWN
MANUAL FUNCTIONS	STANDBY RUN PURGE	SCREW POSITION CLAMP DURATION LOAD/UNLOAD TIME BACK PRESSURE	PROD. CNT CLEAR	H EN SP 2					PAGE RETURN
	POS. 01 SETTINGS   POS. 02 SETTINGS   POS. 03 SETTINGS   POS. 04 SETTINGS   POS. 05 SETTINGS   POS. 06 SETTINGS								SCREEN CAPTURE

## INPUTS/OUTPUTS

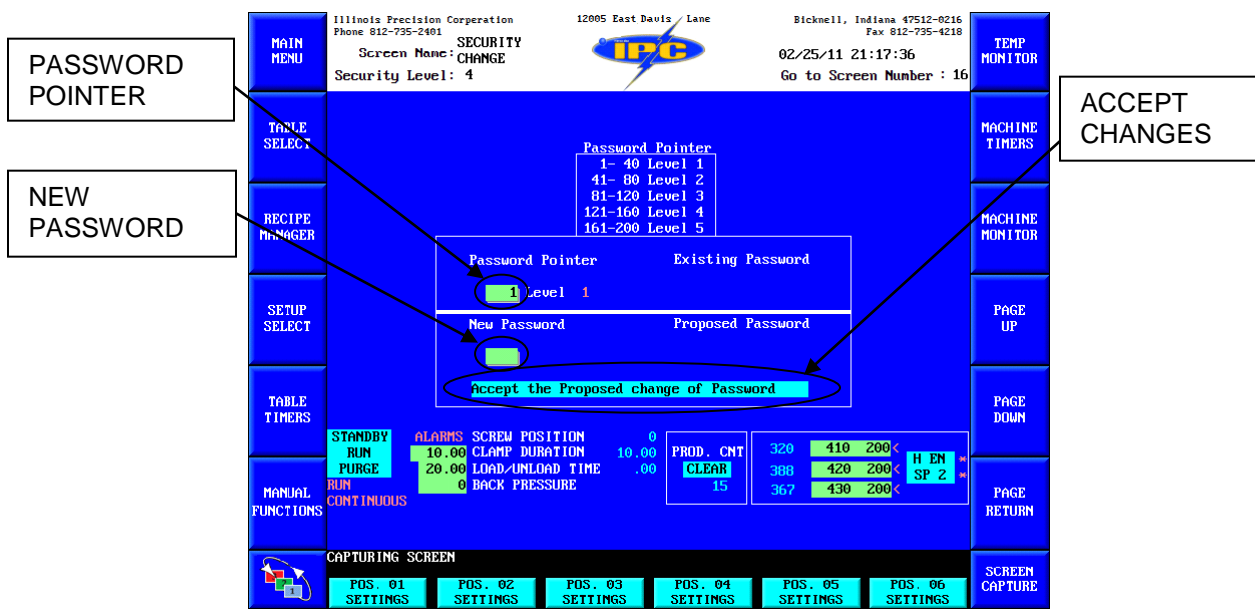
Each line contained in the Inputs/Outputs columns provides you a description of all the available functions on the machine, the address number for that function, and an asterisk corresponding with an "On State" of that Function.

## CR NUM

The CR Number column is a setpoint column that accepts inputs of CR numbers. Once that CR number is entered, an asterisk will activate if that CR is in the "On State".

## SECURITY CHANGE

The Security screen gives you access to add or delete security passwords per individual levels of security per individual personnel. With individual passwords per personnel, reference can be made on the Alarm Log screen on who was logged in to the machine during an Alarm state.



Levels 4 and 5 have no differences in machine access.

Once access is granted to this screen, by selecting the Password Pointer setpoint and entering in a level of security # (1-40, 41-80, ect...) the Existing Password will be displayed. The password can be changed for that level or if no password exists then one can be created by selecting the New Password setpoint, entering in the new password, and selecting Accept the Proposed change of Password. To clear a password enter nothing in the New Password setpoint and select Accept the Proposed change of Password. The +/- key on the Digit Input box denotes a “-“


## DEFAULT PASSWORDS

- Level 1 - 1
- Level 2 - 2
- Level 3 - 3
- Level 4 - 1397 or 735-2401

**Be sure to document, remember, and/or store all passwords in a safe location. It would be beneficial to leave the IPC Phone Number 735-2401 as a level 4 password for troubleshooting purposes if there was a need to contact our Service Department.**

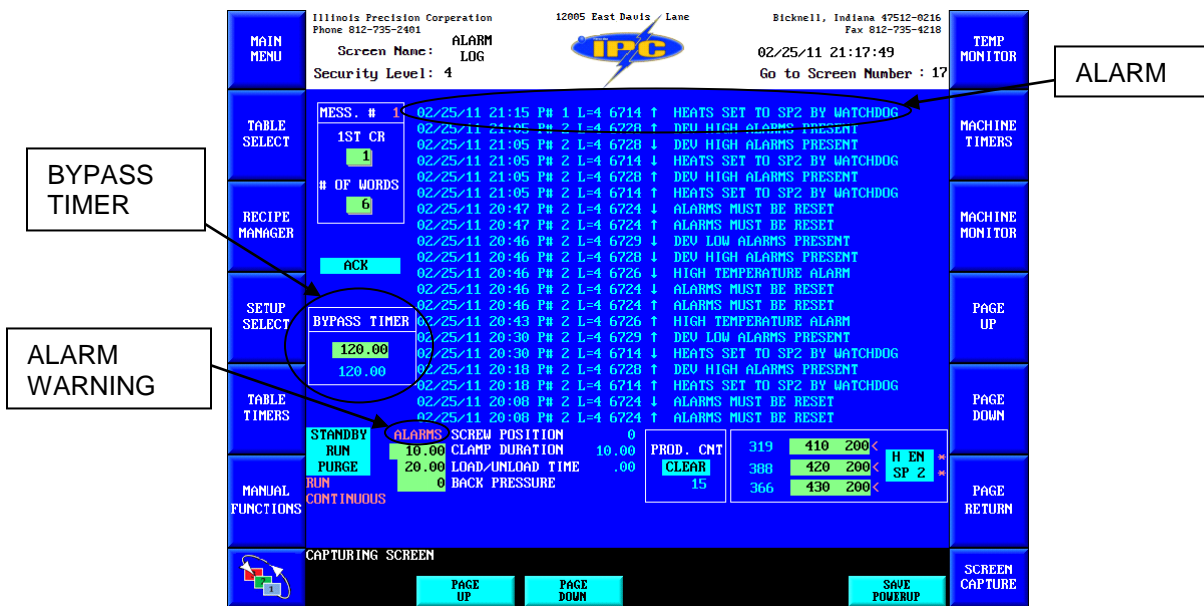
When there has been an alarm on the machine the Alarm Log screen will update with the particulars of the alarm; Date, Time, Password Level and Number, and a brief description of the alarm. Use these numbers to reference the security level during the alarm state.

Example; the picture below, the Heater Watchdog timer timed out on February 25, 2011 at 9:15 p.m. The security level during this alarm was level 4 and it was the first password in level 4. The first password in level 4 security is password #121.

Illinois Precision Corporation Phone 812-735-2401 Screen Name: ALARM Security Level: 4		12005 East Davis Lane  Bicknell, Indiana 47512-0216 Fax 812-735-4218		02/25/11 21:17:49 Go to Screen Number : 17		TEMP MONITOR
MAIN MENU	MESS. # 1	02/25/11 21:15 P# 1 L=4 6714 ↑ HEATS SET TO SP2 BY WATCHDOG				MACHINE TIMERS
	1ST CR 1	02/25/11 21:05 P# 2 L=4 6728 ↑ DEV HIGH ALARMS PRESENT				
TABLE SELECT	# OF WORDS 6	02/25/11 21:05 P# 2 L=4 6728 ↓ DEV HIGH ALARMS PRESENT				MACHINE MONITOR
	ACK	02/25/11 21:05 P# 2 L=4 6714 ↑ HEATS SET TO SP2 BY WATCHDOG				
RECIPE MANAGER	BYPASS TIMER	02/25/11 20:47 P# 2 L=4 6724 ↓ ALARMS MUST BE RESET				PAGE UP
	120.00	02/25/11 20:47 P# 2 L=4 6724 ↑ ALARMS MUST BE RESET				
SETUP SELECT	120.00	02/25/11 20:46 P# 2 L=4 6729 ↓ DEV LOW ALARMS PRESENT				PAGE DOWN
	120.00	02/25/11 20:46 P# 2 L=4 6728 ↓ DEV HIGH ALARMS PRESENT				
TABLE TIMERS	STANDBY	02/25/11 20:46 P# 2 L=4 6726 ↓ HIGH TEMPERATURE ALARM				PAGE RETURN
	RUN	02/25/11 20:46 P# 2 L=4 6724 ↓ ALARMS MUST BE RESET				
MANUAL FUNCTIONS	PURGE	02/25/11 20:43 P# 2 L=4 6726 ↑ ALARMS MUST BE RESET				SCREEN CAPTURE
	CONTINUOUS	02/25/11 20:43 P# 2 L=4 6729 ↑ HIGH TEMPERATURE ALARM				
CAPTURING SCREEN		02/25/11 20:30 P# 2 L=4 6729 ↑ DEV LOW ALARMS PRESENT 02/25/11 20:30 P# 2 L=4 6714 ↓ HEATS SET TO SP2 BY WATCHDOG 02/25/11 20:18 P# 2 L=4 6728 ↑ DEV HIGH ALARMS PRESENT 02/25/11 20:08 P# 2 L=4 6714 ↑ HEATS SET TO SP2 BY WATCHDOG 02/25/11 20:08 P# 2 L=4 6724 ↓ ALARMS MUST BE RESET 02/25/11 20:08 P# 2 L=4 6724 ↑ ALARMS MUST BE RESET				
STANDBY ALARMS SCREW POSITION 0 RUN 10.00 CLAMP DURATION 10.00 PURGE 20.00 LOAD/UNLOAD TIME .00 CONTINUOUS 0 BACK PRESSURE		PROD. CNT 319 410 200 < H EN * CLEAR 388 420 200 < SP 2 * 366 430 200 <		PAGE UP PAGE DOWN SAVE POWERUP		

## ALARM LOG

The Alarm Log screen gives you access to all the alarm descriptions. It is also the only vector screen and will display if there is a vector alarm present.



A vector alarm is an alarm that requires the operators' attention and then a reset of the safeties via the Safety Reset button.

Each alarm is documented in a chronological order and are automatically stored and erased as space provides.

Each line of the Alarm Log screen provides the following information;  
Date – Time – Password # - Security Level – Alarm # - Rising/Falling – Description

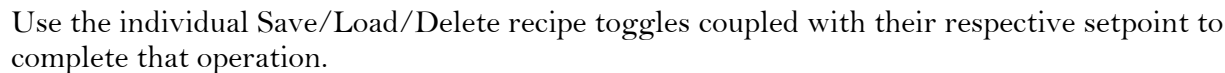
If an alarm exists and has not been reset you will see ALARM warning in the mini screen. Some alarms are vector alarms and some are not. It is possible to see ALARM, but still run normally and not be vectored to the Alarm Log screen.

**Always, an alarm will trigger a red light on the light tower, vector or not.**

### BYPASS TIMER

The Bypass Timer gives you the ability to leave the Alarm Log screen for the duration specified to aid in relieving the alarm. Pressing the Safety Reset button triggers the timer. As the timer is counting down you may navigate away from the Alarm Log screen. If the alarm is not corrected within the bypass time specified the alarm will vector you back to the Alarm Log screen.

A more intuitive and larger recipe management system is offered than in any of our previous models. This system is capable of storing up to a 1000 different recipes with no differences in recipe types, as was in our BCCL model machines. Recipes are easily transferable to USB for safe storage, and a touch screen input keypad is provided for easy renaming and naming of different process recipes.




Screen Soft Keys allow for page scrolling of the Recipe database, as well as text input options and Save/Load options.

Recipe 0 (Zero) is the active recipe on the system and the current Powerup Recipe, if no changes to the process has been made. There is no distinction between Recipe 0 and Powerup Recipe.

## ECHO SERIES

The Mold Data USB Screen allows quick copying of single or multiple recipes across the internal storage, external storage devices, or provided compact flash card.

Illinois Precision Corporation Phone 812-735-2401 Screen Name: MOLD DATA Security Level: 4		12005 East Davis Lane  Bicknell, Indiana 47512-0216 Fax 812-735-4218 02/25/11 21:17:24 Go to Screen Number : 15		TEMP MONITOR
MAIN MENU	FROM/TO FROM 0	1 02/25/11 21:01:41 ECHO2U-SETUP 2 3 4 5 6 7 8 9 10		MACHINE TIMERS
TABLE SELECT	0=MAND FLASH RECIPES START 0 END 0			MACHINE MONITOR
RECIPE MANAGER	1=EXTERNAL STORAGE USB TO 0			
SETUP SELECT	3=INTERNAL STORAGE COMPACT FLASH COPY YES NO	1 02/25/11 21:01:41 ECHO2U-SETUP 2 3 4 5 6 7 8 9 10		PAGE UP
TABLE TIMERS				PAGE DOWN
MANUAL FUNCTIONS				PAGE RETURN
CAPTURING SCREEN				
PAGE DOWN		PAGE UP		SCREEN CAPTURE

By entering in the desired devices in the From/To setpoint fields, using the chart provided, a Start/End line # from the database of the device specified, and selecting copy, multiple recipes can be transferred to any device at one time.

**Please refer to the Eurotherm Maco Manual for internal system file structure and further instructions.**

## CALIBRATION

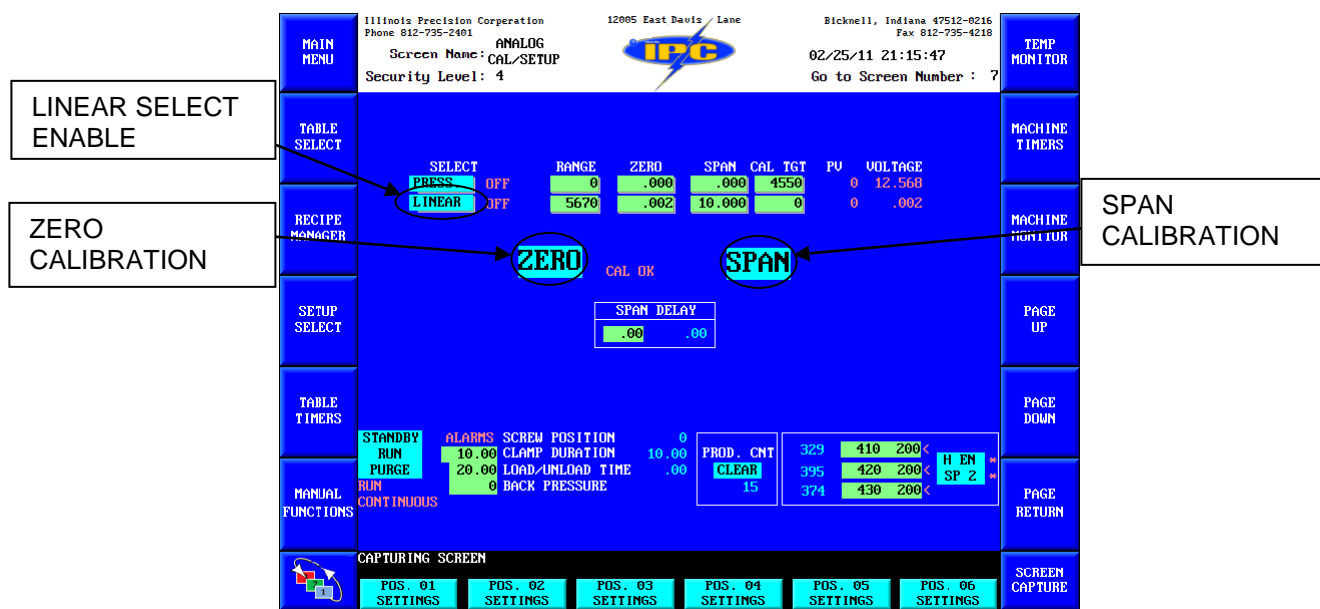
Calibrations of positions, pressures, and speeds should be performed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.

Being out of calibration will not affect machine operation, only your process variables.

Only qualified maintenance personal should perform calibrations

Currently, the only calibration done on the user interface is for the linear transducer (Shotsize). All other calibrations (Pressure & Speed) will be setups on the screen and calibrations on the BOSCH card located in the main electrical box.

**All calibration setup values are set at the factory and should not be altered FOR ANY REASON!**



The following procedure will adjust the Zero and Span screen values of the Analog Linear line. These values displayed will change as the calibration is performed.

1. Locate the Purge Block under the barrel.
2. Bring heats up to temperature.
3. Select Purge mode.
4. Purge the machine by pushing the Cycle Start button.
5. While purging and the stroke of the screw is in the fully down position disable the pump by pressing the E-stop button.
6. Clear all errors and return to the Analog Cal/Setup screen.

7. Verify that the Shotsize Sensor is installed correctly; adjust the Shotsize Sensor so that it is square with the machine and that the tip is “just” touching the Screw Housing plate.
8. With the Shotsize Sensor in the fully down position, select the Linear Select Enable toggle.
9. With the Linear Select Enable “ON”, select the Zero Calibration toggle.
10. A message will read “Calibrating”, once complete it will read “Cal Ok”, if there are no issues with the setup or calibration.
11. Verify that the Linear Select Enable is still “ON”.
12. Have an assistant span the Shotsize Sensor to its full travel and hold it there.
13. Select the Span Calibration toggle.
14. A message will read “Calibrating”, once complete it will read “Cal Ok”, if there are no issues with the setup or calibration.

**Calibration for the Analog Linear Shotsize Sensor is complete.**

The following procedure will calibrate the Pressures and Speeds outputs of the BOSCH Driver Card to the BOSCH Proportional valve. These calibrations require access to the Main Electrical cabinet.

**All Safety guidelines and procedures required with working on electrical components should be adhered.**

**Only qualified maintenance personal should perform calibrations**

1. Turn off machine power.
2. Open the Main Electrical box.
3. Remove the BOSCH Card (PL6-PQI), other model BOSCH Cards may have a different setup, wiring, and Calibration.
4. Verify that the Dip/Pot setups of the BOSCH card are as follows;

0	on	5	off	10	off	15	off
1	off	6	on	11	off	16	on
2	on	7	on	12	off	KP = 11	
3	on	8	off	13	off	KI = 5	
4	on	9	on	14	off	KD = 5	

5. Reinstall The BOSCH card.
6. Turn on machine power leaving the Electrical Cabinet door open.
7. Select Standby mode.
8. Locate the Purge Block under the barrel.
9. Bring heats up to temperature.
10. Select Purge mode.

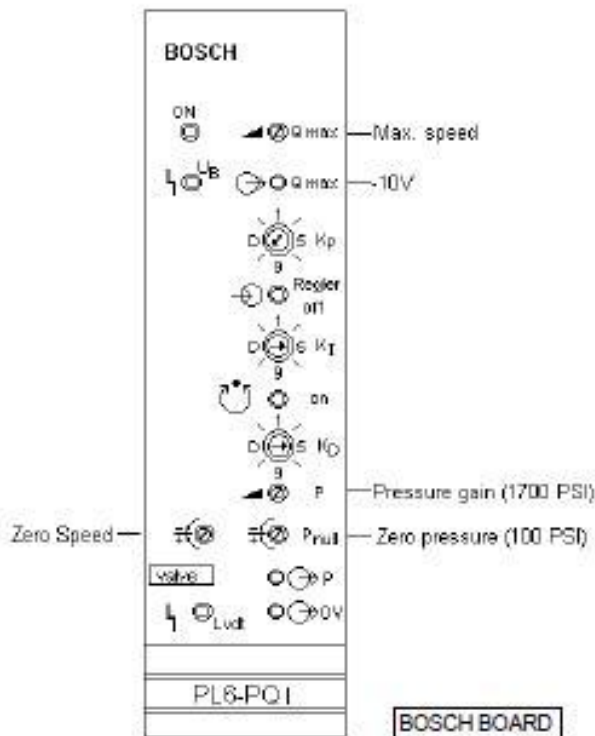


**Make all process changes to the correct position screen, the Purge position, or use Position 13.**

10. Set Shotsize and 2<sup>nd</sup> Stage Shotsize to 0 (Zero).
11. Set 1<sup>st</sup> and 2<sup>nd</sup> Pressures to 1400.

**Use pressures that are not close to your max high and low for easier adjustment reading on the gauge.**

12. Set 1<sup>st</sup> and 2<sup>nd</sup> Speeds to 4000.
13. Disable Back Pressure.
14. Turn DIP switch 4 on the BOSCH card off.
15. Connect a meter to 0V (Ground) and Qmax (Positive 5VDC) on the BOSCH card. (See illustration below)
16. With the Purge mode selected, press and hold the Cycle Start button. Adjust Max Speed (refer to drawing of the BOSCH card) to obtain a negative 5 VDC (-5) reading on the meter.
17. Turn DIP switch 4 on the BOSCH card back on.



18. Press and hold the Cycle Start button and adjust the potentiometer labeled Pressure gain (refer to drawing of the BOSCH card) to obtain 1400 PSI on the Injection Pressure gauge.

19. Set 1<sup>st</sup> and 2<sup>nd</sup> Pressures to 400.

**Use pressures that are not close to your max high and low for easier adjustment reading on the gauge.**

20. Press and hold the Cycle Start button and adjust potentiometer labeled Zero Pressure (refer to drawing of the BOSCH card) for 400 PSI on the Injection Pressure gauge.
21. Recheck for 1400 PSI again.
22. If it is not at 1400, return to step 18.

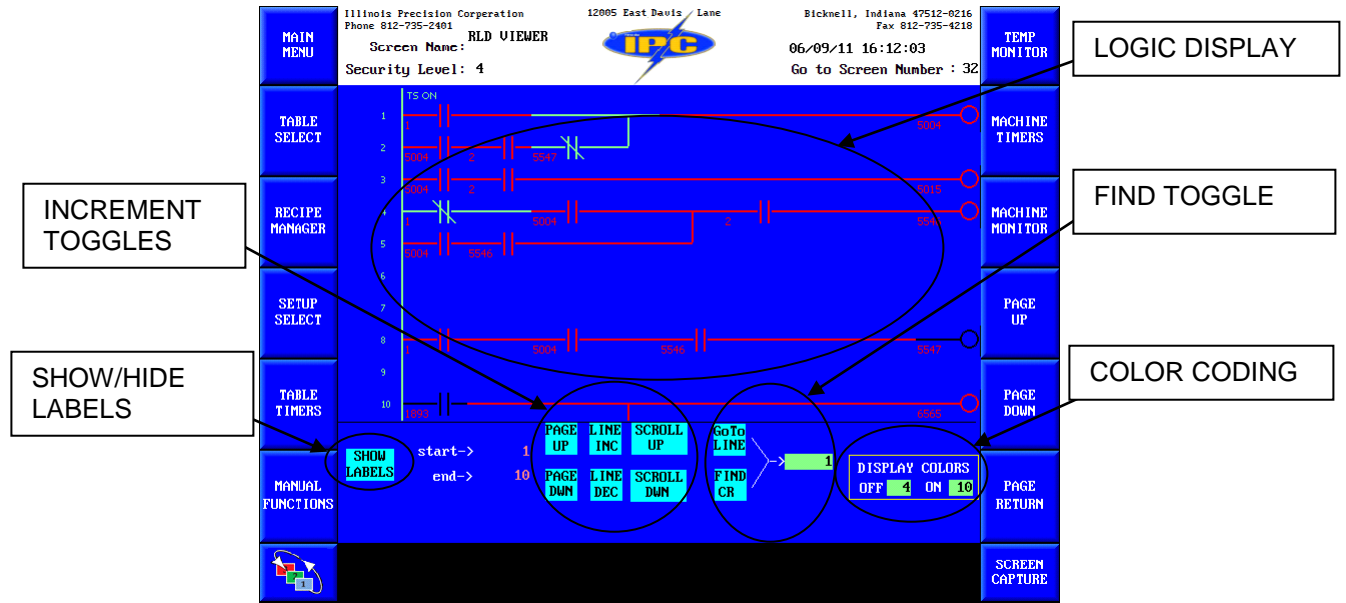
23. Recheck for 400 PSI again.
24. If it is not at 400, return to step 20.
25. Repeat steps until the PSI entered is the same as the Injection Pressure gauge.
26. Set the 2<sup>nd</sup> Stage Speed to 0 (Zero).
27. Set 1<sup>st</sup> Stage Shotsize to 2000.
28. Set 2<sup>nd</sup> Stage Shotsize to 1000.
29. Purge the machine.
30. Adjust Zero Speed (refer to drawing of BOSCH card) to stop movement of the screw once 2<sup>nd</sup> Stage is reached.
31. If the screw initially stops when it reaches the 2<sup>nd</sup> Stage setting, to ensure proper calibration of the Zero Speed function, continue holding the machine in purge, and back off the Zero Speed adjustment on the BOSCH card until the screw just begins to move.
32. Continue adjusting and purging until the screw stops moving down into the barrel.

**The screw Zero Speed adjustment can be affected by the type of material, condition of the material, and the temperature of the material.**

**Calibration for the Pressure and Speed Proportional outputs are complete.**

## RLD VIEWER

The RLD Viewer screen is an advanced troubleshooting screen. It allows the viewer a visual representation of the logic as the machine is running. CR States, Output States, Input States, can all be viewed, monitored, and traced as the machine actually runs and toggles the states on or off.



### LOGIC DISPLAY

The Logic Display will show logic runs that are duplicates of the logic runs that run the machine.

### COLOR CODING

All states are viewed as being either on or off. Color coding of On/Off states distinguish the two.

0	4	8	12
1	5	9	13
2	6	10	14
3	7	11	15

## **SHOW/HIDE LABELS**

Labels can be turned on/off to help further diagnose problems; addresses replace labels when turned off.

## **INCREMENT**

The Increment toggles allow different scrolling options in the Logic Display.

## **FIND**

The Find toggles will jump to a particular CR or Line number in the logic.

## TABLE TIMERS

The following breakdown of timers is not all the timers in the system. It will be a breakdown of timers that are recommended adjustable, as needed.

The remaining timers should be left alone and not adjusted.


Illinois Precision Corporation Phone 812-735-2401 Screen Name: TABLE Security Level: 4		12005 East Davis Lane 		Bicknell, Indiana 47512-0216 Fax 812-735-4218 06/09/11 16:11:32 Go to Screen Number : 47		TEMP MONITOR																																																
MAIN MENU	<table border="1"> <thead> <tr> <th colspan="3">TABLE TIMERS</th> <th colspan="3">SHUTTLE INITIALIZE TIMERS</th> </tr> </thead> <tbody> <tr> <td>EXTEND DELAY</td> <td>.40</td> <td>.40</td> <td>RPB ON DELAY</td> <td>.40</td> <td>.40</td> </tr> <tr> <td>RETRACT DELAY</td> <td>.40</td> <td>.40</td> <td>EXTEND DELAY</td> <td>1.00</td> <td>1.00</td> </tr> <tr> <td>EXTEND DURATION</td> <td>3.50</td> <td>3.50</td> <td>EXTEND DURATION</td> <td>3.50</td> <td>3.50</td> </tr> <tr> <td>RETRACT DURATION</td> <td>3.50</td> <td>3.50</td> <td>RPB OFF DELAY</td> <td>.40</td> <td>.40</td> </tr> <tr> <td>RPB RETRACT DUR.</td> <td>.35</td> <td>.00</td> <td>DE INI BACK OFF DELAY</td> <td>.20</td> <td>.20</td> </tr> <tr> <td>CCW L MC DELAY</td> <td>.30</td> <td>.30</td> <td>CW TO CCW DELAY</td> <td>.20</td> <td>.20</td> </tr> <tr> <td>CCW R MC DELAY</td> <td>.30</td> <td>.30</td> <td>CCW TO CW DELAY</td> <td>.20</td> <td>.20</td> </tr> </tbody> </table>					TABLE TIMERS			SHUTTLE INITIALIZE TIMERS			EXTEND DELAY	.40	.40	RPB ON DELAY	.40	.40	RETRACT DELAY	.40	.40	EXTEND DELAY	1.00	1.00	EXTEND DURATION	3.50	3.50	EXTEND DURATION	3.50	3.50	RETRACT DURATION	3.50	3.50	RPB OFF DELAY	.40	.40	RPB RETRACT DUR.	.35	.00	DE INI BACK OFF DELAY	.20	.20	CCW L MC DELAY	.30	.30	CW TO CCW DELAY	.20	.20	CCW R MC DELAY	.30	.30	CCW TO CW DELAY	.20	.20	MACHINE TIMERS
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SETTINGS	SETTINGS	SETTINGS	SETTINGS	SETTINGS	SETTINGS																																																	

Table timers are broken down into 4 groups; Table, Shuttle, Shuttle Initialize, and Manual. Table timers are the standard timers that run the table CCW, standard operation. Shuttle timers are the timers that run the table CW. Shuttle Initialize timers are the timers that changes the direction of the table rotation from CW to CCW and CCW to CW. Manual Timers are the timers that cycle the table 1 Gear tooth CCW.

## TABLE TIMERS

EXTEND DELAY – Delay before the Rack Cylinder extends.

RETRACT DELAY – Delay before the Rack Cylinder retracts.

EXTEND DURATION – How long the Rack Cylinder is given to extend to hit the left Microswitch before an alarm is tripped. If the Microswitch is bypassed, it is utilized as an actual duration timer before the RPB Cylinder is activated.

RETRACT DURATION - How long the Rack Cylinder is given to retract to hit the right Microswitch before an alarm is tripped. If the Microswitch is bypassed, it is utilized as an actual duration timer before the RPB Cylinder is activated.

CCW L MC DELAY – Delay once the left Microswitch is activated before the RPB Cylinder activates, while rotating CCW.

CCW R MC DELAY - Delay once the right Microswitch is activated before the RPB Cylinder activates, while rotating CCW.

## SHUTTLE TIMERS

EXTEND DELAY - Delay before the Rack Cylinder extends, while rotating CW.

RETRACT DELAY - Delay before the Rack Cylinder retracts, while rotating CW.

EXTEND DURATION - How long the Rack Cylinder is given to extend to hit the left Microswitch before an alarm is tripped. If the Microswitch is bypassed, it is utilized as an actual duration timer before the RPB Cylinder is activated, while rotating CW.

RETRACT DURATION - How long the Rack Cylinder is given to retract to hit the right Microswitch before an alarm is tripped. If the Microswitch is bypassed, it is utilized as an actual duration timer before the RPB Cylinder is activated, while rotating CW.

CW L MC DELAY - Delay once the left Microswitch is activated before the RPB Cylinder activates, while rotating CW.

CW R MC DELAY - Delay once the right Microswitch is activated before the RPB Cylinder activates, while rotating CW.

## SHUTTLE INITIALIZE TIMERS

EXTEND DELAY - Delay before the Rack Cylinder extends.

RPB ON DELAY - Delay before the RPB Cylinder activates.

EXTEND DURATION - How long the Rack Cylinder is given to extend to hit the left Microswitch before an alarm is tripped. If the Microswitch is bypassed, it is utilized as an actual duration timer before the RPB Cylinder is activated

Illinois Precision Corporation Phone 812-735-2401		12005 East Davis Lane <b>IPC</b>		Bicknell, Indiana 47512-0216 Fax 812-735-4218	
Screen Name: MANUAL Security Level: 4		02/25/11 21:16:48 Go to Screen Number : 12		TEMP MONITOR	
MAIN MENU		<b>MANUAL</b> RACK EXTEND RACK RETRACT RACK PULLBACK CLAMP OUTPUT KNOCKOUT OUTPUT BARREL SOL. HI PRESSURE SOL. TRIMMER SOL. SCREW SOL.		MANUAL TABLE TIMERS MT EXTEND DELAY .15 .15 MT RETRACT DELAY .15 .15 MT EXTEND DURATION .08 .08 MT RETRACT DURATION 1.25 1.25	
TABLE SELECT				MACHINE TIMERS	
RECIPE MANAGER				MACHINE MONITOR	
SETUP SELECT				PAGE UP	
TABLE TIMERS				PAGE DOWN	
MANUAL FUNCTIONS		STANDBY RUN 10.00 ALARMS SCREW POSITION 0 PURGE 20.00 CLAMP DURATION 10.00 RUN CONTINUOUS 0 LOAD/UNLOAD TIME .00 0 BACK PRESSURE		PROD. CNT 324 410 200 CLEAR 391 420 200 15 370 430 200	
CAPTURING SCREEN		POS. 01 POS. 02 POS. 03 POS. 04 POS. 05 POS. 06 SETTINGS SETTINGS SETTINGS SETTINGS SETTINGS SETTINGS		H EN SP 2 PAGE RETURN SCREEN CAPTURE	

## MANUAL TIMERS

MT EXTEND DELAY - Delay before the Rack Cylinder extends.

MT RETRACT DELAY - Delay before the Rack Cylinder retracts.

MT EXTEND DURATION - How long the Rack Cylinder is given to extend, no Microswitch.

MT RETRACT DURATION - How long the Rack Cylinder is given to retract, no Microswitch.

## ALL MACHINE TIMERS

MAIN MENU	Illinois Precision Corporation Phone 812-735-2401		12005 East Davis / Lane		Bicknell, Indiana 47512-0216 Fax 812-735-4218		TEMP MONITOR
	MACHINE Screen Name: TIMERS Security Level: 4		IPC		06/09/11 15:38:09 Go to Screen Number : 34		
TABLE SELECT	FUNCTION TIMERS				INJECTION TIMERS		MACHINE TIMERS
	HOLD CLEAR TIME .20 .20 KNOCKOUT DELAY 1.50 1.50 KNOCKOUT DURATION 3.00 3.00 KO COMP TBL DELAY .50 .50 TRIMMER DELAY 1.00 1.00 TRIMMER DURATION .10 .10 CLAMP DELAY .20 .20 CLAMP DURATION 10.00 10.00 CLAMP COMP TBL DELAY 1.00 1.00 BIT PATCH DELAY .15 .00 SHUTTLE ENABLE ONE .05 .05 LOAD/UNLOAD TIME 15.00 15.00				INJECT INITIALIZE .10 .00 INJECT DELAY .50 .50 HI PRESSURE DELAY .00 .00 SCREW DELAY .50 .50 SCREW OVERTIME 25.00 25.00		
RECIPE MANAGER					TEMPERATURE WATCHDOG		MACHINE MONITOR
					WATCHDOG MINUTE TIMER 60.00 60.00		
SETUP SELECT					ALARM VECTOR BYPASS		PAGE UP
					120.00 120.00		
TABLE TIMERS					MODE CHANGE DELAY		PAGE DOWN
					6.00 6.00		
MANUAL FUNCTIONS	STANDBY ALARMS SCREW POSITION 46 RUN 10.00 CLAMP DURATION 10.00 PURGE 15.00 LOAD/UNLOAD TIME 15.00 STANDBY 20 BACK PRESSURE CONTINUOUS				PROD. CNT 239 > 420 90 CLEAR 285 > 410 90 H EN 1 278 > 400 90 SP 2		PAGE RETURN
CAPTURING SCREEN							SCREEN CAPTURE
	POS. 01 SETTINGS POS. 02 SETTINGS POS. 03 SETTINGS POS. 04 SETTINGS POS. 05 SETTINGS POS. 06 SETTINGS						

### FUNCTION TIMERS

**KNOCKOUT DELAY** – Delay before the Knockout Cylinders will activate once in position.

**KNOCKOUT DURATION** – How long the Knockout Cylinders are given to activate the Knockout Limit Switch before an alarm is tripped. If the Knockout Limit Switch is bypassed, it is utilized as an actual duration timer for the Knockout Cylinders.

**KO COMP TBL DELAY** – How long after activating the Knockout Limit Switch or timing out the Duration timer before the table is allowed to move, used to allow the Knockouts to be fully retracted before the table rotates.

**TRIMMER DELAY** – Delay before the Trimmer Cylinder will activate once in position.

**TRIMMER DURATION** – How long the Trimmer Cylinder will stay activated.

**CLAMP DELAY** – Delay before the Clamp Cylinder will activate once in position.

**CLAMP DURATION** – How long the Clamp Cylinder will stay activated. Also found on the All Molds mini screen.

**CLAMP COMP TBL DELAY** - How long after deactivating the Clamp Cylinder before the table is allowed to move, used to allow the Clamp Cylinder to be fully retracted before the table rotates. If the Clamp is not enabled this timer is used for a delay after the Injection Cycle before the table rotates.

**LOAD/UNLOAD TIME** – The Load/Unload time designates how long an operator is allowed to be within the light curtain during the load/unload process without tripping an alarm and having to reset the safeties before the cycle can begin again. The Unload/Load position is at the 6 o'clock table position. This time is only beneficial in Continuous mode. Pressing Cycle Start while the safeties are clear will cancel this time and allow the table to continue rotating back to the injection position. Also found on the All Molds mini screen.

## **INJECTION TIMERS**

**INJECT DELAY** – Delay before the Injection Cycle will activate once in position. This timer should activate after the Clamp Duration activates unless the clamp is not enabled.

**HI PRESSURE DELAY** – Delay before the Pump is spooled to High Pressure during an Injection cycle, should be activated before the Injection Cycle begins.

**SCREW DELAY** – Delay before the Screw Motor will Activate after the Injection Cycle ends.

**SCREW OVERTIME** – How long the screw is given to reach Shotsize before an alarm is tripped.

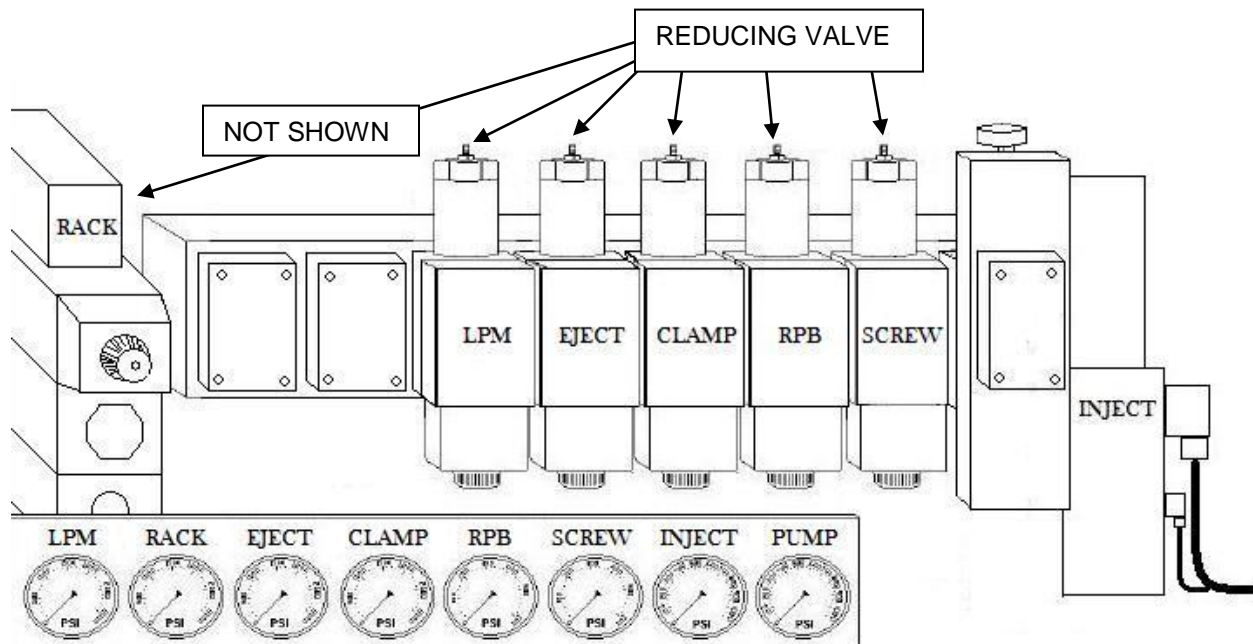




## Section 4 – MACHINE SET-UP

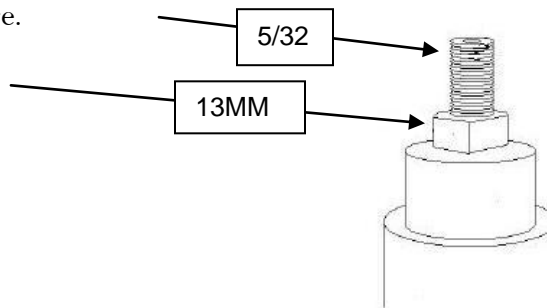
## HOW TO ADJUST/SET PRESSURES

Open the right side panel on the base of the machine to gain access to the necessary Hydraulic Controls.



To adjust machine pressures:

1. On the reducing valve for the solenoid, loosen the jam nut and adjust the stud to the desired pressure.
2. Tighten jam nut.



**NOTE:** Clamp & Screw reducing valves must be adjusted while the system is in High Pressure and that specific solenoid is activated. This can be accomplished by using Manual Mode or by manual spooling the solenoids.

The snubber valves on the back of each gauge should only be opened when making adjustments or troubleshooting. This will help extend the life of the gauges.

## FACTORY SETTINGS

### **FACTORY PRESSURE SETTINGS:**

<u>PUMP LOW PRESSURE</u>	<u>600 PSI</u>
<u>PUMP HIGH PRESSURE</u>	<u>1800 PSI</u>
<u>SCREW</u>	<u>1500 PSI</u>
<u>RPB (RACK PULL BACK)</u>	<u>100 PSI</u>
<u>CLAMP</u>	<u>600 PSI</u>
<u>EJECTORS (KNOCKOUTS)</u>	<u>150 PSI</u>
<u>RACK</u>	<u>150 PSI</u>
<u>LPM (BARREL)</u>	<u>250 PSI</u>

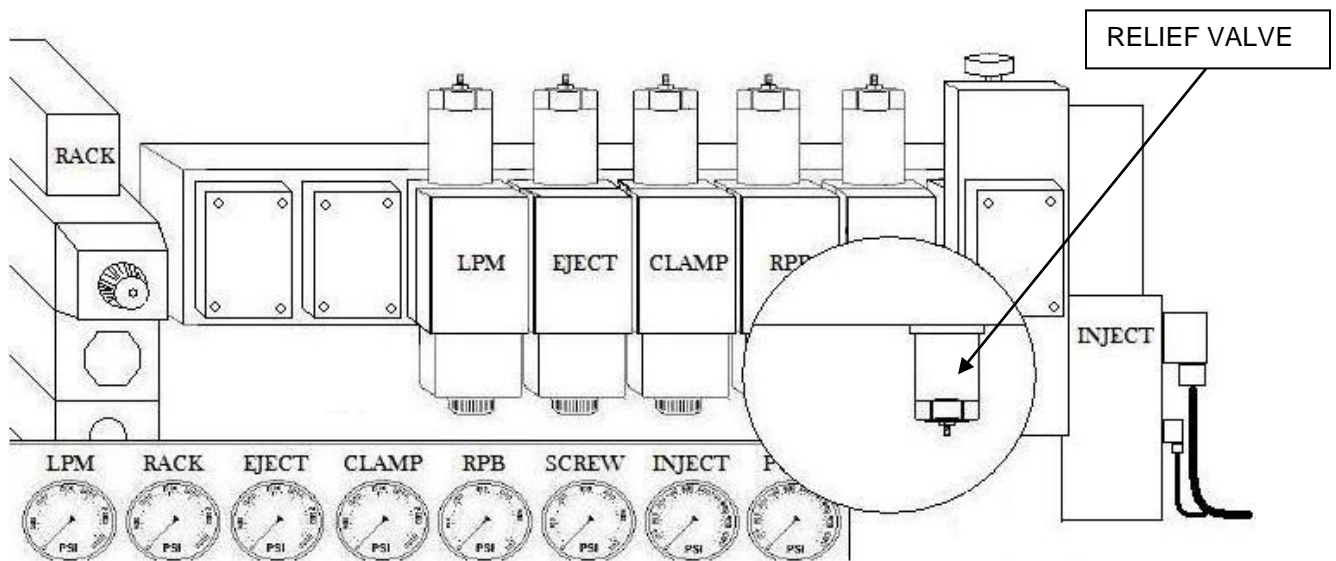
**CAUTION: ANY DRASTIC DEVIATIONS FROM THESE SETTINGS MAY CAUSE MACHINE MALFUNCTIONS, COMPONENT/MOLD DAMAGE, OR SEVERE BODILY HARM AND/OR DEATH.**

## HOW TO ADJUST THE MAIN RELIEF VALVE

There is one relief valve on this machine. It is utilized for directing pressure spikes to the tank. If this valve is adjusted wrong or are not working correctly it will cause a loss of pump pressure and elevated oil temperatures.

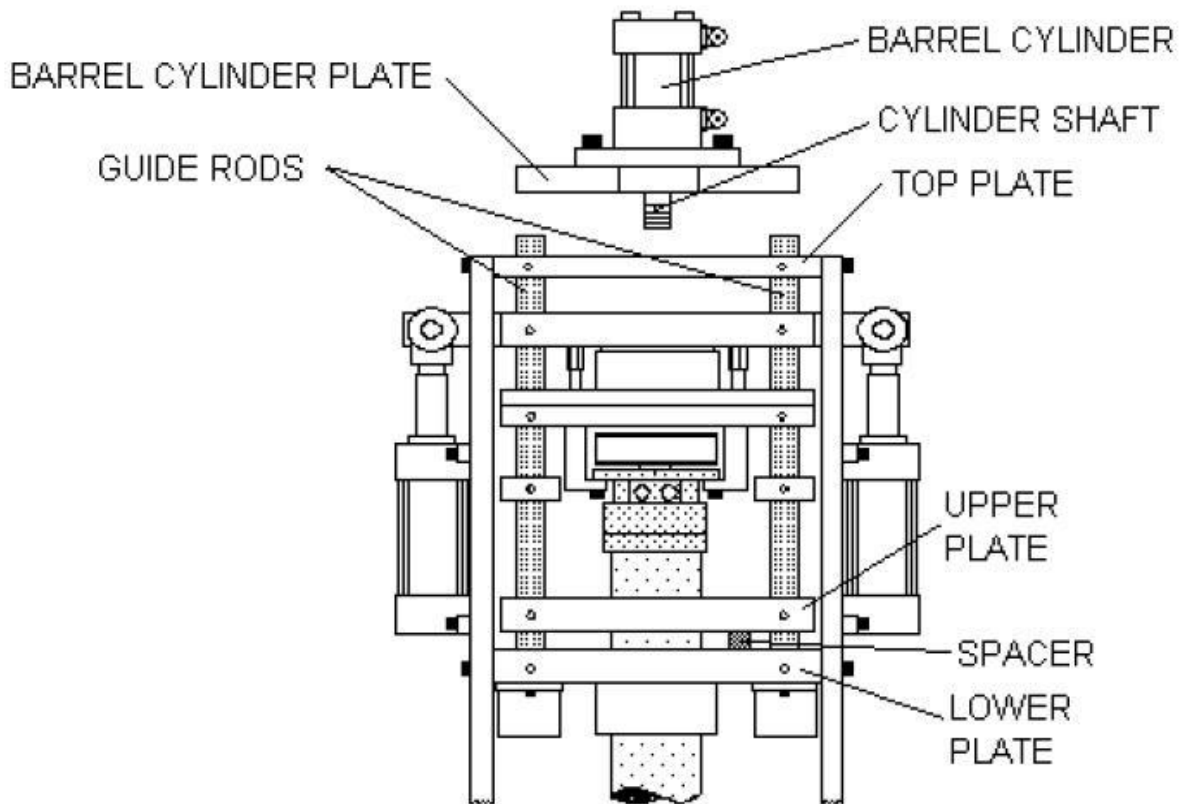
Open the right side panel on the base of the machine to gain access to the necessary Hydraulic Controls. The main pressure relief valve is located on the bottom of the hydraulic manifold towards the right end of the manifold closest to the injection valve.

- 1 Loosen the jam nut and turn the stud all the way clockwise (highest pressure).
- 2 Place pump in high pressure.
- 3 Check the pump high pressure setting.
- 4 Adjust the high pressure setting if needed.
- 5 Adjust stud counter-clockwise until the pump gauge starts to drop.
- 6 Turn stud one turn clockwise and tighten jam nut.



## HOW TO REMOVE THE BARREL CYLINDER (OPTIONAL)

1. Remove the two  $5/16$  screws that attach the barrel cylinder plate to the end of the guide rods.
2. Completely loosen the cylinder shaft from the top plate with a  $13/16$  open end wrench.
3. Remove the barrel cylinder from the top plate.

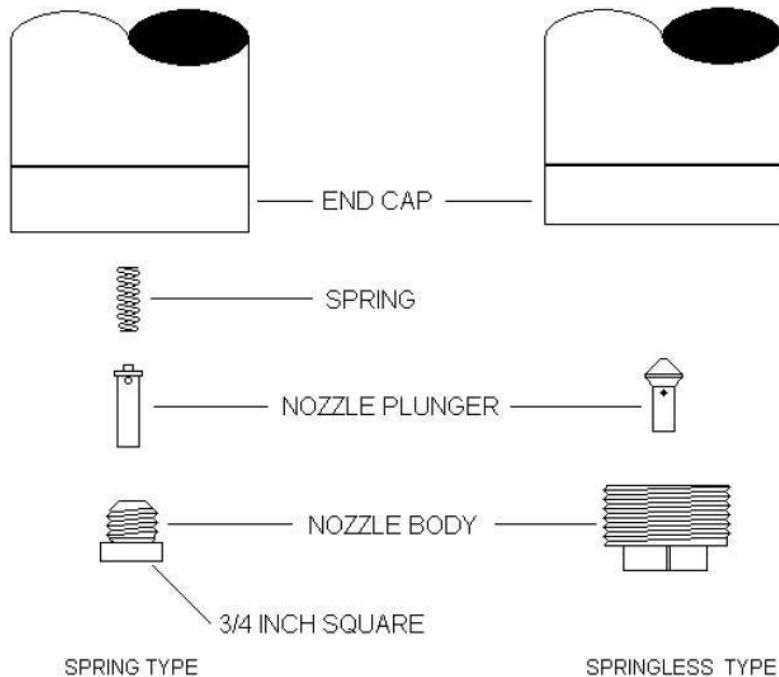


## CLEANING THE NOZZLE - THERMOPLASTICS ONLY

After prolonged use, the nozzle may develop a leak of drool, indication that cleaning is necessary.

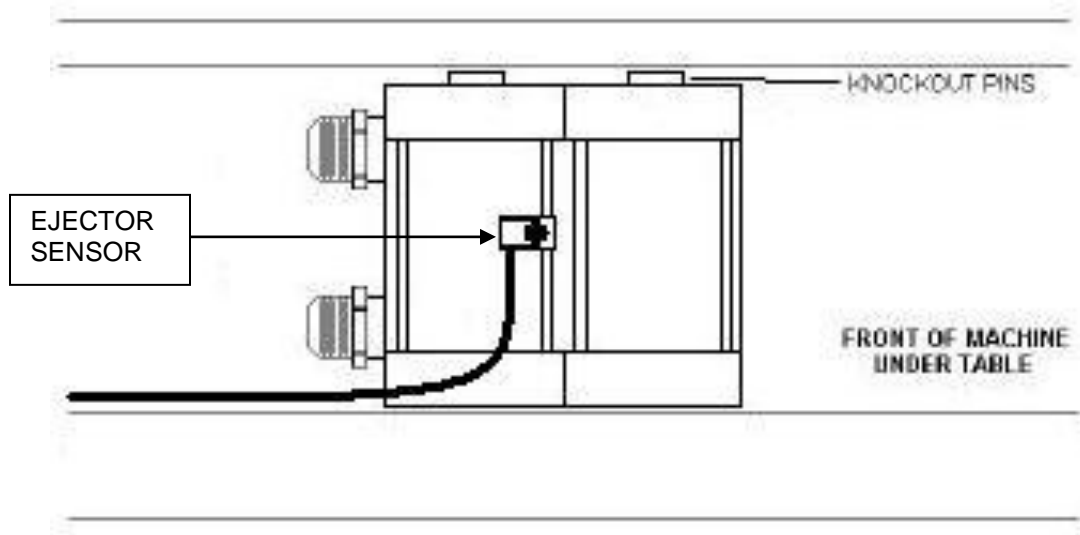
**CAUTION:** All necessary safety precautions should be in effect before proceeding; gloves and safety glasses. During the following procedure it is possible for hot material to spray out.

1. It is first necessary to bring system heat almost up to molding temperature.
2. Unscrew the nozzle assembly (body and plunger) from the end cap.
3. If spring type, remove the nozzle die spring from up inside the end cap.
4. Clean all material from nozzle, separating the nozzle plunger and nozzle body. Clean parts thoroughly with wire brush or emery cloth. Be sure the nozzle plunger will slide freely up and down in the nozzle body.
5. If spring type clean nozzle die spring. Or replace spring, if weak.
6. Apply anti-seize to thread of nozzle body.
7. If spring type, place spring on nozzle assembly and then replace in end cap.



## HOW TO ADJUST THE EJECTOR CYLINDER SENSOR

1. Loosen the ejector sensor mount screw.
2. With ejector pins fully retracted, move the sensor to its lowest position.
3. Move the sensor up while manually activating the ejectors between each adjustment. This can be done by using Manual Mode or by manually spooling the solenoid.
4. Tighten down the sensor once an adequate position is reached.



NOTE: If more travel is needed than the sensor allows either an adjustment must be made to the ejector plate in the mold, or the sensor must be bypassed and the activation duration of the ejectors must be properly adjusted.






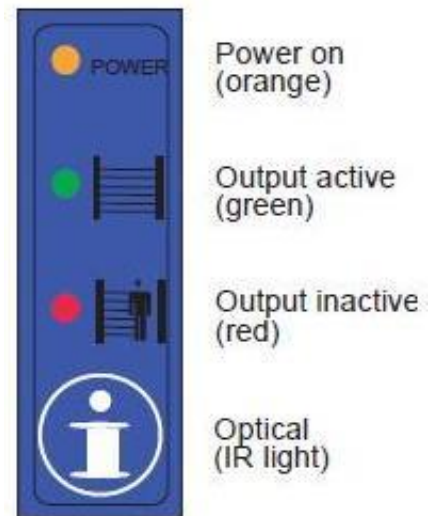
## LIGHT CURTAIN

**CAUTION: BECAUSE THE LIGHT CURTAIN IS A SAFETY DEVICE IT MUST BE WORKING CORRECTLY IN ORDER FOR THE MACHINE TO RUN. THE LIGHT CURTAIN SHOULD NEVER BE DISABLED, BECAUSE IT COULD CAUSE BODILY INJURY. REFER TO THE LIGHT CURTAIN MANUAL FOR MORE INFORMATION.**

### HOW TO LINE UP LIGHT CURTAIN

Both the transmitter and the receiver are equipped with a laser pointer for ease of adjustment.

1. Loosen all brackets associated with the light curtain.
2. Get both the transmitter and the receiver in line by line of sight.
3. Select the laser button  on both the transmitter and receiver to activate the laser pointer.
4. Align the Laser to the corresponding alignment pad. 
5. Verify alignment and slowly retighten associated bracketing in a crisscross pattern paying close attention to the movement of the laser.
6. Once the alignment is finished verify that the Light Curtain LED output activates/deactivates properly.
7. Select the laser button  on both the transmitter and receiver to deactivate the laser pointer.

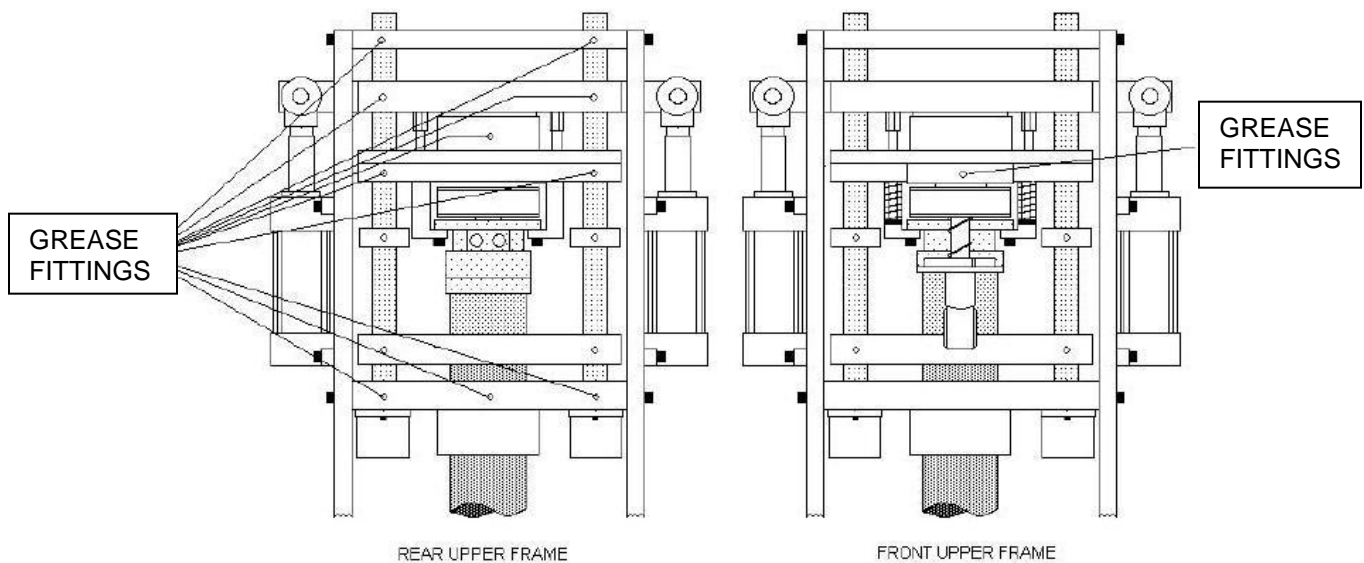


## LUBRICATION

**NOTE:** Machine Lubrication should be performed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.

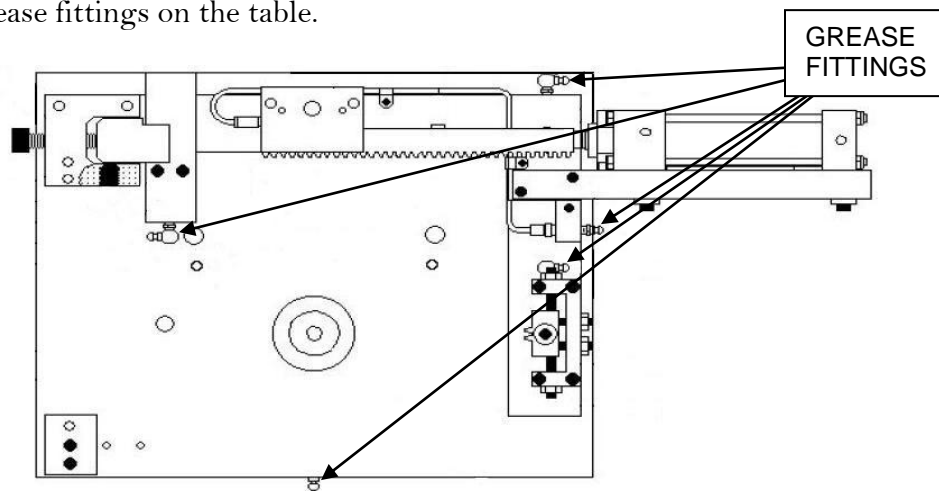
### GREASING THE UPPER FRAME

There are 11 grease fittings on the upper frame. Ten (10) are found from the back of machine and one (1) from the front.



### GREASING THE TABLE

There are 5 grease fittings on the table.



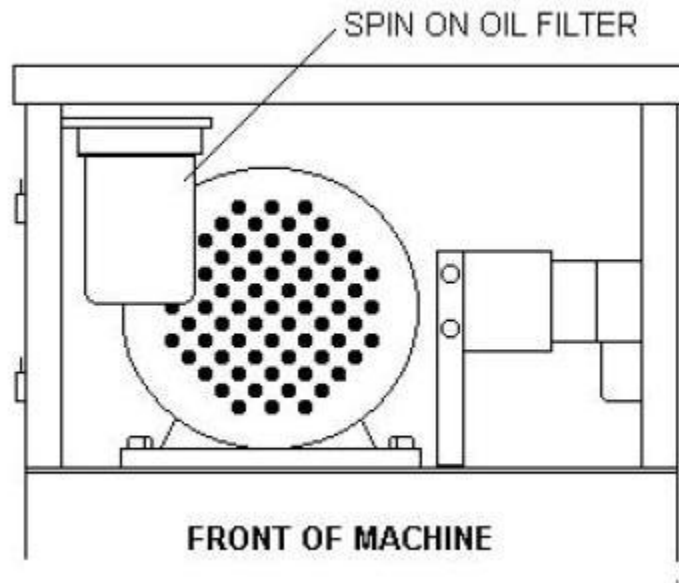
## HYDRAULIC OIL

**NOTE: Machine oil/oil filters should be changed regularly at scheduled intervals, as set forth by individual companies' preventive maintenance guidelines.**

The hydraulic oil should be tested every year for one shift operations. Based on the results of testing the oil should be changed.

## OIL FILTER

The spin-off oil filter is located on the left side, as seen from front of the hydraulic power unit. Replace it every 640 hours. To remove, with pump off, just turn counter-clockwise as viewed from bottom of filter.

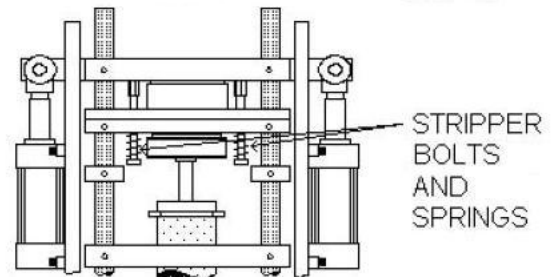
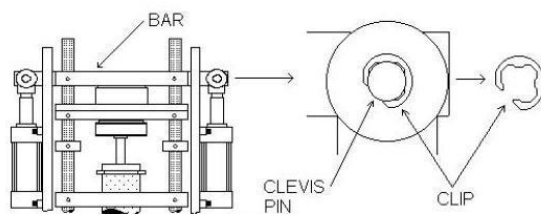
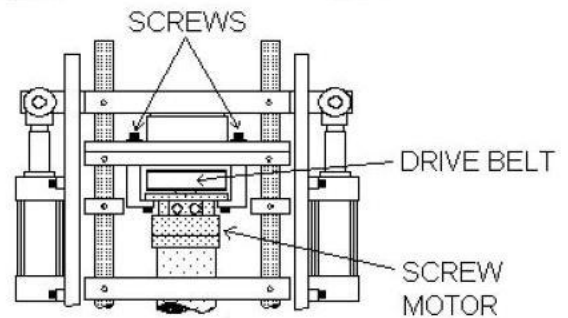
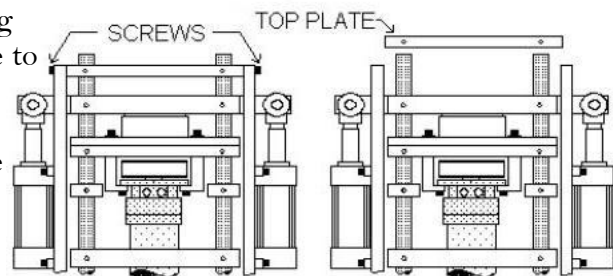
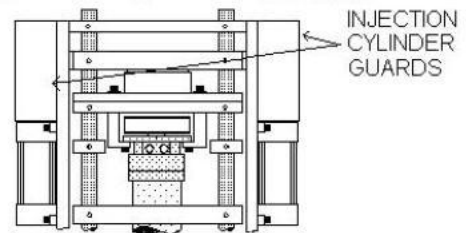


## SCREW OR BARREL REMOVAL

The following shows the components that must be disassembled in order to remove the screw. If possible, purge through a purging compound or polypropylene material first.

### PRELIMINARY PROCEDURE

1. Remove the shot size sensor.
2. Remove the barrel cylinder. (If installed)
3. Remove the injection cylinder guards.
4. Remove the top plate by removing the 4 screws holding the top plate to the upper frame.
5. Holding the screw motor, remove the 2 screws holding the motor to the motor plate.
4. Slip off the drive belt and place motor on floor or on a table.
5. Remove the 2 stripper bolts and springs.
6. Remove the 2 clips from the rear of clevis pins.
7. Remove the 2 clevis pins.



8. Remove the bar.

**NOTE:** The barrel must be hot enough to melt the molding material.

**CAUTION:** All necessary safety precautions should be in effect before proceeding; gloves and safety glasses. During the next steps it is possible for hot material to spray out.

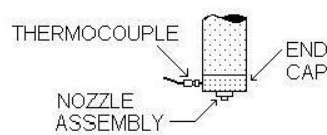
If the molding material was successfully purged, continue with **SCREW REMOVAL PROCEDURE**.

If molding material is burnt follow **BARREL AND SCREW REMOVAL PROCEDURE**.

For removing barrel continue with **BARREL AND SCREW REMOVAL PROCEDURE**.

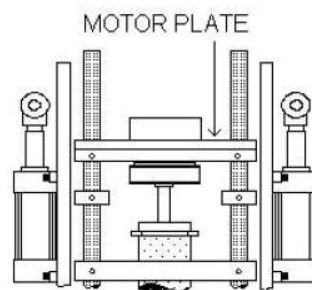
### **SCREW REMOVAL PROCEDURE**

1. Remove the nozzle assembly and spring.
2. Unplug the bottom heater band and remove the bottom thermocouple.
2. Remove the end cap.
3. Pull the motor plate and screw up and out together. If the screw hangs up, push the assembly back down and allow it to heat up more.



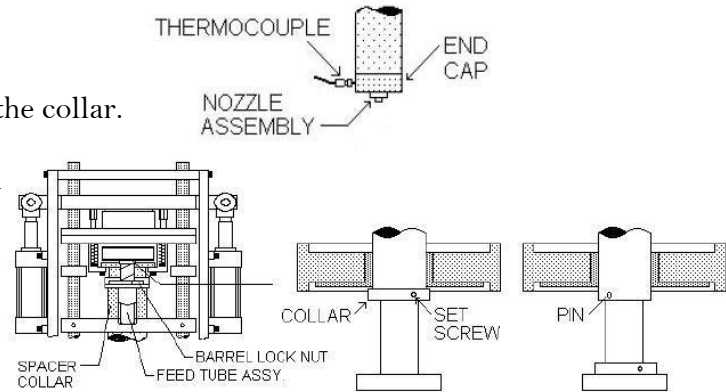
If this doesn't work you may have to continue with the **BARREL AND SCREW REMOVAL PROCEDURE**.

4. When you are ready to reassemble you need to apply anti-seize compound on the material check valve ring retainer, the six screws that hold the end cap on, and the thermocouples. (Any thread component that will be heated up.)
6. To reassemble just reverse the order.



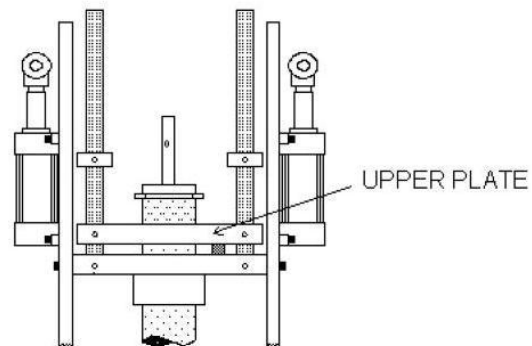
## BARREL AND SCREW REMOVAL PROCEDURE

1. Turn off heat.
2. Remove the nozzle assembly and spring.
2. Unplug the bottom heater band and remove the bottom thermocouple.
3. Remove the end cap.
4. Loosen the set screw on the collar.



5. Slide the collar down and remove the pin from under the former collar position.
8. Lift off the motor plate assembly.

8. Allow the barrel to cool down.
9. Remove the thermocouples and the heater bands.
10. Clean off the surface of the barrel.



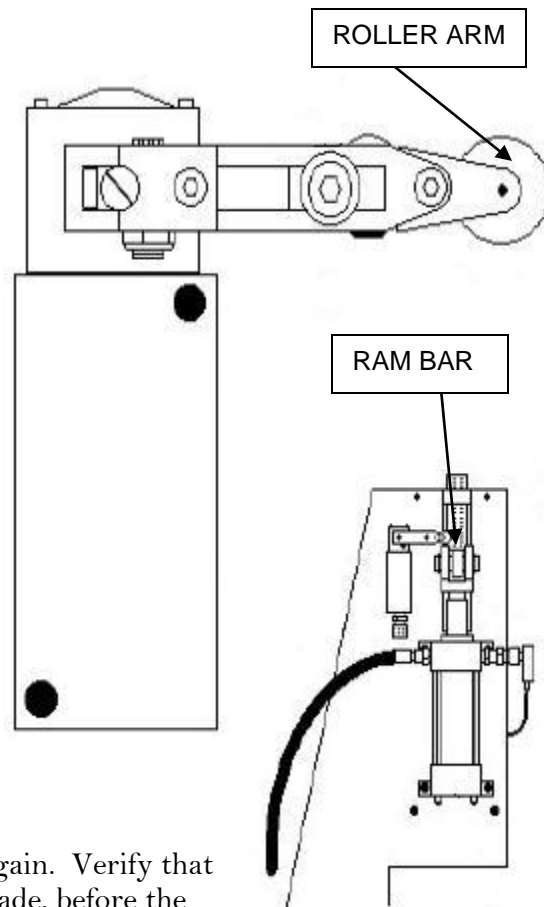
10. Remove barrel by pulling up on the upper plate with the barrel still attached.
12. Secure the barrel in a vise.
13. Apply heat.
14. Push out screw from lower end of barrel.
15. When you are ready to reassemble you need to apply anti-seize compound on the material check valve ring retainer, the six screws that hold the end cap on, and the thermocouples. (Any threaded component that will be heated up.)
16. To reassemble just reverse the order.

## CLEANING OF SCREW AND BARREL

Clean all parts with copper gauze, silicon jell and brass putty knife. Propane heat can also be used as long as care is used not to overheat screw; as this could warp it.

## HOW TO ADJUST THE SCREW OVER-TRAVEL MICRO SWITCH

1. Turn the heats on
2. Set 1<sup>st</sup> Shot Size to its maximum setting.
3. Remove the left injection cylinder guard.
4. Loosen the roller arm on the over-travel micro switch.
5. Turn on the motor.
6. Purge the machine, allowing the screw to retract to its highest shot size. If the screw retracts too high and a counter action pushes the barrel down purge the machine out and set the shot size lower.
7. Once the screw stops rotating at its highest peak, purge the machine slightly and then stop the motor.
8. Adjust the roller arm so that the roller is making contact with the ram bar.
9. Turn on the motor and purge the machine again. Verify that the pump is deactivated once the switch is made, before the machines highest capabilities.
10. Repeat the roller arm adjustment until the switch trips adequately.
11. Reinstall the left injection cylinder guard and reset the shot size back to the process parameters.

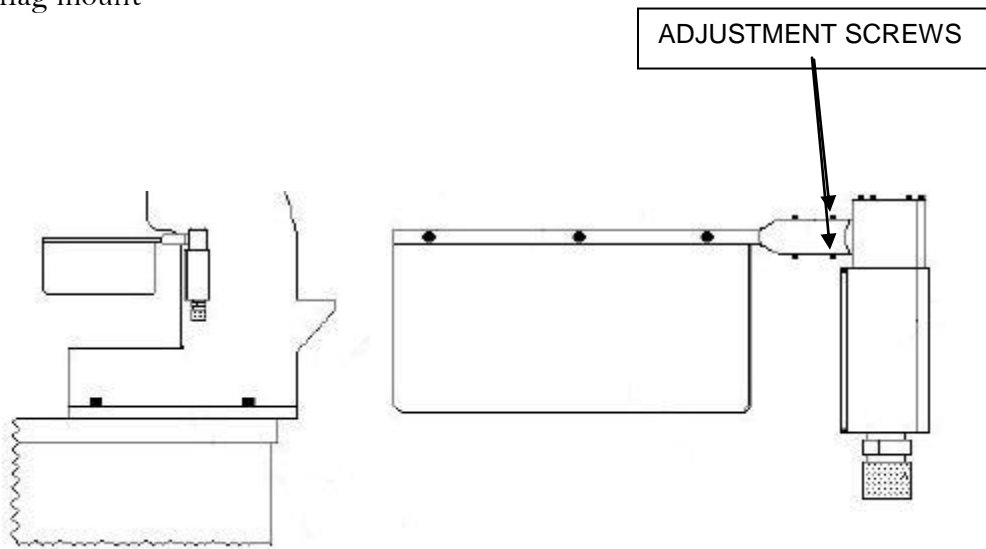


## HOW TO ADJUST THE FLAG

There are two adjustments relating to the flag position; Height of the flag from the table and the angle of the flag tilt.

### ANGLE

The angle of the yellow flag arm can be adjusted by loosening the two set screws on the back end of the flag mount.

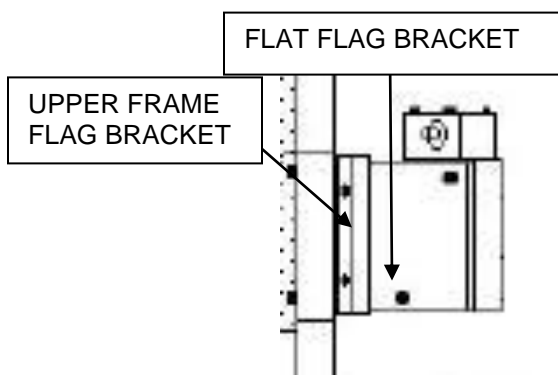


Set the angle of the flag so that it deactivates the pump adequately before the mold hits the barrel guard or upper frame.

### HEIGHT

The height of the flag is adjusted by the two 10/32 screws that mount the flat flag bracket to the upper frame flag bracket.

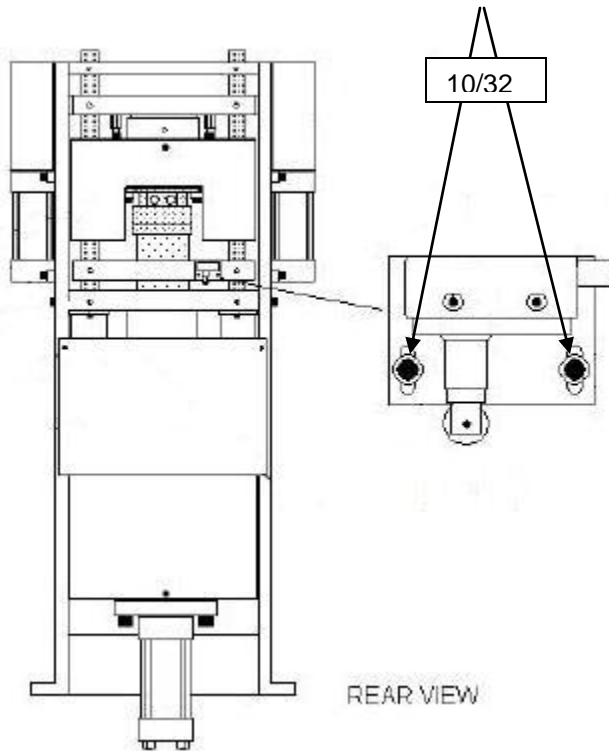
Adjust the height of the flag so that if the mold is held open slightly by debris or an insert it deactivates the pump before the mold hits the nozzle assembly.





## HOW TO ADJUST BARREL MICRO SWITCH

1. Verify that the barrel assembly is in the proper upper position and purge block is under barrel.
2. Turn off motor and electrical.
3. Loosen the two screws of barrel down micro switch bracket.



4. Position bracket so that micro switch roller is  $5/8$ " from the barrel housing plate.
5. Tighten then two screws of the barrel down micro switch bracket

NOTE: Don't adjust barrel down micro switch to where it is "on the ragged edge" of tripping, as this could cause problems when the screw is recovering.



Additional screens in your system. These screens or settings on these screens should only be adjusted by a qualified maintenance personal or at the factory.

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Illinois Precision Corporation  
Phone 812-725-2401

12005 East Davis / Lane

Bicknell, Indiana 47512-0216  
Fax 812-725-4218

MAIN MENU  
Screen Name: SYSTEM POWERUP  
Security Level: 4

02/25/11 21:30:24  
Go to Screen Number :257

TEMP MONITOR

TABLE SELECT  
RECIPE MANAGER  
SETUP SELECT  
TABLE TIMERS  
MANUAL FUNCTIONS

LANGUAGE SELECT  
0 = ENGLISH  
1 = KOREAN  
2 = RUSSIAN  
3 = CHINESE  
4 = SPANISH  
5 = GERMAN  
6 = FRENCH  
7 = ITALIAN  
8 = CZECK  
9 =  
  
PRODUCT RECIPE SELECTED  
ECHO2V-SETUP  
  
COPYRIGHT 2008  
Standard User Screens Version 1.A

CAPTURING SCREEN

SYSTEM POWERUP  
DISPLAY CONFIG  
SYSTEM HEADERS  
SYSTEM COMMAND  
MODULE INFO  
SYSTEM MESSAGES

Illinois Precision Corporation  
Phone 812-725-2401

12005 East Davis / Lane

Bicknell, Indiana 47512-0216  
Fax 812-725-4218

MAIN MENU  
Screen Name: SYSTEM HEADERS  
Security Level: 4

02/25/11 21:33:26  
Go to Screen Number :259

TEMP MONITOR

TABLE SELECT  
RECIPE MANAGER  
SETUP SELECT  
TABLE TIMERS  
MANUAL FUNCTIONS

SYSTEM FILE HEADERS  
  
SYSTEM HEADERS  
USER HEADERS  
  
USER SCREENS  
SYSTEM SCREENS  
RLD HEADER  
  
APU HEADER  
HOST HEADER  
DISPLAY Ver.  
  
U40 USER 24-Feb-11 13:06:38 IPC H2S 4 POSITION Compact  
U40 SYS 05-Oct-10 09:09:43 COMPACT SYSTEM V1.0  
U01 LGC 25 FEB 11 09:50:19  
  
U01 APU0 31 Mar 10 14:33:33 SA-60194-0-20-0206q 01  
U01 HST0 16 Apr 10 14:32:04 SA-60194-0-10-0208x 00  
COMPACT V3.00c FEB 07,2011

CAPTURING SCREEN

SYSTEM POWERUP  
DISPLAY CONFIG  
SYSTEM HEADERS  
SYSTEM COMMAND  
MODULE INFO  
SYSTEM MESSAGES

Illinois Precision Corporation  
Phone 812-725-2401

12005 East Davis / Lane

Bicknell, Indiana 47512-0216  
Fax 812-725-4218

MAIN MENU  
Screen Name: DISPLAY CONFIG  
Security Level: 402/25/11 21:30:36  
Go to Screen Number :258

TEMP MONITOR

TABLE SELECT  
RECIPE MANAGER  
SETUP SELECT  
TABLE TIMERS  
MANUAL FUNCTIONSDISPLAY CONFIGURATION  
FLASH RELOAD COUNT .30  
SCROLL RATE MODE 1 .20  
SCROLL RATE MODE 2 .20  
SCROLL RATE MODE 3 .20  
SCROLL DEAD TIME .40  
BLANK RELOAD COUNT .0  
BLANK TIMER  
CURSOR DISPLAY  
RESET DISPLAY  
SAVE DISPLAY CONFIG  
LOAD DISPLAY CONFIG  
INIT DISPLAY CONFIG  
LOAD SCROLL RATES  
SYS MESS AS NUMBERS  
ENABLE LIMIT DISPLAY  
ENABLE ID DISPLAY  
VECTOR SCREEN 1 17 0 09  
VECTOR SCREEN 2 0 0 10  
VECTOR SCREEN 3 0 0 11  
VECTOR SCREEN 4 0 0 12  
VECTOR SCREEN 5 0 0 13  
VECTOR SCREEN 6 0 0 14  
VECTOR SCREEN 7 0 0 15  
VECTOR SCREEN 8 0 0 16  
PRINTER SCREEN 1 0 0  
PRINTER SCREEN 2 0 0  
PRINTER SCREEN 3 0 0  
PRINTER SCREEN 4 0 0  
PRINTER SCREEN 5 0 0  
PRINTER SCREEN 6 0 0  
PRINTER SCREEN 7 0 0  
PRINTER SCREEN 8 0 0  
User set

CAPTURING SCREEN

SYSTEM POWERUP  
DISPLAY CONFIG  
SYSTEM HEADERS  
SYSTEM COMMAND  
MODULE INFO  
SYSTEM MESSAGES

Illinois Precision Corporation  
Phone 812-725-2401

12005 East Davis / Lane

Bicknell, Indiana 47512-0216  
Fax 812-725-4218

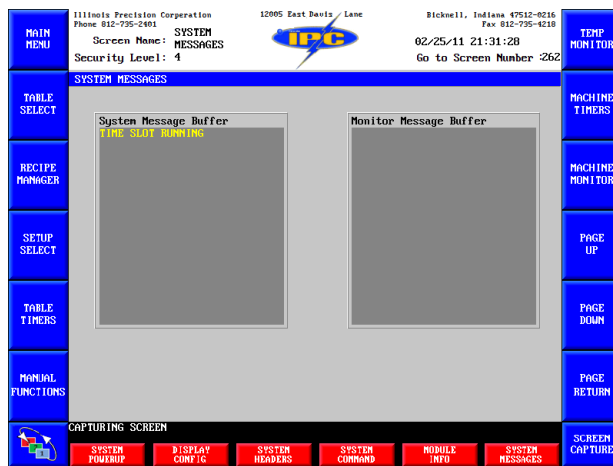
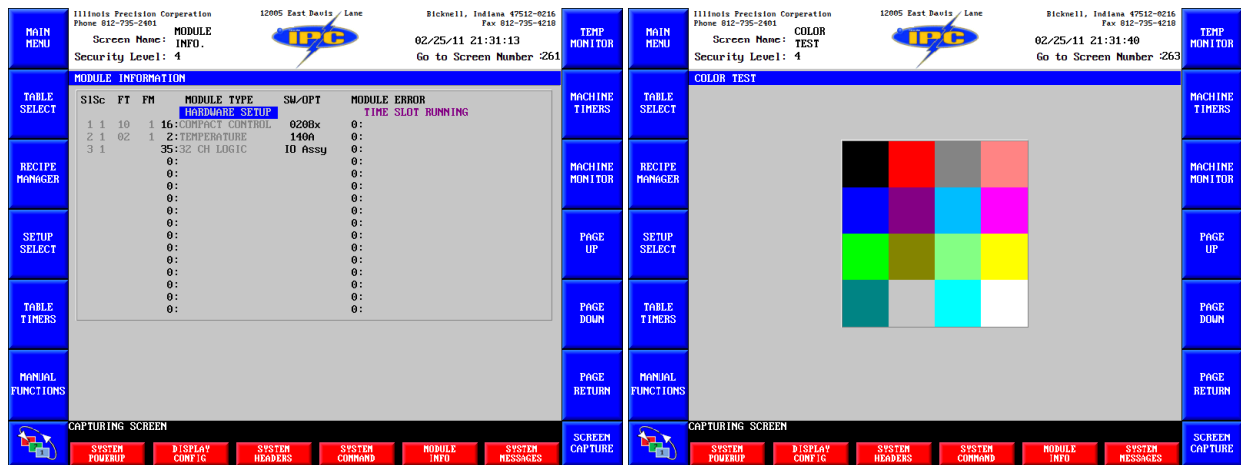
MAIN MENU  
Screen Name: SYSTEM COMMAND  
Security Level: 402/25/11 21:31:00  
Go to Screen Number :260

TEMP MONITOR

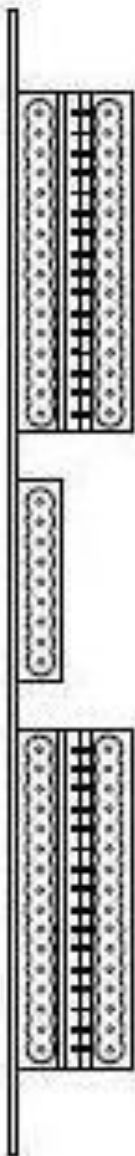
TABLE SELECT  
RECIPE MANAGER  
SETUP SELECT  
TABLE TIMERS  
MANUAL FUNCTIONSSYSTEM COMMANDS  
SAVE SETPOINT  
DISABLE OUTPUTS  
ENABLE OUTPUTS ON  
STOP TIMESLOT ON  
RESET SYSTEM  
SAVE HARDWARE SETUP  
Xfer RLD to System  
Update APU firmware  
Update HOST firmware  
YES NO  
TIME SLOT RUNNING  
Create Directories  
Copy All Files to USB  
Copy Apps Files to USB  
Copy Recipes to USB  
Copy Datafiles to USB  
Copy Software to USB  
Copy Recipe to 2nd  
Load Recipe from 2nd  
START FTP SERVER

CAPTURING SCREEN

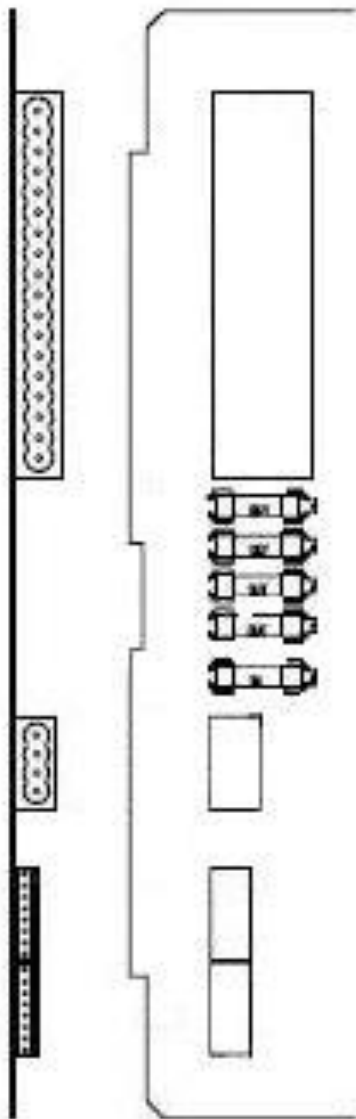
SYSTEM POWERUP  
DISPLAY CONFIG  
SYSTEM HEADERS  
SYSTEM COMMAND  
MODULE INFO  
SYSTEM MESSAGES



## Section 6 – MACO I/O DESIGNATION



<u>INPUT P14 (INSIDE)</u>		<u>OUTPUT P15 (OUTSIDE)</u>	
1.	MOTOR STOP/START PB		TOP HEAT
2.	HYDRAULIC MOTOR RUNNING		MIDDLE HEAT
3.	CYCLE START PB		BOTTOM HEAT
4.	CYCLE STOP PB		MOTOR ENABLE
5.	BARREL DOWN LIMIT		RPB SOL
6.	YELLOW FLAG		CLAMP SOL
7.	KNOCKOUT SENSOR		KNOCKOUT SOL
8.	RT RACK MICRO SENSOR		BARREL SOL
9.	LT RACK MICRO SENSOR		HIGH PRESSURE SOL
10.	BARREL UP OVER TRAVEL		TRIMMER SOL
11.	RESET PB		SCREW SOL
12.	LIGHT CURTAIN OK		RACK EXT SOL
13.	ALL SAFE		RACK RETRACT SOL
14.	ALL NOT SAFE		SERVO CARD ENABLE
15.	ESTOP #1		HYDRAULIC MOTOR RUN LT
16.	ESTOP #2		SAFETY RESET LOAD/UNLOAD
<u>VCC CONNECTIONS</u>			
1.	1580 +24VDC MACHINE POWER		
2.	0002 +24VDC PUMP ON		
3.	0002 +24VDC PUMP ON		
4.	0002 +24VDC PUMP ON		
5.	1580 +24VDC MACHINE POWER		
6.	NA		
7.	NA		
8.	NA		
9.	1581 -24VDC		
<u>INPUT P16 (INSIDE)</u>		<u>OUTPUT P17 (OUTSIDE)</u>	
1.	NA		RED LIGHT TOWER LT
2.	NA		YELLOW LIGHT TOWER LT
3.	NA		GREEN LIGHT TOWER LT
4.	NA		NA
5.	NA		NA
6.	NA		NA
7.	NA		NA
8.	NA		NA
9.	NA		NA
10.	NA		NA
11.	NA		NA
12.	NA		NA
13.	NA		NA
14.	NA		NA
15.	NA		NA
16.	NA		NA

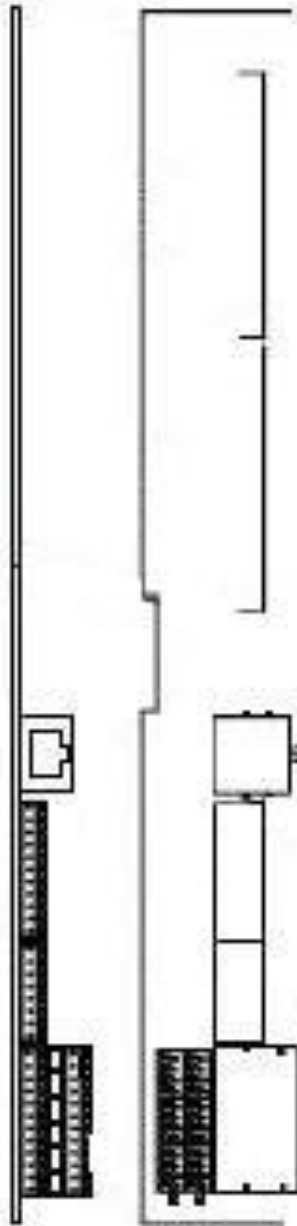


#### THERMOCOUPLES P14

- |     |           |             |
|-----|-----------|-------------|
| 1.  | - (RED)   | TOP HEAT    |
| 2.  | + (WHITE) | TOP HEAT    |
| 3.  | - (RED)   | MIDDLE HEAT |
| 4.  | + (WHITE) | MIDDLE HEAT |
| 5.  | - (RED)   | BOTTOM HEAT |
| 6.  | + (WHITE) | BOTTOM HEAT |
| 7.  | NA        |             |
| 8.  | NA        |             |
| 9.  | NA        |             |
| 10. | NA        |             |
| 11. | NA        |             |
| 12. | NA        |             |
| 13. | NA        |             |
| 14. | NA        |             |
| 15. | NA        |             |
| 16. | NA        |             |
| 17. | NA        |             |
| 18. | SHIELDS   |             |

#### CONTROLLER POWER P18

- |    |             |
|----|-------------|
| 1. | 5210 +24VDC |
| 2. | 1581 -24VDC |
| 3. | NA          |
| 4. | NA          |



#### ANALOG OUTPUTS P16

1. 7081 BLACK (ANAOUT1+) PRESSURE
2. 1581 -24VDC (ANAOUT1-)
3. 7082 RED (ANAOUT2+) SPEED
4. 1581 -24VDC (ANAOUT2-)
5. NA
6. NA
7. NA
8. NA

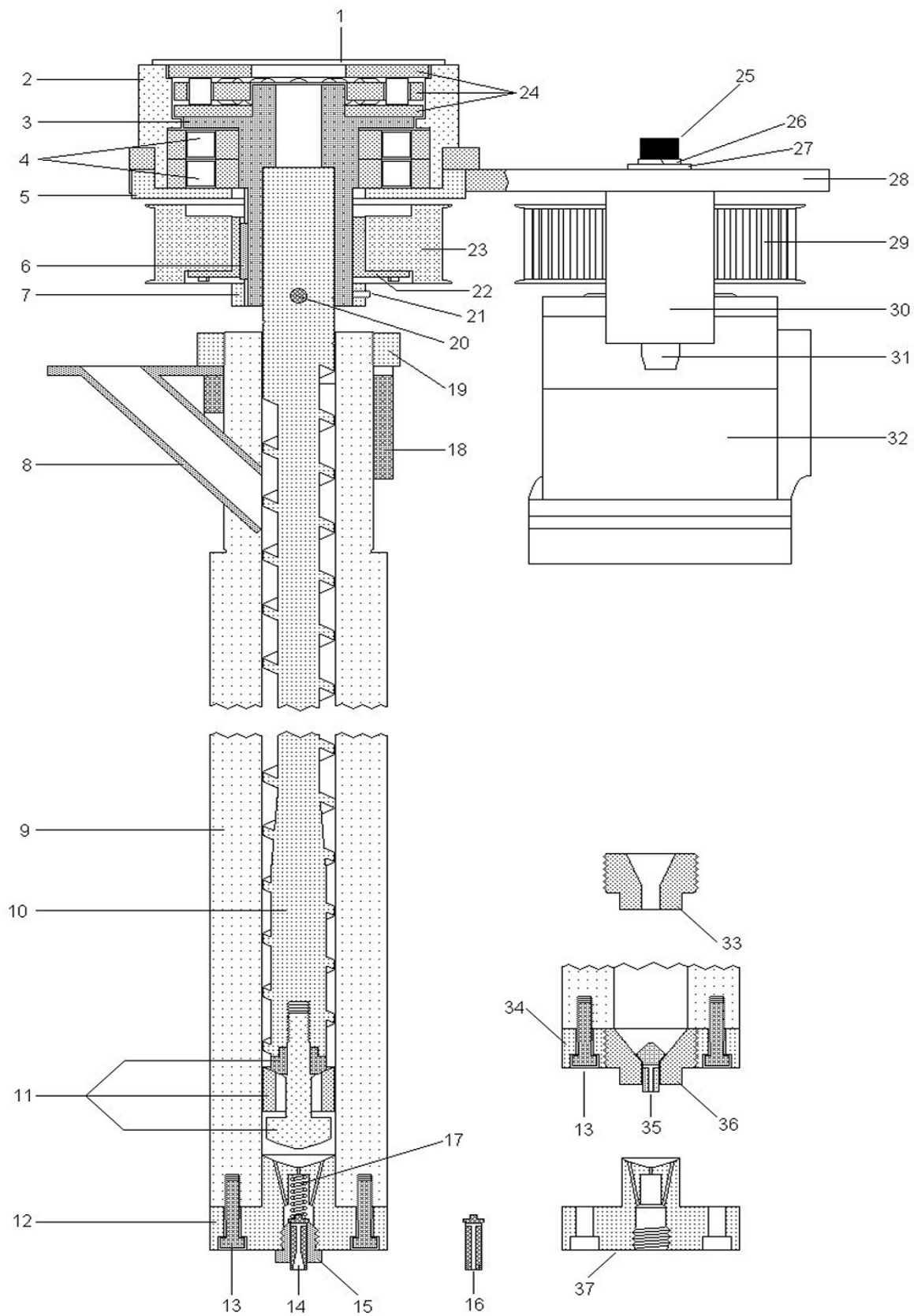
#### ANALOG INPUTS P17

1. NA
2. NA
3. NA
4. NA
5. 7210 BLACK (IN2+) LINEAR (SHOTSIZE)
6. 1581 -24VDC (IN2-)
7. 7220 RED (EX2+) LINEAR (SHOTSIZE)
8. 1581 -24VDC (EX2-)
9. NA
10. NA
11. NA
12. NA





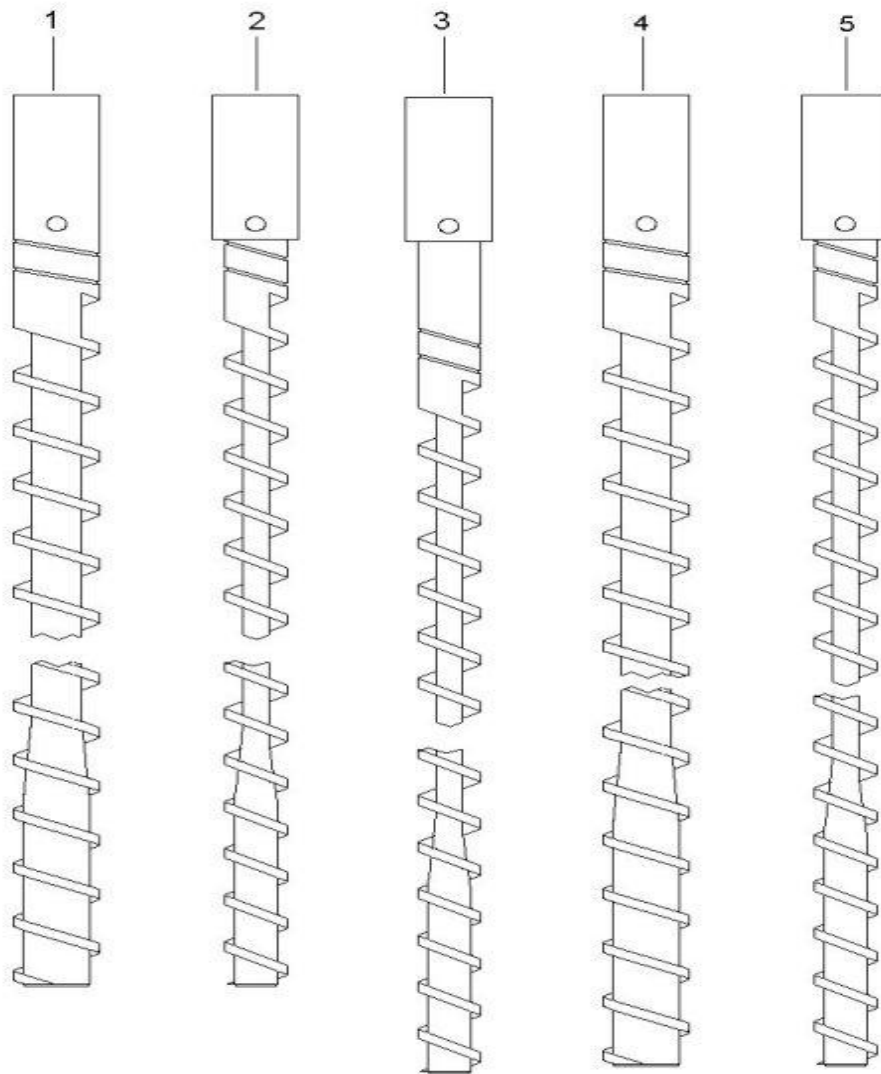
## Section 7 – ECHO SERIES PARTS



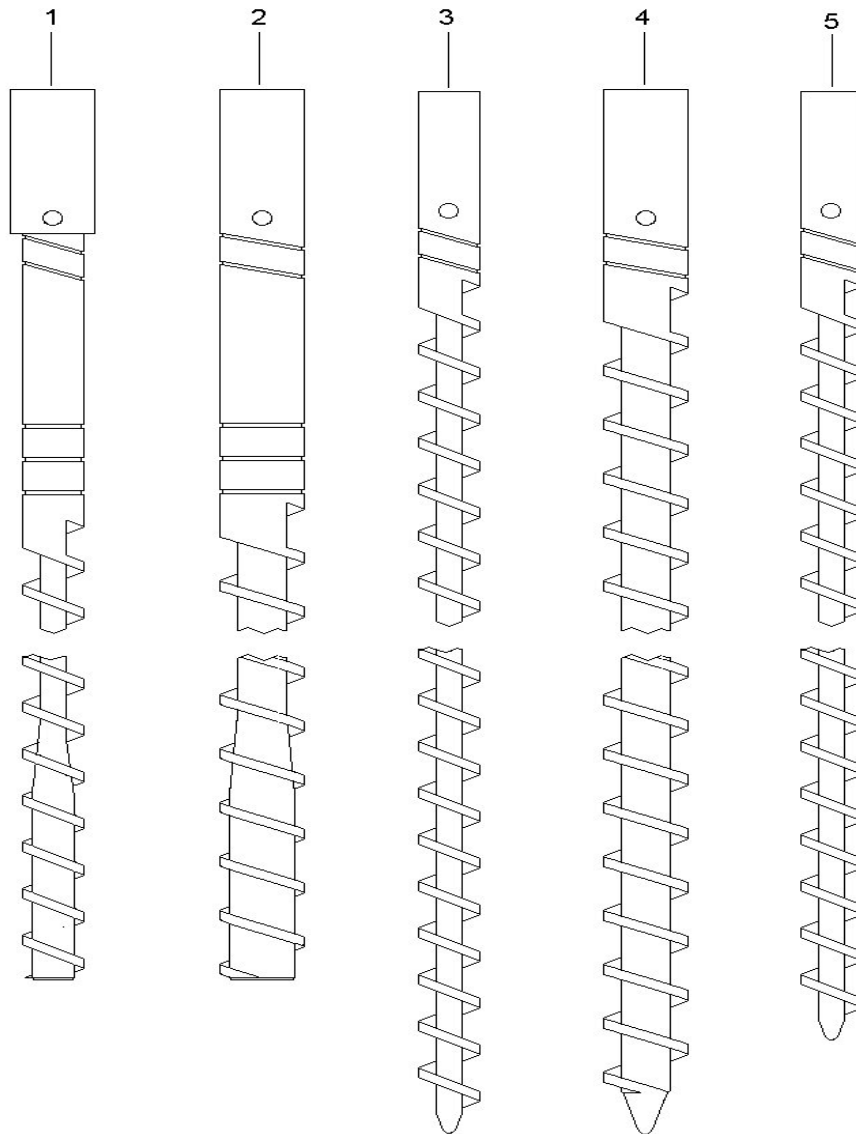
## BARREL, SCREW AND MOTOR ASSEMBLY

ITEM NO	DESCRIPTION	PART NO	QTY
1	Retainer, Bearing	M260.2	1
2	Housing, Bearing	M260.3	1
3	Coupler, Screw	M260.1	1
4	Bearing, Roller	M260.16	2
5	Cap, Bearing Housing	M263.0	1
6	Key, Drive	M260.7	1
7	Collar, Drive Pin	M260.8	1
8	Tube, Feed (std)	M204.0	1
8	Tube, Feed (wide)	M204.1	1
9	Barrel (30 mm)	I101.0	1
9	Barrel (22 mm)	I100.0	1
	Barrel (22mm liquid silicone)	I100.1	1
10	Screw, Injection		1
11	Assy, Material Check Valve (30mm)(3 parts)	I120.0	1
11	Assy, Material Check Valve (22mm)(3 parts)	I120.1	1
12	Cap, End (30 mm)	I104.0	1
13	Screw, 3/8 - 16 X 1 1/4 SHCS	B140.0	6
14	Plunger, Nozzle (large hole)	I117.2	1
15	Assembly, Nozzle (large or small with spring)	I117.0	1
16	Plunger, Nozzle (small hole)	I117.1	1
17	Spring, Nozzle	I129.0	1
18	Collar, Spacer	M204.2	1
19	Nut, Barrel	M204.3	1
20	Pin, Drive	M260.9	1
21	Screw, 10-32 X 3/16 Set	B176.2	1
22	Bushing, Screw Pulley	M260.17	1
	Bushing, Motor Pulley	M260.18	1
23	Pulley, Screw	M260.14	1
24	Bearing, Thrust	M260.15	1
25	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	2
26	Washer, 1/2 Split Lock	B158.0	2
27	Washer, 1/2	B157.0	2
28	Housing, Screw Drive	M260.4	1
29	Pulley, Motor	M260.13	1
30	Adapter, Mounting	M260.5	2
31	Screw, Modified 5/8-11 X 1.0 SHCS	M260.6	2
32	Motor, Hydraulic Screw	I115.0	1
33	Nut, Nozzle (22 mm springless)	I113.0	1

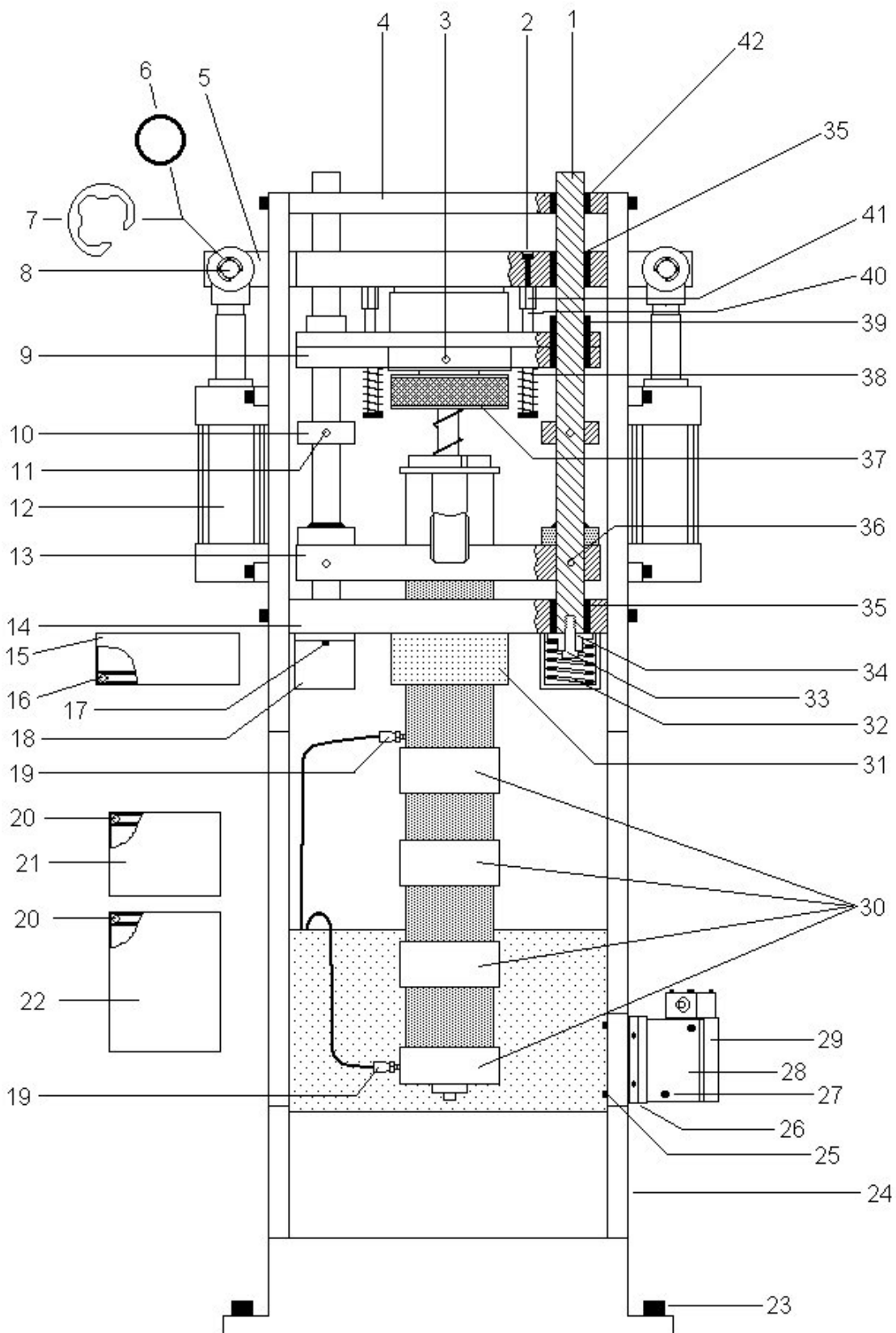
34	Cap, End (springless nozzle)	I105.0	1
35	Plunger, Nozzle (springless)	I119.0	1
36	Nut, Nozzle (30 mm springless)	I114.0	1
37	Cap, End (22 mm)	I103.0	1



ITEM NO	DESCRIPTION	LENGTH	PART NO	QTY
1	Screw, 30 mm (spring type nozzle)	21.65	I122.0	1
2	Screw, 22 mm (spring type nozzle)	21.65	I122.1	1
2	Screw, 22 mm (teflon)	21.65	I121.5	1
3	Screw, 22 mm (PVC)	23.50	I122.5	1
4	Screw, 30 mm (springless nozzle)	23.30	I122.2	1
5	Screw, 22 mm (springless nozzle)	23.30	I122.3	1



ITEM NO	DESCRIPTION	LENGTH	PART NO	QTY
1	Screw, 22 mm (thermoset liquid silicone)	22.33	I121.3	1
2	Screw, 30 mm (thermoset liquid silicone)	22.33	I121.2	1
3	Screw, 22 mm (thermoset)	25.56	I121.1	1
4	Screw, 30 mm (thermoset)	25.72	I121.0	1
5	Screw, 22 mm (thermoset for spring type nozzle)	23.23	I121.4	1





## FRAME

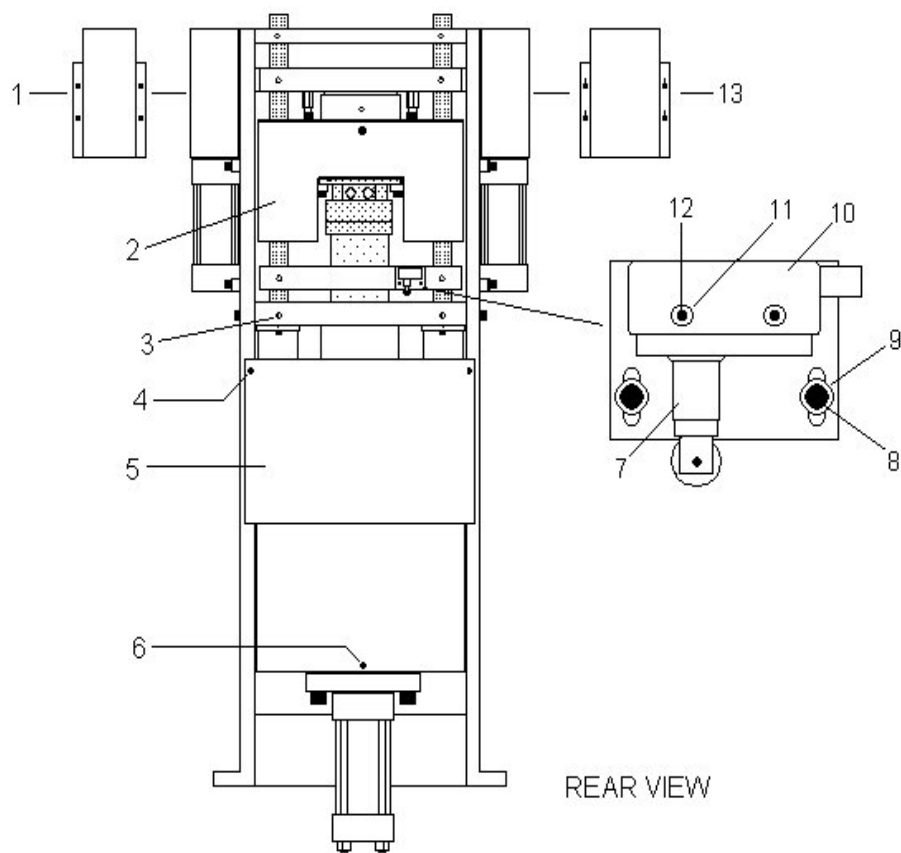
ITEM NO	DESCRIPTION	PART NO	QTY
1	Rod, Guide Return (with welded ring)	M306.2	2
2	Screw, 5/16 -18 X 1 1/2 SHCS	B143.1	2
3	Fitting, Grease	M145.0	1
4	Plate, Frame Top	M147.0	1
	Plate, Ext. Stroke Frame Top (1.5 in longer)	M147.1	1
	Plate, Heavy Duty Frame Top (R)	M147.2	1
5	Bar, Ram	M102.0	1
6	Ring, Spiral Lock (for I180.0)	M187.0	4
7	Clip, 3/4 inch Spring (for I108.1)	M104.5	2
8	Pin, Clevis (Groove width of .050)	I118.0	2
8	Pin, Clevis (Groove width of .070)	I108.1	2
9	Housing, Screw Drive	M260.4	1
10	Ring, Guide Rod	M306.1	2
11	Pin, 1/4 x 2" Dowel	B110.4	2
12	Cylinder, Injection		
13	Housing, Barrel Return	M262.0	1
14	Housing, Barrel	M260.3	1
15	Jacket, Large OD Water (5" x 2.625")	W101.0	1
16	Ring, Large "O" Ring (3-3/4" silicone)	W107.0	1
17	Screw, 5/16 - 18 X 1" SHCS	B147.0	4
18	Cup, Spring	M260.19	2
19	Thermocouple	E389.1	3
20	Ring, Small "O" Ring (3" silicone)	W106.0	4
21	Jacket, Small OD Short Water (4" x 2.75")	W100.0	1
22	Jacket, Small OD Tall Water (4" x 4.875")	W100.1	1
23	Screw, 1/2-13 X 2.0 SHCS	B128.0	4
24	Frame, Assy	M200.0	1
25	Screw, 10-32 X 1" SHCS	B136.0	2
26	Bar, Safety Flag Mounting Hex	M123.0	1
27	Screw, 10-32 X 1/2 SHCS	B135.0	2
28	Plate, Safety Flag Mounting	M172.0	1
29	Switch, Oil Tight Limit	E376.0	1
30	Bands, Heater		
31	Bushing, Barrel (requires machining)	M261.1	1
32	Spring, Return	M305.0	2
33	Screw, 1/2-13 X 1 3/4 SHCS	B127.0	2
34	Retainer, Spring	M260.20	2
35	Bushing, 1.5 inch Bronze (requires machining)	M129.0	4
36	Pin, .25 Dia. X 4 Retaining	M260.21	2
37	Belt, Drive	I102.0	1
38	Spring, 3/4 OD X 3/8 ID X 2.5 L	M197.2	2
39	Bushing, 2 inch Bronze (requires machining)	M130.0	2
40	Screw, 5/16-8 X 4 Socket Head Shoulder	B113.0	2
41	Nut, 5/16-18 X 1 1/2 Coupling	B103.1	2
42	Bushing, 3/4 inch Bronze (requires machining)	M131.1	2

### INJECTION CYLINDERS

ITEM NO	DESCRIPTION	PART NO	QTY
12	Cylinder, Vickers Injection	Use H104.0	2
12	Cylinder, Vickers Injection (extended stroke)	Use H104.1	2

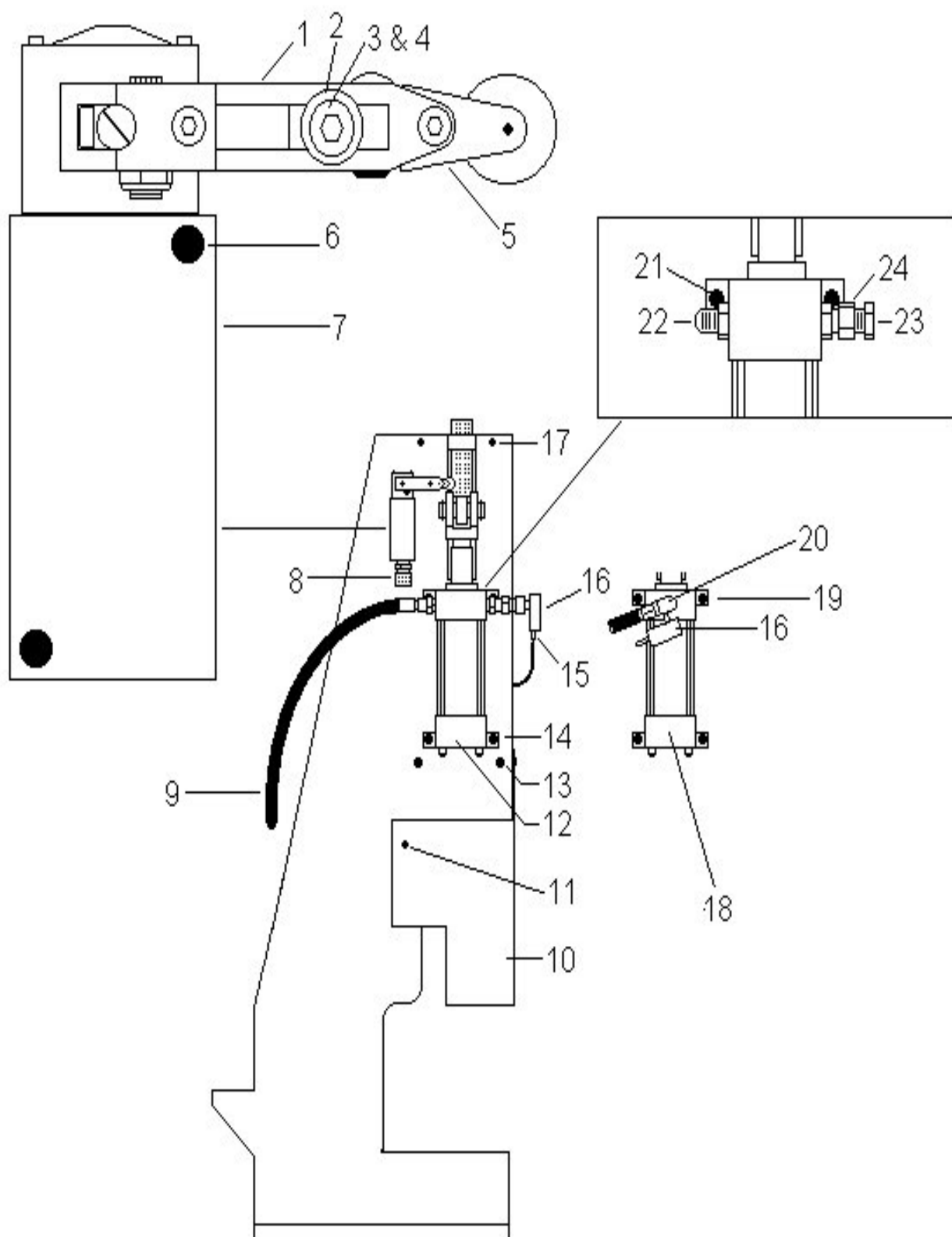
### HEATER BANDS

30	Bands, Top Zone Heater	600 Watt	E102.0	2
	Bands, Middle Zone Heater	600 Watt	E102.0	2
	Bands, Bottom Zone Heater	400 Watt	E101.0	1



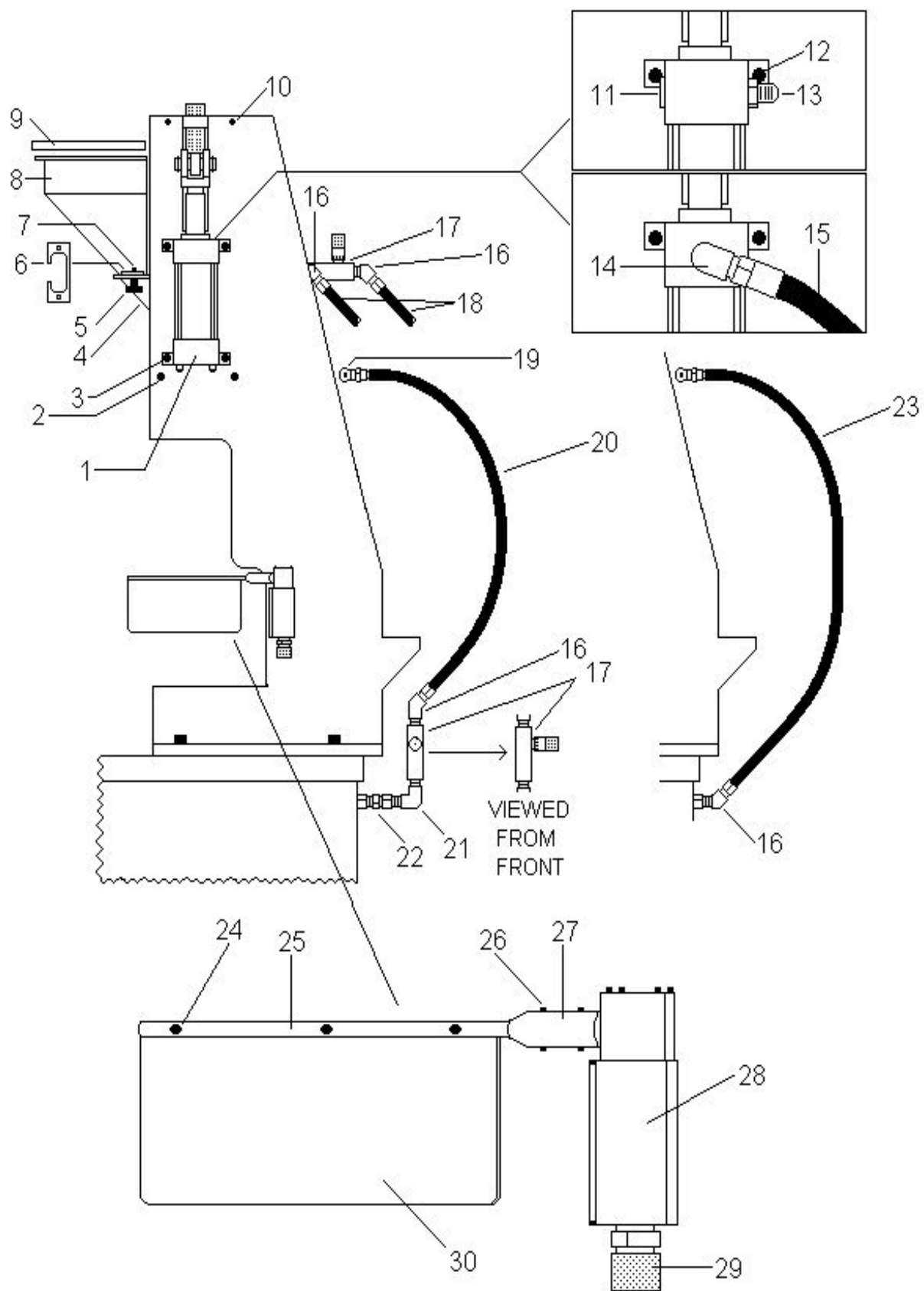
### REAR OF FRAME

ITEM NO	DESCRIPTION	PART NO	QTY
1	Guard, Right Injection Cylinder	M154.0	1
2	Guard, Screw Motor	M155.0	1
3	Fitting, Grease (2 not showing)	M145.0	10
4	Screw, 10/32 X 3/8 Button Head	B116.0	2
5	Guard, Clamp	M152.0	1
6	Screw, 10/32 X 1 SHCS	B136.0	1
7	Switch, Micro	E377.0	1
8	Screw, 10/32 X 1/2 SHCS	B135.0	2
9	Washer, #10	B161.0	2
10	Boot, Micro Switch	E130.0	1
11	Washer, #6	B155.0	2
12	Screw, 6/32 X 1 SHCS	B148.0	2
13	Guard, Left Injection Cylinder	M153.0	1



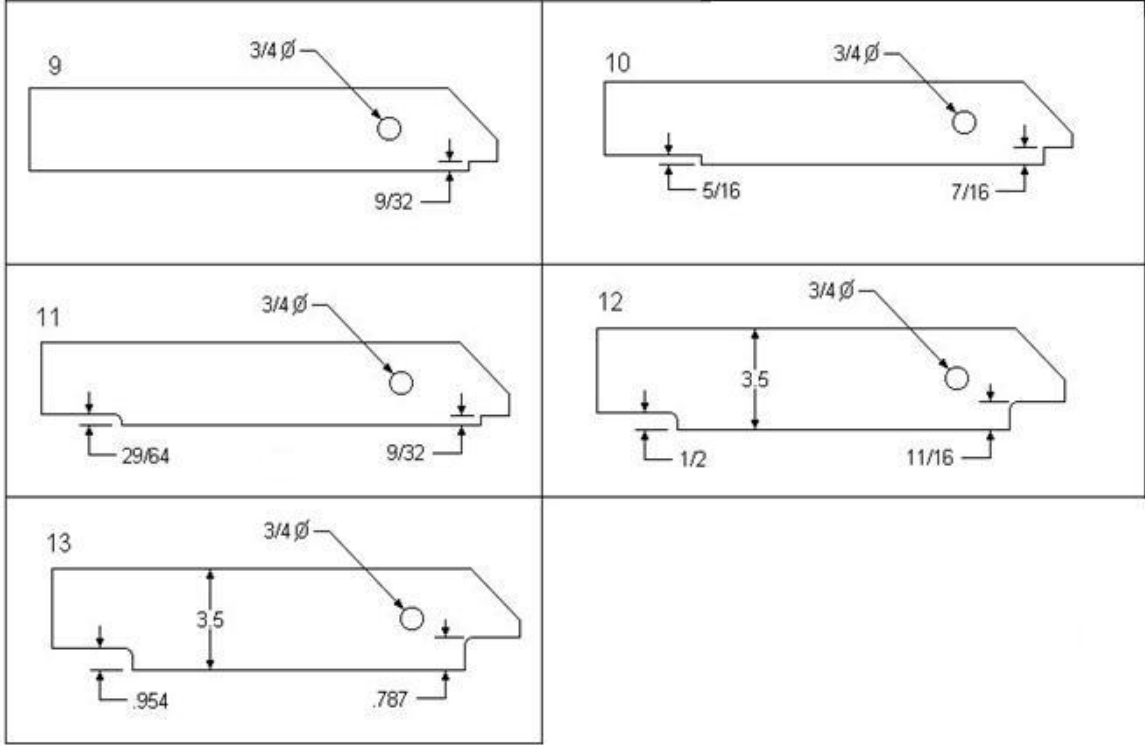
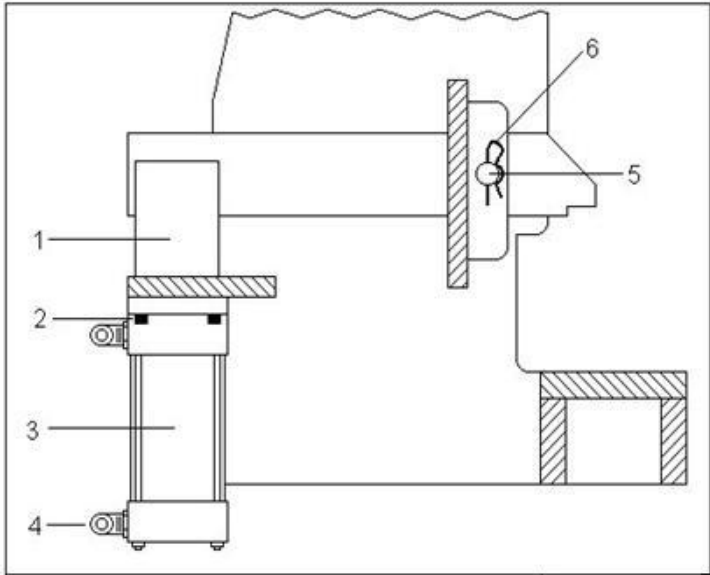
## LEFT SIDE OF FRAME

ITEM NO	DESCRIPTION	PART NO	QTY
1	Lever, Limit (Adj) Switch Roller	E271.0	1
2	Washer, 5/16	B161.1	2
3	Screw, 5/16 -18 X 1 SHCS	B147.0	1
4	Nut, 5/16 (not shown)	B103.0	1
5	Lever, Limit (Micro Adj) Switch Roller	E272.0	1
6	Screw, 10-32 X 2 SHCS	B137.0	2
7	Switch, Oil Tight Limit	E376.0	1
8	Connector, Cord	E198.0	1
9	Assy, Short Injection Hose		1
10	Guard, Barrel	M151.0	1
11	Screw, 10/32 X 1/2 Button Head	B115.0	4 / guard
12	Cylinder, Injection REFER TO PAGE 8		2
13	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	2
14	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	2
15	Connector, Injection Pressure Transducer	E293.0	1
16	Transducer, Injection Pressure	E398.0	1
17	Screw, 3/8-16 X 1 1/2 SHCS	B139.0	2
18	Cylinder, Injection REFER TO PAGE 8		2
19	Screw, 1/2-13 X 1 1/2	B126.0	4
20	Fitting, 1/2 90 deg (Modified)	H169.12	2
21	Screw, 1/2-13 X 1 1/2 low head	B166.1	4
22	Fitting, 1/2 flair	H169.29	2
23	Fitting, 3/8 to 1/8 Adapter	H169.40	1
24	Fitting, 1/2 swivel adapter	H169.39	1



## RIGHT SIDE OF FRAME

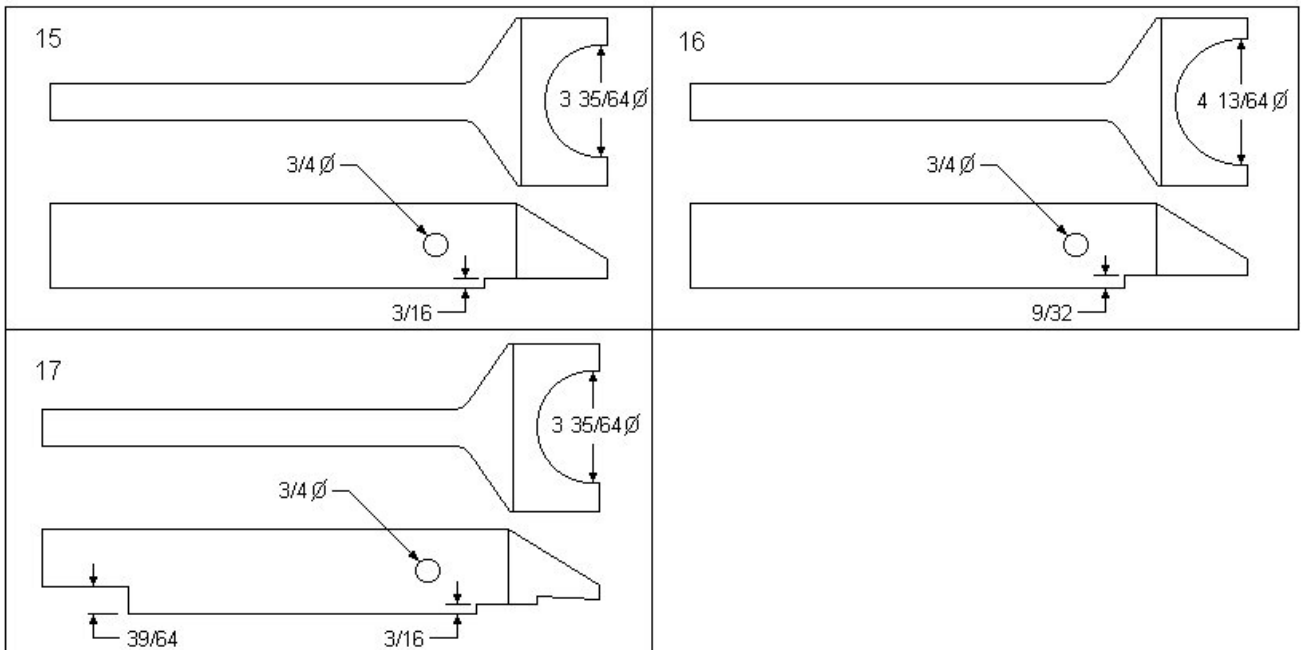
ITEM NO	DESCRIPTION	PART NO	QTY
1	Cylinder, Injection REFER TO PAGE 8		1
2	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	2
3	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	4
4	Tube, Feed	M204.0	1
4	Tube, Wide Feed (not shown)	M204.1	1
5	Nut, 5/16-18 X 1 Steel Hopper	M159.0	2
6	Plate, Hopper Support	M124.0	1
7	Screw, 5/16-18 X 1 SHCS	B147.0	2
8	Hopper, Plastic	M158.0	1
9	Lid, Plastic Hopper	M160.0	1
10	Screw, 3/8-16 X 1 1/2 SHCS	B139.0	2
11	Fitting, Hollow Hex Plug	H169.41	1
12	Screw, 1/2-13 X 1 1/2 low head	B166.1	2
13	Fitting, 1/2 flair	H169.29	1
14	Fitting, 1/2 90 deg (Modified)	H169.12	2
15	Hose, Short Injection		1
16	Fitting, 1/2 45 Deg	H142.0	3
17	Control, Flow	H202.0	1
18	Assy, Screw Hose		1
19	Fitting, 1/2" Tee	H113.1	1
20	Assy, Short Injection Hose		1
21	Fitting, 1/2" 90 Deg	H124.0	1
22	Fitting, 1/2 Swivel Union	H112.0	1
23	Assy, Long Injection Hose		1
24	Screw, 8-32 X 3/8 SHCS	B149.0	3
25	Rod, Safety Flag	M188.0	1
26	Screw, 8-32 X 3/16 Set	B176.0	4
27	Coupling, Safety Flag	M141.0	1
28	Switch, Micro	E376.0	1
29	Connector, Cord	E198.0	1
30	Flag, Plexiglas Safety	M146.0	1

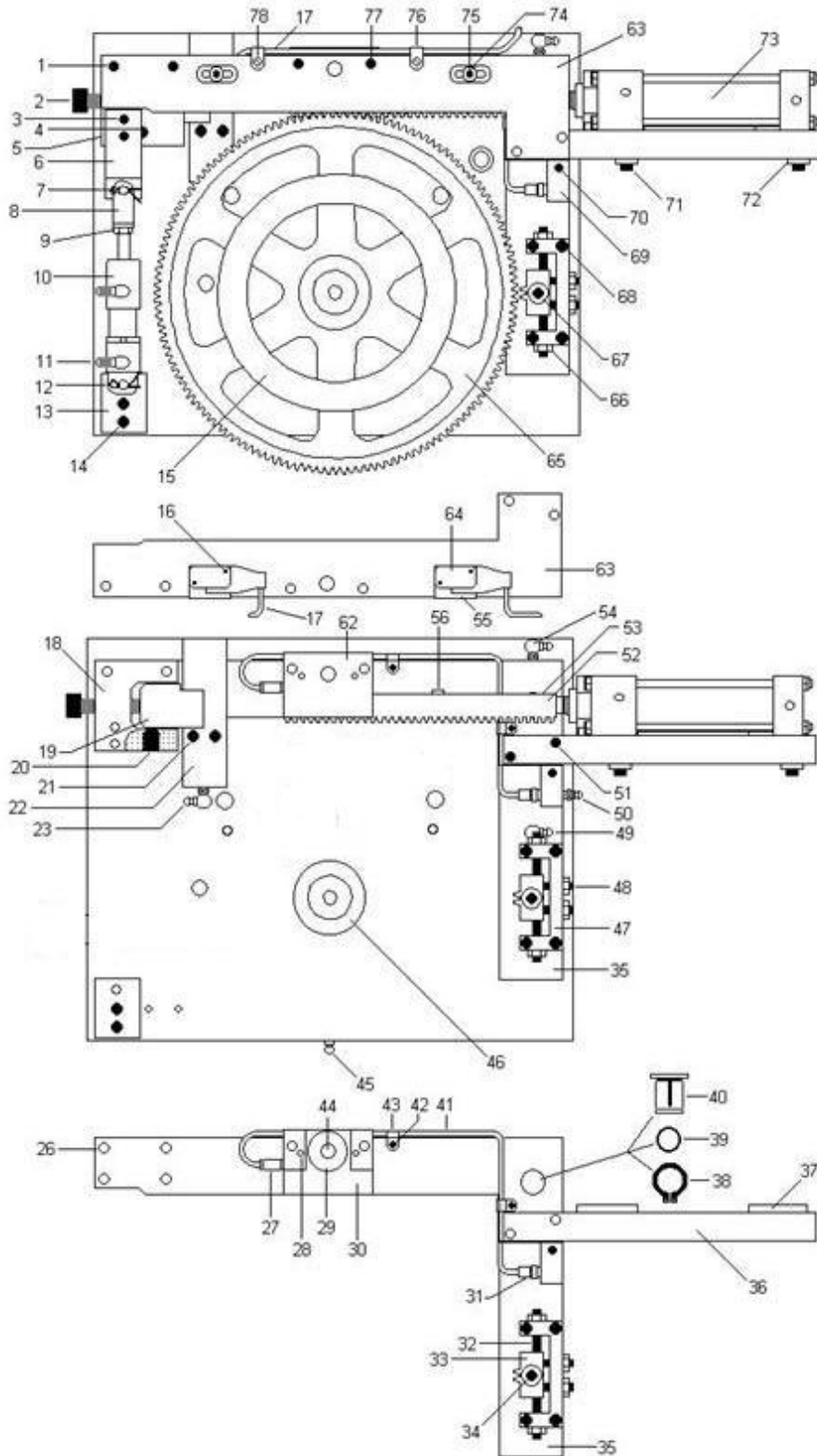




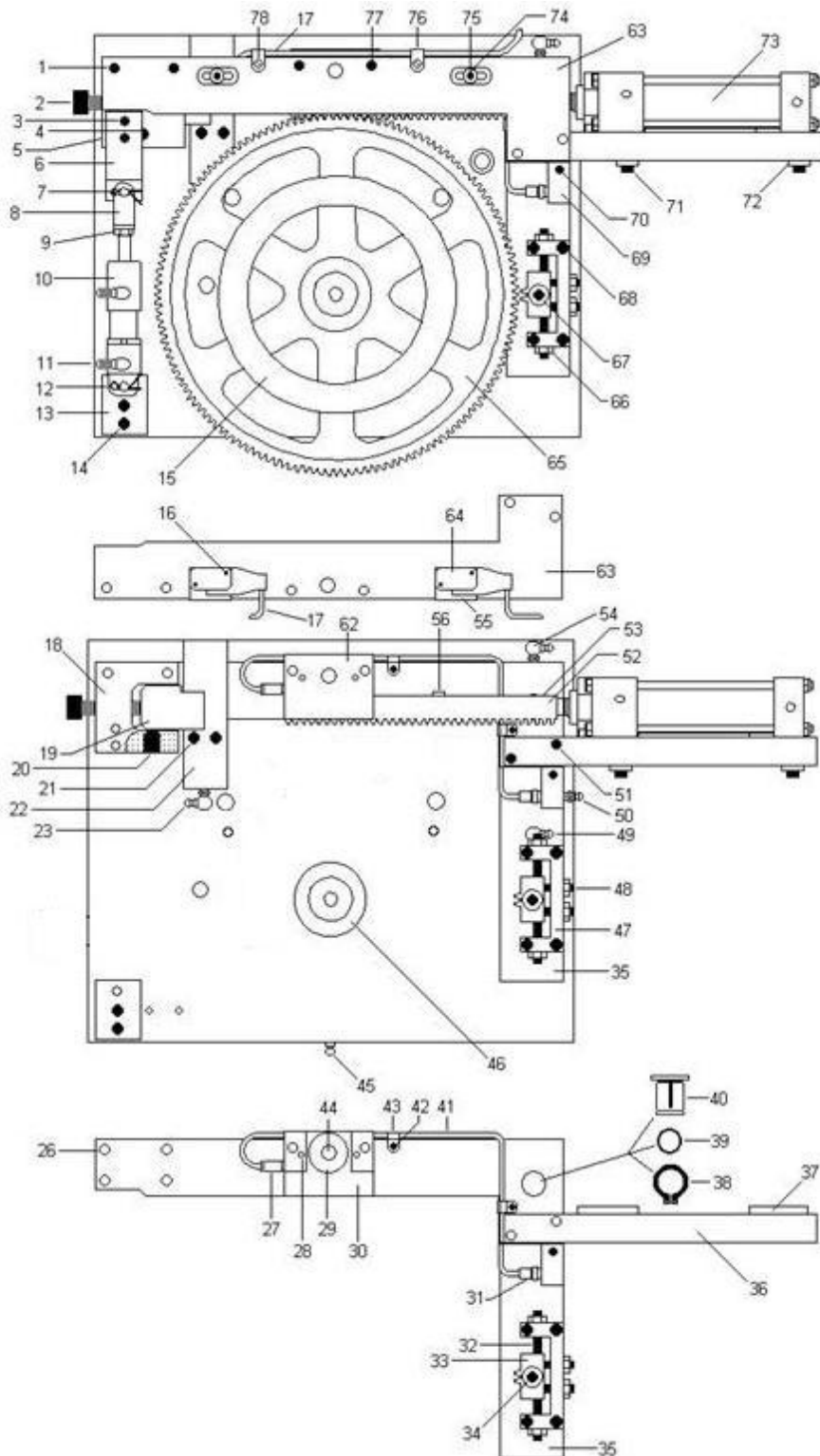
## CLAMP COMPONENTS

ITEM NO	DESCRIPTION	PART NO	QTY
1	Clevis, Clamp Bar	M104.1	1
2	Screw, 1/2-13 X 1 1/2 SHCS	B126.0	4
3	Cylinder, Clamp	H103.0	1
4	Fitting, SAE # 8 90 deg (For Ortman Cyl)	H169.36	
4	Fitting, 1/2 in 90 deg (Sheffer)	H150.0	
5	Pin, Clamp Bar (3/4" Dia)	M104.2	2
6	Clip, Hairpin For Clamp Bar Pin	M104.3	2
9	Bar, Clamp	M104.0	1
10	Bar, Clamp (For 4.5" Molds)	M104.4	1
11	Bar, Clamp (For Thermo Set)	M104.6	1
12	Bar, HP Clamp	M104.7	1
13	Bar, HP Clamp (For Thermo Set)	M104.8	1
15	Bar, Forked Clamp	M103.0	1
16	Bar, Forked Clamp (For Thermo Set)	M103.1	1
17	Bar, Forked Clamp (For 4.5" Molds)	M103.2	1



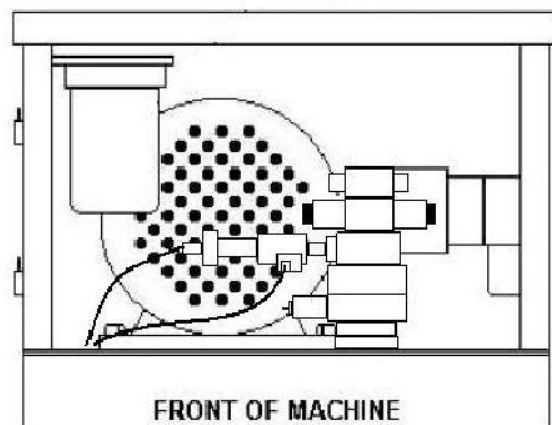
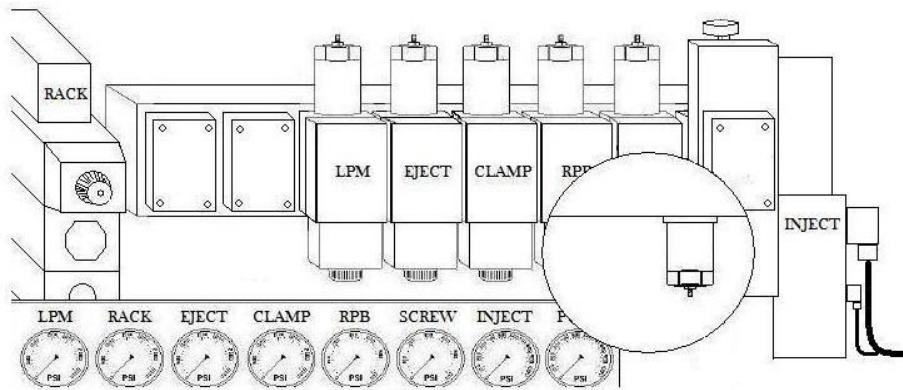
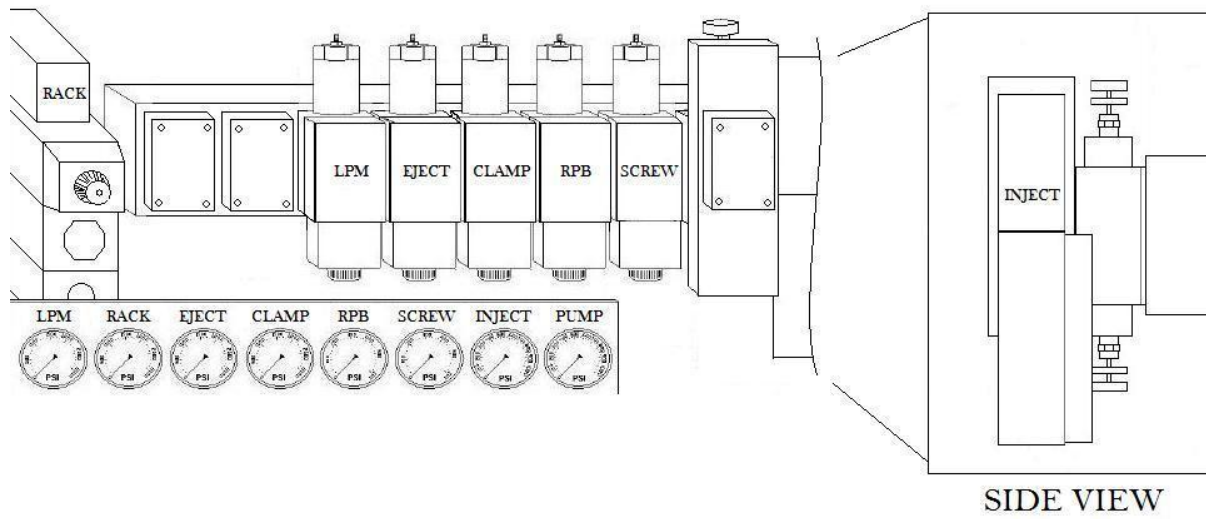


ITEM NO	DESCRIPTION	PART NO	QTY
1	Screw, 1/4-20 X 1 SHCS	B174.0	2
2	Screw, 1/2-13 X 2 Rack Stop Adjustment	B128.0	1
3	Screw, 1/4-20 X 2 1/2 SHCS	B184.0	2
4	Screw, 1/4-20 X 3/4 FHCS	B135.2	1
5	Cover, Stop Block	M264.3	1
6	Clevis, Rack Stop Block	M258.1	1
7	Pin, Cotter (For H102.2)	H102.4	4
8	Clevis, Rack Pull Back	H102.2	1
9	Nut, 3/8-24 Jam	B170.0	1
10	Cylinder, Rack Pull Back (Vickers)	H102.1	1
	Kit, Vickers Seal (RPB)	HK121.0	1
11	Fitting, 1/4" flair 1/8 NPT 90 deg	H119.0	2
12	Pin, Rack Pull Back Clevis	H102.5	2
13	Mount, Rack Pull Back Cylinder	M258.6	1
14	Screw, 5/16-18 X 2 1/4 SHCS	B173.0	2
15	Ring, Table Mounting (Requires machining)	M100.0	1
16	Screw, 4-40 X 1/2 SHCS	B114.1	4
17	Cable, Sensor	E500.0	2
18	Housing, Stop Block	M259.0	1
19	Stop, Rack	M259.1	1
20	Screw, 1/2-13 X 3/4 Rack Stop Set	B180.0	1
21	Screw, 1/4-20 X 1 SHCS	B174.0	2
22	Bracket, Pivot Arm Hold Down	M264.2	1
23	Fitting, 90 deg. Grease (short thread)	M143.0	1
24	Assy, Ring Sensor (Note 1)	E125.0	1
25	Screw, 6-32 X 3/8 Button head	B153.1	2
26	Screw, 1/4-20 X 5/8 SHCS (not shown)	B182.0	4
27	Fitting, 10-32 Male Grease	M264.11	1
28	Pin, 3/16 Dia. X 1 Dowel	B191.0	1
29	Bearing, Rack Clevis	M105.0	2
	Spacer, 1/2 ID X 3/4 OD X .062 Arbor	B175.0	2
30	Block, Bearing Assy Bottom	M199.3	1
31	Fitting, 1/8 X 1/8 Brass Compression	M264.6	1
32	Screw, 1/4-20 X 1 1/2 Set	B178.0	2
33	Lock, Main Gear	M264.17	1
34	Screw, 1/4-20 X 2 SHCS	B183.0	1
35	Arm, Bottom Pivot	M258.8	1
36	Block, Rack Cylinder Mounting (Requires machining)	M264.20	1
37	Plate, Rack Cylinder Alignment	M258.4	2
	Screw, 10-32 X 1/2 SHCS (not shown)	B135.0	4
38	Clip, Rack Pivot Arm Pin (3/4" Snap Ring)	B176.1	1
39	Bushing, 3/4 ID X 7/8 OD X 1/2 Bronze (Requires machining) Half of M297.0	M297.1	1



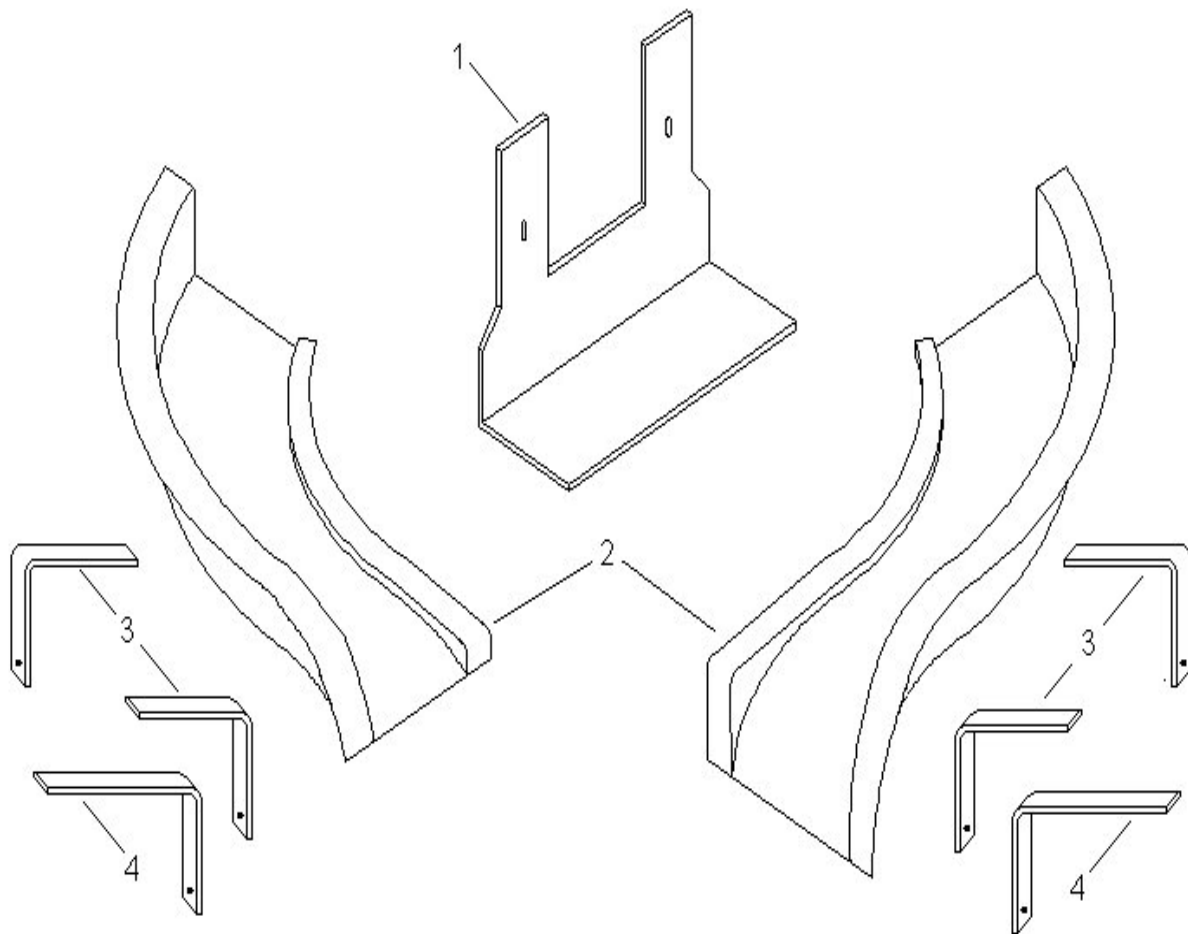
## TABLE COMPONENTS

ITEM NO	DESCRIPTION	PART NO	QTY
40	Pin, Rack Pivot Arm	M264.16	1
41	Tubing, Copper Grease Preformed	M264.14	1
42	Screw, 10-32 X 1/4 Brass Set	B187.0	2
43	Clip, 1/8 Dia. Nylon Clamp	E195.0	2
44	Pin, 1/2 Dia. X 2.75 Dowel	B192.0	1
45	Fitting, 1/4-28 Straight Grease (short)	M145.0	1
46	Bearing, Main Gear (1.5" Dia)	M107.0	1
47	Adjuster, Gear Lock	M264.5	1
48	Screw, 1/4-20 X 1 Set	B177.0	2
49	Fitting, 1/4-28 90 deg. Grease (short)	M143.0	1
50	Fitting, 1/8 NPT Grease	M264.12	1
51	Screw, 1/4-20 X 3/4 SHCS (2 not shown)	B132.0	4
	Pin, 1/4 Dia. X 1 Dowel (not shown)	B193.0	2
52	Arm, Long Rack (With 7/16-20 Hole, 9.5 L)	M185.2	1
	Washer, 7/16 hardened (not shown)	M310.0	1
53	Screw, 10-32 X 3/16 Brass Tipped Set	B188.0	1
54	Fitting, 1/4-28 90 deg. Grease (short)	M143.0	1
55	Block, Rack Sensor Mounting	M268.0	2
56	Target, Rack Sensor	M268.1	2
	Screw, 8-32 X 3/8 FHCS (not shown)	B189.0	2
57	Cable, Sensor (Note 1)	E500.0	2
58	Sensor, Proximity (Note 1)	E473.0	1
59	Screw, 4-40 X 1/2 SHCS (Note 1)	B114.1	2
60	Plate, Skip Sensor Mounting (Note 1)	M314.0	1
61	Screw, 6-32 X 1/2 SHCS (Note 1)	B190.0	
62	Block, Bearing Assy Top	M199.4	1
63	Arm, Upper Pivot (12 station)	M258.2	1
64	Sensor, Proximity	E473.0	1
65	Gear, Table (Requires machining)	M283.1	1
66	Nut, 1/4-20 Jam	B179.0	4
67	Washer, 1/4 Dia. Hard	B135.3	1
68	Screw, 1/4-20 X 1 1/2 SHCS	B185.0	4
69	Block, Grease Distributing	M264.4	1
70	Screw, 1/4-20 X 1 SHCS	B174.0	1
71	Screw, 1/4-20 X 1 1/2 SHCS	B185.0	4
72	Plate, Hardened	M311.0	2
73	Cylinder, Rack	H107.3	1
74	Washer, #10 SAE	B161.0	2
75	Screw, 10-32 X 5/8 SHCS	B135.1	2
76	Clamp, 3/16" Loop	E195.1	2
77	Screw, 1/4-20 X 2 1/2 SHCS	B184.0	2
78	Screw, 8/32 X 3/8 Pan Head (self tap)	B149.2	2



## HYDRAULIC VALVES AND GAUGES

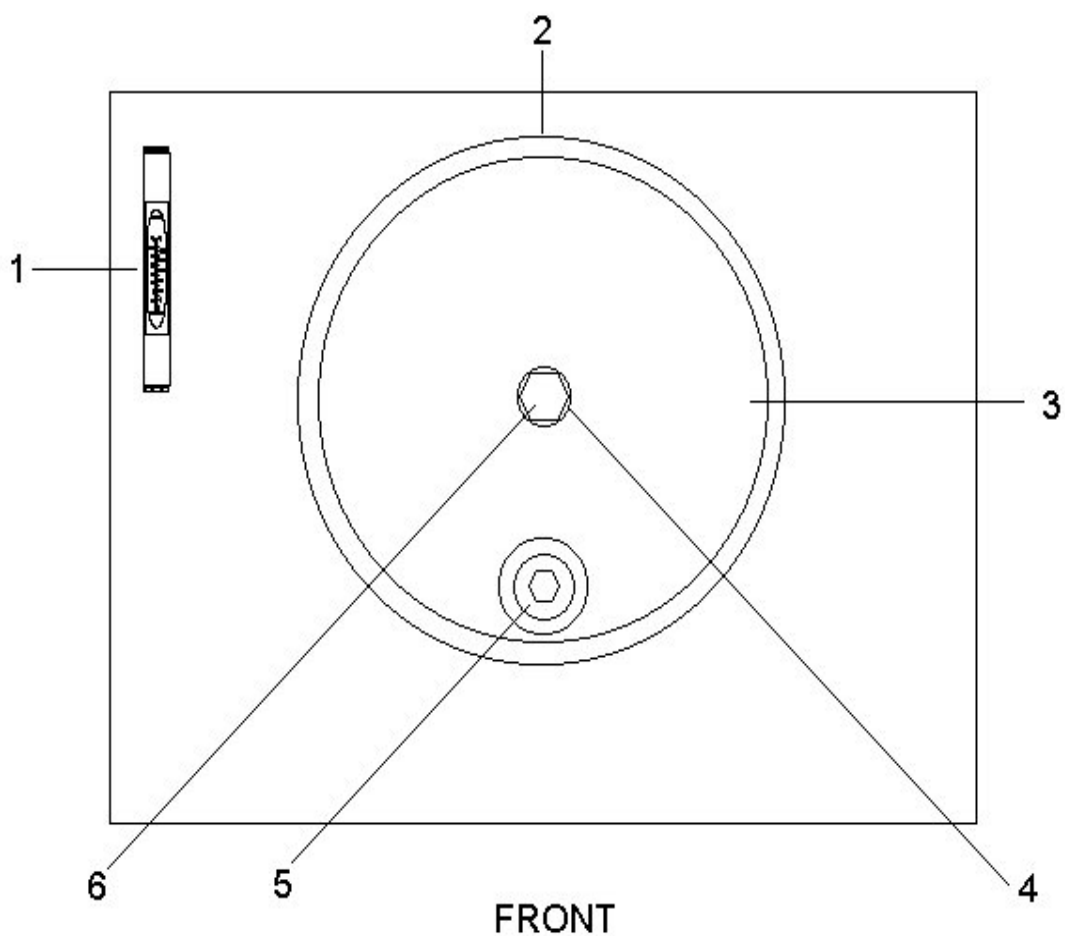
ITEM NO	DESCRIPTION	PART NO	QTY
1	Manifold, Main	H182.0	1
2	Valve, Single Directional	H210.0	4
	Screw, 10-24 X 1 1/4 SHCS (not shown)(for one valve)	B133.0	4 per stack
	Screw, 10-24 X 3 SHCS (not shown)(for two valves)	B134.0	4 per stack
3	Valve, Clamp Reducing (51 - 1000)	H217.0	1
4	Valve, Clamp Relief (43.5 - 1450)	H216.0	1
5	Valve, Dual Directional	H211.0	1
6	Valve, Reducing (100 - 3000) -"KAN"	H207.0	2
7	Body, "O" Ring Plate and EBY Valve	H206.0	1
8	Valve, Main Relief (725 - 4500)	H212.0	1
9	Gauge, 0-3000 PSI	H171.0	3
10	Body, EAK Valve- (STEEL)	H205.0	1
11	Valve, Table Reducing (24 - 400) "KEN"	H208.0	1
12	Gauge, 0-1000 PSI	H170.0	1
13	Gauge, 0-600 PSI	H173.0	1
14	Valve, Single Directional (24 VDC)	H197.0	1
	Screw, 10-24 X 1 1/4 SHCS (not shown)	B133.0	4 per stack
15	Adapter, Manifold	H100.0	1
	Kit, Bolt (4)	HK100.0	1
16	Valve, Proportional	H200.0	1
	Screw, 10-24 X 1 1/4 SHCS (not shown)	B133.0	4 per stack
17	Valve, Reducing Valve (43.5 - 435)	H217.1	2
18	Ring, "O"	H186.0	4 per valve



### CORD TRAYS

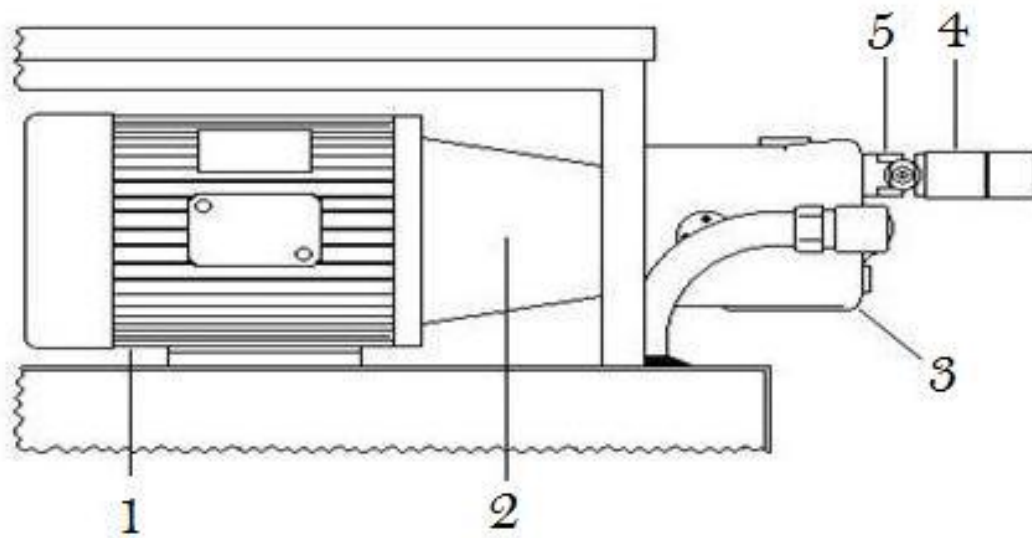
ITEM NO	DESCRIPTION	PART NO	QTY
1	Tray, Back Cord	M202.0	1
2	Tray, Cord (Machining needed)	M201.0	1
3	Arm, Cord Tray Mounting	M120.0	4
4	Arm, 33" Dia Front Cord Tray Mounting	M121.0	2





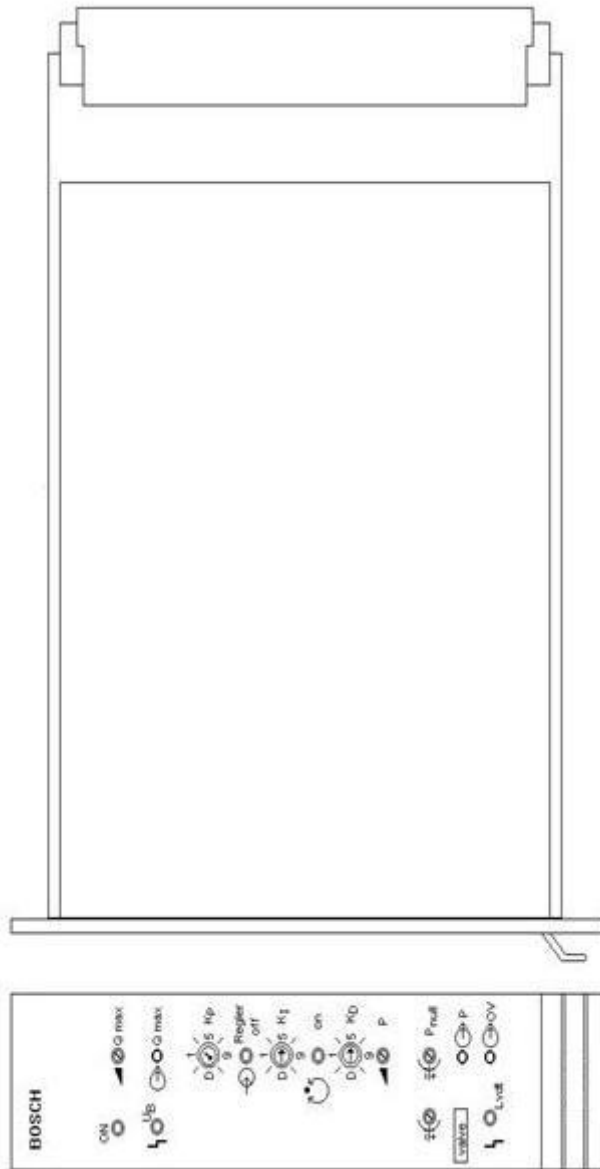
**TANK FRONT**

ITEM NO	DESCRIPTION	PART NO	QTY
1	Gauge, Oil Level & Temperature	H174.0	1
2	Gasket, 12" Oil Tank Cover (not shown)(Both ends)	M149.0	2
3	Cover, Oil Tank (Both Ends)	M149.1	2
4	Gasket, Nylon (Washer) (Both Ends)	M148.0	2
5	Fitting, SAE # 12 Plug	H138.1	2
5	Fitting, 3/4 NPT	H224.0	2
6	Screw, 5/8-11 X 1-3/4" Hex Head	B194.0	2



### PUMP, HYDRAULIC

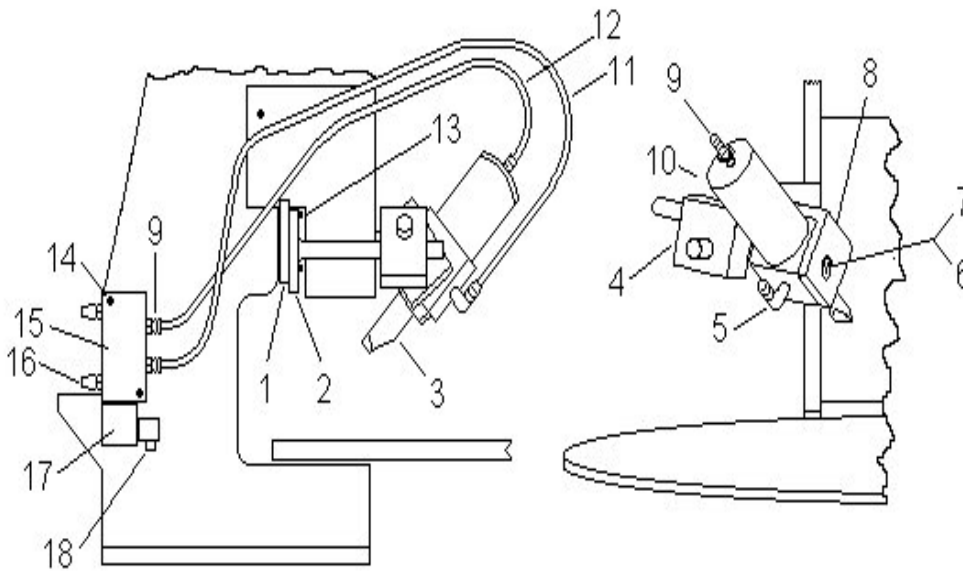
ITEM NO	DESCRIPTION	PART NO	QTY
1	Motor, 7 1/2 HP 3 Phase	E445.0	1
2	Spider (not shown) Motor to Pump Coupler	M139.1	1
3	Pump, Vickers Piston (Including 4 & 5)	H193.0	1
	Kit, Seal (Pump)	H193.1	1
4	Valve, Single Directional	H210.0	4
5	Compensator, Pump	H193.2	1
	Filter, Spin On Oil (not shown)	H110.0	1



### BOSCH BOARD

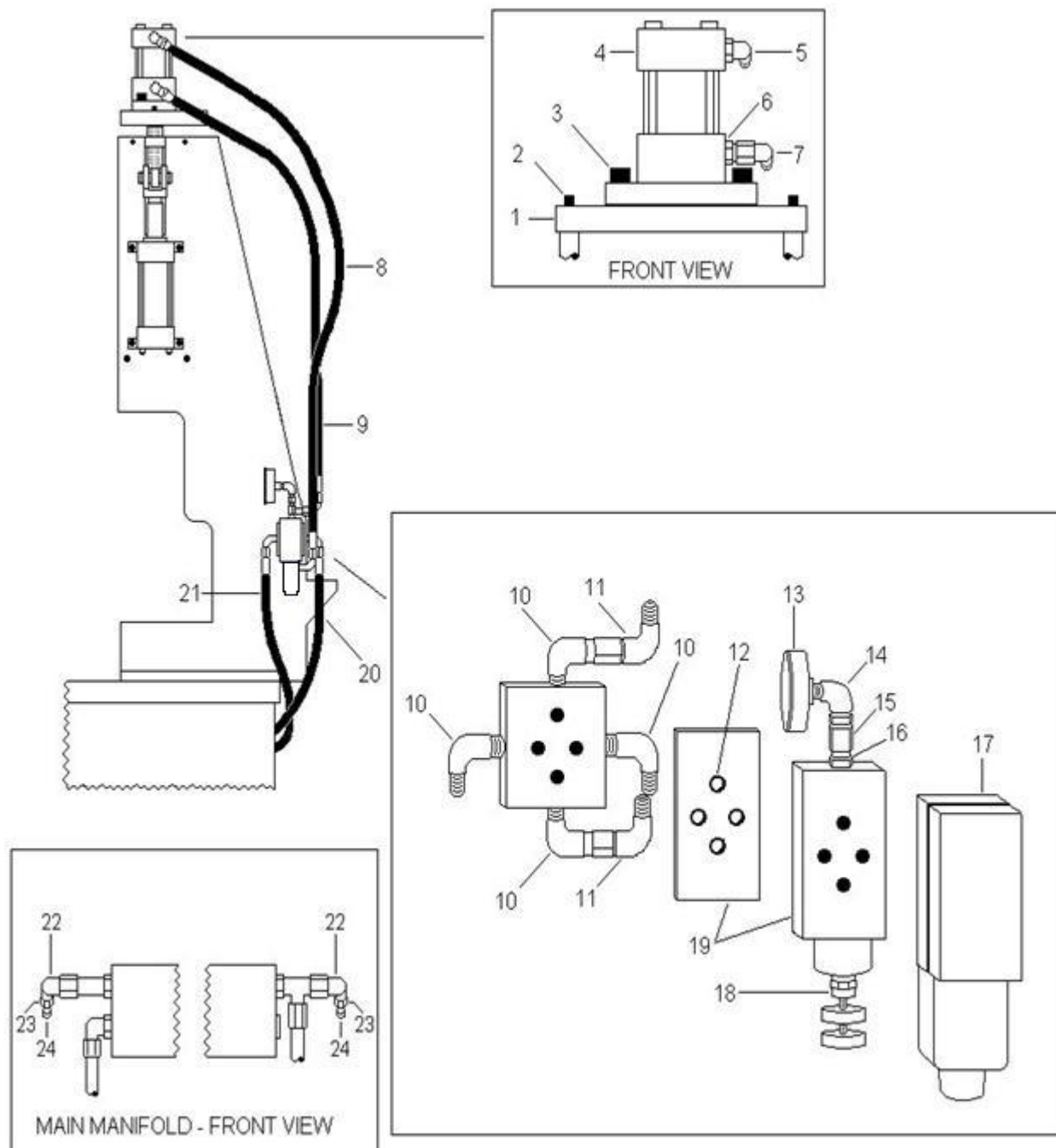
DESCRIPTION	PART NO	QTY
Board, Bosch Amp (PL6-PQI) (Note 1)	E118.0	1

Note 1: Replacing this board will require re-calibration.



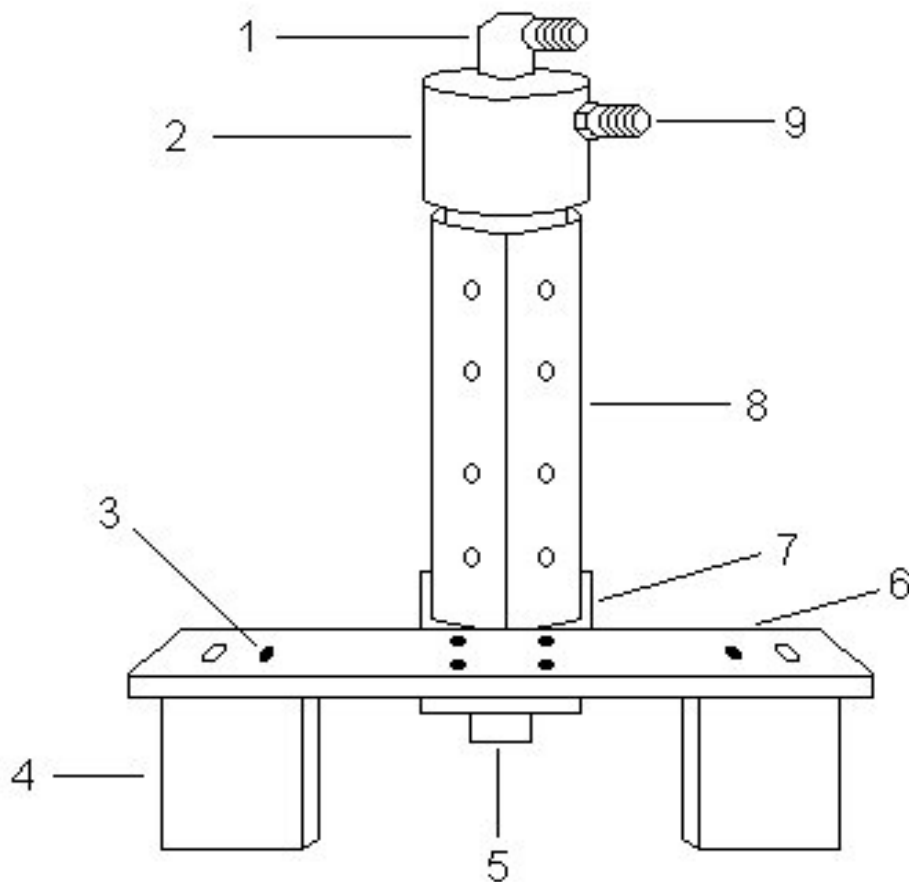
### TRIMMER OPTION

ITEM NO	DESCRIPTION	PART NO	QTY
1	Plate, Trimmer Sprue	M183.0	1
2	Bracket, Trimmer	M164	1
3	Blade, Trimmer	M110.0	1
	Nut, 7/16 - 18 Trimmer Jam (not shown)	M179.1	1
4	Block, Adjustable Clamping	M112.0	1
	Screw, 5/16 - 18 X 1 SHCS (not shown)	B147.0	4
5	Fitting, Male Swivel Elbow 1/4" x 1/4" NPT	H154	1
6	Bushing, Trunion	A102.1	2
7	Screw, 10/32 X 3/8	B116.1	2
8	Mount Arm, Trim Sprue	M163	1
9	Fitting, Male Hex Head Socket 1/4" x 1/4" NPT	H151	1
10	Cylinder, Trimmer	A102.0	1
	Spring, Trimmer	M197.0	1
11	Tubing, 1/4 Para flex	A120.0	36 "
12	Tubing, 1/4 Para flex	A120.0	40 "
13	Screw, 5/16 - 18 X 3/4 SHCS	B143.2	3
	Washer, 5/16 (not Shown)	B161.1	3
14	Screw, 1/4 - 20 X 1 1/2 SHCS	B131.0	2
15	Valve, Directional Air (with 120 VAC coil)	A125.0	1
16	Muffler, Air	A115.0	2
17	Coil, Directional Air Valve (120 VAC)	A125.2	1
18	Connector, Hirshman (Large)	E206.1	1



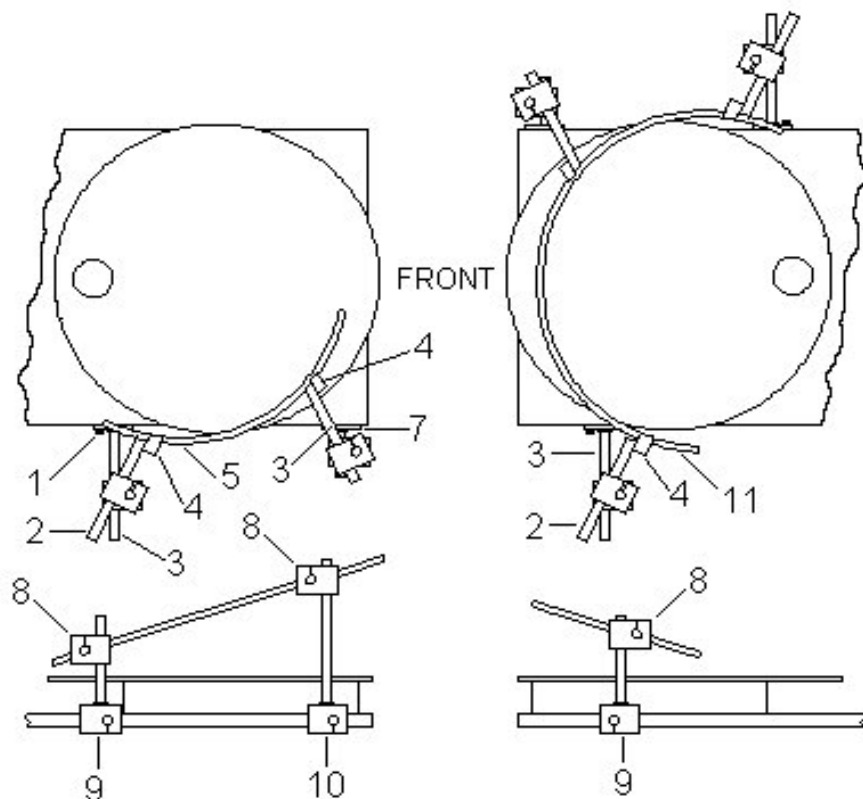
### LPM OPTION

ITEM NO	DESCRIPTION	PART NO	QTY
1	Plate, LPM Cylinder Mounting	M177.0	1
2	Screw, 5/16-18 X 1 1/4 SHCS	B143.0	2
3	Screw, 1/2-13 X 1 1/4 SHCS	B125.0	4
4	Cylinder, LPM	H103.0	1
5	Fitting, 90 Deg Elbow SAE to Flair	H169.36	1
6	Fitting, Straight Thread Connector	H169.29	1
7	Fitting, Swivel Nut Elbow	H169.32	1
8	Assy, Long LPM Hose		1
9	Assy, Short LPM Hose		1
10	Fitting, 3/8 Elbow	H149.0	4
11	Fitting, 3/8 Swivel Nut Elbow	H137.0	2
12	Ring, "O"	H186.0	4 per valve
13	Gauge, 0-3000	H171.0	1
14	Fitting, NPT Elbow	H135.0	1
15	Fitting, Swivel Nut Male	H165.0	1
16	Fitting, 1/4 Male Connector	H146.0	1
17	Valve, Single Directional	H210.0	1
	Screw, 10-24 X 3 SHCS (not shown)	B134.0	4
18	Valve, Reducing (100 - 3000) "KAN"	H207.0	1
19	Body, "O" Ring Plate and EBY Valve	H206.0	1
20	Assy, LPM Pressure Hose		1
21	Assy, LPM Tank Hose		1
22	Fitting, 5/8 Elbow	H137.0	2
23	Fitting, 5/8 Nut Reducer	H169.38	2
24	Fitting, 5/8 to 3/8 Reducer	H169.37	2



### WATER MANIFOLD OPTION

ITEM NO	DESCRIPTION	PART NO	QTY
1	Fitting, 1/2 Flair 90 Deg Brass (Special)	W112.0	1
	Pipe, 1/4 X 7 Stainless Steel	W108.0	1
2	Union, Water	W109.0	1
3	Screw, 10-32 X 3/4" Flat Head	B152.0	7
4	Leg, Water Manifold Long	W103.0	2
5	Leg, Water Manifold Short	W102.0	1
6	Bar, Water Manifold Upper Mounting	W105.2	1
7	Bar, Water Manifold Lower Mounting	W105.1	1
8	Manifold, Water	W111.0	1
9	Fitting, 1/2 Flair	H127.0	1



### RAMP OPTION

ITEM NO	DESCRIPTION	PART NO	QTY
1	Screw, 5/16-18 X 1 SHCS	B147.0	2 per
2	Rod, Ramp Rod (end flat)	M193.0	2 or 3
3	Bracket, Back Ramp Mounting	M126.0	1 or 2
4	Clamp, Ramp	M132.0	1 per
	Screw, 10-32 X 1/2 SHCS (not shown)	B135.0	2 per
5	Ramp, 25 in. Radius Standard	M195.2	1
	Ramp, 33 in. Radius Standard	M195.4	1
7	Bracket, Front Ramp Mounting	M126.1	
8	Block, Adjustable Clamping	M112.0	
	Screw, 5/16-18 X 3/4 SHCS (not shown)	B146.0	4 per
9	Rod & Block, Rear Ramp	M189.0	1
	Screw, 5/16-18 X 3/4 SHCS (not shown)	B146.0	2 per
10	Rod & Block, Front Ramp	M190.0	
	Screw, 5/16-18 X 3/4 SHCS (not shown)	B146.0	2 per
11	Ramp, 25 in. Radius Full	M195.3	1
	Ramp, 33 in. Radius Full	M195.5	1





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QTY	L (Inches)	F1 * (Inches)	F2 * (Inches)	D (Inches)	Style (1-4)	Push lock (Yes)

\* Distance between flats or wrench size

