Medical Devices Injection Molder
Setup & Operational Manual

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NOTES


IPC
ECHO
Series

Rev 1	01/18/2017	Joshua W. George

Begin the rework for the new medical molder manual.

Rev 1.1	08/14/2018	Joshua W. George

First pass of relevant screen updates.

Rev 2.0	8/15/2018	Joshua W. George

Final rough draft completed.

Rev 3.0	08/20/2018	Joshua W. George

Adding more relevant and unifying.

Rev 4.0	08/28/2018	Joshua W. George

Correcting electrical.

Rev. 4.1	09/06/2018	Joshua W. George

Three edits by Mike Lewis

INTRODUCTION

The IPC injection mold press utilizes a Windows based microprocessor Maco-sys MACO Compact controller and touch screen display.

It is recommended that the production engineer read this manual and the Maco-sys manual and become familiar with the overall machine operation.

Any machine subjected to continuous production work may develop malfunctions.

Section 1 – UNCRATING & INSTALLATION

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 should be placed in position to allow access to all sides, and to allow all doors and panels to be opened completely and/or removed, if needed. Optional air/oil cooler needs at least two feet of clearance to allow for proper air flow. Rubber type mats/squares, not included, can be used under the machines base to help alleviate rocking and vibration transfer to floor, as well as help with leveling.

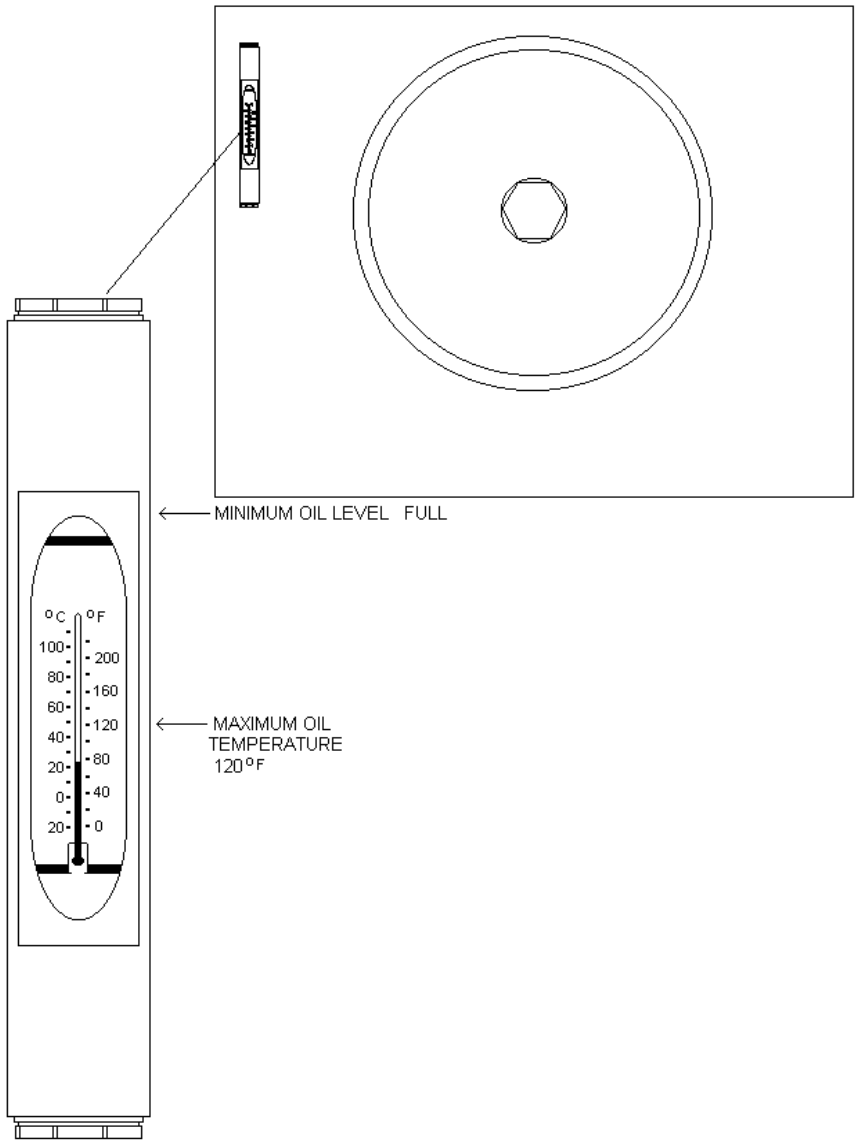
HYDRAULIC FLUID

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 an anti-wear hydraulic oil with a grade rating of 46.

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.



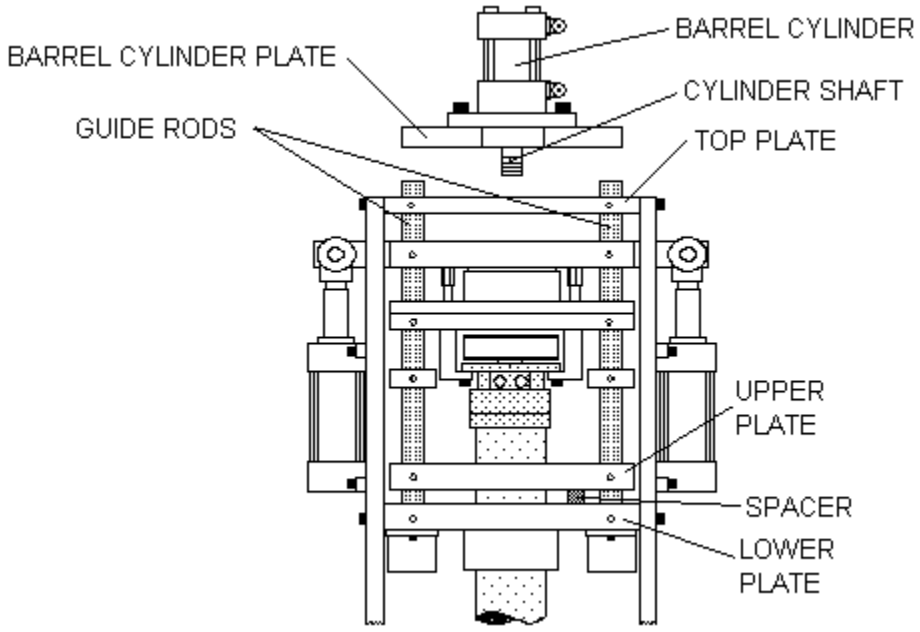
WARNING:
Never operate machine when the oil level gauge shows less than 3/4 full.

BARREL CYLINDER INSTALLATION (OPTIONAL)

- Position the barrel cylinder on the top plate so that the cylinder shaft lines up with the threaded hole.

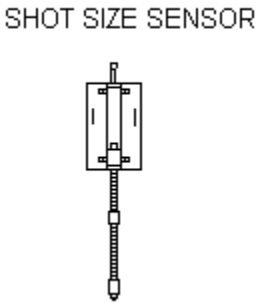
- Tighten the cylinder shaft onto the top plate with a 7/8 open end wrench. Make sure that the small 5/16” holes in the barrel cylinder plate lines up with the guide rods.

- Now install and tighten the two 5/16 screws through the barrel cylinder plate and into the end of the guide rods.

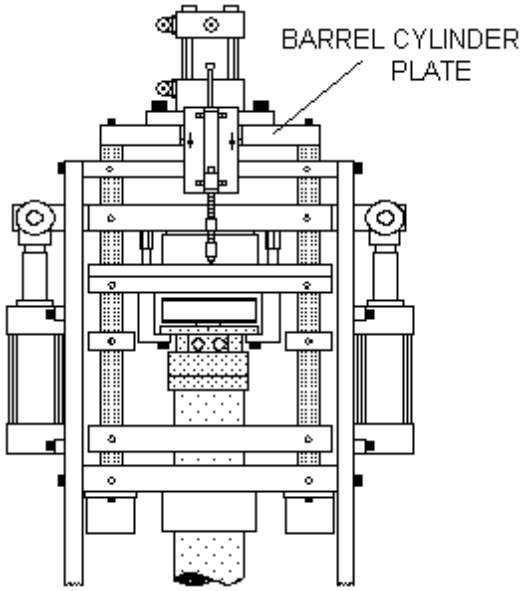


SHOTSIZE SENSOR INSTALLATION

- Carefully unpack the shotsize sensor.



- Attach the shotsize sensor to the barrel cylinder plate, with two 10/32 screws and two washers.



- Attach the cable to the shotsize sensor connector. Make sure the cable is not in the way of the hoses.

- Adjust the shotsize 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 services;

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

480VAC, 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 208VAC, 240VAC, or 480VAC:

- Connect the 3 phases to the top of the main disconnect.
- The primary of the transformers should be wired for 208VAC, 240VAC, or 480VAC, depending on your service. The secondary of the transformers should be wired for 240VAC with the neutral output connected to the machine ground and neutral terminal in the controller enclosure.
- The motor controller setting should be adjusted to; 22 amps for a 208VAC or 240VAC connection, 11 amps for a 480VAC connection.
- Connect ground to cabinet.
- 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 208VAC:

- Connect the 3 phases to L1, L2, and L3 on the main wireway.
- The motor controller setting should be adjusted to 22 amps.
- Connect ground to ground terminal strip just left of main disconnect.
- Connect neutral to neutral terminal strip just left of main disconnect.
- 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 240VAC:

- Connect the 3 phases to the top of L1, L2, and L3 of the wireway.
- **The B phase (wild phase) should be connected to the center terminal (L2).**
- The motor controller setting should be adjusted to 22 amps.
- Connect ground to ground terminal strip.
- Connect neutral to the neutral terminal strip.
- 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:

- Ensure all the circuit breakers are in the off position.
- Turn the main disconnect switch to the on position.
- The pump must be primed before the next step.
- 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.
- 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.

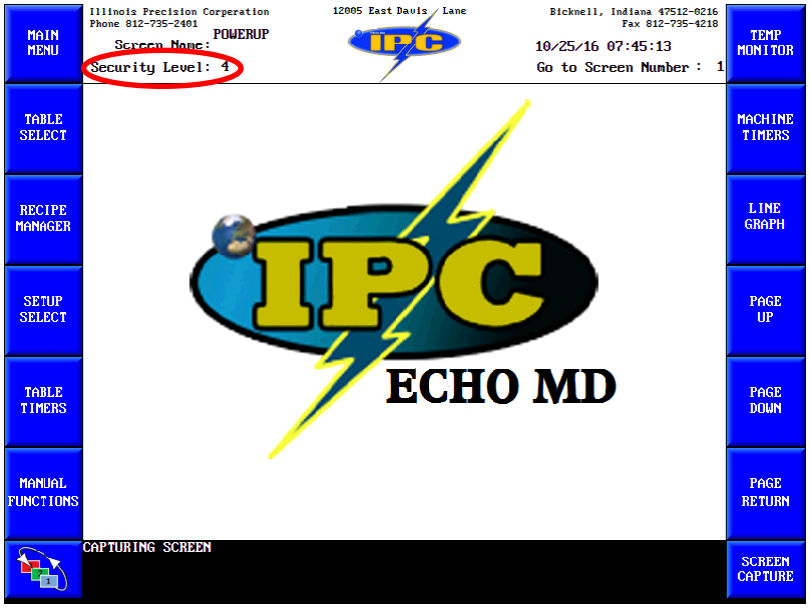
CIRCUIT BREAKER START UP

- 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 24VDC between any wire 1580 (+) and wire 1581 (-).
- The next breaker to turn on is for the Maco Compact controller (second from left, 3A DC).
- Then turn on the op station breaker (far left 3A DC).
- You may now turn the remaining circuit breakers on.

Section 2 - SYSTEMS

DISPLAY

As delivered, the controller will power up displaying the Powerup screen.



SECURITY LEVEL

On power up, security is at the default level (level 1). Factory set security levels are established when programming screens and cannot be erased.

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.

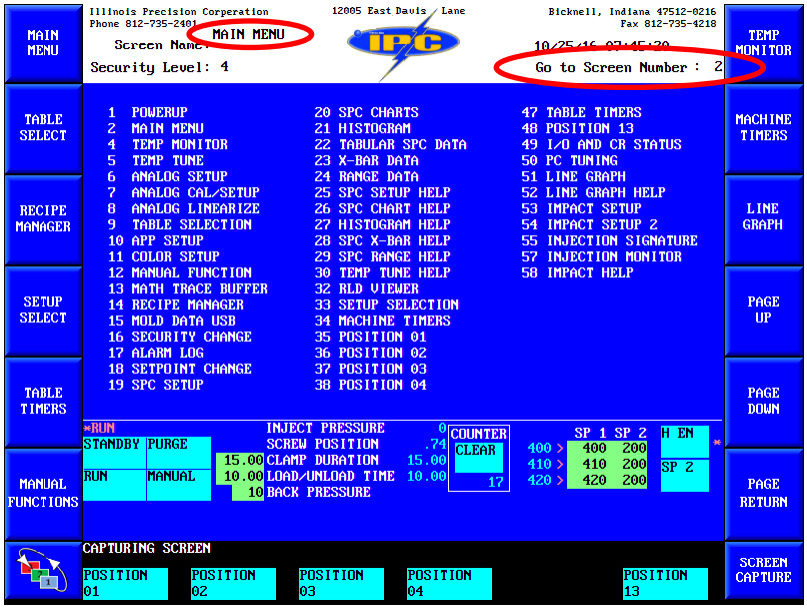
Only screens with a security level equal to or less than the operating security level will be accessible.

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.

GO TO 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.



MOVING THROUGH THE SCREENS

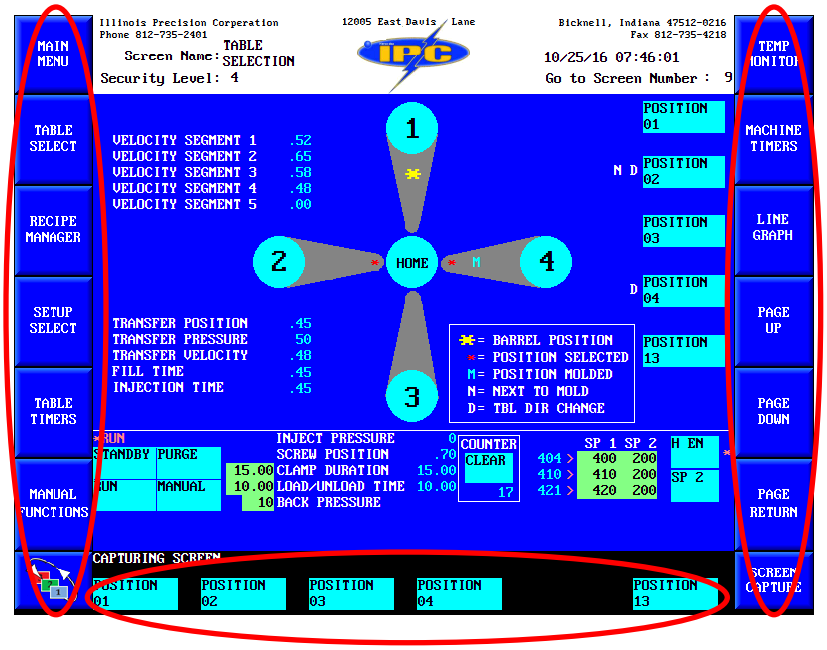
Screens are divided into two major groups - system screens and user screens.

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 effects 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 effects 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 soft key will cause the action to occur which is described by the label of the soft key.

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 to appear. Pressing the page key a second time will cause the page 3 soft keys - which contain the system paths to appear.

Note that page 3 soft keys are the only means of accessing the system screen set. Paths, other than direct screen number input, 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

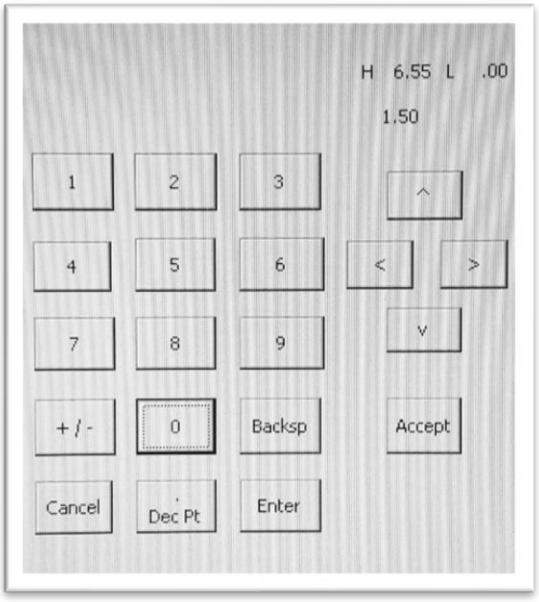
The page return key is used to toggle to the previous screen. This key is especially useful when it is necessary to examine or compare two screens which do not have a path directly to one another.

SCREEN CAPTURE

The screen capture key is used to take a complete screenshot of the active screen and all variables. The file is saved on the compact flash.

NUMBER KEYPAD INPUT

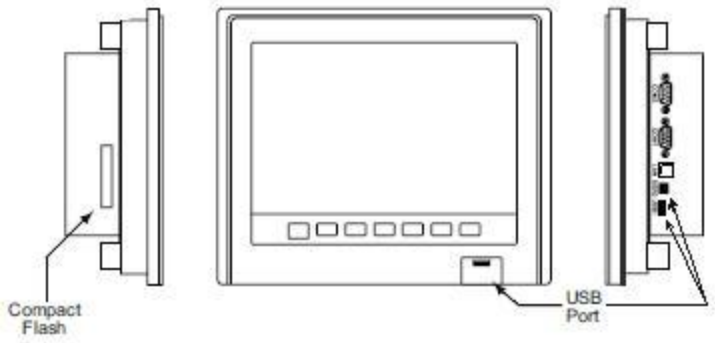
When a variable value is selected on the display a number keypad input box pops up at the best position on the screen. Across the top of the box is the high/low limit of the variable selected. The high/low limit will also be displayed on the main screen, in red text, below the All Molds Mini screen. By inputting the new value and selecting enter, the input box will disappear, and your variable will be updated to the new value. By selecting accept, instead of enter, the variable will be updated, but the input box will stay active. Utilizing the arrows to scroll through the available variables on the screen, blinking while selected, and selecting accept after each value input change you can make multiple changes quickly. After all changes have been made, select enter to close the input box.



For a value utilizing a decimal point, there is no need to select the decimal point input. It will already be placed in respect to the variable selected.

Selecting the backspace input before any other input will recall the last value entered. This aids for quick entering of the same value across multiple variables.

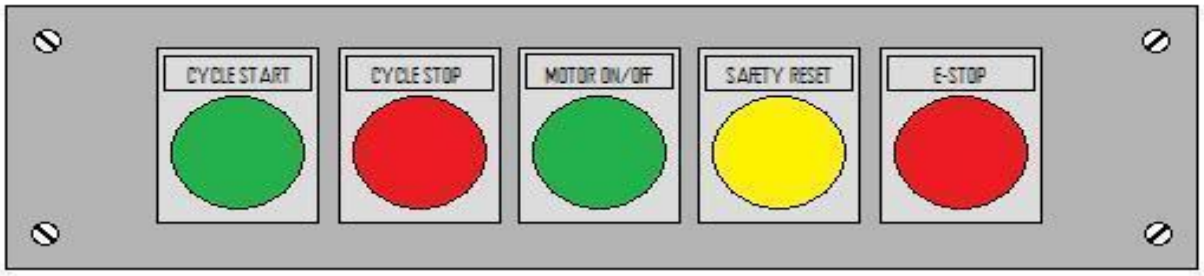
USB & MEMORY STICK PORTS



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. Screen version updates may cause differences in location and access to certain ports.

OPERATOR CONTROLS

The operating controls are grouped in a separate box as well as on the operator station. Both have the same operation. HMI interface emergency stop pushbutton is labeled E1. Operator position emergency stop pushbutton is labeled E2. These labels are referenced in the I/O and CR Status screen, screen 49, and any associated wiring documentation.



CYCLE START

Pressing cycle start will activate the table rotation and production in run mode, table rotation in standby mode, one gear tooth increments in manual mode, and purge function in purge mode. During purge mode the cycle start will engage the purge function for as long as the pushbutton is pressed, and the screw rotation will begin after the button is released.

CYCLE STOP

Pressing cycle stop will stop table rotation at the next table position, if pressed after rotation begins. If pressed before table rotation begins the table will not move from that location.

MOTOR ON/OFF

Pressing the motor on/off pushbutton will active/deactivate the motor, a LED pushbutton light corresponds with the activation/deactivation.

SAFETY RESET

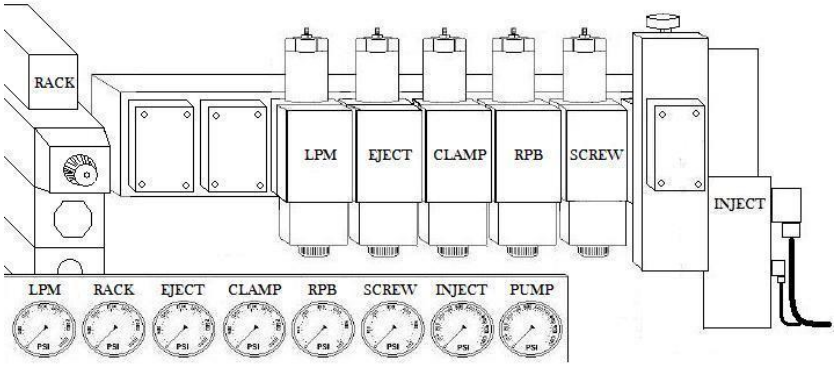
Before beginning any production, the safeties must be verified and set. Pressing safety reset will latch the safety blocks of the system, if all safeties are cleared. If safeties are not cleared the safety blocks will not set and the display will vector to the Alarm Log screen with the appropriate error display. Anytime a safety is tripped the safety reset button must be pressed.

EMERGENCY STOP

Press the emergency stop pushbutton any time an emergency shut down of the hydraulic system, table, and injection unit must occur. It can also be used in conjunction with lockout systems to insure the hydraulics will not start. The emergency stop pushbutton is a twist to release pushbutton and must be twisted to release the latch.

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)



SNUBBER VALVES

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

FACTORY PRESSURE SETTINGS

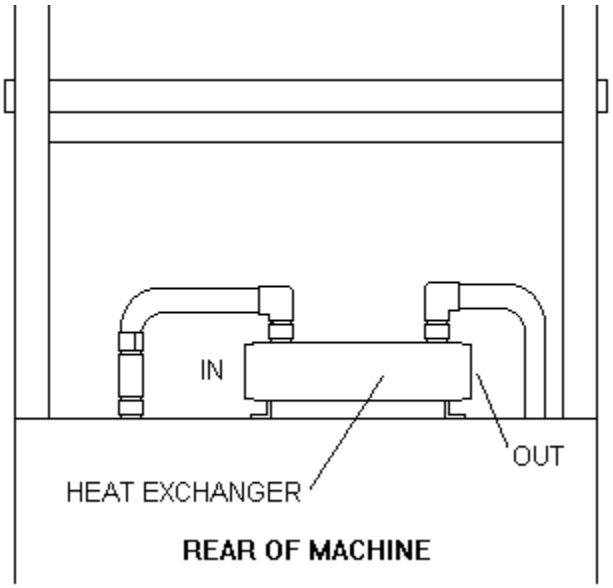
SYSTEM	PRESSURE (PSI)
PUMP	600/1800
RACK	250
RACK PULL BACK	100
KNOCKOUTS	150
CLAMP	600
SCREW	600-1500 (Note 1)
LOW PRESSURE MOLDING	250

Note 1 – Screw pressure will fluctuate with adjustment of the screw motor flow control and viscosity of the material.

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

WATER HEAT EXCHANGER FOR OIL COOLING (STANDARD)

This system cycles the hydraulic oil from the machines internal bypass system through porting that is being cooled via an external water or chiller system. The water heat exchanger should be connected to a water-cooling system if the oil temperature exceeds 120°F.

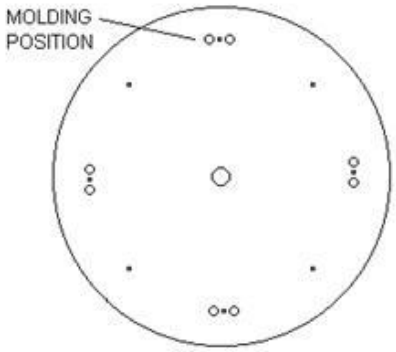


AIR HEAT EXCHANGER FOR OIL COOLING (OPTIONAL)

The air heat exchanger is an optional installation that requires no additional water/chiller hookups and operates the same as the water heat exchanger but utilizes a fan and radiator to provide the required cooling.

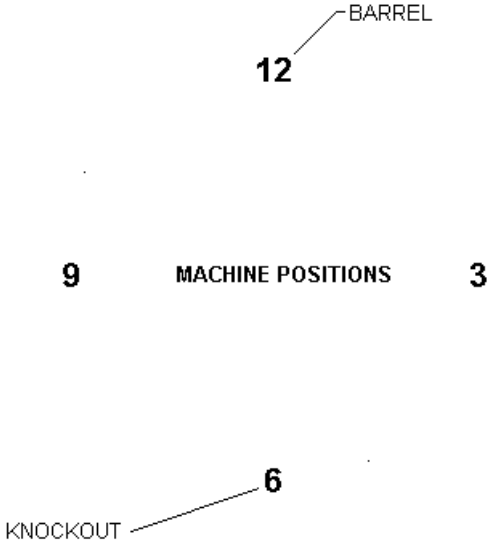
ROTARY MOLD TABLE

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.

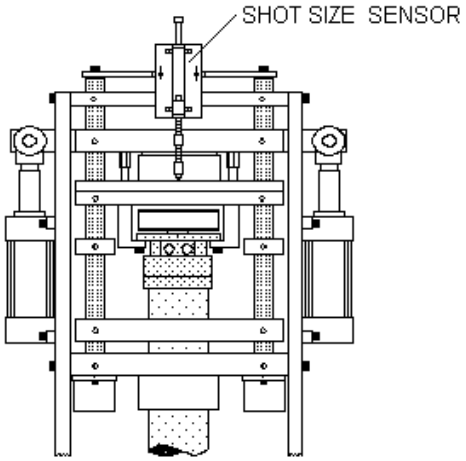


For example:

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.

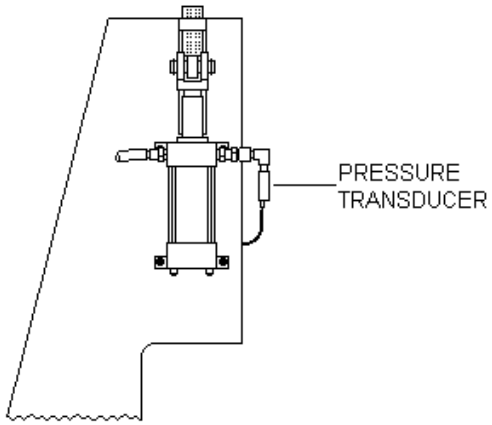
SHOTSIZE SENSOR

The shotsize sensor is mounted on the top rear of the machine. This sensor provides the Maco-sys controller linear position feedback for open loop control. Please see "SHOTSIZE SENSOR INSTALLATION" for adjustment procedures.



PRESSURE TRANSDUCER

The pressure transducer is mounted on the injection cylinder on the left side of the machine, as viewed from the operator. This sensor allows the Maco-sys controller feedback of the injection pressure for controlled closed loop operation. The pressure transducers potentiometers are factory set and should not be adjusted.



SAFETY SWITCHES

There are three hardwired safety switches installed on the machine; safety flag, barrel down limit, and barrel up limit. These three switches are all tied to the hydraulic system and will deactivate the hydraulic pump. The display will be vectored to the Alarm Log screen with the appropriate error displayed. A trait of these three switches that is unique for troubleshooting purposes is that when they are tripped the hydraulic system will enable but only as the motor on/off pushbutton is pressed. When the pushbutton is released the hydraulic system will deactivate again. This allows you to properly clear the error, if possible, by using the hydraulic pressure. Once the error is cleared the switch will properly reset and by pressing motor on/off pushbutton the hydraulic system will be allowed to stay latched.

SAFETY FLAG

The plexiglass safety flag and its components are used to protect the barrel, barrel guarding, top frame, and mold from crashing if the mold is accidentally left open, not fully closed, is too large, or has some other build up that otherwise would not fit into the space provided under the injection unit.

It is adjusted so that a mold will clear underneath it with minimum spacing allotted, and preferably at a slight angle forward. Follow the procedures on "HOW TO ADJUST THE SAFETY FLAG"

If the safety flag is tripped, to clear this error, hold the motor on/off pushbutton to engage the hydraulic system, at the same time press the safety reset pushbutton to latch the safeties and then push cycle start. The table will rotate backwards to the previous position, machine position 3. As soon as the safety flag is clear the motor on/off pushbutton can be released. Press cycle stop to stop table rotation. If you press cycle stop before the table reaches machine position 3 your table count will stay correct. If you delay hitting cycle stop you may have to re home the machine to your table position 1. When the table completes it rotation backwards you can correct the obstruction that is tripping the safety flag.

BARREL DOWN LIMIT

The barrel down limit switch is located on the rear of the top frame just above the barrel bushing housing plate. This safety switch will be engaged if the machine tries to inject or purge over a position that has no mold or purge block, or if the mold or purge block is designed to short. In some instances, it may also engage if there is inadequate grease in the top frame or if the barrel springs are weak or broken.

Adjustment of the switch only requires that the switch roller be set approximately 5/8” away from the barrel housing bushing plate. Follow the procedures on "HOW TO ADJUST THE BARREL DOWN LIMIT SWITCH"

Usually the error is momentary and will immediately reset after the springs push the barrel back upward. Depending on the operation that was occurring during the error, there may still be some processes running and immediate engaging of the hydraulic system may result in the switch being tripped again. Wait for the process to finish and then reengage the hydraulic system.

BARREL UP LIMIT

The barrel up limit switch is located just above the left injection cylinder, as viewed from the operators work zone. It will be located underneath the injection clevis guard.

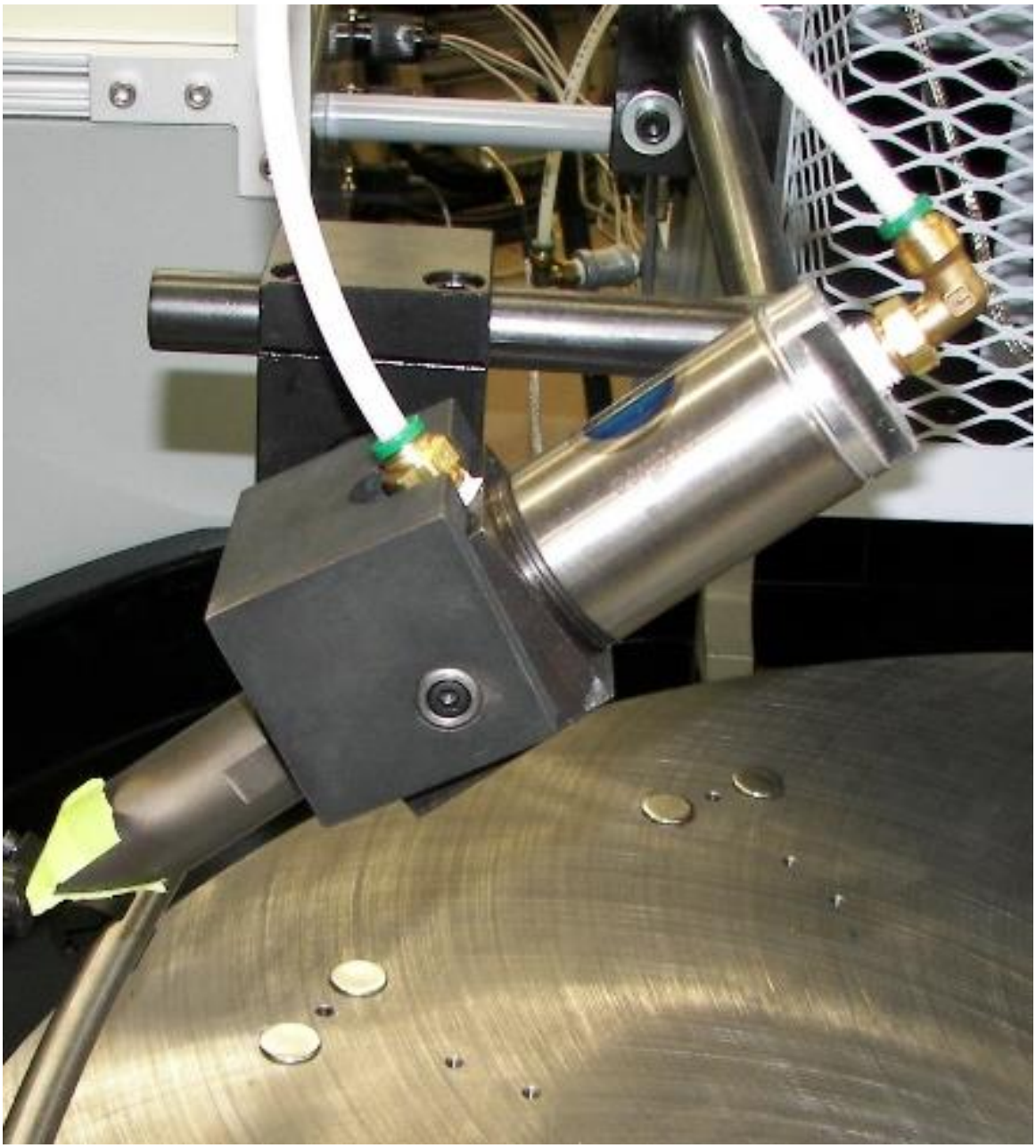
This switch is usually adjusted either by setting the switch arm just below the machines maximum allowed shotsize, 4 inches, or slightly above the process designed shotsize maximum. Follow the procedures on "HOW TO ADJUST THE BARREL UP LIMIT SWITCH"

If the machines screw rotation goes above setpoint this switch will restrict the system from reaching its maximum height, which could possibly lockup the screw/barrel system. When the screw rotates further than allowed, 4 inches travel of the injection cylinders, the added plastic that is building up in front of the screws check ring will push the barrel system down. This could result in both the screw and barrel being locked in their opposite directions.

To relieve this error, you may have to pull the screw from the barrel system. But, if the pressure of the plastic is relieved from the barrel the barrel would release back upward. This is can be done by first correcting the issue of why the screw went further up than expected, removing the nozzle nut from the end cap or inserting a purge block under the barrel, manually or otherwise, hold in the motor on/off pushbutton to engage the hydraulic system, reset the safeties, and purge the machine. Once the pressure is released the barrel will move back up and the screw back down, resetting the safety switches. Once the safety switches are reset the motor on/off pushbutton can be released.

SPRUE TRIMMER (OPTIONAL)

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

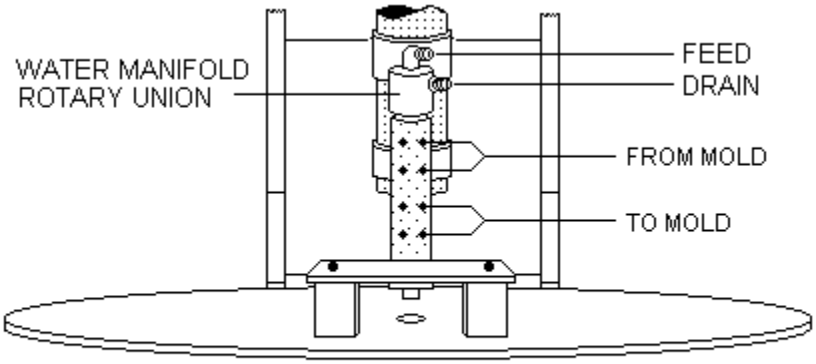


WATER MANIFOLD WITH ROTATING UNION (OPTIONAL)

The water manifold can be added to provide the molds water/oil-based heating and/or cooling. The molds will have to be designed with the proper porting to utilize this option and an external chiller/heater system installed.

Do not use solid pipe when installing water lines from molds to water ports. Only use flexible hose, and quick disconnects recommended.

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.

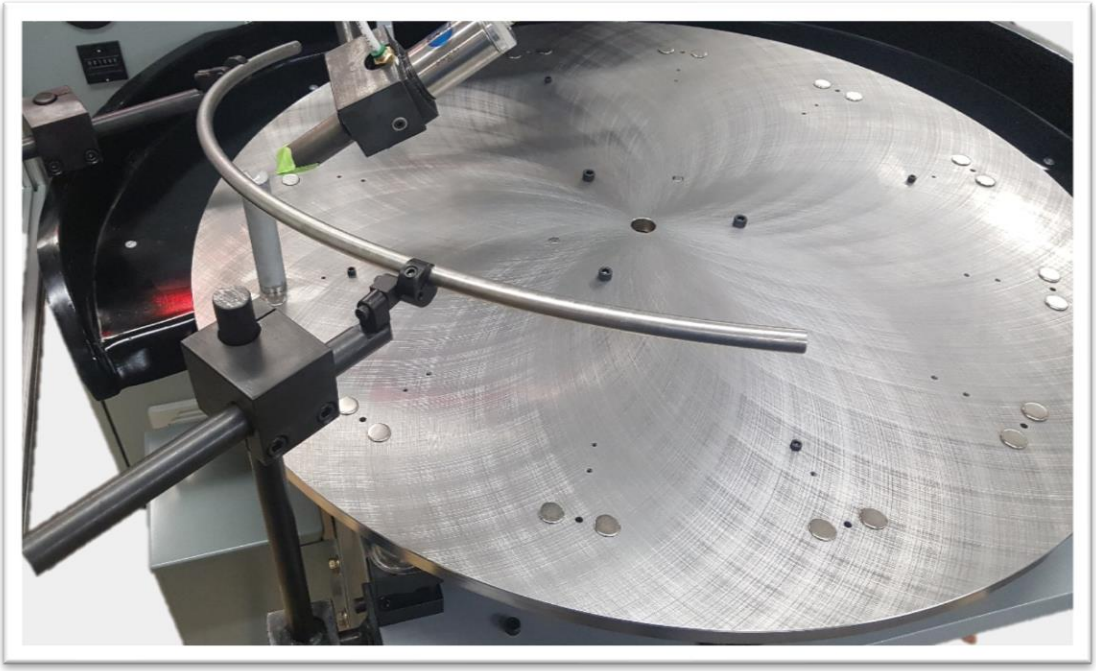
WARNING: Do not turn the water on until the water union is connected to the necessary devices.

DISCONNECTING DEVICES FROM WATER

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

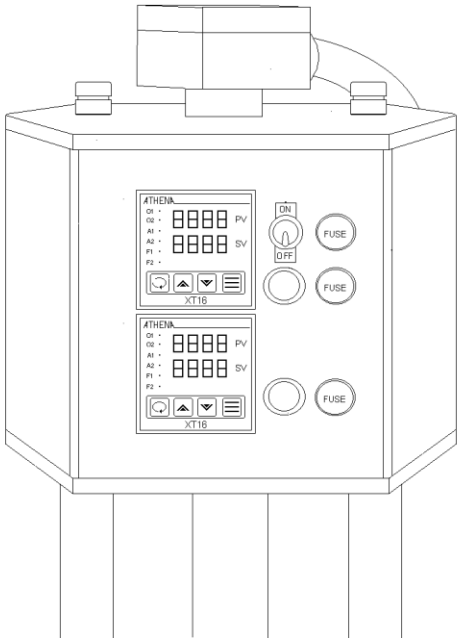
MOLD OPENING RAMP (OPTIONAL)

The optional mold opening ramp is used to open our book style type molds before the mold reaches the operator position, machine position 6. Utilizing roller bearing handles on the mold and this ramp system, a mold can be fully opened or partially opened and closed, hands free. Half ramp systems stop prior to the operator position and requires that the operator close the mold before continuning table rotation, pictured below. A full ramp system runs from the machines 8 o'clock position to the 3 o'clock position and allows the mold top be opened and closed without operator assistance. Full ramp systems requre that the core of the mold, or insert, be small enough for installation/removal without fully opening the mold and to be stable enough during any table movement. A core, or insert, that needs exact placement and stable holding may require the mold to be closed before any movement of the table, no ramp or a half ramp system may be more appropriate for this type of setup.



MOLD HEATING CARROUSEL (OPTIONAL)

The mold heating carrousel can independently heat and control up to 4 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. Molds need to be designed with the proper porting to utilize 240VAC cartridge type heaters.



When the control switch is moved to the on position, the temperature controllers will control the heat of the mold.

Pressing the temperature controller's up arrow button will raise the temperature setting. Likewise, pressing the down arrow 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.

MOLD HEATER CAROUSEL DISCONNECT (OPTIONAL)

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

- Connect a 240VAC 30-amp 3 phase service to L1, L2, and L3.
- Connect ground to cabinet.

240VAC 30-amp
3-phase

Section 3 – SCREENS AND SET-UP PROCEDURES

MODES OF OPERATION

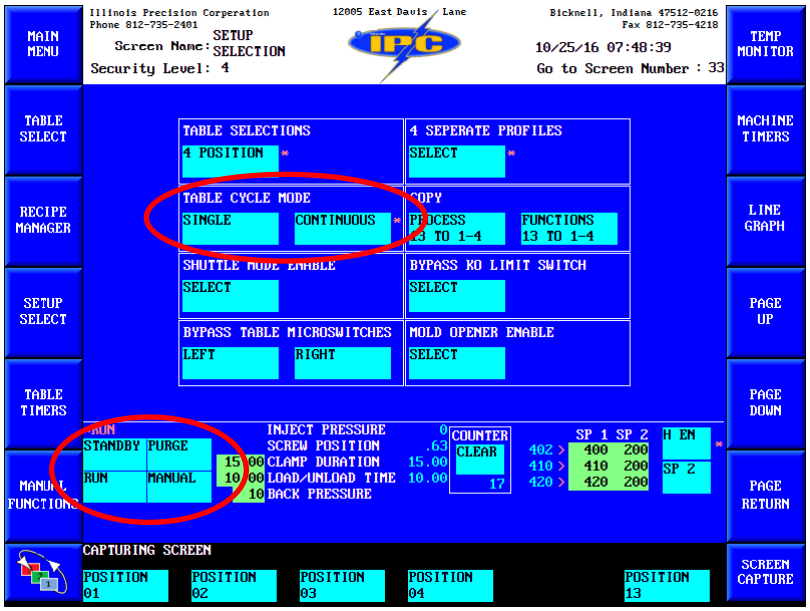


TABLE CYCLE MODES

The machine can run 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. This operation is best used if you are running four molds and must stop for an undetermined amount of time at each mold. Otherwise using continuous mode is optimal.

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. When in run mode and the heats up to their setpoint the machine will automatically start running its production cycles.

OPERATION MODES

The machine has five types of operational modes; standby, run, purge, manual, and shuttle.

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 shotsize for the next position selected to mold. If no position is selected the machine will default to the #1 positions shotsize. Upon exiting from the barrel position, the mold will trim and knockout, if selected to, and stop at the load/unload (operator) position for time specified by the load/unload timer.

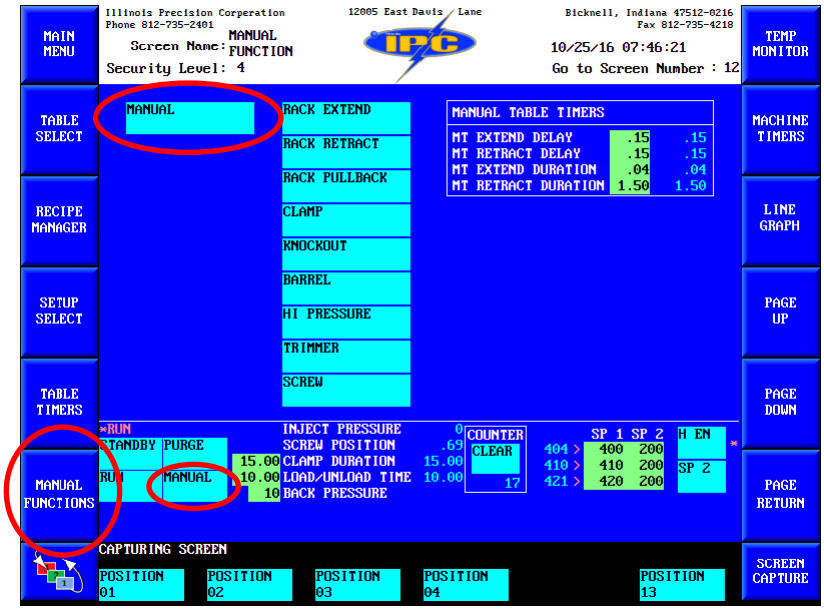
PURGE

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 under the barrel. The shotsize 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, one tooth of the main gear. This is beneficial in re aligning the table or installing/uninstalling a mold or purge block.



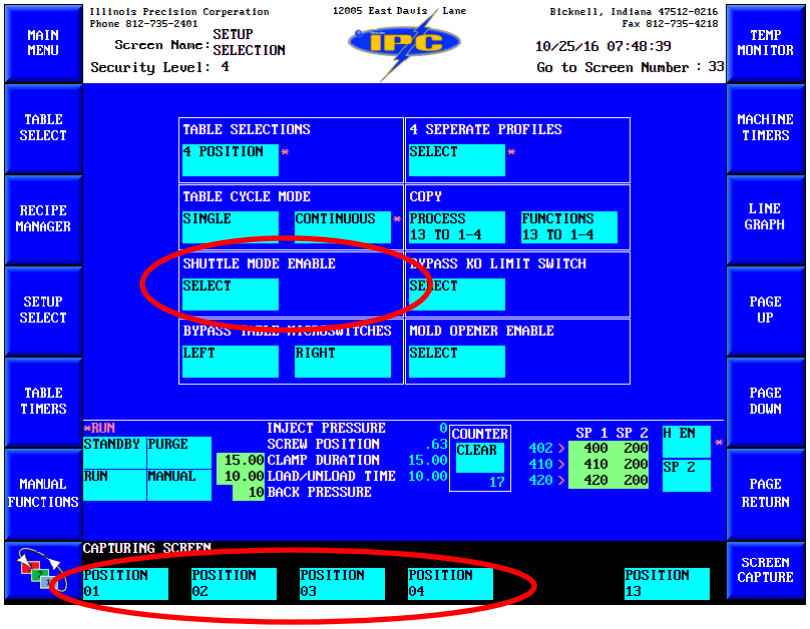
Note - Mold change positions can also be accessed if you break the light curtain half way between the 6 o'clock and 3 o'clock machine position. This will allow the molding position to clear the knockouts enough to allow you access to the mounting screw underneath the table. Once installed, resetting the safeties and selecting cycle start will reset correct table positioning and continue table operation.

While in manual mode, selecting and holding the individual output 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 and trimmer toggle which will cycle with just a press and release of the toggle, following their timer settings found on the Machine Timers screen.

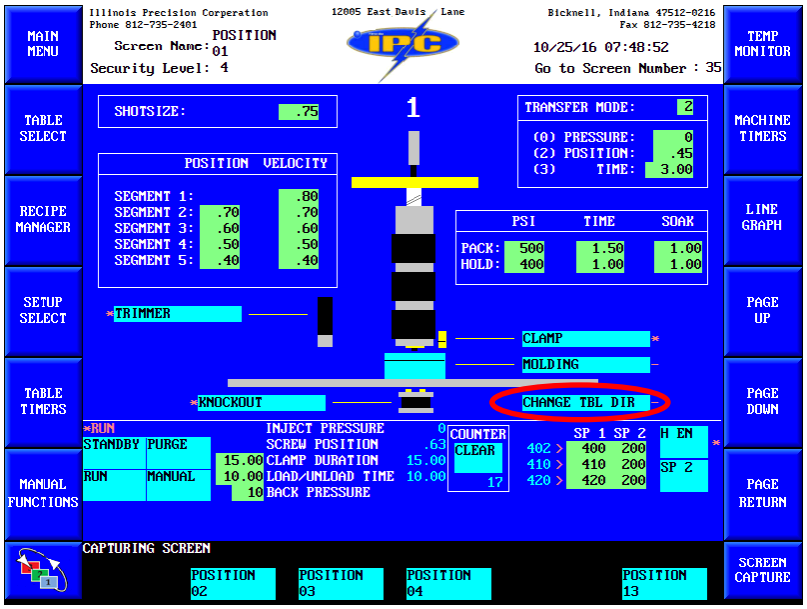
SHUTTLE MODE

Shuttle mode is a setup that allows the machine to rotate 180° to the barrel (CCW) and then back to the load/unload (operator) position following the reverse path (CW). 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° apart and may only shuttle them on the right side of table rotation.

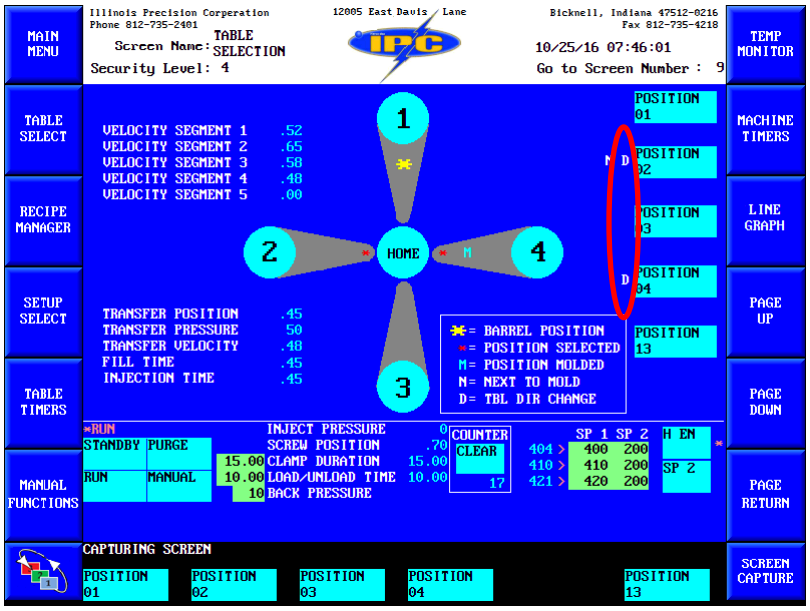
To set up shuttle mode you must first turn on the shuttle function by selecting the shuttle toggle on the Setup Selections screen.



Place the barrel on the table position between your two pivot positions. Then by accessing the individual pivot positions by pressing the soft keys along the bottom of the page, position 01-04, select CHANGE TBL DIR along the bottom of the screen.

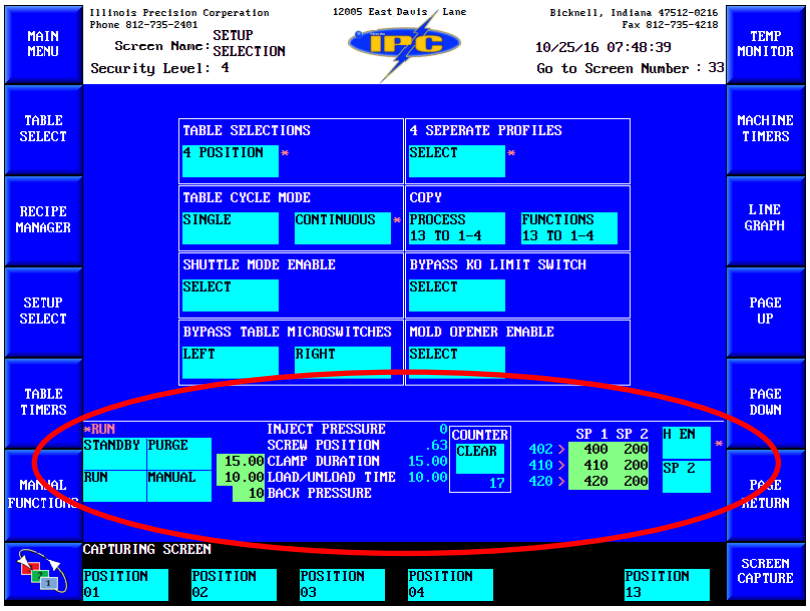


In standby mode, check your rotation and function of shuttle. Be sure that the rotation is utilized on the right side of the machine and that shuttle is working properly.
From the Table Selection screen, you will see a “D” on your individual pivot position, right side of the screen, representing the positions selected for a directional change.



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. It is important to understand these values are the same on all molds no matter the molds individual processes.



CLAMP DURATION

Clamp duration gives you a value and a setpoint for the time the clamp will be engaged during a molding process. This time is universal and must 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 can be within the light curtain during the load/unload process without tripping an alarm. The load/unload 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. When a position is molded and rotates to the 6 o'clock position you must wait for the green tower light before entering the work area, and you must be out before the timer counts down completely. Otherwise you must reset the safeties before resuming production.

SCREW POSITION

Screw position gives the operator an analog value of the current linear position of the screw. This value will relate to the shotsize 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. Enabling of the back pressure is done on the Setup Selection screen (33).

PROD. CNT (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.

MODES

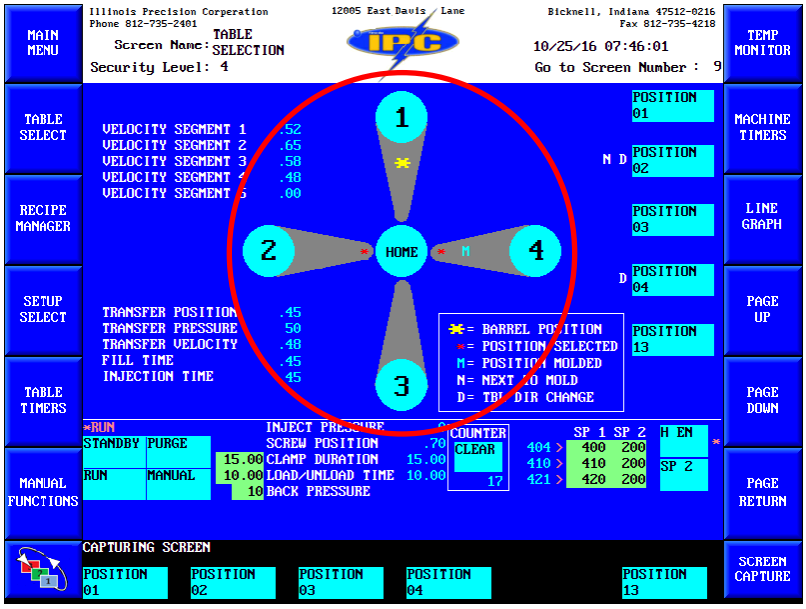
All operation modes, besides shuttle, are accessible on this All Molds Mini screen. There is also a visual display of what operational and cycle modes are active.

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.

TABLE SELECTION (9)

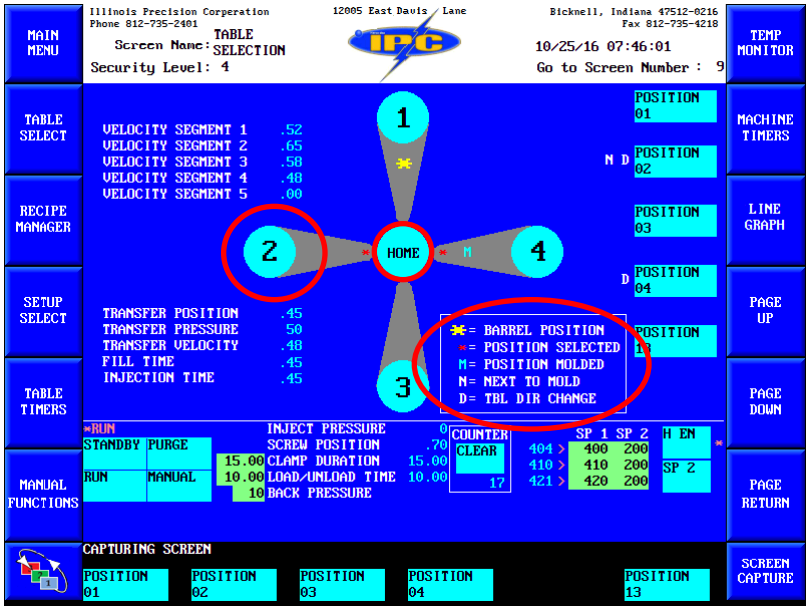
All Echo MD machines are setup for four position operation, you may only run up to four individual molds. If the machine is setup for four molds you lose your purge block position and, generally, you must remove a mold to install the purge block if the purging operation is required.



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.

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 1.

The blue M denotes the position has molded and will trim and knockout, if that function is enabled for that position. It also activates the load/unload timer when in the load/unload position. The M will not clear until that position load/unloads.

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.

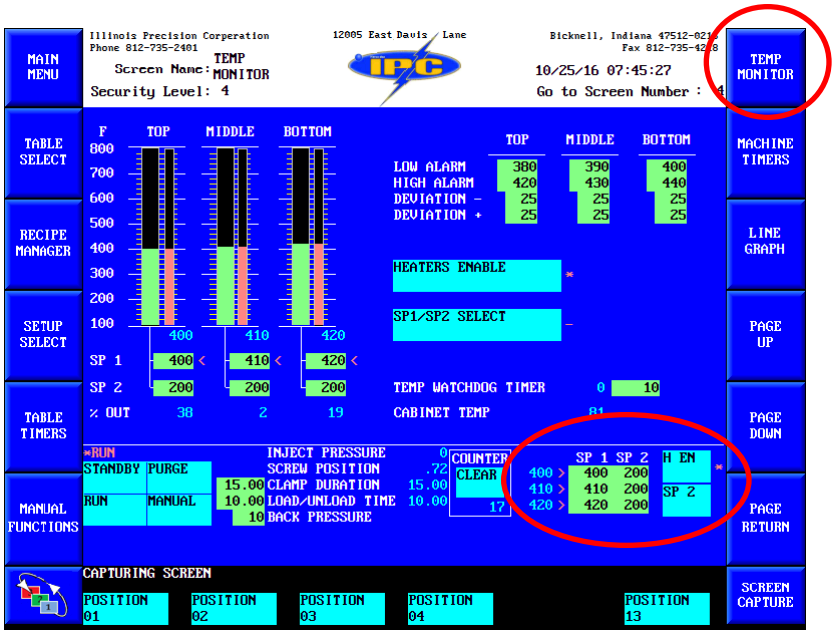
It will set shotsize to the 1st shotsize of the next mold selected, position 1’s 1st shotsize if no mold is selected to mold, or the 1st shotsize of the current position under the barrel if in purge mode.

The home toggle, center of the daisy dial, will reset, when pressed, the position under the barrel to table machine position 1. When the machine powers up the position under the barrel automatically gets set to table position 1. But, if the table becomes misaligned and the position becomes off, this toggle will allow you to reset the process table position 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.

TEMP MONITOR (4, 5, 30)

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 (HEATERS ENABLE)

To enable/disable the heats select the H EN or heaters enable 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. Toggle between the two setpoints by the SP1/SP2 select or SP2 toggle.

If the machine sits idle, without injecting, for the time specified by the temp watchdog timer the system will switch from SP1 to SP2 automatically and the heats will begin to drop to SP2. This is a safety setting so by selecting the reset safety pushbutton it will automatically revert to SP1 and begin reheating the system. If you manually select the

SP1/SP2 toggle then the safety reset will not revert the heats to SP1, you must manually select the SP1/SP2 toggle to revert to SP1.

TEMP WATCHDOG

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

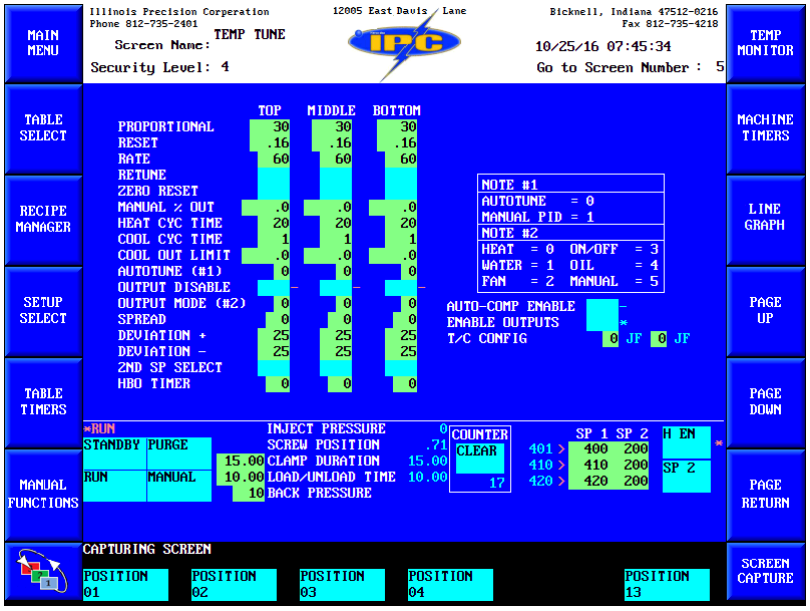
This setpoint is a high alarm warning for the heats that does not restrict any operation but will vector you to the error screen until the alarm is cleared.

DEV +/- (DEVIATION +/- ALARM)

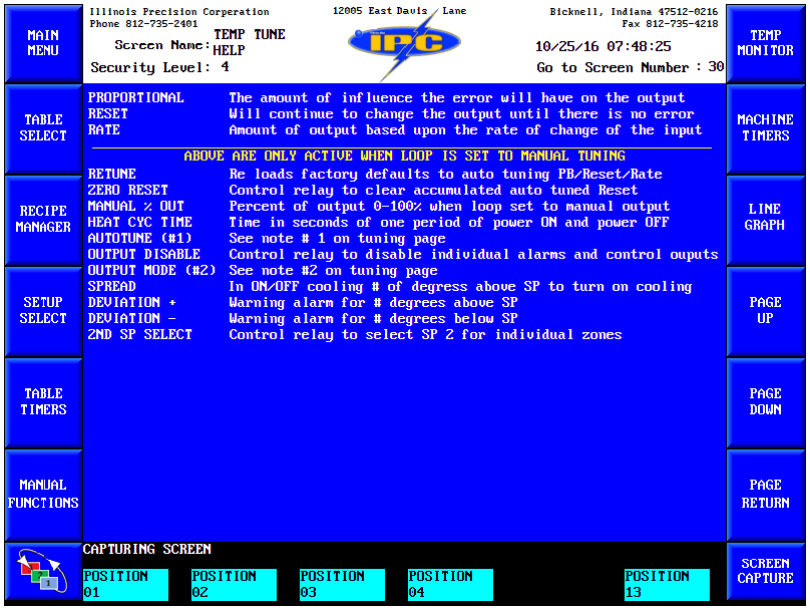
These setpoints are a secondary warning alarm for the heats, if needed. These alarms will not vector you to the Alarm Log screen or restrict any operations but will give you an ALARM warning on the All Molds Mini screen as well as a red-light alarm. A value of 0(zero) will disable the alarm.

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. Leaving the tuning function to auto tune is recommended.

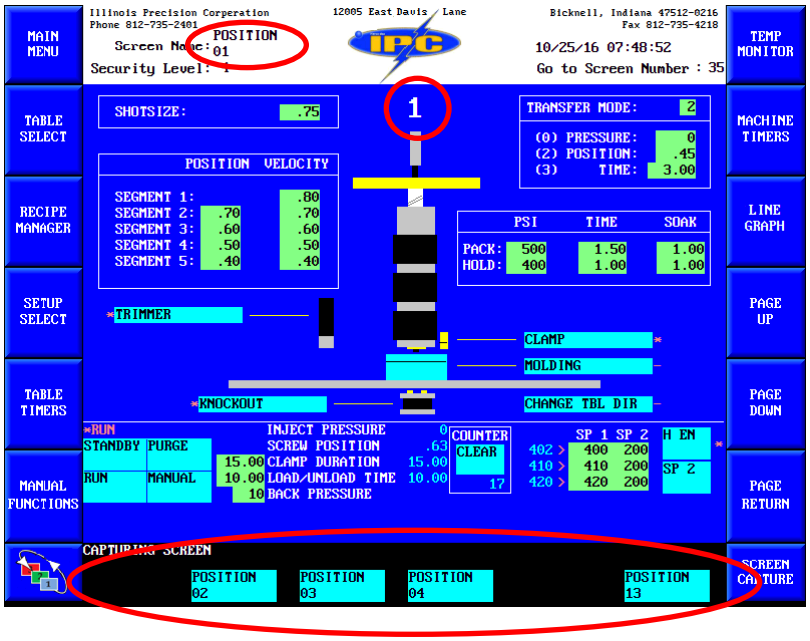


But, a Temp Tune Help screen and Maco-sys Maco manual is available to help guide setup, if need be.

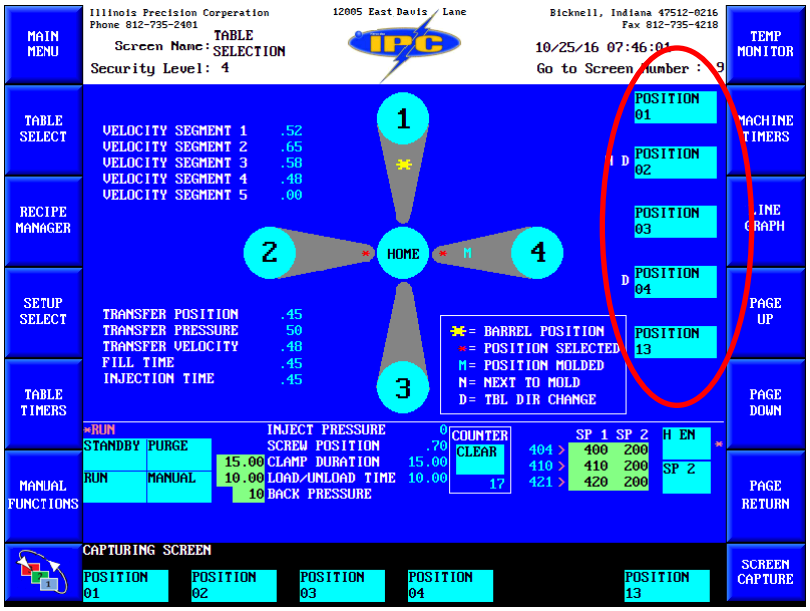


INJECTION PROFILE (POSITION 1-4) (35-38)

The process of setting up the injection profile is like our BCCL model injection molders. There are five stages of injection positions and speeds that can be utilized before leading into pack and/or hold.

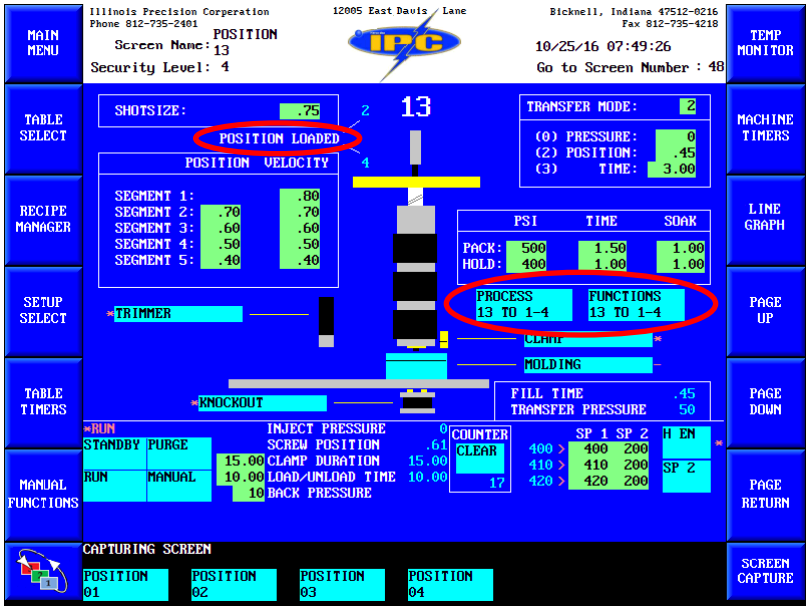


Each mold position on the table has a corresponding injection process screen. The screen name in the main title bar describes which positions profile is currently active. You can access individual positions by page 1 & 2 of the soft keys on most screens and from the Table Selection screen from the position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


MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: TABLE SELECTION
Security Level: 4
10/25/16 07:46:01
Go to Screen Number : 9
VELOCITY SEGMENT 1 .52
VELOCITY SEGMENT 2 .65
VELOCITY SEGMENT 3 .58
VELOCITY SEGMENT 4 .48
VELOCITY SEGMENT 5 .00
1
2
HOME
4
3
POSITION 01
POSITION 02
POSITION 03
POSITION 04
POSITION 13
TRANSFER POSITION .45
TRANSFER PRESSURE 50
TRANSFER VELOCITY .48
FILL TIME .45
INJECTION TIME .45
= BARREL POSITION
= POSITION SELECTED
M= POSITION MOLDED
N= NEXT TO MOLD
D= TBL DIR CHANGE
RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .70
CLAMP DURATION 15.00 15.00
LOAD/UNLOAD TIME 10.00 10.00
BACK PRESSURE 10
COUNTER
CLEAR
17
SP 1 SP 2
404 > 400 200
410 > 410 200
421 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
POSITION 13

POSITION 13 (48)

On the Table Selection screen there is an extra position toggle labeled position 13. 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 screen page will be subsequently copied to all molds upon selecting the process 13 to 1-4 or functions 13 to 1-4 toggle.



PROCESS 13 TO 1-4

This toggle will copy all process variables to all four molding positions. Process variables does not include enabling/disabling clamp, molding, knockout, or trimmer.

FUNCTIONS 13 TO 1-4

This toggle will copy the selected states of the four molding functions to all four molding positions. Molding functions does not include process variables.

A zero value must be entered on an individual injection process screen as needed.

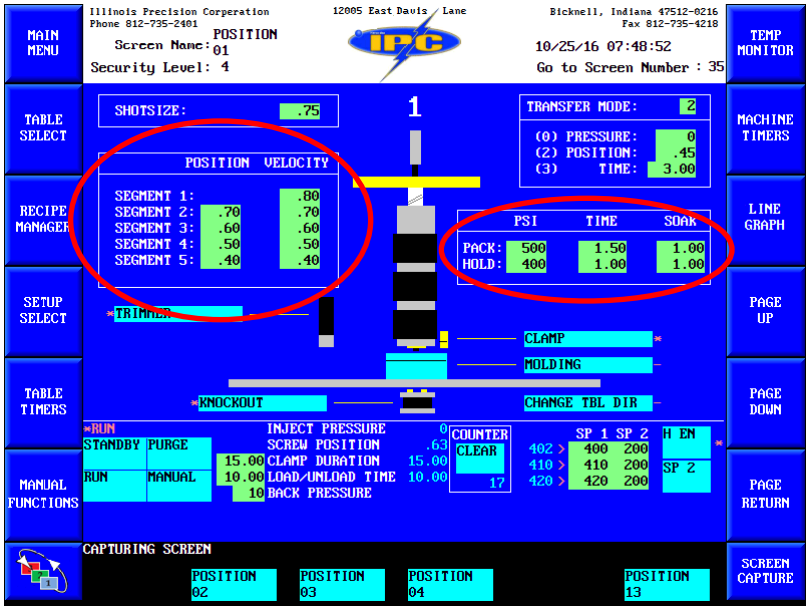
POSITION LOADED

This indicator shows the molding position loaded for both the shotsize and segments profile and will populate accordingly for the next to 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 3 stages; the injection profile has stage 1 along the left side of the screen in the segments profile and stage 2 and 3 across the right labeled pack and hold.



The process at which injection runs is as follows;

The process will run from shotsize following segment 1's velocity until it reaches segment 2's position at which time it will switch to segment 2's velocity. It will follow this pattern across the segments until the transfer mode is reached. Once the transfer mode is reached the process will switch to pack mode. Once pack mode is completed hold mode will operate. When hold mode is completed the injection process will cease and the screw will recover. Screw recovery resets the shotsize to the shotsize of whatever position is selected to mold next, position 1's shotsize if no mold is selected to mold, or the shotsize of the current position under the barrel if in purge mode.

Optimally, this entire process must happen before the the injection timeout, found on the PC Tuning screen, or the clamp duration timer times out. If the injection timeout or clamp duration times out, before the entire process is ran, the screw will retract to its setpoint and production will resume, but the process never fully completed as designed.

The process can be designed with the number of segments you prefer and either pack or hold or neither. But generally, at least one segment and one pressure pack are recommended.

SHOTSIZE

This value is your linear position of the screw and references inches; 4.00 inches maximum is equivalent to 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 All Molds Mini screen. Controller scan time, screw speed, plastic, heats, and other variables will cause a slight difference in these two numbers.

Segment positions are a marker reference of the shotsize to enable that specific segments velocity at the positions setpoint.

VELOCITY

This value is the injection speed referenced in inches per second (ips). 4.00 ips maximum. Use this value to increase/decrease the speed of injection per segment positions.

PACK/HOLD

The two stages after your segment profile to utilize for precise pressure processing. Pack always initializes before hold.

PACK/HOLD PRESSURE

The pressure destination of the stage utilized. This value can be referenced via the injection gauge or on the All Molds Mini screen. It represents Pressure per Square Inch (PSI). General maximum value is 1800 PSI, factory max machine pressure.

PACK/HOLD TIME

Total amount of time the stage will operate.

PACK/HOLD SOAK TIME

The amount of time in the beginning of its pack/hold time that the pack/hold pressure will be held constant. After this timer ends the pack/hold pressure will ramp up or down depending on the pressure setting of the next stage of the operation. Pack will ramp to hold pressure. Hold pressure will ramp to zero pressure. If pack/hold time and its soak

time are equal then pack/hold pressure will stay constant throughout pack/hold time and will jump instantly to the next pressure stage, or zero pressure if in the hold stage

TRANSFER MODE

There are three different modes of transferring from the segment profile to pack/hold stage; 0=Pressure, 2=Position, 3=Time. Select a preferred transfer indicator by entering the the number corresponding to the transfer indicator in the transfer mode selection setpoint. Enter a value into that specific transfer indicator setpoint. As the process is running when the value of the transfer indicator is met the process will transfer from the segment profile to the pack/hold stages.

0=PRESSURE

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the injection pressure reaches its transfer indicator setpoint.

2=POSITION

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the shotsize position reaches its transfer indicator setpoint.

3=TIME

This transfer indicator will transfer the process from the segment profile to the pack/hold stage when the injection time reaches its transfer indicator setpoint.

*** Note on process setup *** When setting process positions, velocities, transfers, and pack/hold variables you must remember to have adequate times setup in the injection timeout and clamp duration timers. These two timers will cease all process variables when timed out.

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° 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 SELECTION (33)

The Setup Selections screen gives you access to several bypasses and setup toggles.

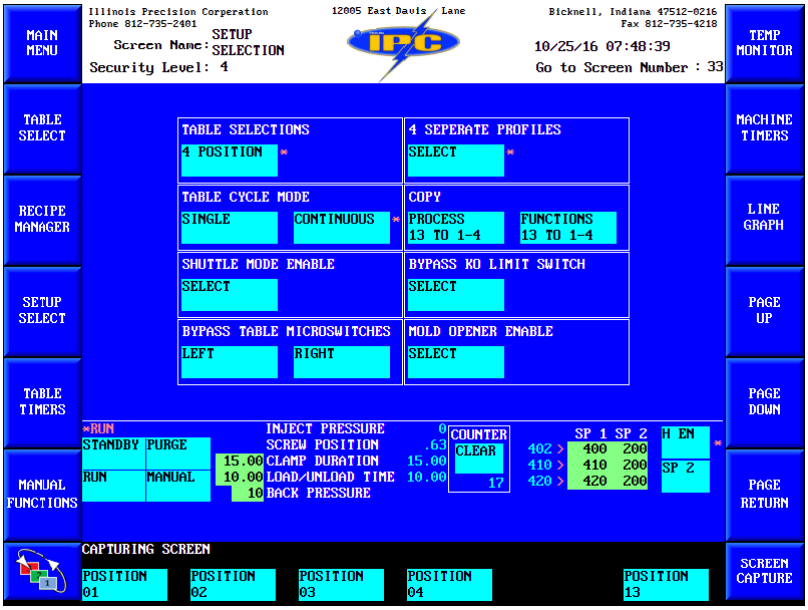


TABLE SELECTIONS

This toggle relates to the amount of table positions available. All Echo MD machines are 4 station tables. This toggle was designed for programming only and should be left in the on state indefinitely.

This option is predetermined at the factory and should not be altered.

BYPASS TABLE MICROSWITCHES

LEFT (LEFT MICRO SWITCH 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. When not bypassed the extend duration timer becomes an error timer for this microswitch.

RIGHT (RIGHT MICRO SWITCH 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. When not bypassed the retract duration timer becomes an error timer for this microswitch.

BYPASS KO LIMIT SWITCH

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. When not bypassed, the knockout duration timer becomes an error timer for this switch.

TABLE CYCLE MODES

The machine can run 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. This operation is best used if you are running four molds and must stop for an undetermined amount of time at each mold. Otherwise using continuous mode is optimal.

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. When in run mode with the heats up to their setpoint the machine will automatically start running its production cycles.

SHUTTLE MODE

Shuttle mode is a setup that allows the machine to rotate 180° to the barrel (CCW) and then back to the load/unload (operator) position following the reverse path (CW). 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° apart and may only shuttle them on the right side of 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.

COPY

PROCESS 13 TO 1-4

This toggle will copy all process variables from Position 13 screen to all four molding positions. Process variables does not include enabling/disabling clamp, molding, knockout, or trimmer.

FUNCTIONS 13 TO 1-4

This toggle will copy the selected states of the four molding functions from the position 13 screen to all four molding positions. Molding functions does not include process variables.

A zero value must be entered on an individual injection process screen as needed.

4 SEPARATE PROFILES

Selecting this toggle will enable/disable the ability to run four unique individual molds or for all molds to run the same profile, position 13. When enabled, positions 1-4 are setup per their individual screens and position 13 is populated with their variables, depending on mold positions selected to mold, as the table rotates. When disabled position 13 is the process screen and all adjustments made to 13 will affect all positions selected to mold.

MOLD OPENER ENABLE

If option is installed, this toggle will enable a mold opening sequence that provides two additional 24VDC outputs, two delays, and two duration timers running concurrently at the machines 9 o'clock position. Specifically designed for a mold opening hydraulic cylinder, extend and retraction.

TABLE TIMERS (47)

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.

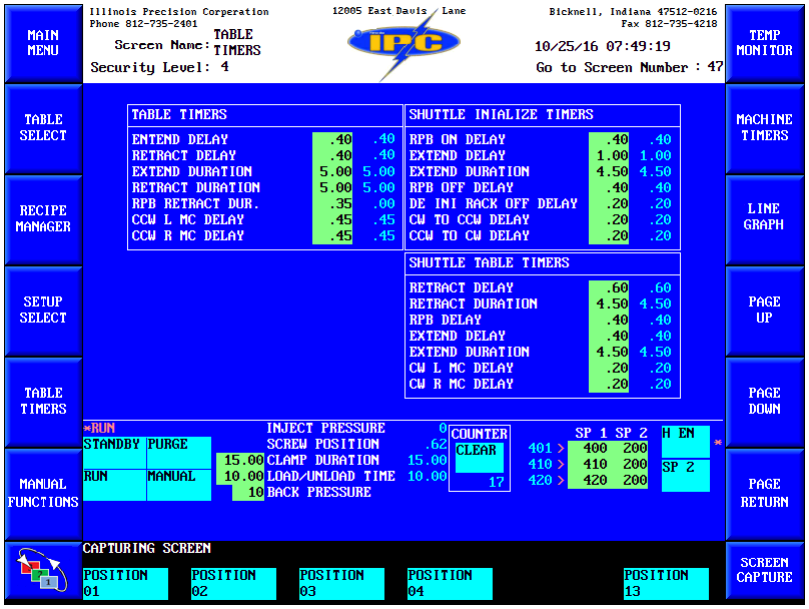


Table timers are broken down into 4 groups; table, shuttle, shuttle initialize, and manual. Table timers are the standard timers that run the table CCW, standard operation. Shuttle table timers are the timers that run the table CW. Shuttle initialize timers are the timers that changes the direction of 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

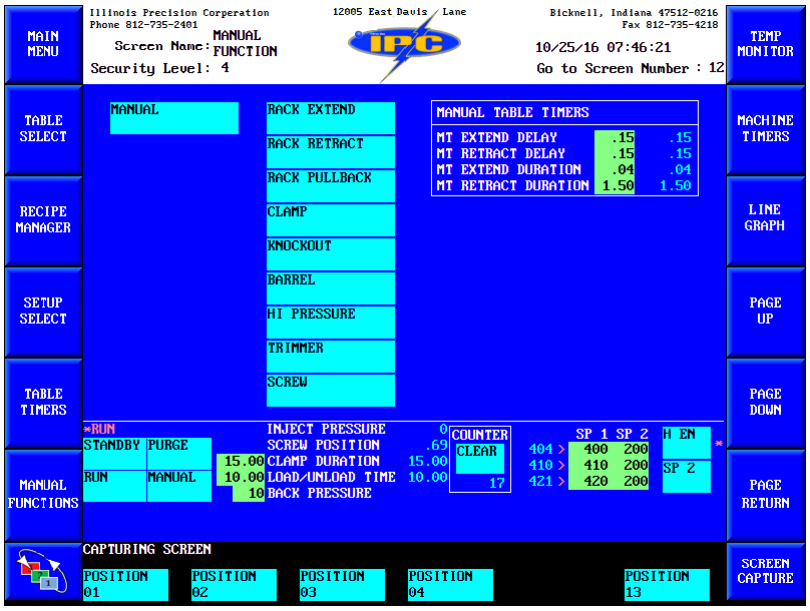
How long the rack cylinder is given to extend to hit the left microswitch before an alarm is tripped. If the microswitch is bypassed, it is utilized as an actual duration timer before the RPB cylinder is activated

MANUAL FUNCTION (12)

To access the manual mode, you must first select the Manual Functions screen key. Upon selection of the manual mode toggle, selecting cycle start will move the table in increments of a rotation, one tooth of the main gear. This is beneficial in re aligning the table or installing/uninstalling a mold or purge block.

Note - Mold change positions can also be accessed if you break the light curtain half way between the 6 o'clock and 3 o'clock machine position. This will allow the molding position to clear the knockouts enough to allow you access to the mounting screw underneath the table. Once installed, resetting the safeties and selecting cycle start will reset correct table positioning and continue table operation.

While in manual mode, selecting and holding the individual output 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 and trimmer toggle which will cycle with just a press and release of the toggle, following their timer settings found on the Machine Timers screen.



MANUAL TIMERS

MT EXTEND DELAY

Delay before the rack cylinder extends.

MT RETRACT DELAY

Delay before the rack cylinder retracts.

MT EXTEND DURATION

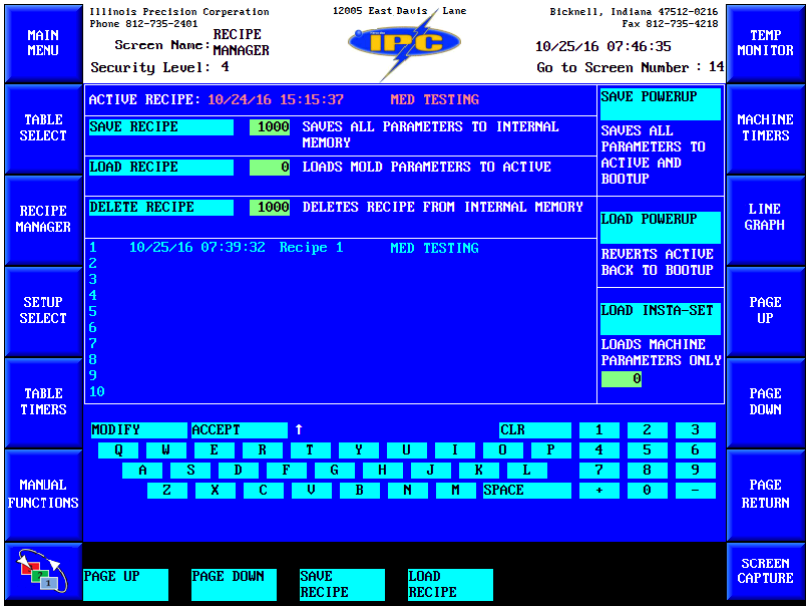
How long the rack cylinder is given to extend, no microswitch.

MT RETRACT DURATION

How long the rack cylinder is given to retract, no microswitch.

RECIPE MANAGER (14)

A more intuitive and larger recipe management system is offered than in any of our previous models. This system can store up to 999 different recipes. 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.



Use the individual save/load/delete recipe toggles coupled with their respective setpoint to complete that operation.

The keypad makes text input increasingly easier.

Screen soft keys allow for page scrolling of the recipe database, as well as text input options and save/load options.

Active recipe is the current loaded recipe on the system and the current powerup recipe (boot-up recipe), if no changes to the process has been made. The recipes do not automatically save. Any recipe changes made throughout production must be resaved down into the recipe database, and re saved to the powerup recipe, if it is to be the powerup recipe.

Save recipes often, and if changes have occurred save power up as well.

SAVE/LOAD/DELETE RECIPE

Enter the database line # in the setpoint field and the select the toggle of the corresponding operation you wish to perform.

SAVE POWERUP RECIPE

Saves all current process parameter to the active and powerup recipe.

LOAD POWERUP RECIPE

Reverts the active recipe back to the last saved powerup recipe.

LOAD INSTA-SET

A distinction that needs to be made is the difference between a recipe and an insta-set. A recipe is all process specific variables; mold parameters, heats, molding timers, etc. Insta-sets are machine specific parameters, such as calibrations and timers related to the table that do not change with process changes. It is recommended that once all machine parameters are set and correct a recipe is saved down into recipe database with an appropriate label specifying it is an insta-set recipe base. If changes are accidentally made to machine settings, then that insta-set is reloaded. All recipes will be loaded on top of that insta-set thereafter. If calibration is redone on the machine, the old insta-set recipe should be deleted and a new resaved.

MODIFY

Selecting modify will bring down the active recipes title to make slight changes to the title or add a revision #.

ACCEPT

Select accept will save the new recipe title as the active recipe title.

CLR

Selecting CLR will clear out the current recipe title change.

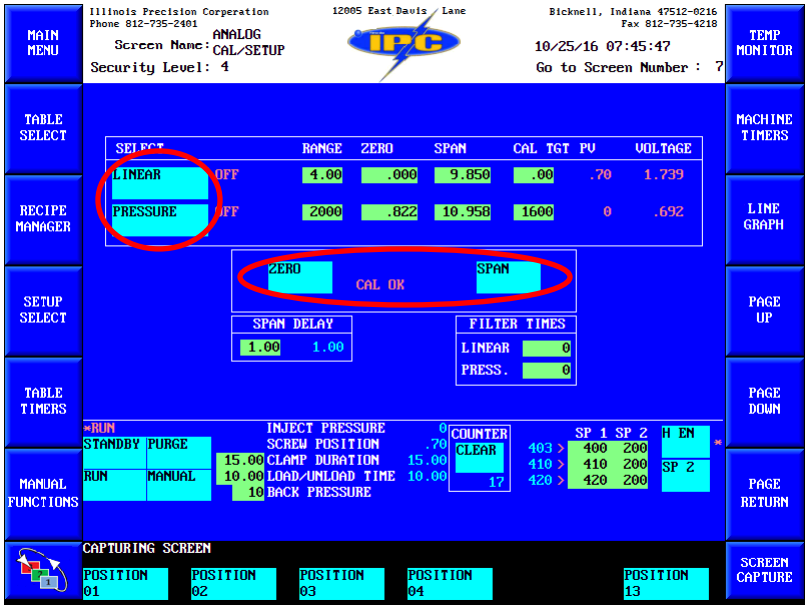
ANALOG CALIBRATION SETUP (6, 7, 8)

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 personnel should perform calibrations

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 linear line. The values zero and span displayed will change as the calibration is performed. Range, Cal Tgt, span delay, and filter times are factory set values and should not be adjusted.

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. When the screw mounting plate is against the black rings on the guide rod the machine has reached its bottomed-out position.
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 toggle.
9. With the linear toggle “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 toggle is still “ON”.
12. Have an assistant span the shotsize sensor to its full travel, 4 inches, 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.

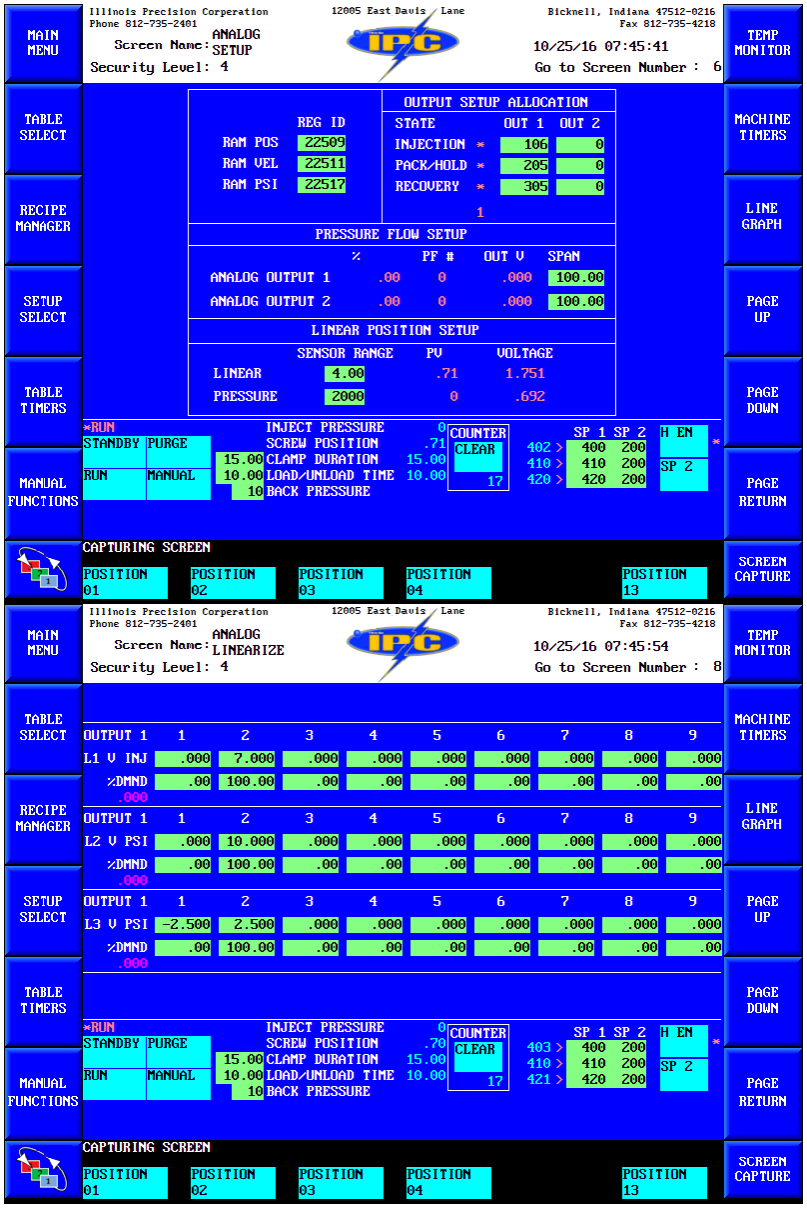
Calibration for the Analog Linear Shotsize Sensor is complete.

The following procedure will adjust the zero and span screen values of the pressure line. The values zero and span displayed will change as the calibration is performed. Range, Cal Tgt, span delay, and filter times are factory set values and should not be adjusted.

1. Verify the pump is still disabled.
2. Select the pressure toggle.
3. With the pressure toggle “ON”, select the Zero calibration toggle.
4. A message will read “Calibrating”, once complete it will read “Cal Ok”, if there are no issues with the setup or calibration.
5. Verify that the pressure toggle is still “ON”.
6. Select the Span calibration toggle.
7. 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 Pressure is complete.

Two other screens that are calibration specific are pictured below; Analog Setup and Analog Linearize. These screens are set at the factory and should not be adjusted



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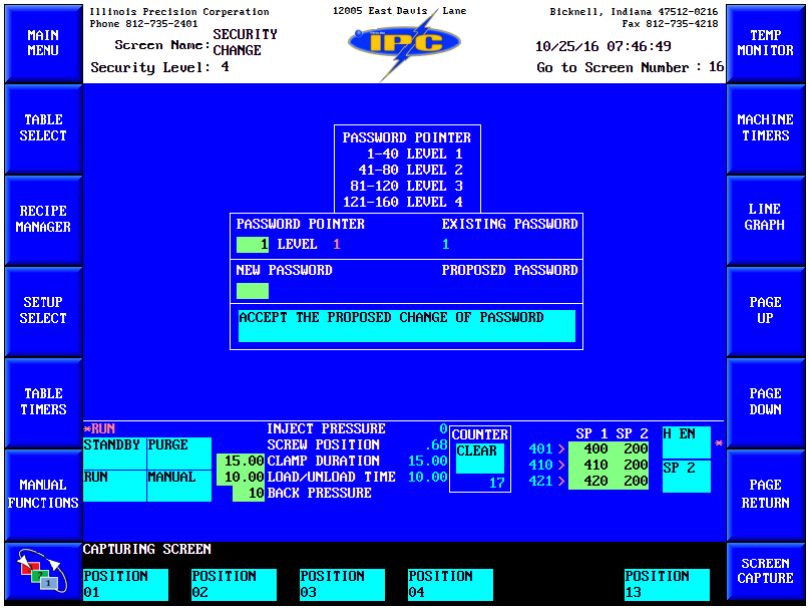
SECURITY CHANGE (16)

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.



Once access is granted to this screen, by selecting the password pointer setpoint and entering in a level of security # (1-40, 41-80, etc.…) 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 hyphen.

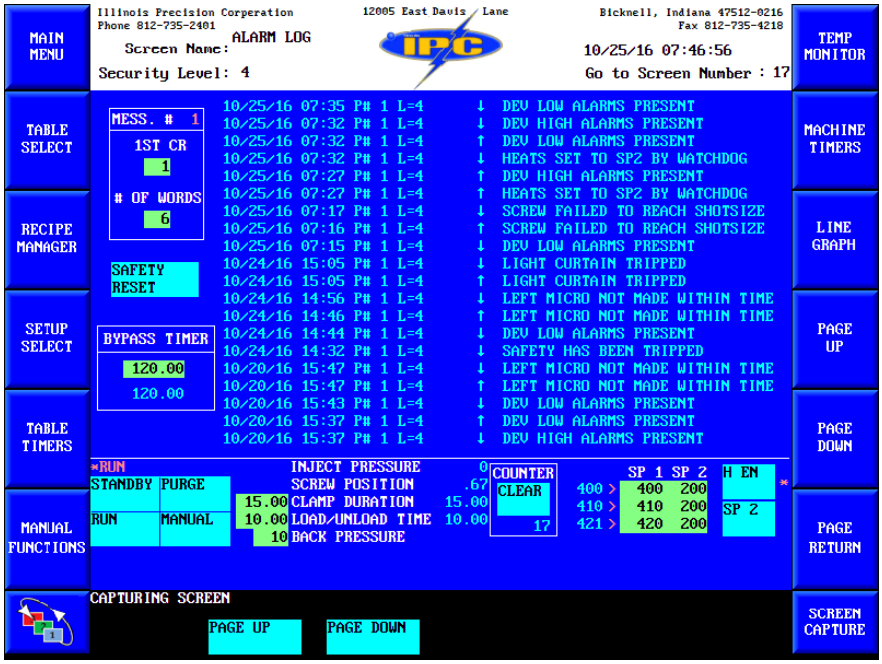
DEFAULT PASSWORDS

Level 1 - 1
Level 2 - 1234
Level 3 - 1397
Level 4 - 735-2401

Be sure to document, remember, and/or store all passwords in a safe location. Factory installed passwords cannot be deleted or overwritten 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 information on 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.

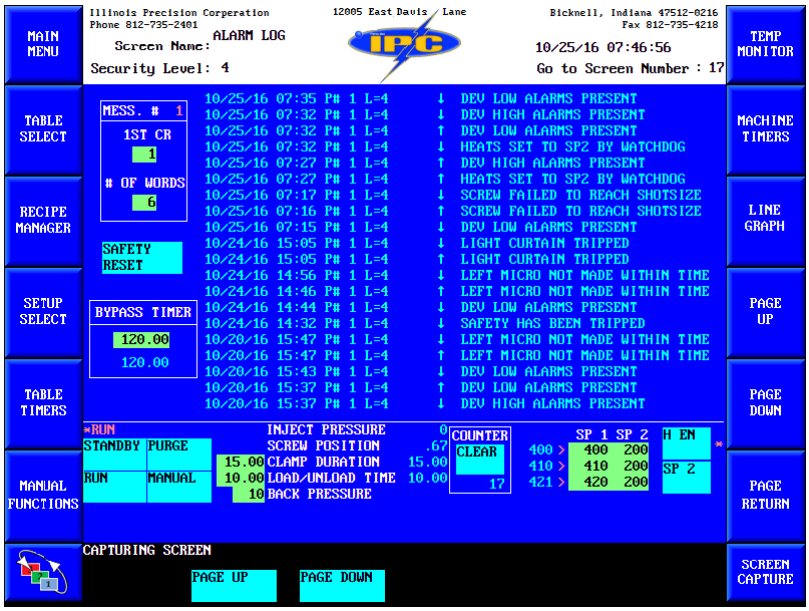
Example; in the picture below, the heater watchdog timer timed out on October 25, 2016 at 7:32 a.m. The security level during this alarm was level 4 and it was the first password in level 4. The first password in level 4 security is password 735-2401.



ALARM LOG (17)

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 operator's' 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 in the All Molds 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.

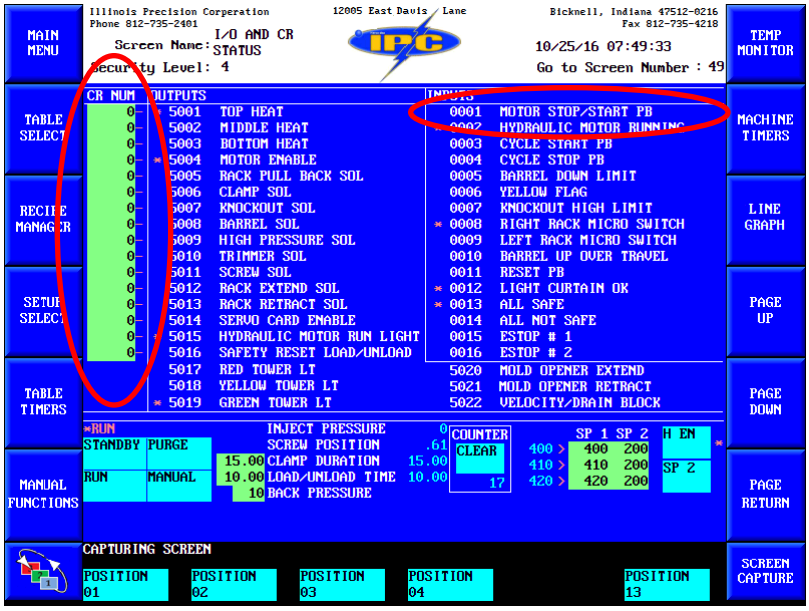
Always, an alarm will trigger a red light on the light tower, vector or not.

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. If a vector alarm is triggered, by pressing the safety reset button you may leave the Alarm Log screen. As the timer is counting down you may navigate away from the Alarm Log screen to help alleviate the alarm. If the alarm is not corrected within the bypass time specified, the alarm will vector you back to the Alarm Log screen.

I/O AND CR STATUS (49)

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 makes troubleshooting of system malfunctions even easier.



INPUTS/OUTPUTS

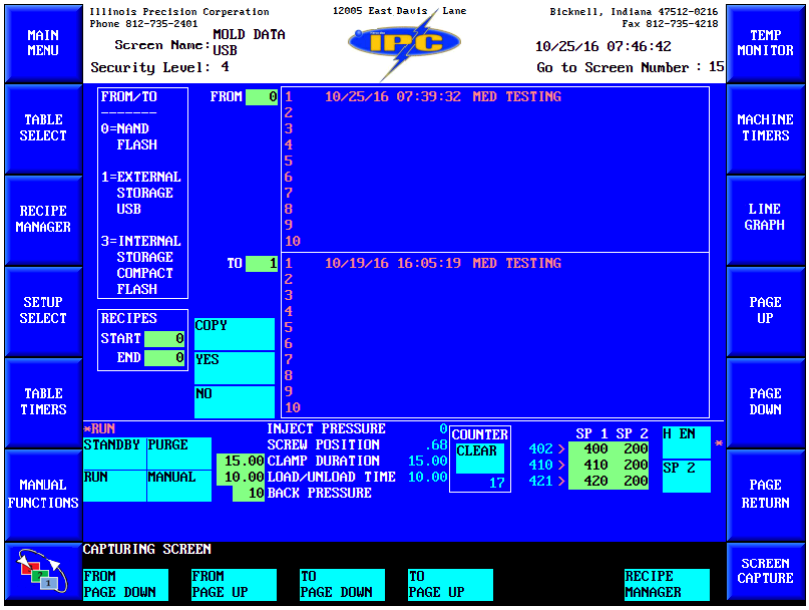
Each line contained in the inputs/outputs columns provides you a description of all the available functions on the machine, the address number for that function, and an asterisk corresponding with an on state of that function.

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.

MOLD DATA USB (15)

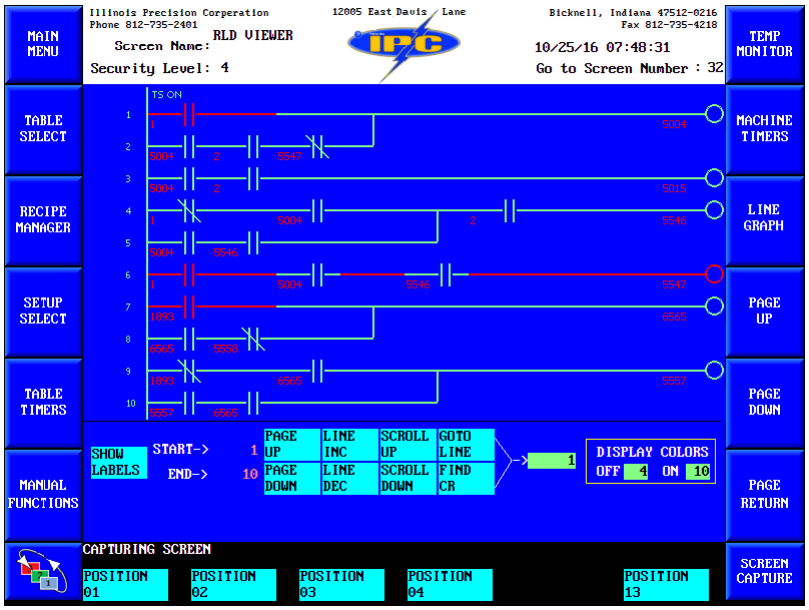
The Mold Data USB Screen allows quick copying of single or multiple recipes across the internal storage, external storage devices, or provided compact flash card. By entering in the desired devices in the from/to setpoint fields, using the chart provided, a start/end line # from the database of the device specified, and selecting copy, multiple recipes can be transferred to any device at one time.



Please refer to the Maco-sys Maco Manual for further internal system file structure and instructions.

RLD VIEWER (32)

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 runs and toggles the states on or off.

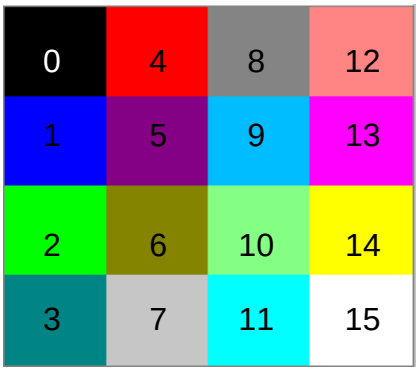


LOGIC DISPLAY

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.



SHOW/HIDE LABELS

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

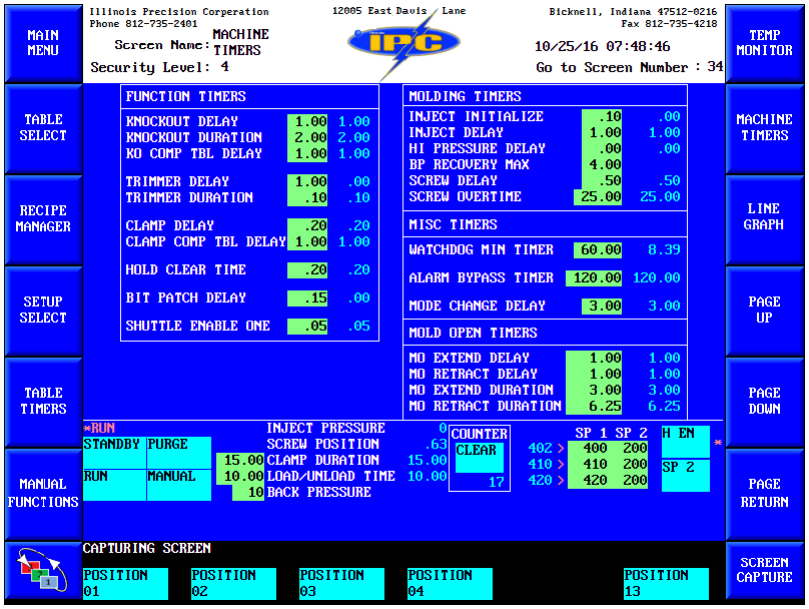
INCREMENT

The increment toggles allow different scrolling options in the logic display.

FIND

The find toggles will jump to a CR or line number in the logic.

MACHINE TIMERS (34)



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 can 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 can 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 can 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 load/unload 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.

MOLDING 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.

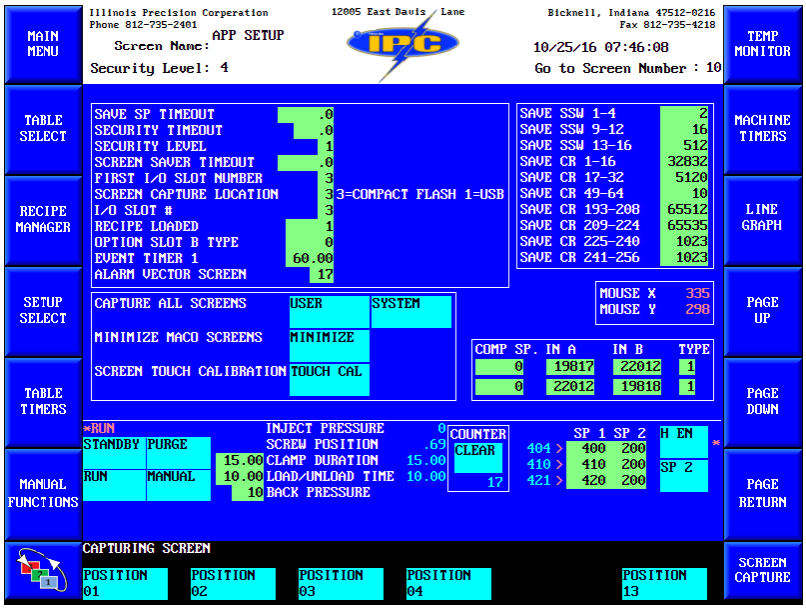
SCREW DELAY

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.

APP SETUP (APPLICATION SETUP) (10)



Application setup gives access to a few adjustable settings and allows you access to the calibration, capture all screens, and the windows system.

Access to the windows system that the screen resides on can also be accessed if a windows based USB keyboard is installed and the window key on the keyboard is pressed.

MINIMIZE MACO SCREENS

Minimizing the Maco screens will give you access to the windows system. This only minimizes the screen. To update the screens, copy, delete, etc you must first close the Maco screens. Once minimized, using a mouse installed in a USB port, you can right click on the Maco screens located in the taskbar and select close. Once closed you can perrform all actions to the user and system screens without error. Once all tasks are completed rebooting the machine will reload the Maco screens to normal and with any screen updates changed.

WINDOWS

Do not delete any screen files without first speaking to a Maco-sys or IPC representative.

Other operations do not require that you close the Maco screens, only have them minimized.

The windows system is the same as standard windows in respect to being able to cut, copy, paste, delete, marquee highlight, etc…

Most all the system files on the windows should not be altered in any way. The three folders that pertain to machine operation are as follows;

NAND FLASH

The nand flash is the name given to the internal memory of the HMI Display. It could also be referred to as the hard drive of the HMI. Stored on the nand flash are the user and system screens, RLD, recipes, log files, SPC files, linegraph files, and HMI host and APU software files. Some of the locations for these files is as follows;

My Device\Nand Flash\MCS_Files\Run\Application\RLD

My Device\Nand Flash\MCS_Files\Run\Application\User_Scrn

My Device\Nand Flash\MCS_Files\Run\Application\Sys_Scrn

My Device\Nand Flash\MCS_Files\Run\Application\Recipes\Current

My Device\Nand Flash\MCS_Files\Run\Data\Line_Graphs

My Device\Nand Flash\MCS_Files\Run\Data\LOG

My Device\Nand Flash\MCS_Files\Run\Data\SPC

STORAGE CARD

The storage card is the secondary storage area on the HMI display. It is used to store some of the larger files for the system. These files are any screen captures you take. Their locations is as follows;

My Device\Storage Card\MCS_Files\Run\Data\Scrn_Capture

HARD DISK

The hard disk is the name given to any USB storage device plugged into one of the USB ports. You will only see this file if your USB is plugged in.

CAPTURE ALL SCREENS USER/SYSTEM

Individual screen captures can be taken on a screen by screen bases via the screen capture side button located on the bottom right of the display. But if you want to capture all the screens, selecting either of these toogles will complete this task. Any screen captures can be found on the windows system.

SCREEN TOUCH CALIBRATION

This toggle will allow you to run a touch screen calibration to better fine tune the touch screen system. You may use a stylus or finger for the calibration, or standard machine operation. If a stylus is to be used it is recommended to use a soft tip stylus and/or utilizing a screen protector that allows touch screen operation via stylus or finger.

APPLICATION SETUP TIMERS

SAVE SP TIMEOUT

An automatic save timer that will save all new parameters to the powerup recipe. .0 disables the timer. And all changes should be saved down into recipe database before powering down the machine.

SECURITY TIMEOUT

Accompanied with the security level setpoint this timer allows the display to drop to the security level, specified by the security level setpoint, specified after timing out. The timer runs during idle screen time.

SECURITY LEVEL

The security level in which the machine will switch to once the security timeout timer finishes.

SCREEN SAVER TIMEOUT

This timer, when set, will turn on the screen save for the HMI display. The screeensaver is a blacked out screen. A swipe of the screen will revert to normal operation.

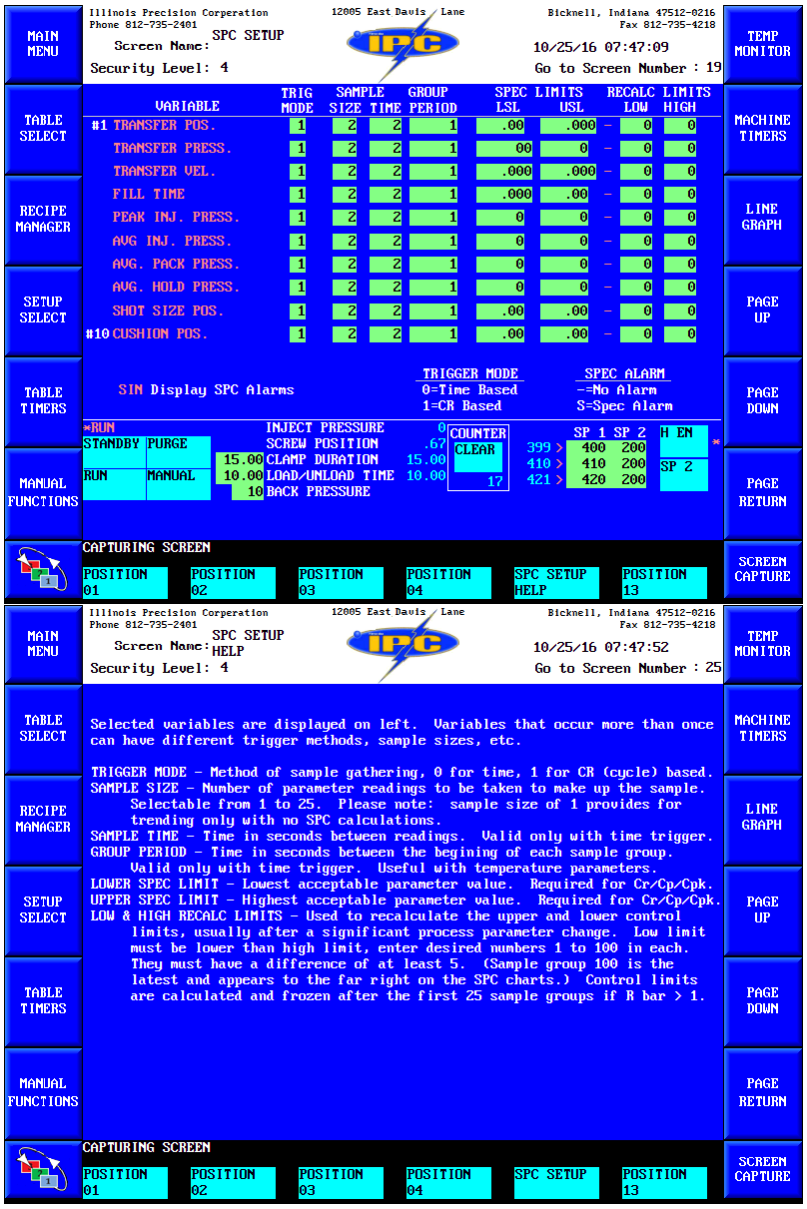
SCREEN CAPTURE LOCATION

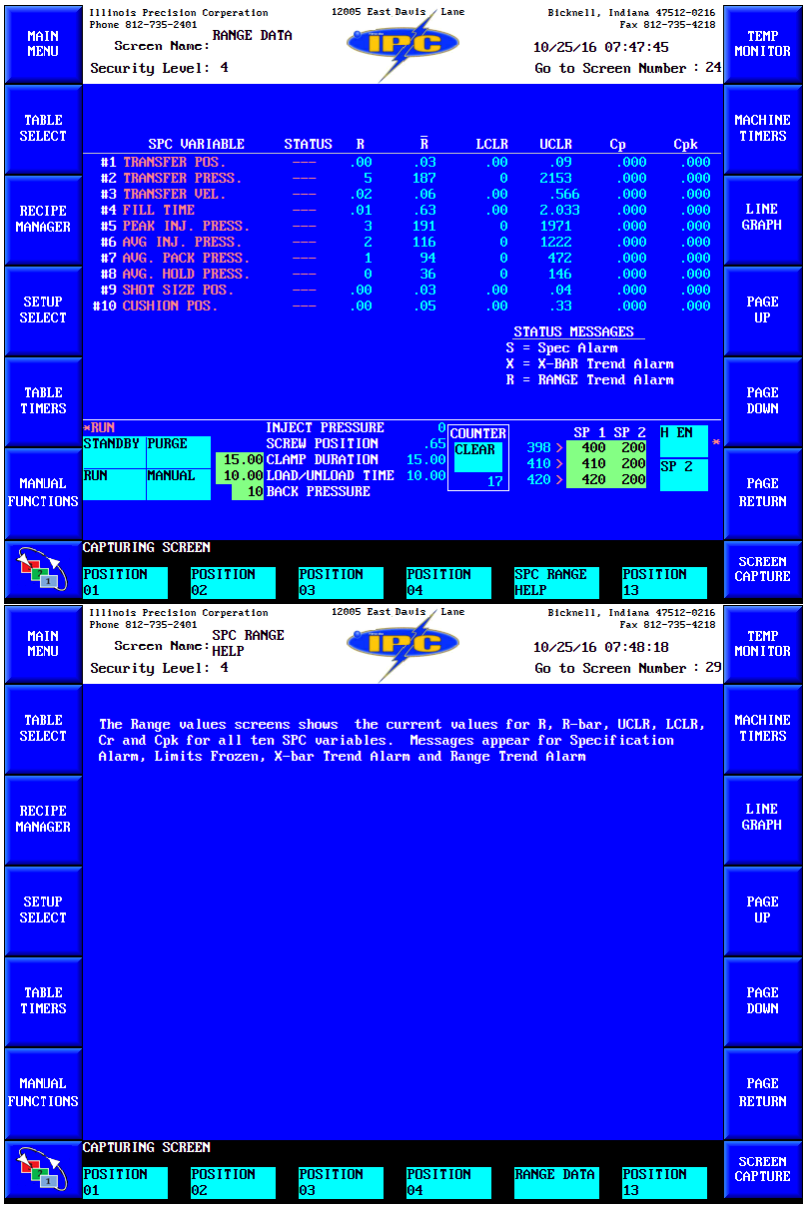
This setpoint tells the machine where to save any screen captures taken. Please refer to the MACO Controller manual for further instruction.

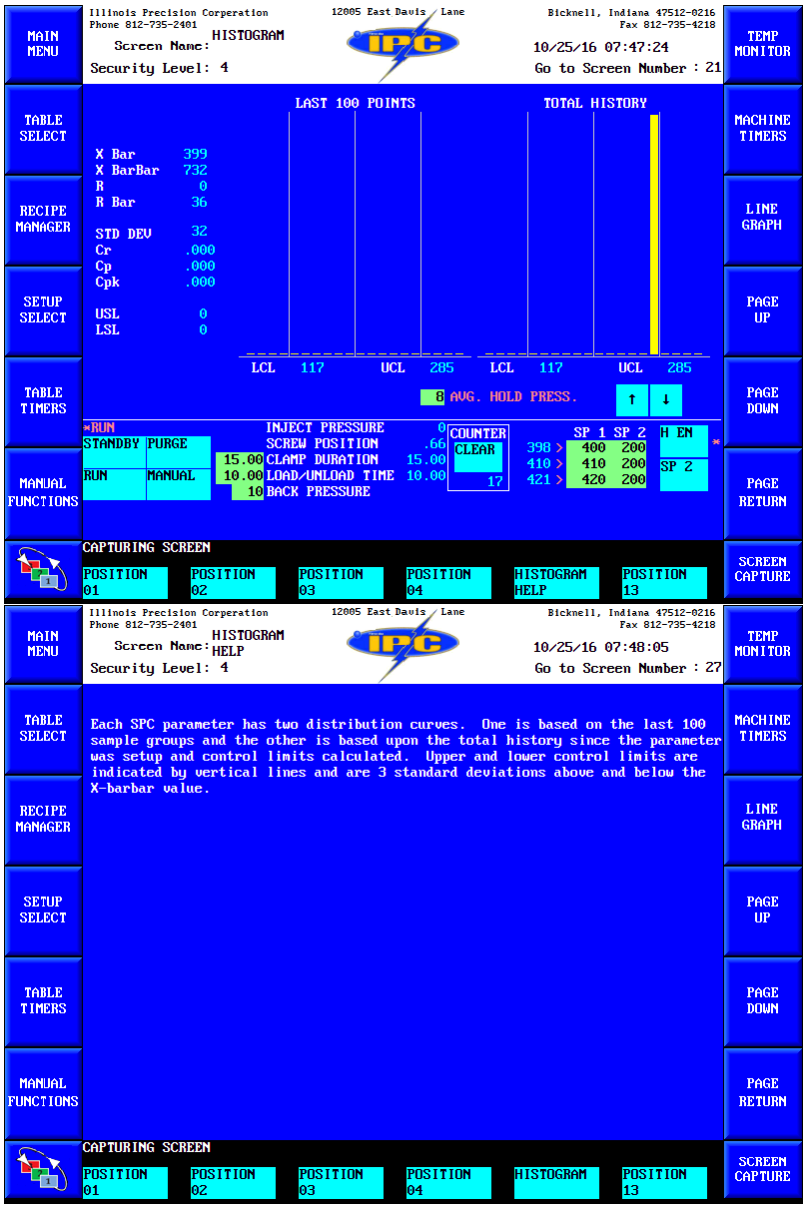
SPC SCREENS AND SETUP (19-29)

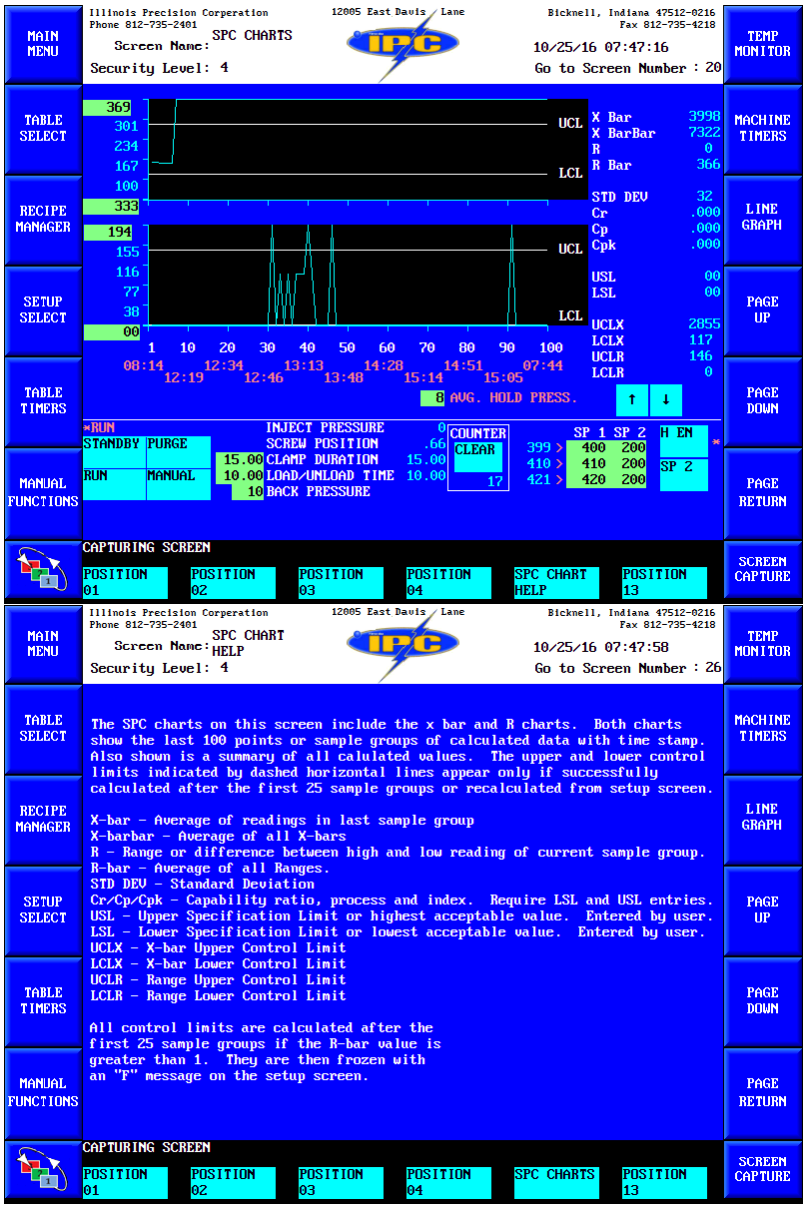
Statistical Process Control (SPC) provides for the simultaneous calculation of ten different user selectable parameters. Any process value from the system can be selected as an SPC parameter. Each of the ten parameters allows selection of sample size, time or event based triggering, time between readings, time between sample groups, and upper and lower control specification limits. X-Bar, R, and histogram charts may be displayed for each of the values. Calculated X-Bar, R, Cr, and CpK values are also available.

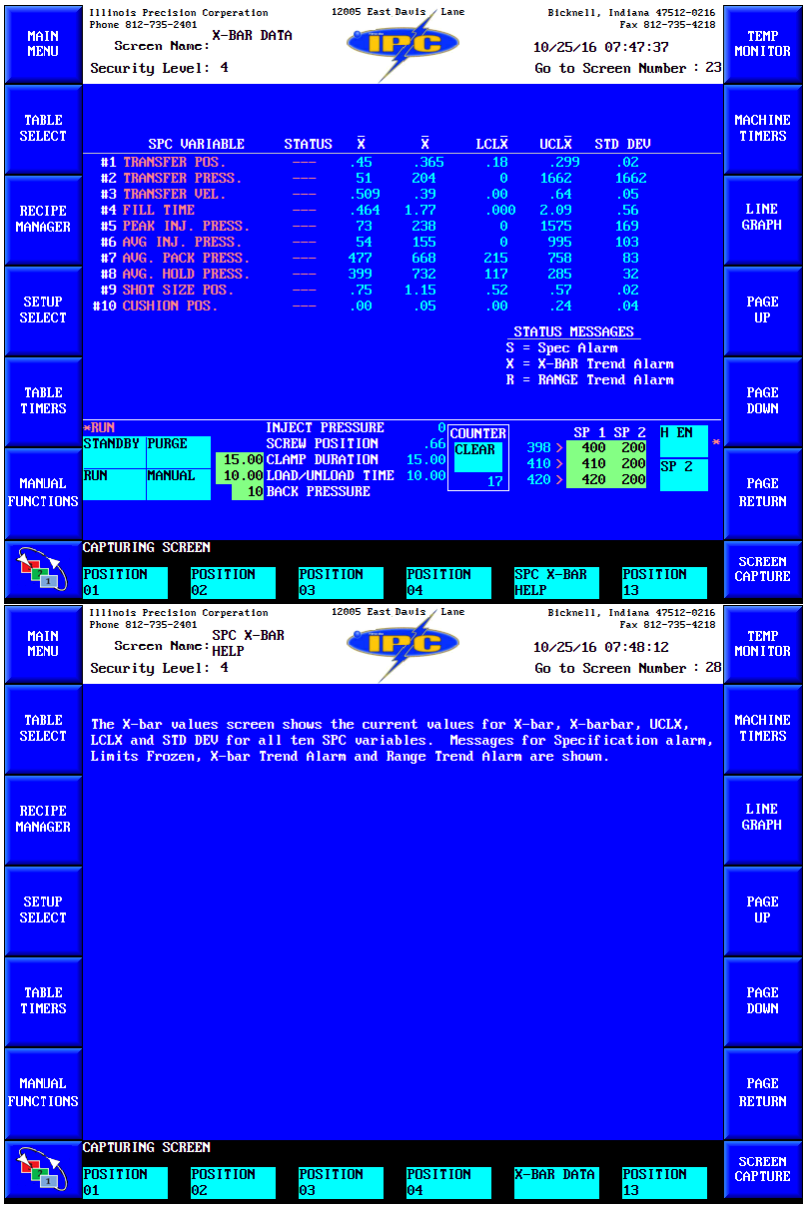
The last 100 calculated values for each of the 10 parameters remain in memory and are available for the operator to view and print on demand or automatically after 100 points have been collected. SPC alarms based on industry accepted standards are available to the sequential machine control to make machine decisions based on part quality. Reference the individual help screens and the Maco Controller manual for setup and further descriptions of the SPC system.

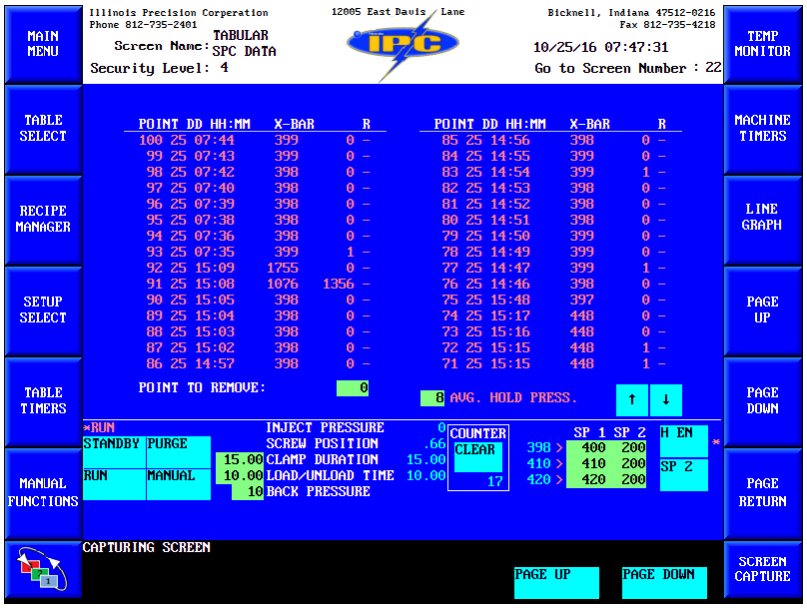

Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: SPC SETUP
Security Level: 4
10/25/16 07:47:09
Go to Screen Number : 19
MAIN MENU
TEMP MONITOR
TABLE SELECT
MACHINE TIMERS
RECIPE MANAGER
LINE GRAPH
SETUP SELECT
PAGE UP
TABLE TIMERS
PAGE DOWN
MANUAL FUNCTIONS
PAGE RETURN
SCREEN CAPTURE
VARIABLE
TRIG MODE
SAMPLE SIZE
SAMPLE TIME
GROUP PERIOD
SPEC LIMITS LSL
SPEC LIMITS USL
RECALC LIMITS LOW
RECALC LIMITS HIGH
#1 TRANSFER POS.
TRANSFER PRESS.
TRANSFER VEL.
FILL TIME
PEAK INJ. PRESS.
AVG INJ. PRESS.
AVG. PACK PRESS.
AVG. HOLD PRESS.
SHOT SIZE POS.
#10 CUSHION POS.
SIN Display SPC Alarms
TRIGGER MODE
0=Time Based
1=CR Based
SPEC ALARM
-=No Alarm
S=Spec Alarm
*RUN
STANDBY
PURGE
RUN
MANUAL
INJECT PRESSURE
SCREW POSITION
CLAMP DURATION
LOAD/UNLOAD TIME
BACK PRESSURE
COUNTER
CLEAR
SP 1 SP 2
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
SPC SETUP HELP
POSITION 13
Screen Name: SPC SETUP HELP
10/25/16 07:47:52
Go to Screen Number : 25
Selected variables are displayed on left. Variables that occur more than once can have different trigger methods, sample sizes, etc.
TRIGGER MODE - Method of sample gathering, 0 for time, 1 for CR (cycle) based.
SAMPLE SIZE - Number of parameter readings to be taken to make up the sample. Selectable from 1 to 25. Please note: sample size of 1 provides for trending only with no SPC calculations.
SAMPLE TIME - Time in seconds between readings. Valid only with time trigger.
GROUP PERIOD - Time in seconds between the begining of each sample group. Valid only with time trigger. Useful with temperature parameters.
LOWER SPEC LIMIT - Lowest acceptable parameter value. Required for Cr/Cp/Cpk.
UPPER SPEC LIMIT - Highest acceptable parameter value. Required for Cr/Cp/Cpk.
LOW & HIGH RECALC LIMITS - Used to recalculate the upper and lower control limits, usually after a significant process parameter change. Low limit must be lower than high limit, enter desired numbers 1 to 100 in each. They must have a difference of at least 5. (Sample group 100 is the latest and appears to the far right on the SPC charts.) Control limits are calculated and frozen after the first 25 sample groups if R bar > 1.


MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: RANGE DATA
Security Level: 4
10/25/16 07:47:45
Go to Screen Number : 24
SPC VARIABLE STATUS R R̄ LCLR UCLR Cp Cpk
#1 TRANSFER POS. --- .00 .03 .00 .09 .000 .000
#2 TRANSFER PRESS. --- 5 187 0 2153 .000 .000
#3 TRANSFER VEL. --- .02 .06 .00 .566 .000 .000
#4 FILL TIME --- .01 .63 .00 2.033 .000 .000
#5 PEAK INJ. PRESS. --- 3 191 0 1971 .000 .000
#6 AVG INJ. PRESS. --- 2 116 0 1222 .000 .000
#7 AVG. PACK PRESS. --- 1 94 0 472 .000 .000
#8 AVG. HOLD PRESS. --- 0 36 0 146 .000 .000
#9 SHOT SIZE POS. --- .00 .03 .00 .04 .000 .000
#10 CUSHION POS. --- .00 .05 .00 .33 .000 .000
STATUS MESSAGES
S = Spec Alarm
X = X-BAR Trend Alarm
R = RANGE Trend Alarm
*RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .65
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
420 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
SPC RANGE HELP
POSITION 13
MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: SPC RANGE HELP
Security Level: 4
10/25/16 07:48:18
Go to Screen Number : 29
The Range values screens shows the current values for R, R-bar, UCLR, LCLR, Cr and Cpk for all ten SPC variables. Messages appear for Specification Alarm, Limits Frozen, X-bar Trend Alarm and Range Trend Alarm
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
RANGE DATA
POSITION 13


Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: HISTOGRAM
Security Level: 4
10/25/16 07:47:24
Go to Screen Number : 21
MAIN MENU
TEMP MONITOR
TABLE SELECT
MACHINE TIMERS
RECIPE MANAGER
LINE GRAPH
SETUP SELECT
PAGE UP
TABLE TIMERS
PAGE DOWN
MANUAL FUNCTIONS
PAGE RETURN
SCREEN CAPTURE
LAST 100 POINTS
TOTAL HISTORY
X Bar 399
X BarBar 732
R 0
R Bar 36
STD DEV 32
Cr .000
Cp .000
Cpk .000
USL 0
LSL 0
LCL 117 UCL 285 LCL 117 UCL 285
8 AVG. HOLD PRESS.
*RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .66
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
421 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
HISTOGRAM HELP
POSITION 13
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: HISTOGRAM HELP
Security Level: 4
10/25/16 07:48:05
Go to Screen Number : 27
Each SPC parameter has two distribution curves. One is based on the last 100 sample groups and the other is based upon the total history since the parameter was setup and control limits calculated. Upper and lower control limits are indicated by vertical lines and are 3 standard deviations above and below the X-barbar value.
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
HISTOGRAM
POSITION 13


MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: SPC CHARTS
Security Level: 4
10/25/16 07:47:16
Go to Screen Number : 20
369
301
234
167
100
333
194
155
116
77
38
00
UCL
LCL
X Bar 3998
X BarBar 7322
R 0
R Bar 366
STD DEV 32
Cr .000
Cp .000
Cpk .000
USL 00
LSL 00
UCLX 2855
LCLX 117
UCLR 146
LCLR 0
1 10 20 30 40 50 60 70 80 90 100
08:14 12:34 13:13 14:28 14:51 07:44
12:19 12:46 13:48 15:14 15:05
8 AVG. HOLD PRESS.
RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .66
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
399 > 400 200
410 > 410 200
421 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
SPC CHART HELP
POSITION 13
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: SPC CHART HELP
Security Level: 4
10/25/16 07:47:58
Go to Screen Number : 26
The SPC charts on this screen include the x bar and R charts. Both charts show the last 100 points or sample groups of calculated data with time stamp. Also shown is a summary of all calulated values. The upper and lower control limits indicated by dashed horizontal lines appear only if successfully calculated after the first 25 sample groups or recalculated from setup screen.
X-bar - Average of readings in last sample group
X-barbar - Average of all X-bars
R - Range or difference between high and low reading of current sample group.
R-bar - Average of all Ranges.
STD DEV - Standard Deviation
Cr/Cp/Cpk - Capability ratio, process and index. Require LSL and USL entries.
USL - Upper Specification Limit or highest acceptable value. Entered by user.
LSL - Lower Specification Limit or lowest acceptable value. Entered by user.
UCLX - X-bar Upper Control Limit
LCLX - X-bar Lower Control Limit
UCLR - Range Upper Control Limit
LCLR - Range Lower Control Limit
All control limits are calculated after the first 25 sample groups if the R-bar value is greater than 1. They are then frozen with an "F" message on the setup screen.
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
SPC CHARTS
POSITION 13


MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: X-BAR DATA
Security Level: 4
10/25/16 07:47:37
Go to Screen Number : 23
SPC VARIABLE STATUS X̄ R̄ LCLX̄ UCLX̄ STD DEV
#1 TRANSFER POS. --- .45 .365 .18 .299 .02
#2 TRANSFER PRESS. --- 51 204 0 1662 1662
#3 TRANSFER VEL. --- .509 .39 .00 .64 .05
#4 FILL TIME --- .464 1.77 .000 2.09 .56
#5 PEAK INJ. PRESS. --- 73 238 0 1575 169
#6 AVG INJ. PRESS. --- 54 155 0 995 103
#7 AVG. PACK PRESS. --- 477 668 215 758 83
#8 AVG. HOLD PRESS. --- 399 732 117 285 32
#9 SHOT SIZE POS. --- .75 1.15 .52 .57 .02
#10 CUSHION POS. --- .00 .05 .00 .24 .04
STATUS MESSAGES
S = Spec Alarm
X = X-BAR Trend Alarm
R = RANGE Trend Alarm
*RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .66
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
420 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
SPC X-BAR HELP
POSITION 13
MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: SPC X-BAR HELP
Security Level: 4
10/25/16 07:48:12
Go to Screen Number : 28
The X-bar values screen shows the current values for X-bar, X-barbar, UCLX, LCLX and STD DEV for all ten SPC variables. Messages for Specification alarm, Limits Frozen, X-bar Trend Alarm and Range Trend Alarm are shown.
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
X-BAR DATA
POSITION 13

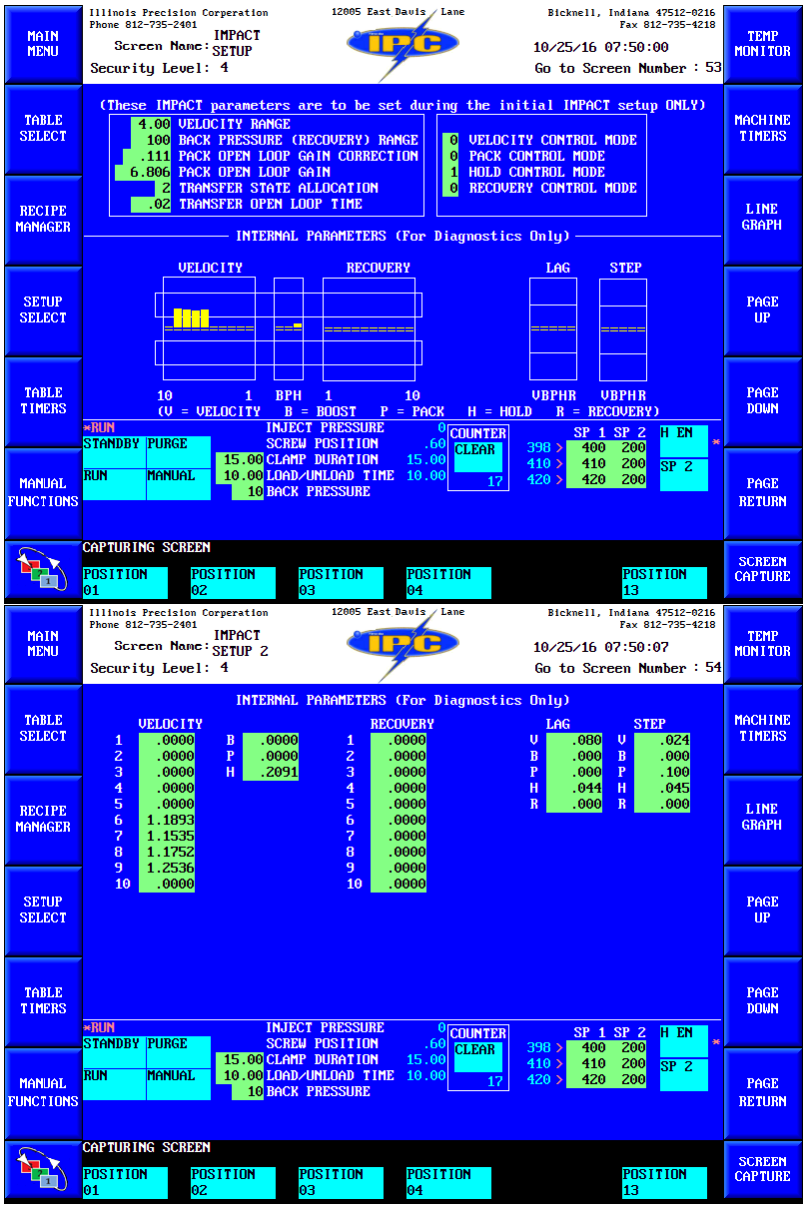

MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: TABULAR SPC DATA
Security Level: 4
10/25/16 07:47:31
Go to Screen Number : 22
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
POINT DD HH:MM X-BAR R
100 25 07:44 399 0 –
99 25 07:43 399 0 –
98 25 07:42 398 0 –
97 25 07:40 398 0 –
96 25 07:39 398 0 –
95 25 07:38 398 0 –
94 25 07:36 398 0 –
93 25 07:35 399 1 –
92 25 15:09 1755 0 –
91 25 15:08 1076 1356 –
90 25 15:05 398 0 –
89 25 15:04 398 0 –
88 25 15:03 398 0 –
87 25 15:02 398 0 –
86 25 14:57 398 0 –
85 25 14:56 398 0 –
84 25 14:55 399 0 –
83 25 14:54 399 1 –
82 25 14:53 398 0 –
81 25 14:52 398 0 –
80 25 14:51 398 0 –
79 25 14:50 399 0 –
78 25 14:49 399 0 –
77 25 14:47 399 1 –
76 25 14:46 398 0 –
75 25 15:48 397 0 –
74 25 15:17 448 0 –
73 25 15:16 448 0 –
72 25 15:15 448 1 –
71 25 15:15 448 1 –
POINT TO REMOVE: 0
8 AVG. HOLD PRESS.
RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .66
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
420 > 420 200
H EN
SP 2
CAPTURING SCREEN
PAGE UP
PAGE DOWN

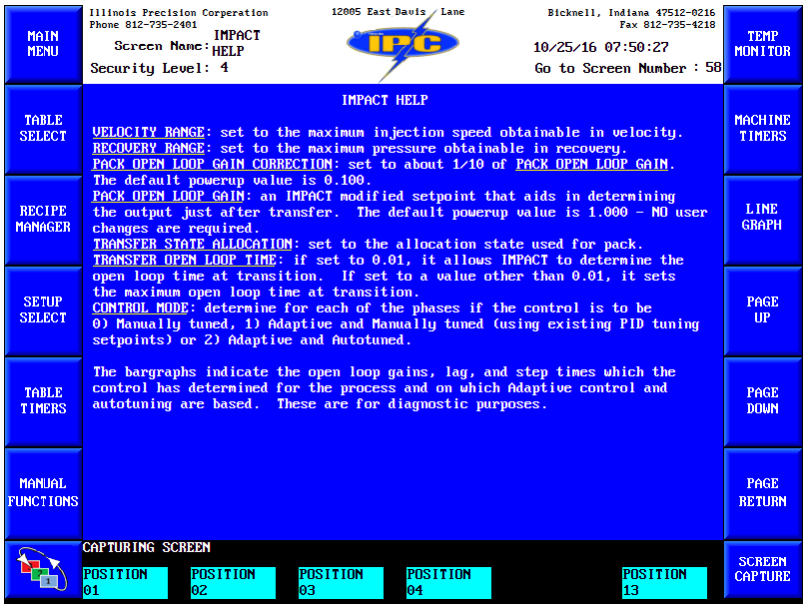
IMPACT CONTROL (53, 54, 58)

The MACO Compact supports IMPACT injection process control. Run the machine for a few cycles, and IMPACT creates a theoretical model of the process. It uses this model along with hundreds of rules to automatically optimize the process to compensate for short and long term deviations in the injection molding process. Injection control features velocity or pressure controlled fill with ramping.

Reference the individual help screens and the Maco Controller manual for setup and further descriptions of the IMPACT control.

Please familiarize yourself with impact control before enabling. On the IMPACT Setup screen, any mode selection other than 0 (zero) will make changes to your process setup in increments specified. It is highly recommended that IMPACT modes be set to zero until IMPACT design is researched further.

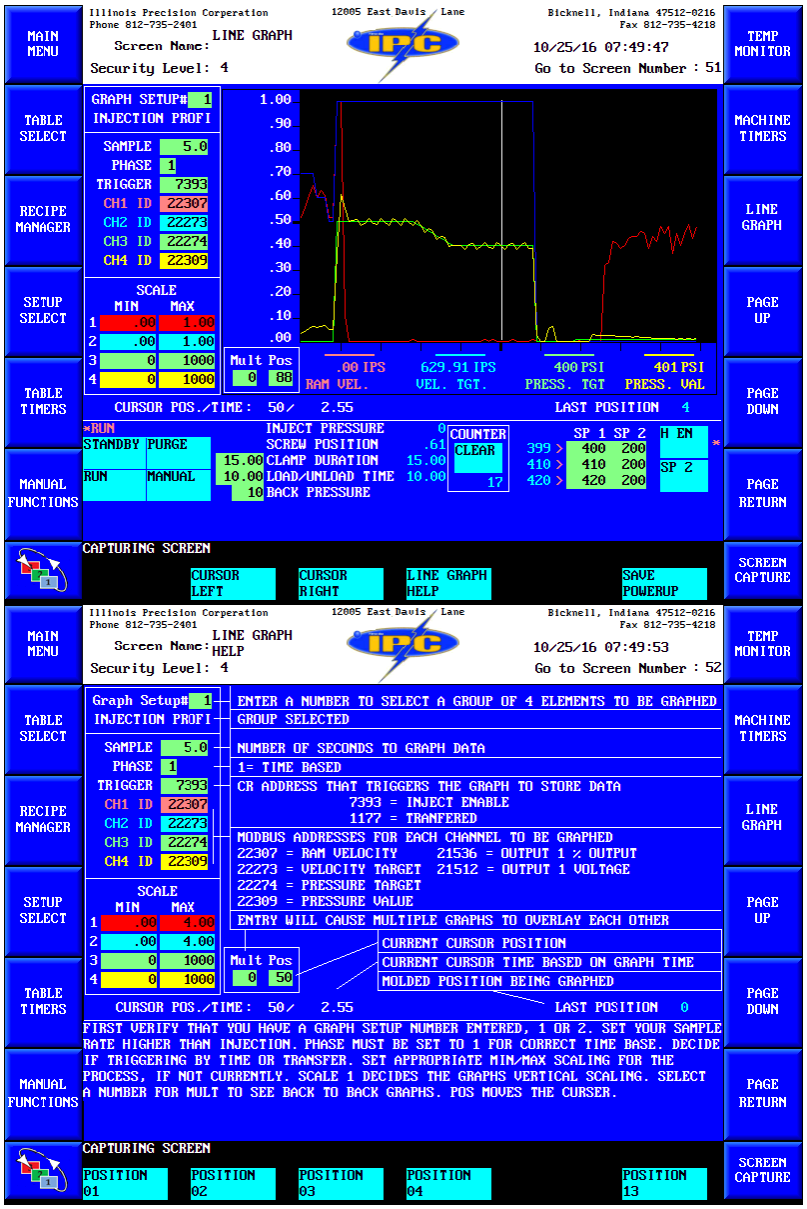

MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: IMPACT SETUP
Security Level: 4
10/25/16 07:50:00
Go to Screen Number : 53
(These IMPACT parameters are to be set during the initial IMPACT setup ONLY)
4.00 VELOCITY RANGE
100 BACK PRESSURE (RECOVERY) RANGE
.111 PACK OPEN LOOP GAIN CORRECTION
6.806 PACK OPEN LOOP GAIN
2 TRANSFER STATE ALLOCATION
.02 TRANSFER OPEN LOOP TIME
0 VELOCITY CONTROL MODE
0 PACK CONTROL MODE
1 HOLD CONTROL MODE
0 RECOVERY CONTROL MODE
INTERNAL PARAMETERS (For Diagnostics Only)
VELOCITY
RECOVERY
LAG
STEP
10 1 BPH 1 10 VBPHR VBPHR
(V = VELOCITY B = BOOST P = PACK H = HOLD R = RECOVERY)
*RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .60
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
420 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
POSITION 13
MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: IMPACT SETUP 2
Security Level: 4
10/25/16 07:50:07
Go to Screen Number : 54
INTERNAL PARAMETERS (For Diagnostics Only)
VELOCITY
1 .0000
2 .0000
3 .0000
4 .0000
5 .0000
6 1.1893
7 1.1535
8 1.1752
9 1.2536
10 .0000
B .0000
P .0000
H .2091
RECOVERY
1 .0000
2 .0000
3 .0000
4 .0000
5 .0000
6 .0000
7 .0000
8 .0000
9 .0000
10 .0000
LAG
V .080
B .000
P .000
H .044
R .000
STEP
V .024
B .000
P .100
H .045
R .000
*RUN
STANDBY PURGE
RUN MANUAL
INJECT PRESSURE 0
SCREW POSITION .60
15.00 CLAMP DURATION 15.00
10.00 LOAD/UNLOAD TIME 10.00
10 BACK PRESSURE
COUNTER
CLEAR
17
SP 1 SP 2
398 > 400 200
410 > 410 200
420 > 420 200
H EN
SP 2
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
POSITION 13


MAIN MENU
TABLE SELECT
RECIPE MANAGER
SETUP SELECT
TABLE TIMERS
MANUAL FUNCTIONS
Illinois Precision Corperation
Phone 812-735-2401
12005 East Davis Lane
Bicknell, Indiana 47512-0216
Fax 812-735-4218
Screen Name: IMPACT HELP
Security Level: 4
10/25/16 07:50:27
Go to Screen Number : 58
TEMP MONITOR
MACHINE TIMERS
LINE GRAPH
PAGE UP
PAGE DOWN
PAGE RETURN
SCREEN CAPTURE
IMPACT HELP
VELOCITY RANGE: set to the maximum injection speed obtainable in velocity.
RECOVERY RANGE: set to the maximum pressure obtainable in recovery.
PACK OPEN LOOP GAIN CORRECTION: set to about 1/10 of PACK OPEN LOOP GAIN.
The default powerup value is 0.100.
PACK OPEN LOOP GAIN: an IMPACT modified setpoint that aids in determining
the output just after transfer. The default powerup value is 1.000 - NO user
changes are required.
TRANSFER STATE ALLOCATION: set to the allocation state used for pack.
TRANSFER OPEN LOOP TIME: if set to 0.01, it allows IMPACT to determine the
open loop time at transition. If set to a value other than 0.01, it sets
the maximum open loop time at transition.
CONTROL MODE: determine for each of the phases if the control is to be
0) Manually tuned, 1) Adaptive and Manually tuned (using existing PID tuning
setpoints) or 2) Adaptive and Autotuned.
The bargraphs indicate the open loop gains, lag, and step times which the
control has determined for the process and on which Adaptive control and
autotuning are based. These are for diagnostic purposes.
CAPTURING SCREEN
POSITION 01
POSITION 02
POSITION 03
POSITION 04
POSITION 13

LINE GRAPH (51, 52)

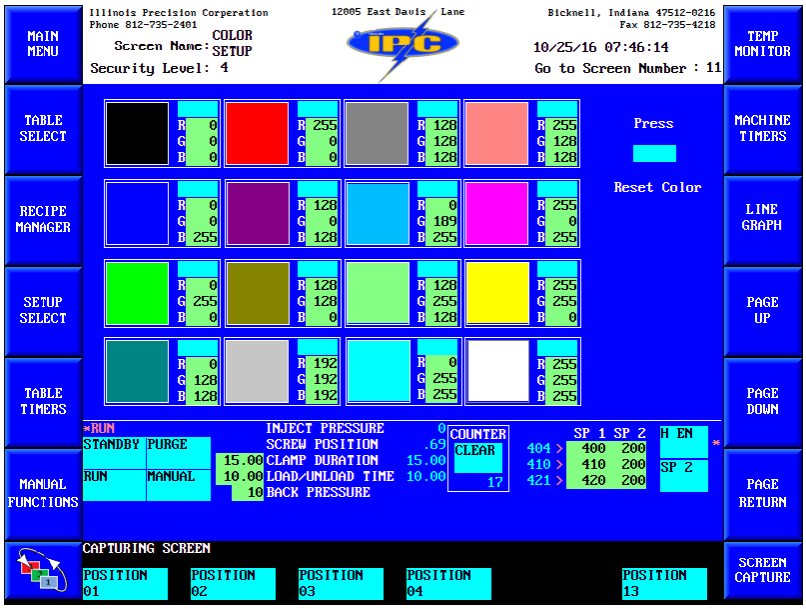
Line graphs can be used to display the active profile setpoints and the actual process value on the screen in comparison.

Reference the help screen and the Maco Controller manual for setup and further descriptions of the line graph.



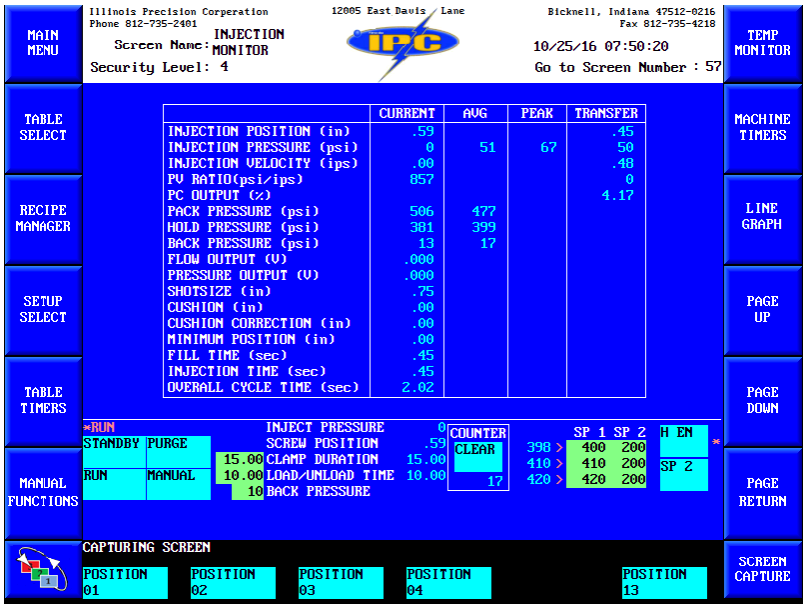
COLOR SETUP (11)

The Color Setup screen will usually be left at all factory settings. The only reason to make adjustments on this screen is if an operator was having issues seeing certain colors that was hendering operation; color blindness, etc…



INJECTION MONITOR (57)

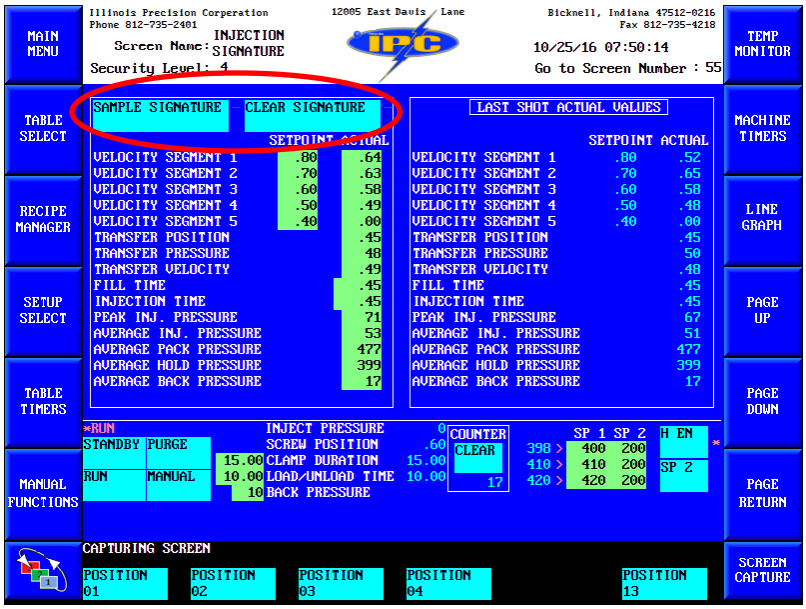
Injection Monitor screen can be used to view the production process and gives you an overview of several key values shot for shot.



INJECTION SIGNATURE (55)

The Injection Signature screen can capture the values of last shot produced, the left panel, and then show every actual shot, right panel, thereafter for comparison.

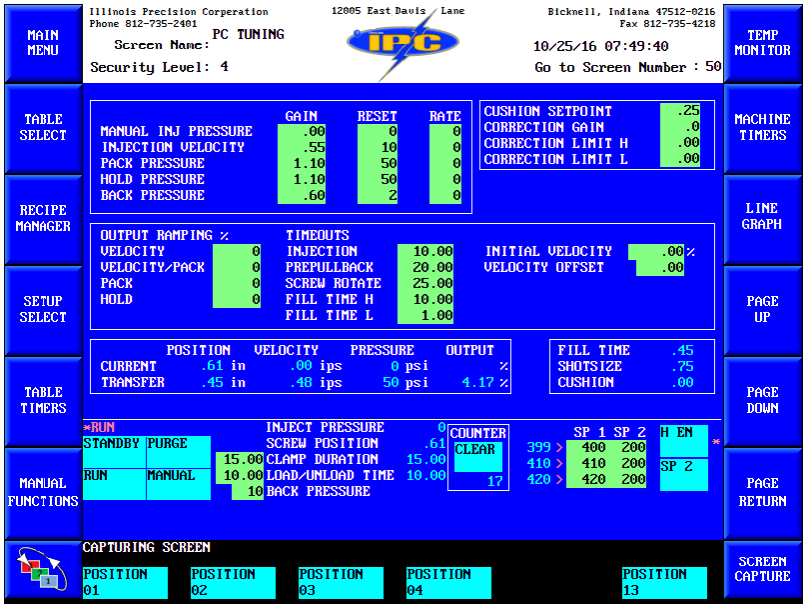
After a known good produced part, select the sample signature toggle and the left panel will be popluted with all the values available for that specific parts process. Further production will constantly update and repopulate the right panel. Compare each process with a known good process. If you want to clear the sample then select the clear signature toggle.



PC TUNING (50)

The PC Tuning screen gives access to a few IMPACT variables, See IMPACT control, ramping control in %, timeouts, and alarm timers.

Gain, reset, and rate setpoints are IMPACT setpoints and are only utilized if IMPACT is enabled. Please reference IMPACT control in this manual and the Maco Controller manual.



TIMEOUTS

INJECTION

This timeout will end injection no matter the process design. This value should be high enough not to timeout unless there is an issue with the process or mold.

SCREW ROTATE

This timeout begins when the screw begins rotation. Optimally the screw will stop when shotsize is met, but if the screw doesn't reach shotsize this timer will stop the screw.

FILL TIME H

This is a fill time high timer and can be used to show an alarm if the fill time runs slower than designed.

FILL TIME L

This is a fill time low timer and can be used to show an alarm if the fill time runs faster than designed.

PREPULLBACK

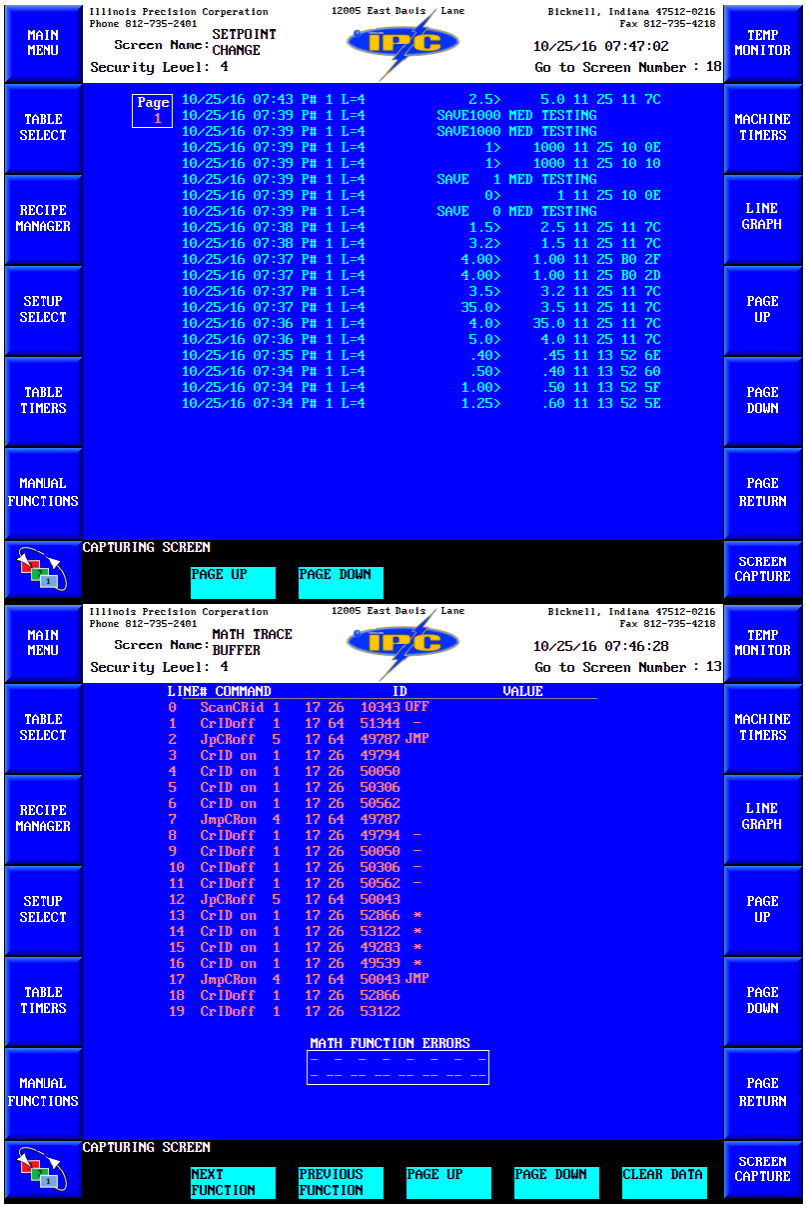
Not installed

RAMPING/OFFSET/INTIAL %

Ramping and an initial velocity can be added, in %, to further aide transitions between the shotsize, segment profiles, and pack/hold. Please reference the Maco Controller manual for more detailed explanation.

ADDITIONAL USER SCREENS (13, 18)

These screens have no adjustment or operator values. They are strictly for troubleshooting and RLD design and setup by a Maco-Sys or IPC representative.



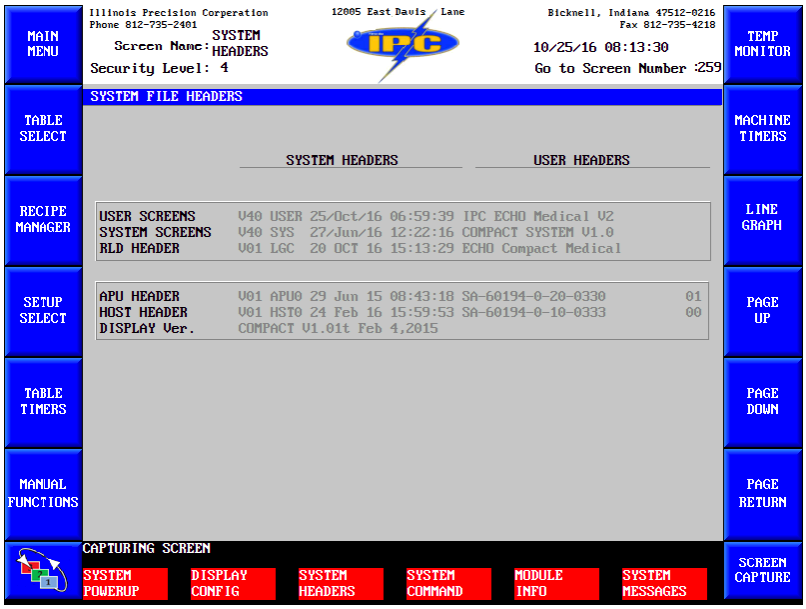
SYSTEM SCREENS

Most all system screens and settings should be left at factory settings. If a toggle or setpoint is not defined it is best not to adjust or toggle it unless first speaking with a Maco-sys or IPC representative. If further questions need answered please reference the Maco controller manual shipped with the machine.

To access all system screens the machine has to be in level 4 security. Soft key screen 3, tabbed red, will direct you to the System screens. You can also go straight to a specific screen number by selecting the go to screen number toggle at the top right of the screen.

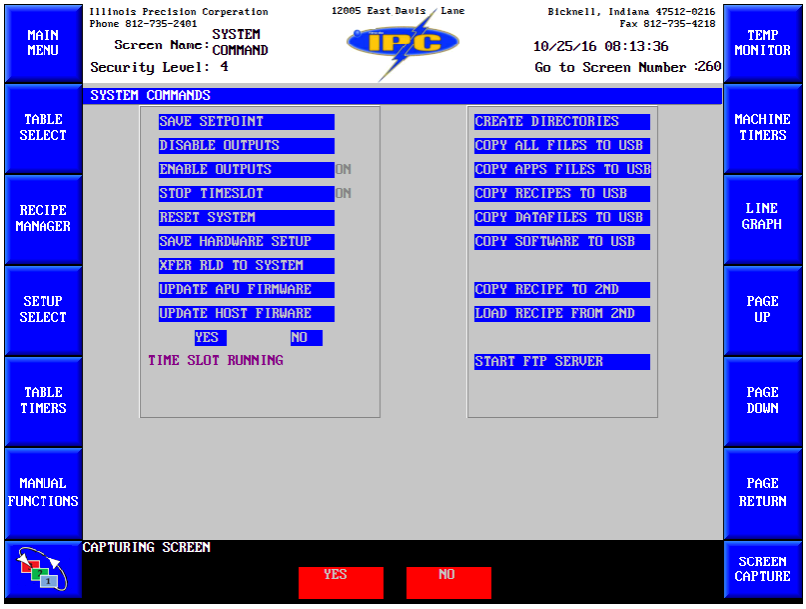
SYSTEM HEADERS (259)

This screen shows the user/system/RLD systems installed, as well as the controller and HMI information.



SYSTEM COMMAND (260)

This screen is vital in uploading new screens and RLD, as well as resetting the system and many other operations.



TIMESLOT

Timeslot is another name for logic, or RLD. If the machines stop timeslot is off the logic for the machine is not running. Timeslot may have shut off for a variety of reasons, but generally the issue is either a fault in one of the controller cards, a controller card has vibrated loose, or a new controller card has been installed and the system has yet to be updated.

Please contact an IPC representative if your timeslot has turned off.

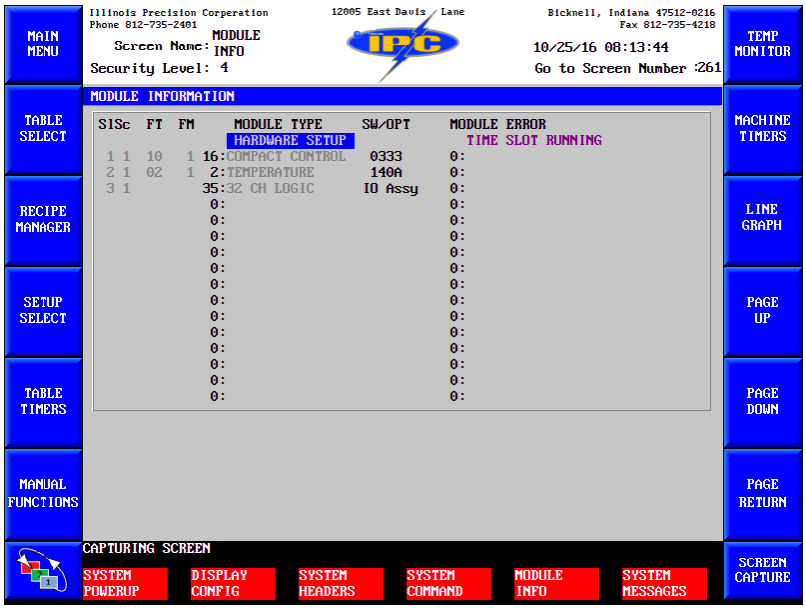
If a new logic needs to be installed the timeslot must be turned off before transfer. To upload new logic, you must first stop the timeslot, copy the new logic to the machine, xfer RLD to system, and then reset the machine, either by reset system or by rebooting the machine manually.

SAVE HARDWARE SETUP

At each off cycle of the machine the controller takes an inventory of the controller cards installed in the card rack; their model, revision, serial, etc. If at bootup of the machine the new inventory does not match the old inventory the machine will turn the timeslot off. To correct this issue, once bootup is finished, with the new controller card installed, select save hardware setup. This toggle will take a new inventory with the current cards. Then select reset system or reboot. The timeslot condition should turn back on.

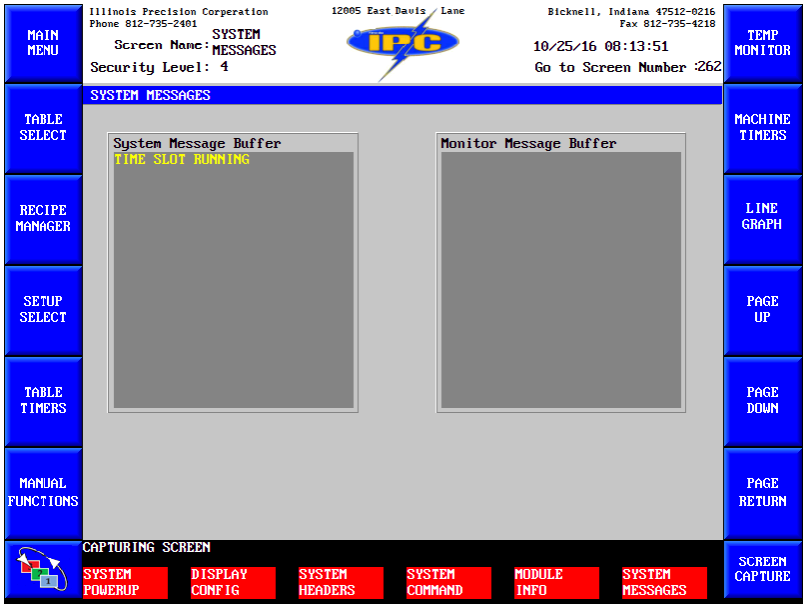
MODULE INFO (261)

This screen shows the inventory of the controller cards installed, as described in the previous section. The hardware setup toggle also performs the same as describe in the previous section.



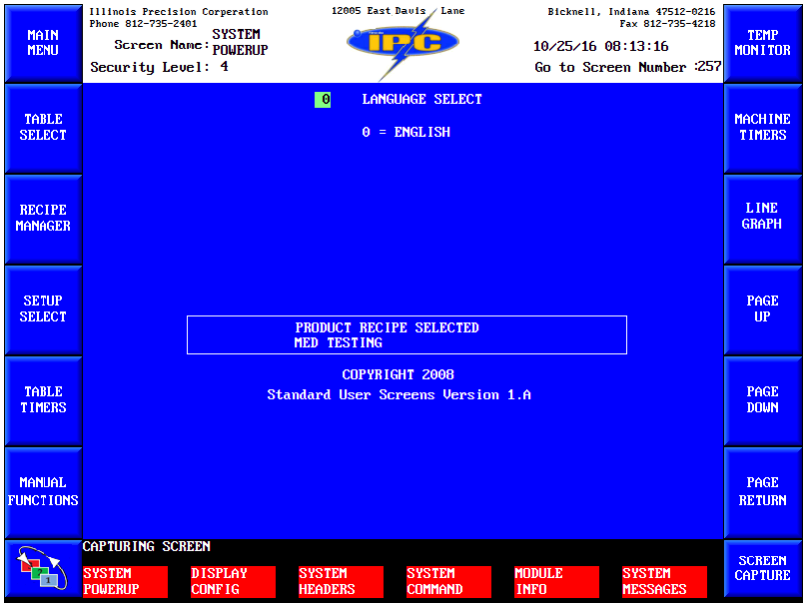
SYSTEM MESSAGES (262)

This screen will provide system and error messages related to the controller and HMI systems. The MACO Controller manual, shipped with the machine, provides descriptions and details pertaining to the type of error or message, and possible corrections.



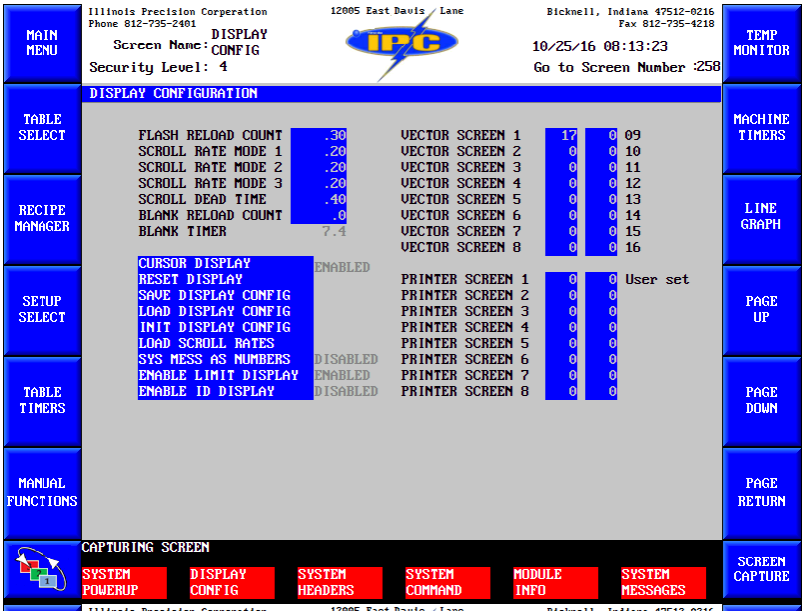
SYSTEM POWERUP (257)

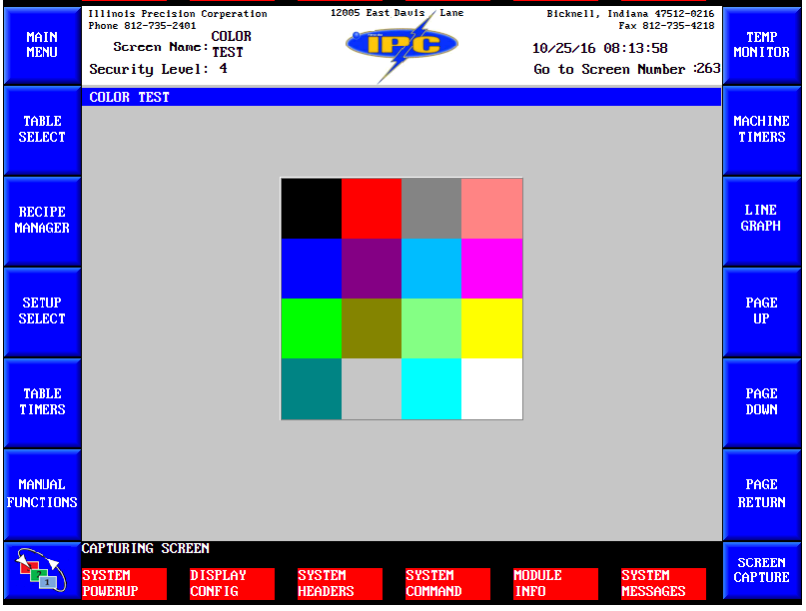
This screen shows the active recipe installed and will be used for language selection. Currently, English is the only language available and the language select setpoint should not be adjusted.



ADDITIONAL SYSTEM SCREENS (258, 263)

These screens have no adjustment or operator values. They are strictly for troubleshooting and RLD design and setup by a Maco-Sys or [IPC representative]





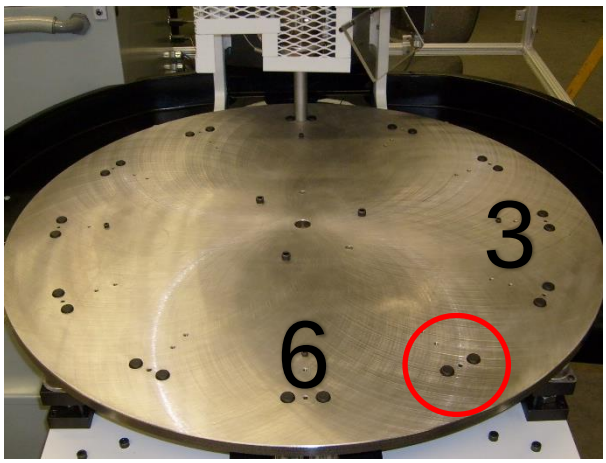
Section 4 – MACHINE SET-UP

HOW TO INSTALL A MOLD

All our molding machines are designed to work in accordance to our book mold design. And the operational aspects of our machines ensure that the sprue hole is always center to our injection nozzle. Our book mold design ensures this by having one mount hole for a 10-32 FHCS directly inline of the mold sprue hole. Twisting of the book mold is usually not an issue, but if need be, the bottom of the mold can be slotted to accept an added bolt head for the rear of the mold allowing two points of contact and zero twisting. This alignment also ensures that the knockouts are always contacting the underside of the mold correctly.

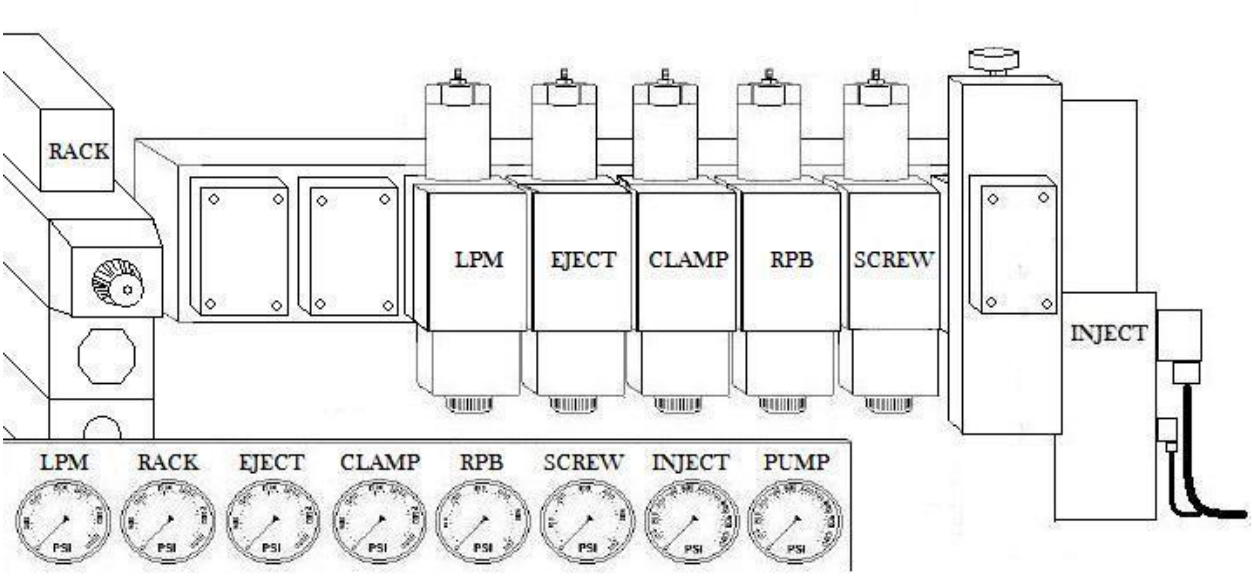
To mount a new mold in a molding position, first define the molding positions by placing the machine in standby mode and cycle the table. The four positions that stop under the barrel are the current selected molding positions. The machines table has 12 positions for molds and only four will be in alignment at a time. The other eight are extras that can be set up as molding positions when needed. When the molding position you desire is at the machines 6 o'clock position, place the machine in manual mode and push cycle start repeatedly until the center mount hole is clear of the knockouts and is easily accessible. Mount your mold to the table using the appropriately sized 10-32 FHCS. Now continue pressing cycle start until the mold position is at the machines 3 o'clock position. Place the machine back in standby mode and continue your setup or keep the machine in manual mode and start setting up the next position for a mold.

A faster way to access molding positions is to break the light curtain during rotation when the molding position is half way between the 6 o'clock and 3 o'clock machine position. This will allow the molding position to clear the knockouts enough to allow you access to the mounting hole underneath the table. Once installed, resetting the safeties and selecting cycle start will automatically realign the table to its correct molding position.



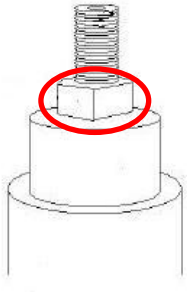
HOW TO ADJUST/SET PRESSURES

Open the right-side panel on the base of the machine to gain access to the necessary hydraulic controls.



To adjust machine pressures:

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



NOTE - Clamp & screw reducing valves must be adjusted while the system is in high pressure. This can be accomplished by using manual mode or by manually spooling the solenoids.

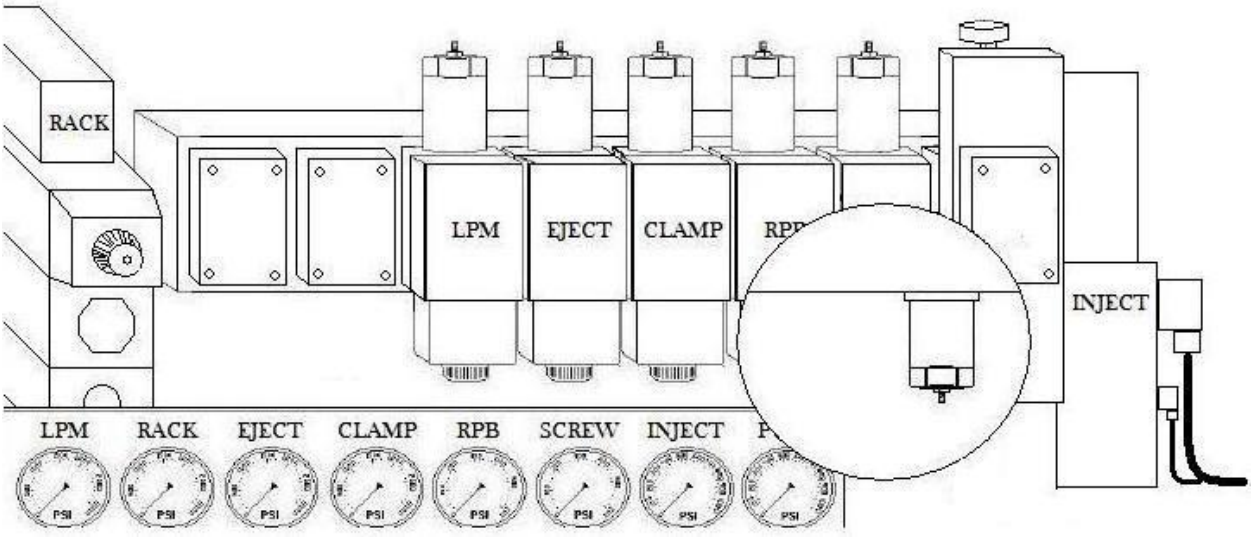
The snubber valves on the back of each gauge should only be opened when adjusting or troubleshooting. This will help extend the life of the gauges.

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.

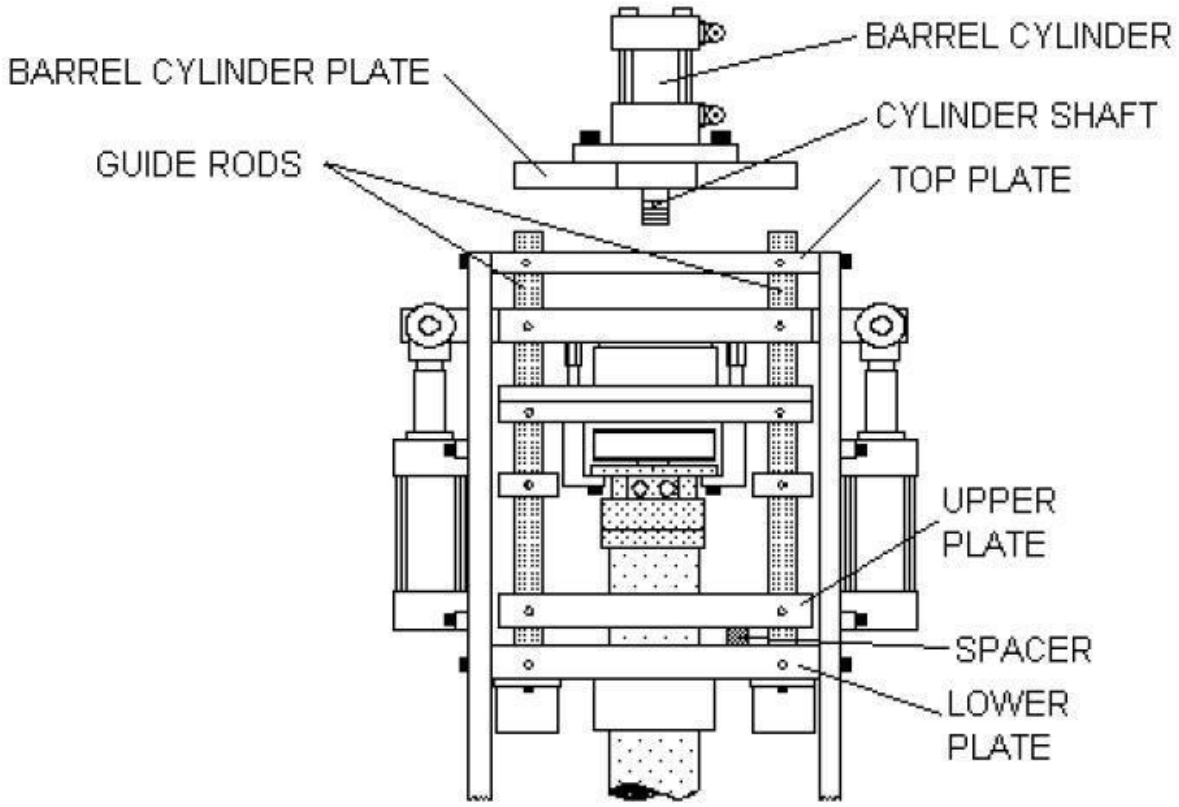
Open the right-side panel on the base of the machine to gain access to the necessary hydraulic controls. The main pressure relief valve is located on the bottom of the hydraulic manifold towards the right end of the manifold closest to the injection valve.

- Loosen the jam nut and turn the stud all the way clockwise (highest pressure).
- Place pump in high pressure.
- Check the pump high pressure setting.
- Adjust the high pressure setting if needed via the pumps compensator valve.
- Adjust the stud counter-clockwise until the pump gauge starts to drop.
- Turn stud two turns clockwise and tighten jam nut.



HOW TO REMOVE THE BARREL CYLINDER (OPTIONAL)

- Remove the two 5/16 screws that attach the barrel cylinder plate to the end of the guide rods.
- Completely loosen the cylinder shaft from the top plate with a 7/8 open end wrench.
- Remove the barrel cylinder from the top plate.

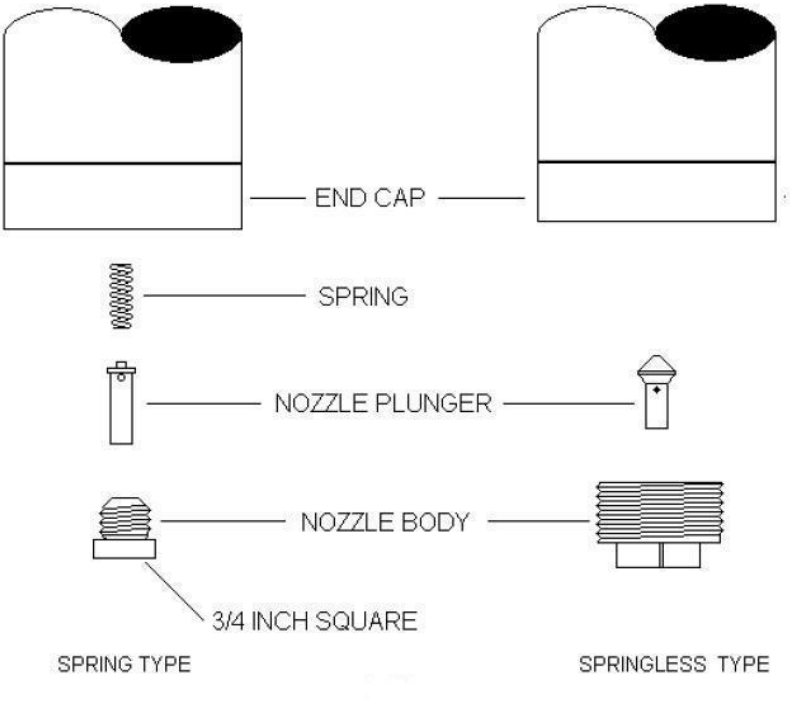


CLEANING THE NOZZLE - THERMOPLASTICS ONLY

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

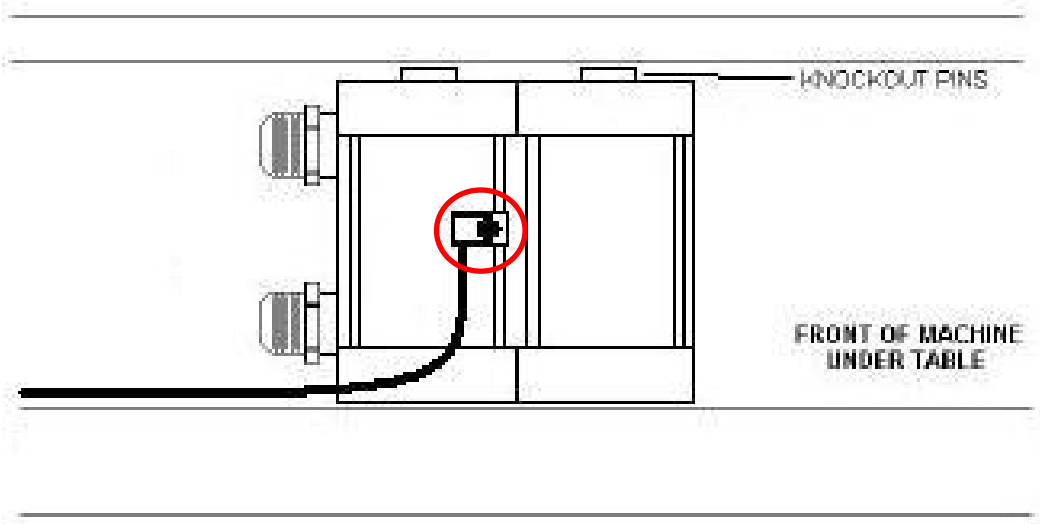
CAUTION - All necessary safety precautions should be in effect before proceeding; gloves and safety glasses. During the following procedure it is possible for hot material to spray out.

- It is first necessary to bring system heat almost up to molding temperature.
- Unscrew the nozzle assembly (body and plunger) from the end cap.
- If spring type, remove the nozzle die spring from up inside the end cap.
- 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.
- If spring type clean nozzle die spring. Or replace spring, if weak.
- Apply anti-seize to thread of nozzle body.
- If spring type, place spring on nozzle assembly and then replace in end cap.



HOW TO ADJUST THE EJECTOR CYLINDER SENSOR

- Loosen the ejector sensor mount screw.
- With ejector pins fully retracted, move the sensor to its lowest position.
- 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.
- 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.

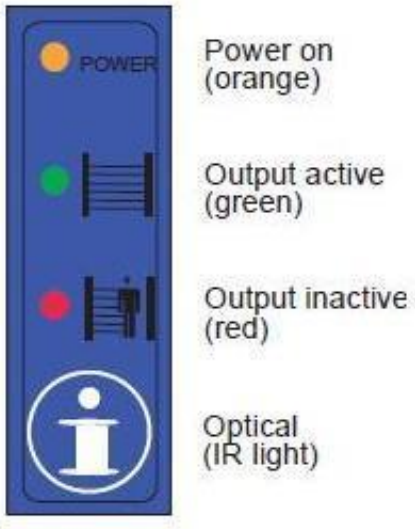
LIGHT CURTAIN

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.

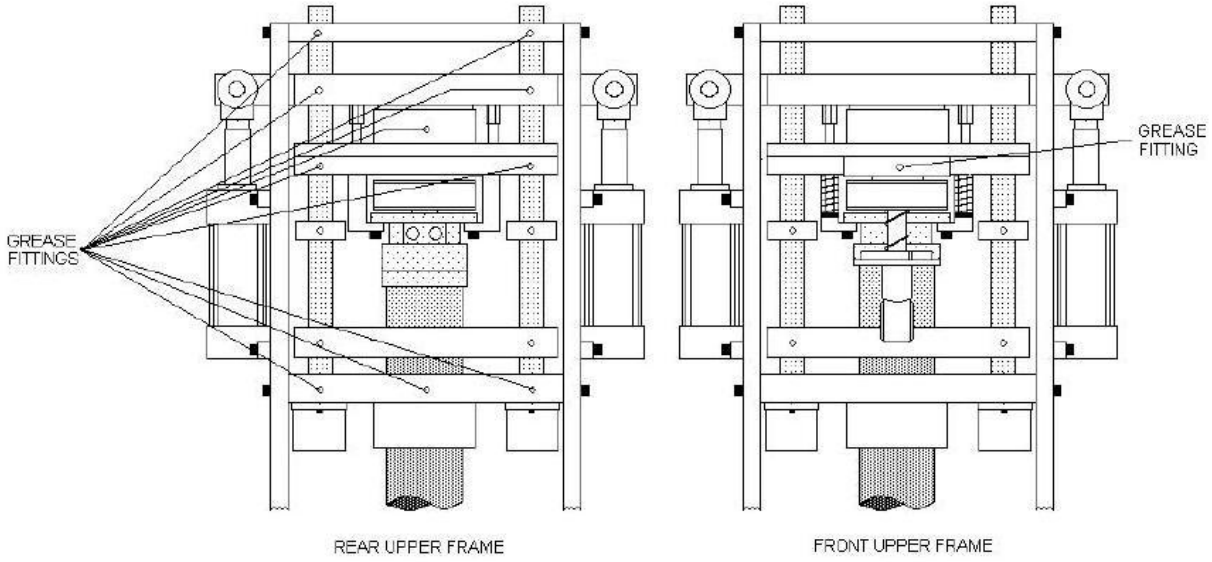
- Loosen all brackets associated with the light curtain.
- Get both the transmitter and the receiver in line by line of sight.
- Select the laser ☞ button on both the transmitter and receiver to activate the laser pointer.
- Align the laser to the corresponding alignment pad.
- Verify alignment and slowly re tighten associated bracketing in a crisscross pattern paying close attention to the movement of the laser.
- Once the alignment is finished, verify that the light curtain LED output activates/deactivates properly.
- 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.

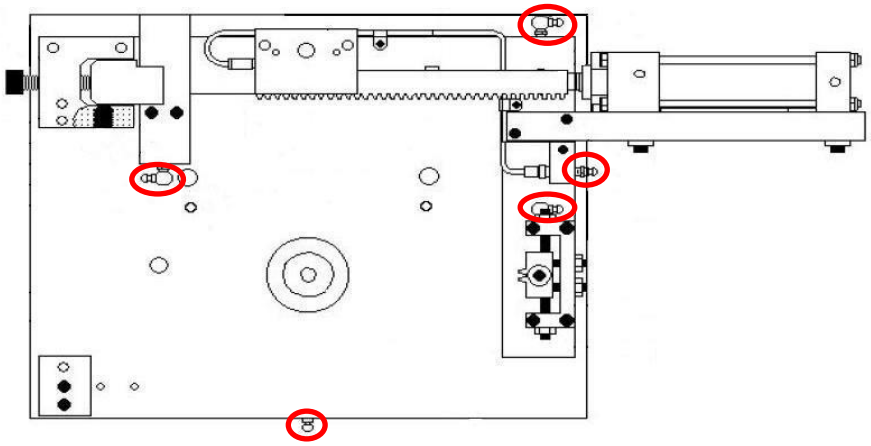
GREASING THE UPPER FRAME



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.



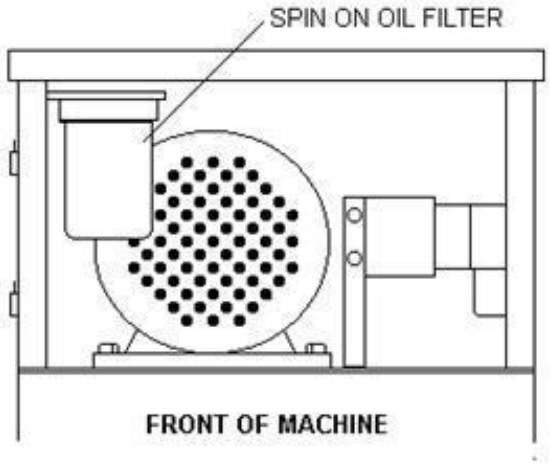
HYDRAULIC OIL

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.

LOCATION OF THE OIL FILTER

The spin-off oil filter is located on the left side under the table, as seen from the operator position. Removing of some machine components may be needed to remove and reinstall the oil filter.

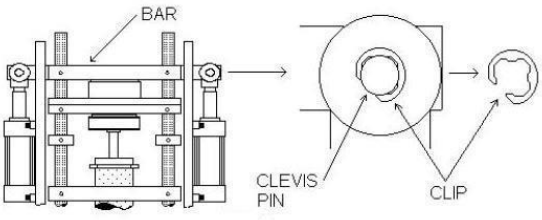


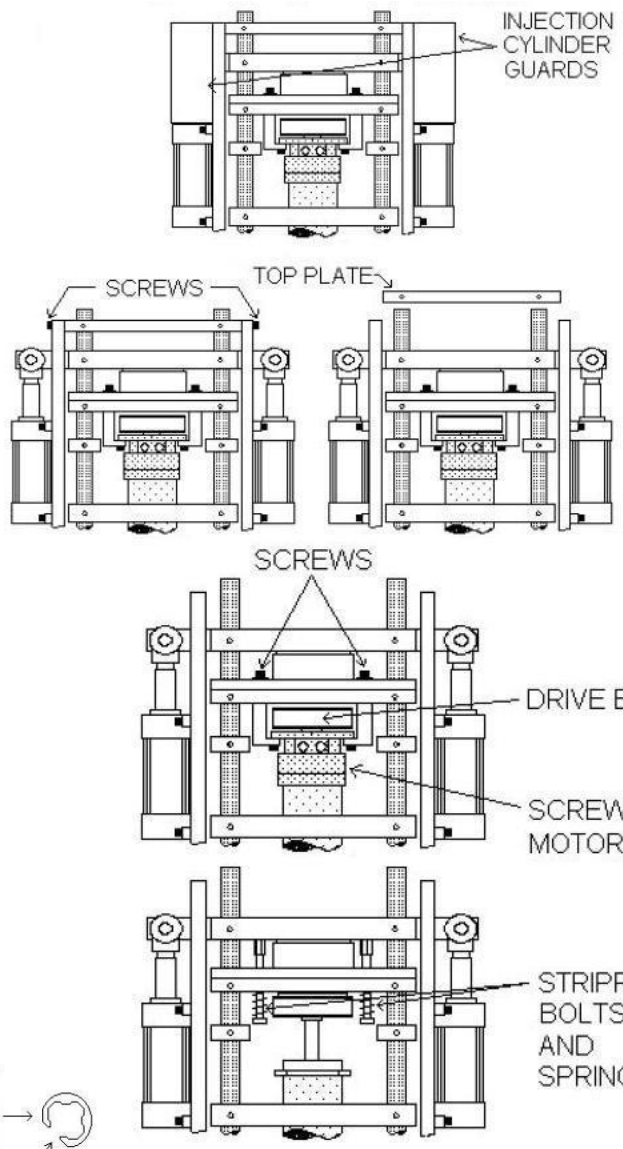
SCREW OR BARREL REMOVAL

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

PRELIMINARY PROCEDURE

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





- 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.

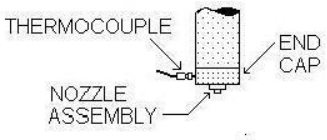
If the molding material was successfully purged, continue with SCREW REMOVAL PROCEDURE.

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

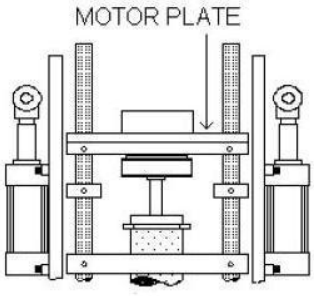
For removing barrel continue with BARREL AND SCREW REMOVAL PROCEDURE.

SCREW REMOVAL PROCEDURE

- Remove the nozzle assembly and spring.
- Unplug the bottom heater band and remove the bottom thermocouple.
- Remove the end cap.
- 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.



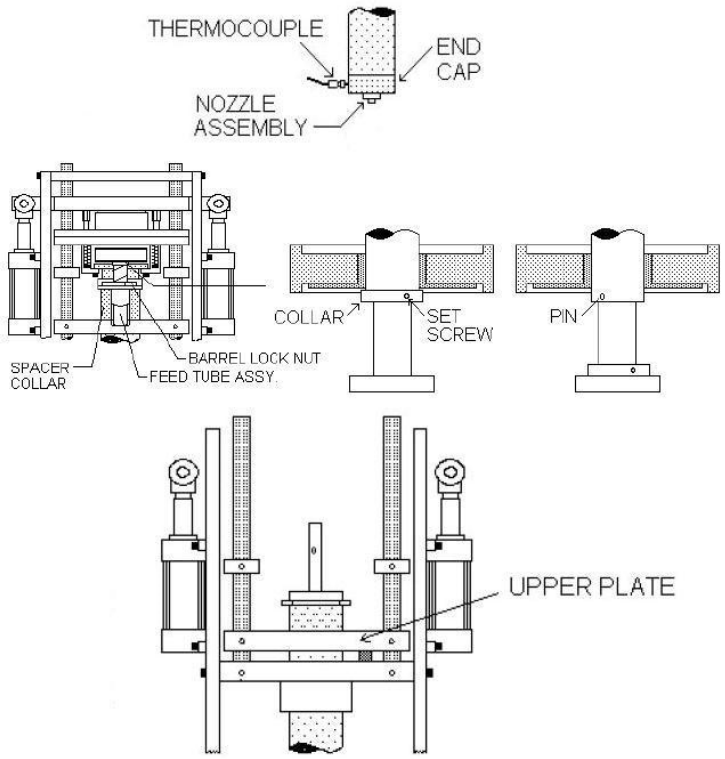
If this doesn't work you may have to continue with the BARREL AND SCREW REMOVAL PROCEDURE.



- 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.)
- To reassemble just reverse the order.

BARREL AND SCREW REMOVAL PROCEDURE

- Turn off heat.
- Remove the nozzle assembly and spring.
- Unplug the bottom heater band and remove the bottom thermocouple.
- Remove the end cap.
- Loosen the setscrew on the collar.
- Slide the collar down and remove the pin from under the former collar position.
- Lift off the motor plate assembly.
- Allow the barrel to cool down.
- Remove the thermocouples and the heater bands.
- Clean off the surface of the barrel.



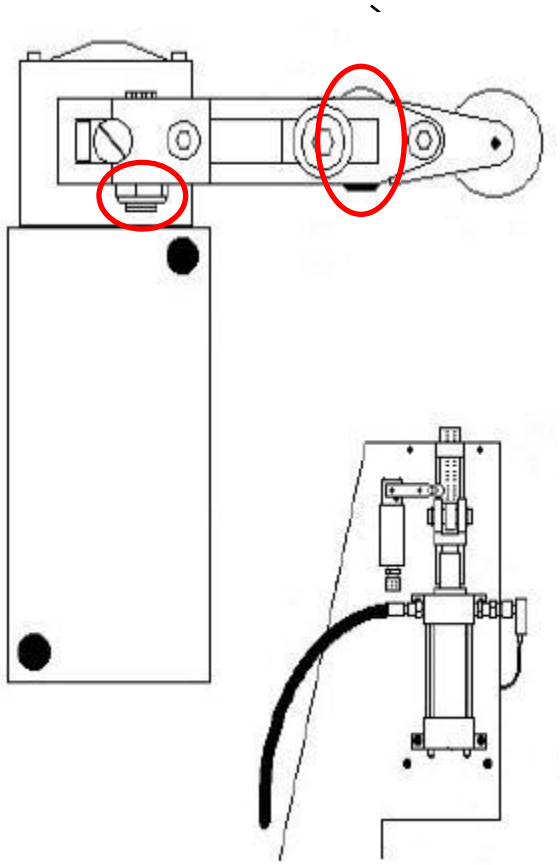
- Remove barrel by pulling up on the upper plate with the barrel still attached.
- Secure the barrel in a vise.
- Apply heat.
- Push out screw from lower end of barrel.
- When you are ready to reassemble you need to apply anti-seize compound on the material check valve ring retainer, the six screws that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

CLEANING OF SCREW AND BARREL

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

HOW TO ADJUST THE BARREL UP LIMIT SWITCH

- Turn the heats on
- Set shotsize to its maximum setting.
- Remove the left injection cylinder guard.
- Loosen the roller arm on barrel up limit switch.
- Turn on the motor.
- Purge the machine, allowing the screw to retract to its highest shotsize. If the screw retracts too high and a counter action pushes the barrel down purge the machine out and set the shotsize lower.
- Once the screw stops rotating at its highest peak, purge the machine slightly and then stop the motor.
- Adjust the roller arm so that the roller is contacting the ram bar.



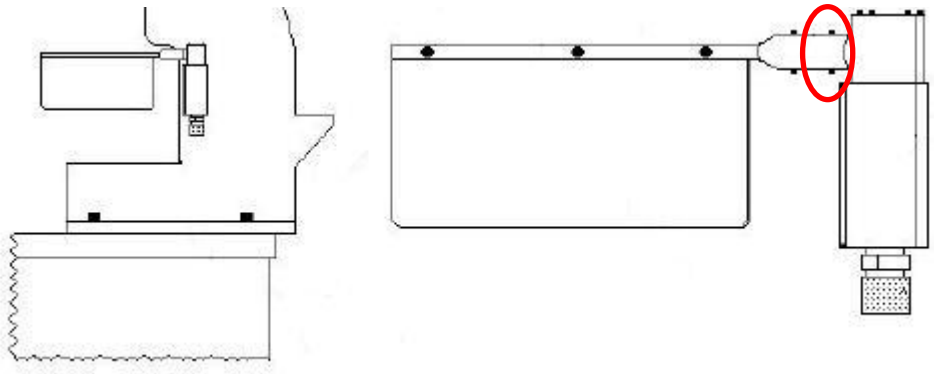
- Turn on the motor and purge the machine again. Verify that the pump is deactivated once the switch is made, before the machines highest capabilities.
- Repeat the roller arm adjustment until the switch trips adequately.
- Reinstall the left injection cylinder guard and reset the shotsize back to the process parameters.

HOW TO ADJUST THE SAFETY 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 loosen the two set screws on the back end of the flag mount

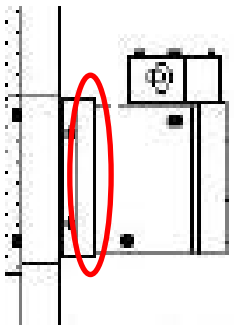


Set the angle of the flag so that it deactivates the pump adequately before the mold hits the barrel guard or upper frame.

HEIGHT

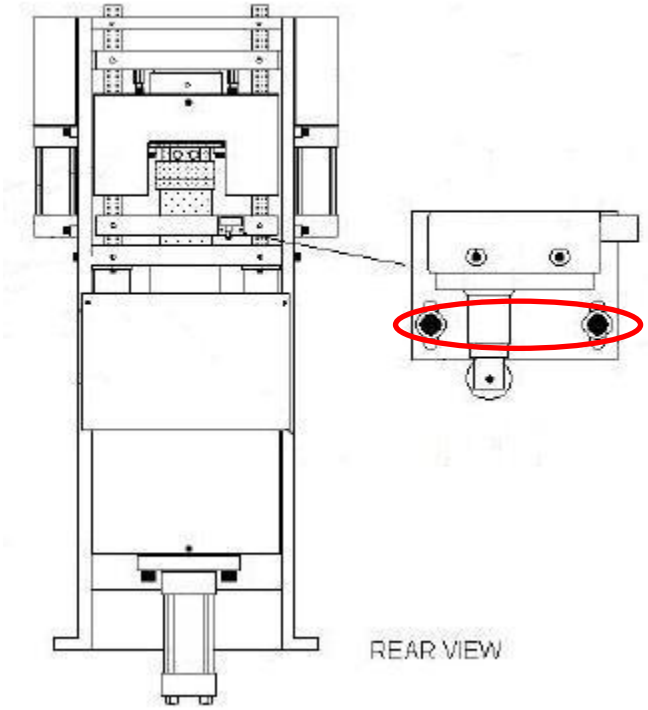
The height of the flag is adjusted by the two 10/32 screws that mounts the flat flag bracket to the upper frame flag bracket.

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 DOWN LIMIT SWITCH

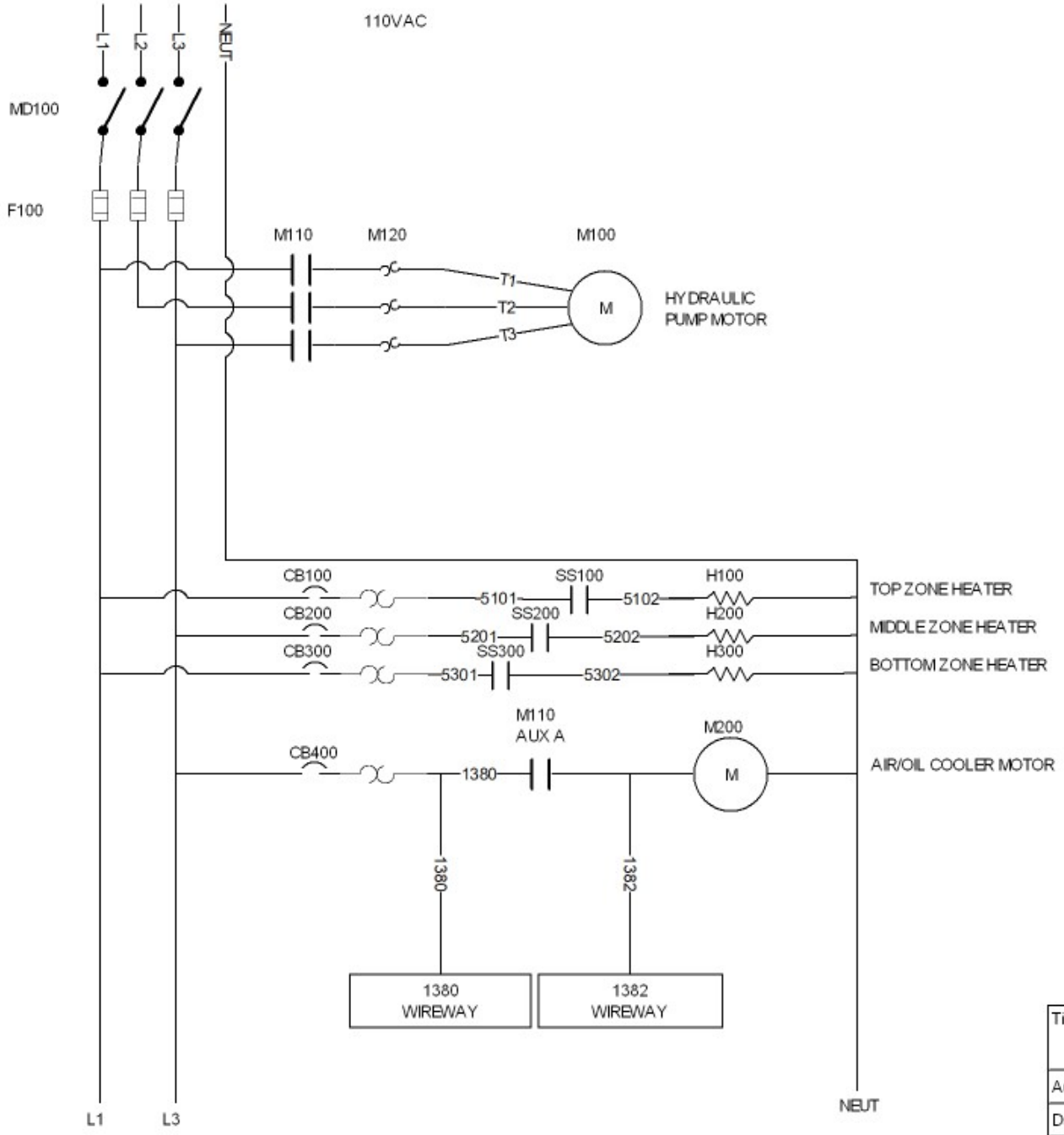
- Verify that the barrel assembly is in the proper upper position and purge block is under barrel.
- Turn off motor and electrical.
- Loosen the two screws of barrel down limit switch bracket.
- Position bracket so that switch roller is 5/8” from the barrel housing plate.
- Tighten the two screws of the barrel down limit switch bracket



NOTE - Don’t adjust the barrel down limit switch to where it is “on the ragged edge” of tripping, as this could cause problems when the screw is recovering.

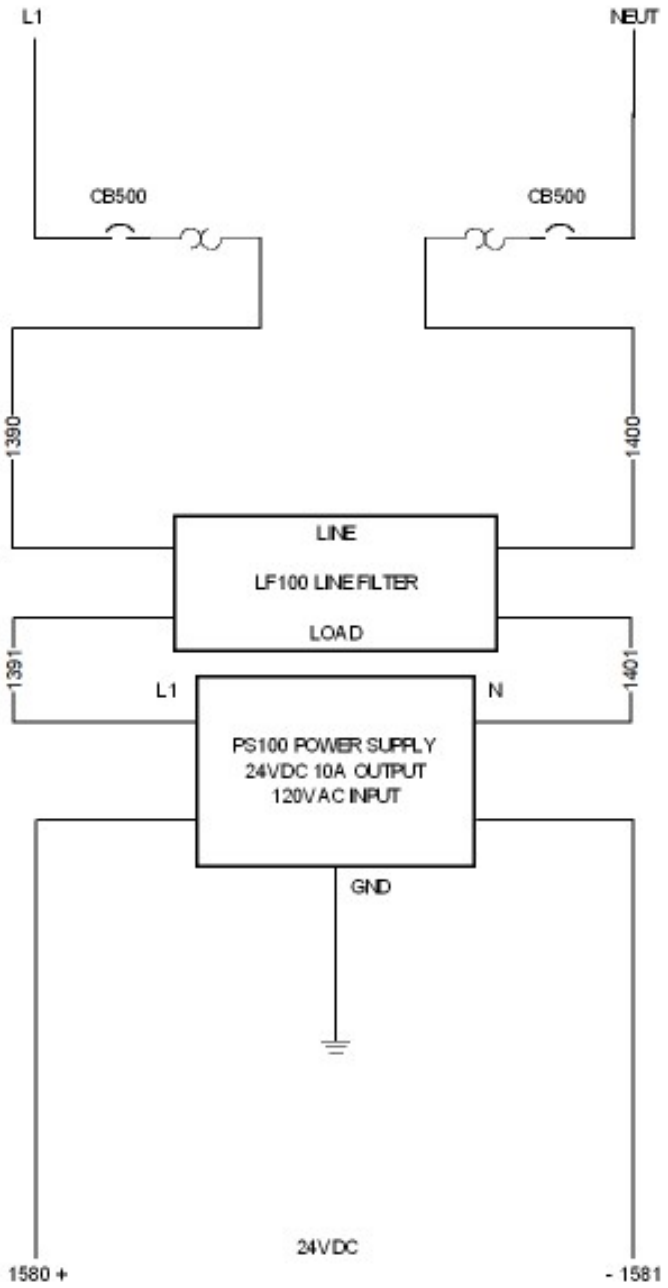
Section 6 – ECHO/MACO WIRE DESIGNATIONS

ELECTRICAL LADS 1-4 & WIREWAY



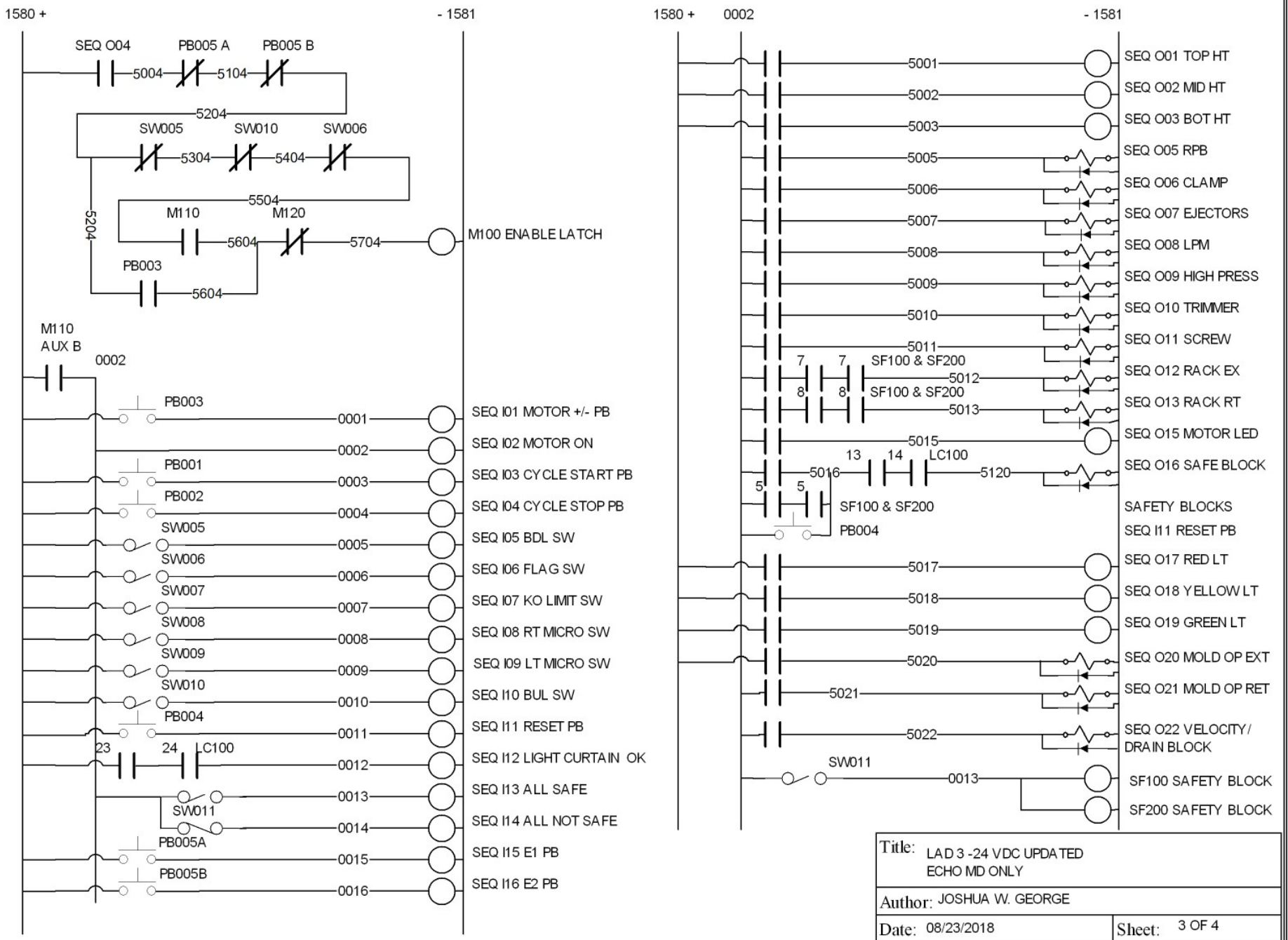
MD100	MAIN DISCONNECT
F100	40 AMP FUSE
M110	MOTOR RELAY
M100	MAIN MOTOR
M120	MOTOR OVERLOAD
M200	AIR/OIL MOTOR
CB100	16 AMP CIRCUIT BREAKER (TOP)
CB200	16 AMP CIRCUIT BREAKER (MID)
CB300	16 AMP CIRCUIT BREAKER (BOTT)
CB400	3 AMP CIRCUIT BREAKER
CB500	3 AMP 2 POLE CIRCUIT BREAKER
CB600	3 AMP DC CIRCUIT BREAKER
CB700	3 AMP DC CIRCUIT BREAKER
SS100	HEATER SOLID STATE (TOP)
SS200	HEATER SOLID STATE (MID)
SS300	HEATER SOLID STATE (BOTT)
H100	HEATER BAND (TOP)
H200	HEATER BAND (MID)
H300	HEATER BAND (BOTT)
LF100	LIINE FILTER
PS100	POWER SUPPLY
PB001	CYCLE START PB
PB002	CYCLE STOP PB
PB003	MOTOR START/STOP PB
PB004	RESET PB
PB005A	EMERGENCY STOP PB OP STATION
PB005B	EMERGENCY STOP PB PUSHBUTTON BOX
E100	MACO COMPACT OP STATION
E200	MACO COMPACT CONTROLLER
E300	ETHERNET HUB

Title:	LAD 1 - 110 VAC UPDATED ECHO SERIES ALL	
Author:	JOSHUA W. GEORGE	
Date:	08/23/2018	Sheet: 1 OF 4
Revision:	3.0	

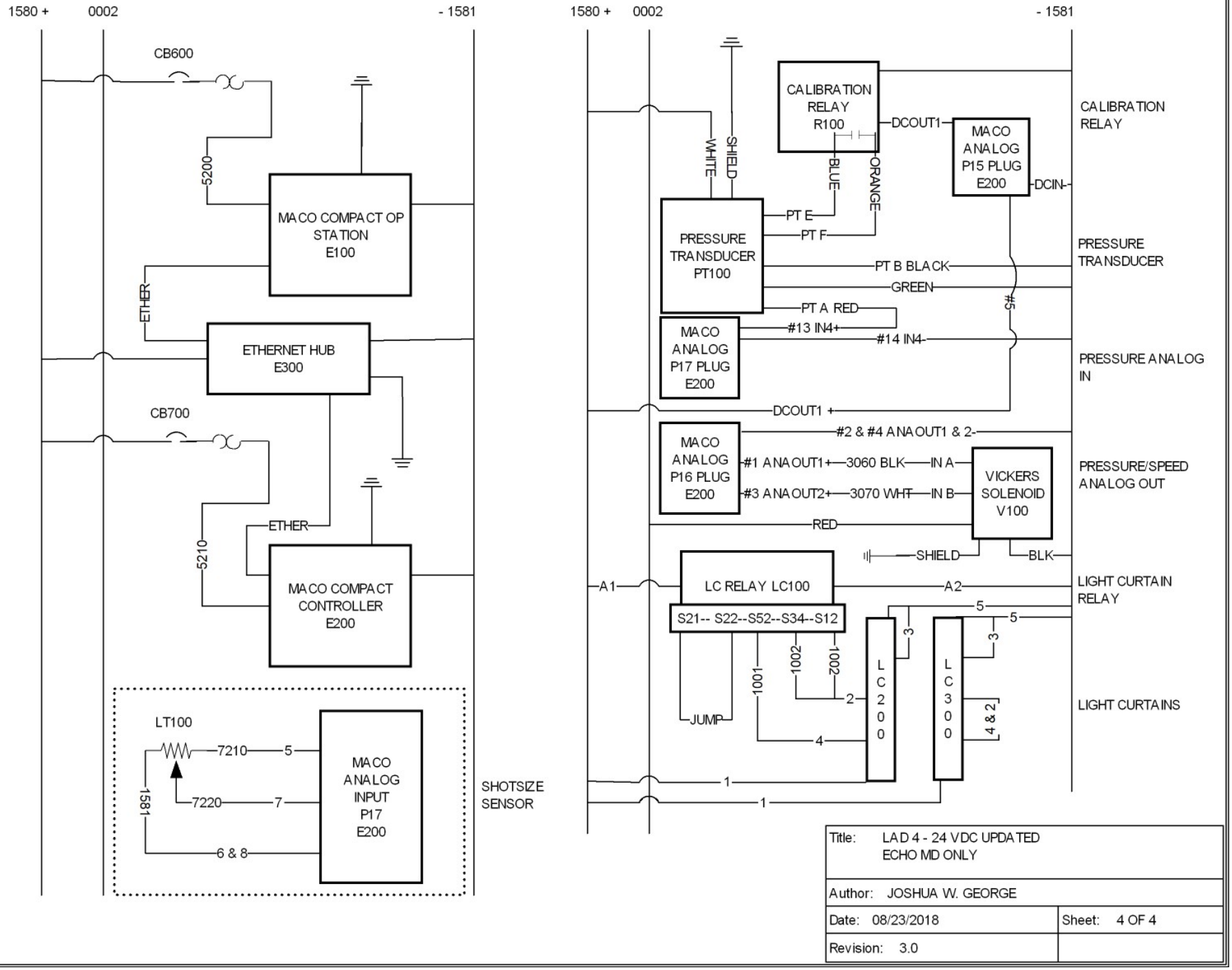


M110 AUX A	MOTOR RELAY AUX CONTACT 110VAC
M110 AUX B	MOTOR RELAY AUX CONTACT 24VDC
SW005	BDL SW
SW006	FLAG SW
SW007	KD LIMIT SW
SW008	RT MICRO SW
SW009	LT MICRO SW
SW010	BUL SW
SW011	MONITOR VALVE SW
SF100	SAFETY RELAY 1
SF200	SAFETY RELAY 2
LC100	LIGHT CURTAIN RELAY
LC200	LIGHT CURTAIN RECEIVER
LC300	LIGHT CURTAIN TRANSMITTER
PT100	PRESSURE TRANSDUCER
LT100	LINEAR TRANSDUCER
V100	VICKERS SOLENOID
R100	CALIBRATION RELAY

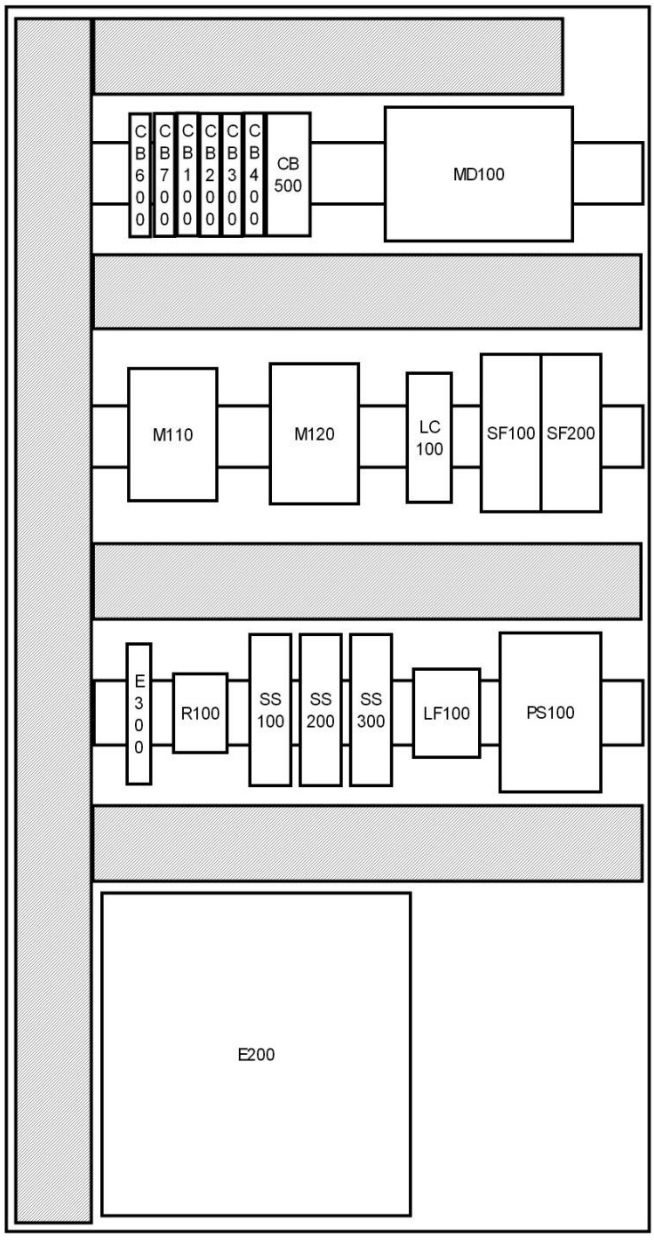
Title: LAD 2 - 110 VAC UPDATED ECHO MD ONLY	
Author: JOSHUA W. GEORGE	
Date: 08/23/2018	Sheet: 2 OF 4
Revision: 3.0	



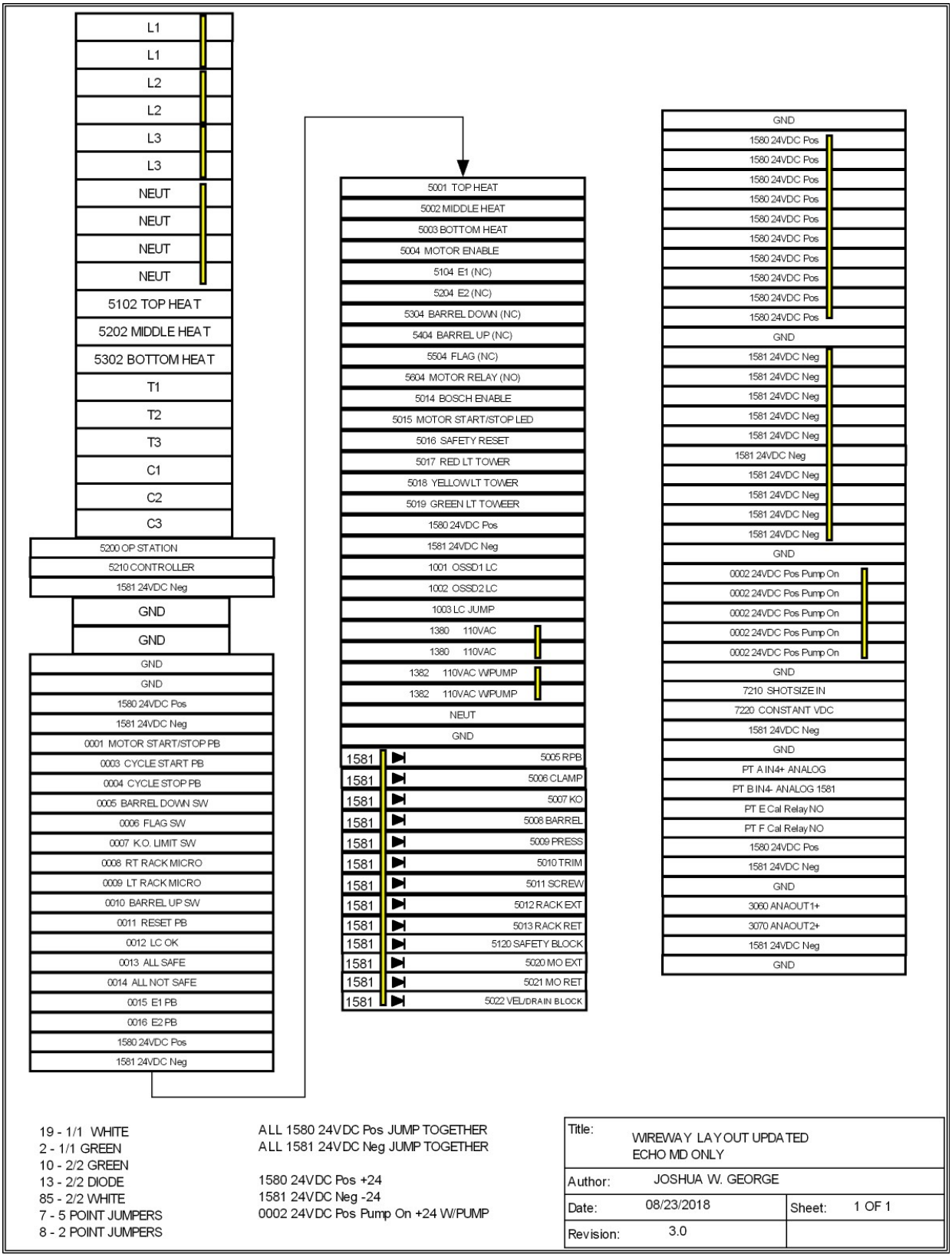
Title: LAD 3 -24 VDC UPDATED ECHO MD ONLY	
Author: JOSHUA W. GEORGE	
Date: 08/23/2018	Sheet: 3 OF 4
Revision: 3.0	



Title: LAD 4 - 24 VDC UPDATED ECHO MD ONLY	
Author: JOSHUA W. GEORGE	
Date: 08/23/2018	Sheet: 4 OF 4
Revision: 3.0	



Title:	COMPONENT LAYOUT ECHO MD ONLY		
Author:	JOSHUA W. GEORGE		
Date:	8/28/2018	Sheet:	1 OF 1
Revision:	1.0		


L1
L1
L2
L2
L3
L3
NEUT
NEUT
NEUT
NEUT
5102 TOP HEAT
5202 MIDDLE HEAT
5302 BOTTOM HEAT
T1
T2
T3
C1
C2
C3
5200 OP STATION
5210 CONTROLLER
1581 24VDC Neg
GND
GND
GND
GND
1580 24VDC Pos
1581 24VDC Neg
0001 MOTOR START/STOP PB
0003 CYCLE START PB
0004 CYCLE STOP PB
0005 BARREL DOWN SW
0006 FLAG SW
0007 K.O. LIMIT SW
0008 RT RACK MICRO
0009 LT RACK MICRO
0010 BARREL UP SW
0011 RESET PB
0012 LC OK
0013 ALL SAFE
0014 ALL NOT SAFE
0015 E1 PB
0016 E2 PB
1580 24VDC Pos
1581 24VDC Neg
5001 TOP HEAT
5002 MIDDLE HEAT
5003 BOTTOM HEAT
5004 MOTOR ENABLE
5104 E1 (NC)
5204 E2 (NC)
5304 BARREL DOWN (NC)
5404 BARREL UP (NC)
5504 FLAG (NC)
5604 MOTOR RELAY (NO)
5014 BOSCH ENABLE
5015 MOTOR START/STOP LED
5016 SAFETY RESET
5017 RED LT TOWER
5018 YELLOW LT TOWER
5019 GREEN LT TOWEER
1580 24VDC Pos
1581 24VDC Neg
1001 OSSD1 LC
1002 OSSD2 LC
1003 LC JUMP
1380 110VAC
1380 110VAC
1382 110VAC W/PUMP
1382 110VAC W/PUMP
NEUT
GND
1581 5005 RPB
1581 5006 CLAMP
1581 5007 KO
1581 5008 BARREL
1581 5009 PRESS
1581 5010 TRIM
1581 5011 SCREW
1581 5012 RACK EXT
1581 5013 RACK RET
1581 5120 SAFETY BLOCK
1581 5020 MO EXT
1581 5021 MO RET
1581 5022 VEL/DRAIN BLOCK
GND
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
1580 24VDC Pos
GND
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
1581 24VDC Neg
GND
0002 24VDC Pos Pump On
0002 24VDC Pos Pump On
0002 24VDC Pos Pump On
0002 24VDC Pos Pump On
0002 24VDC Pos Pump On
GND
7210 SHOTSIZE IN
7220 CONSTANT VDC
1581 24VDC Neg
GND
PT A IN4+ ANALOG
PT B IN4- ANALOG 1581
PT E Cal Relay NO
PT F Cal Relay NO
1580 24VDC Pos
1581 24VDC Neg
GND
3060 ANAOUT1+
3070 ANAOUT2+
1581 24VDC Neg
GND
19 - 1/1 WHITE
2 - 1/1 GREEN
10 - 2/2 GREEN
13 - 2/2 DIODE
85 - 2/2 WHITE
7 - 5 POINT JUMPERS
8 - 2 POINT JUMPERS
ALL 1580 24VDC Pos JUMP TOGETHER
ALL 1581 24VDC Neg JUMP TOGETHER
1580 24VDC Pos +24
1581 24VDC Neg -24
0002 24VDC Pos Pump On +24 W/PUMP
Title: WIREWAY LAYOUT UPDATED ECHO MD ONLY
Author: JOSHUA W. GEORGE
Date: 08/23/2018
Sheet: 1 OF 1
Revision: 3.0

32 I/O CONTROLLER CONTROLLER

INPUT ADDRESS/WIRE

INPUTS BOTTOM PLUG

#	ADDRESS/WIRE	DESCRIPTION
1	0001	MOTOR ON/OFF PUSHBUTTON
2	0002	MOTOR ON
3	0003	CYCLE START PUSHBUTTON
4	0004	CYCLE STOP PUSHBUTTON
5	0005	BARREL DOWN LIMIT SWITCH
6	0006	SAFETY FLAG
7	0007	KNOCKOUT LIMIT SWITCH
8	0008	RIGHT RACK MICROSWITCH
9	0009	LEFT RACK MICROSWITCH
10	0010	BARREL UP LIMIT SWITCH
11	0011	RESET PUSHBUTTON
12	0012	LIGHT CURTAIN OK
13	0013	ALL SAFE
14	0014	ALL NOT SAFE
15	0015	EMERGENCY STOP PUSHBUTTON E1
16	0016	EMERGENCY STOP PUSHBUTTON E2

OUTPUT ADDRESS/WIRE

OUTPUTS TOP PLUGS

#	ADDRESS/WIRE	DESCRIPTION
1	5001	TOP HEATS
2	5002	MIDDLE HEATS
3	5003	BOTTOM HEATS
4	5004	MOTOR ENABLE
5	5005	RACK PULL BACK SOLENOID
6	5006	CLAMP SOLENOID
7	5007	KNOCKOUT SOLENOID
8	5008	BARREL SOLENOID
9	5009	HIGH PRESSURE SOLENOID
10	5010	TRIMMER VALVE
11	5011	SCREW SOLENOID
12	5012	RACK EXTEND SOLENOID
13	5013	RACK RETRACT SOLENOID
14	5014	BOSCH ENABLE (NOT INSTALLED)
15	5015	MOTOR ON/OFF LED
16	5016	SAFETY RESET
17	5017	RED LIGHT TOWER
18	5018	YELLOW LIGHT TOWER

19	5019	GREEN LIGHT TOWER
20	5020	MOLD OPENER EXTEND SOLENOID
21	5021	MOLD OPENER RETRACT SOLENOID
22	5022	VELOCITY DRAIN BLOCK VALVE

VCC CONNECTIONS WIRE

VCC CONNECTIONS PLUG

#	ASSIGNMENT	WIRE
1	VCC 1-4	1580
2	VCC 5-8	0002
3	VCC 9-12	0002
4	VCC 13-16	0002
5	VCC 17-20	1580
6	VCC 21-24	0002
9	COMMON	1581

8 ZONE T/C 24VDC CONTROLLER CARD

THERMOCOUPLE LEAD INPUT WIRES

THERMOCOUPLE LEADS P14 PLUG

#	ASSIGNMENT	WIRE
1	TC 1-	RED THERMOCOUPLE LEAD TOP
2	TC 1+	WHITE THERMOCOUPLE LEAD TOP
3	TC 2-	RED THERMOCOUPLE LEAD MIDDLE
4	TC 2+	WHITE THERMOCOUPLE LEAD MIDDLE
5	TC 3-	RED THERMOCOUPLE LEAD BOTTOM
6	TC 3+	WHITE THERMOCOUPLE LEAD BOTTOM
18	CHASSIS	ALL THERMOCOUPLES LEAD SHIELDS

PRIMARY CONTROLLER POWER WIRES

PRIMARY CONTROLLER POWER P18 PLUG

#	ASSIGNMENT	WIRE#
1	PRIM_24+	5210
2	PRIM_COM	1581

COMPACT HI SPEED APU CONTROLLER CARD

SHOTSIZE SENSOR WIRES

SHOTSIZE SENSOR P17 PLUG BOTTOM

#	ASSIGNMENT	WIRE #
5	IN2+	7210
6	IN2-	1581
7	EX2+	7220
8	EX2-	1581

PRESSURE TRANSDUCER WIRES

PRESSURE TRANSDUCER P17 PLUG TOP

#	ASSIGNMENT	WIRE #
13	IN4+	PTA
14	IN4-	1581

CALIBRATION RELAY WIRES

CALIBRATION RELAY P15 PLUG

#	ASSIGNMENT	WIRE #
5	DCOUT1	RLY+
9	DCOUT+	1580
11	DCIN-	1581

VICKERS INJECTION VALVE WIRES

VICKERS INJECTION VALVE P16 PLUG

#	ASSIGNMENT	WIRE #
1	ANAOUT1+	3060
2	ANAOUT1-	1581
3	ANAOUT2+	3070
4	ANAOUT2-	1581

NOTES