Controls & Indicators
Section TBD

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CONTROLS AND INDICATORS OVERVIEW

This section covers the basic layout of the controls and indicators of the V400. The Main Power Disconnect switch is located on the main electrical enclosure. Once power has been turned on, most of the operation of the V400 will be performed at the Operator's Control Panel. The operator interface software program is controlled via the touch screen panel referred to after this point as a Human Machine Interface (HMI).

This section first describes the physical controls of the V400 followed by a description of the software controls. Most of the controls on the V400, including program setup and manual and automatic controls are contained in the software program.

MAIN POWER DISCONNECT SWITCH

Input power for the V400 is controlled by the main power disconnects switch located on the main electrical enclosure.

When set to **ON**, the switch applies power to all V400 circuits. This switch must be **ON** before the operator's control panel will function.

EMERGENCY SHUTDOWN

Pressing the Emergency Stop pushbutton disables the grinding operation. If the V400 is in motion and an **E-STOP** is pressed the V400 servo axes stop immediately and the grinding spindle coasts to a stop.

The **EMERGENCY STOP** pushbutton should only be used to stop the V400 in an emergency!

PUSHBUTTONS AND STACK LIGHTS

This section discusses the pushbuttons and stack light located on the machine.

In addition to the software controls included on the HMI, the V400 has these controls on electrical enclosure.

Table 1 Operator's Console Panel Pushbuttons

COLOR	INDICATION
RESET-black pushbutton	• Press this button to reset latch in the emergency stop circuit.
E-STOP- red mushroom head Push/pull button	• This will immediately stop the machine.

Table 2 Stack Light Colors and Functions

COLOR	INDICATION
RED	• **Blinking** = indicates an emergency stop condition

TOUCH PANEL SCREENS

The HMI (touch panel) is the main operator interface for the machine.

Its functions include:

- Indicating warnings and machine faults.
- Adjusting machine-operating parameters such as grinding speed and other adjustments.
- Control of selected devices.

HMI SCREEN TREE STRUCTURE

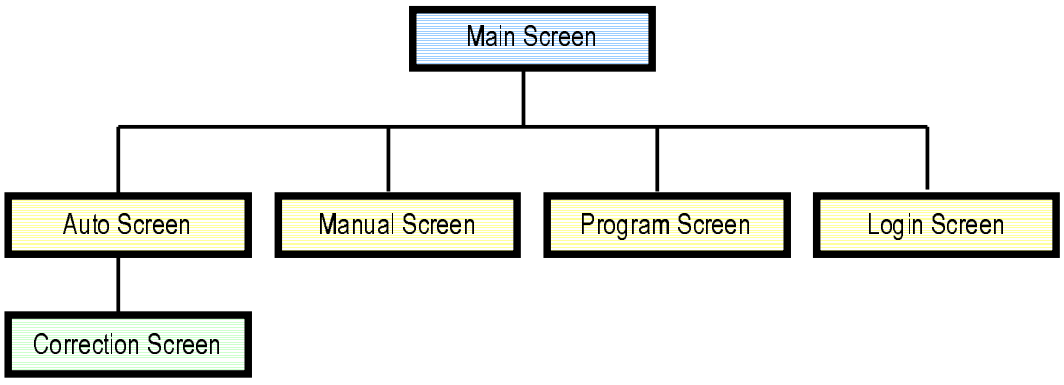


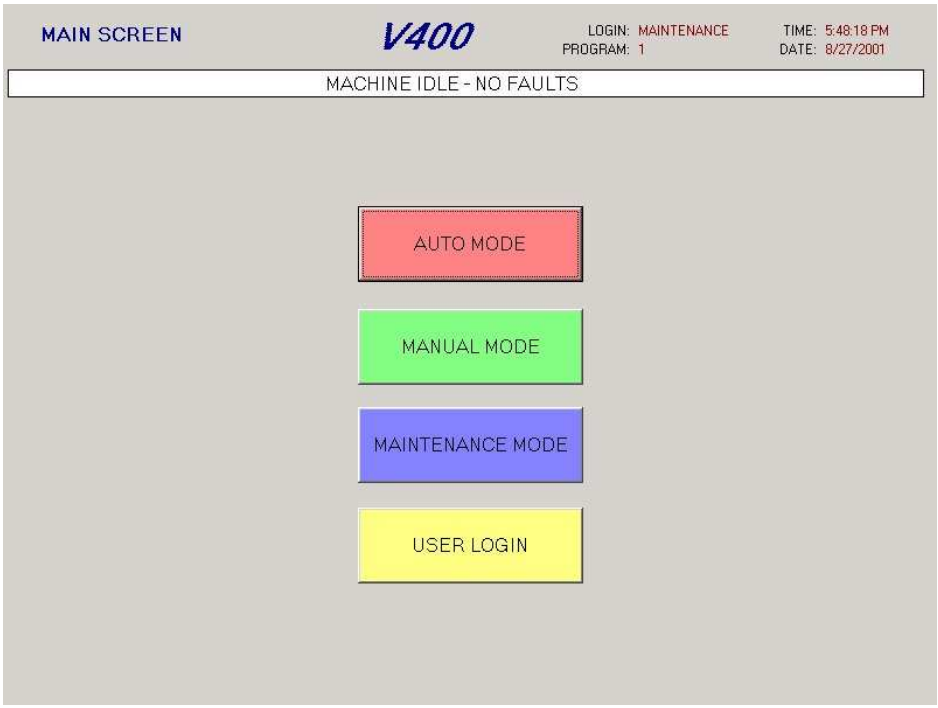
Figure 1 Screen Tree Main Menu with all the Sub Menus

The screen tree structure above illustrates the navigation from screen to screen.

HMI SCREENS OVERVIEW

This section provides a description of each HMI screen. A picture of each screen is given and the function of the pushbuttons and displays are described.

SCREEN HEADER



There is a common header at the top of all screens. The ***MAIN*** screen is shown above for illustration purposes. The header contains the following information:

- **Screen Name**: Current screen name that is displayed
- **Login**: Current user level. See the ***Login*** screen section below for more information.
- **Active Program**: Current program number that is loaded
- **Status**: Current machine status (i.e. running, faulted…)

- **Date and Time:** The current date and time are displayed

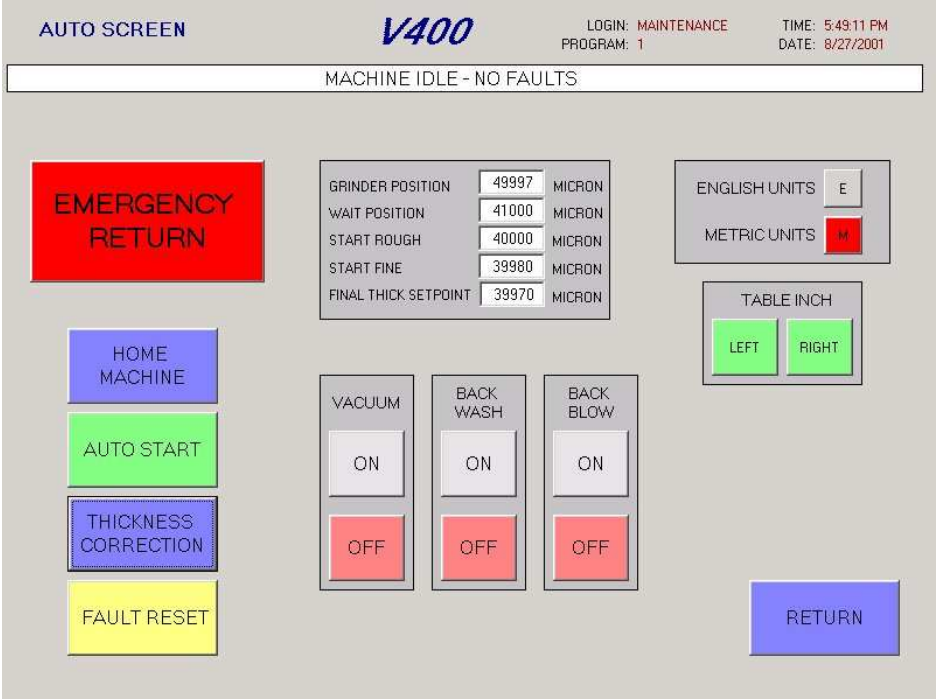
MAIN SCREEN

The ***MAIN*** screen is shown above in the SCREEN BORDER section.

This screen is the central point from which most of the other screens are accessed. Following is a description of each of the buttons:

- **AUTO MODE:** accesses the ***AUTO MODE*** screen. This is the screen that the operator will use most of the time for grinding wafers.
- **MANUAL MODE:** accesses the ***MANUAL MODE*** screen. This screen is used to manually actuate individual functions of the machine.
- **MAINTENANCE MODE:** accesses the ***PROGRAM*** screen. This screen provides access to program parameters (i.e. grinding speed).
- **USER LOGIN:** accesses the ***LOGIN*** screen. This screen allows different security levels to be accessed.

AUTO MODE SCREEN

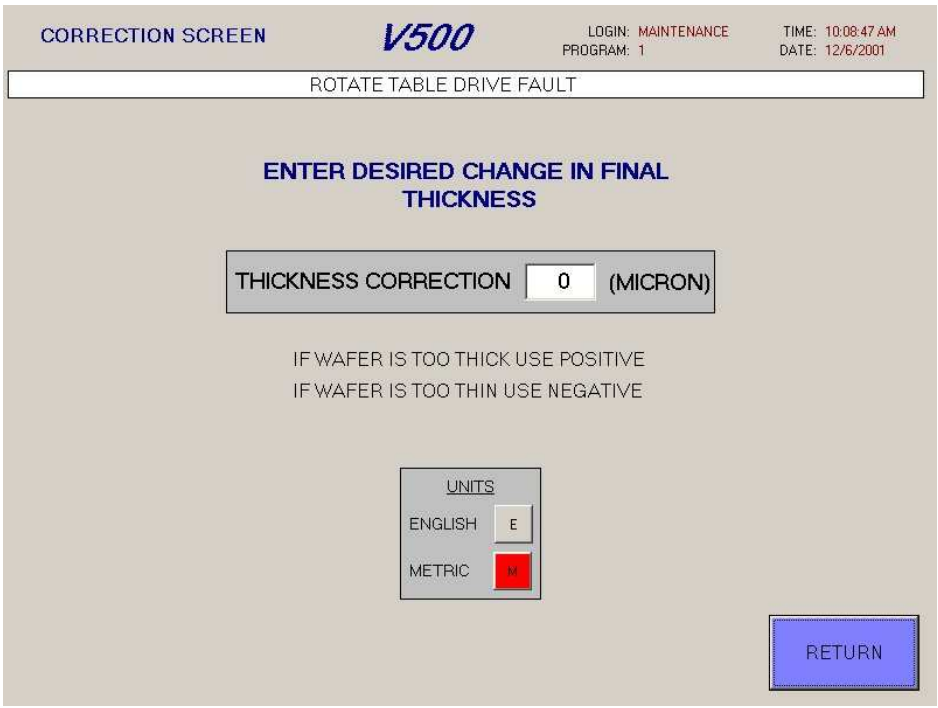


This screen is accessed by touching the **AUTO MODE** button on the ***MAIN*** screen. This screen is used to run the machine in automatic mode. Following is a description of each of the functions on the screen:

- **EMERGENCY RETURN:** this button immediately returns the slide to the Wait Position when the machine is running in auto or is homing. When the slide reaches the Wait Position the spindle is stopped, the table is stopped and the coolant water is turned off.
- **HOME MACHINE:** this button homes the slide (X-Axis) and table. The home sequence is as follows:
  - The slide moves upward until the home switch is made.
  - The slide then moves down slowly until the marker pulse on the motor resolver is sensed.
  - The slide moves to the Wait Position.
- **AUTO START**: this buttons starts the machine running in Auto Mode.

- **THICKNESS CORRECTION**: this button pulls up the ***THICKNESS CORRECTION*** screen. This screen allows the operator to enter a Thickness Correction that is applied to the next grinding cycle.
- **FAULT RESET:** this button clears any active machine faults (i.e. Table Drive Fault).
- **VACUUM:** these buttons turn the vacuum. Vacuum must be on before the machine can be started in Auto Mode. When the vacuum is turned off the back wash and back blow are automatically turned off.
- **BACK WASH:** these buttons turn the back wash on and off. The backwash cannot be turned on if the vacuum is on.
- **BACK BLOW:** these buttons turn the back blow on and off. The back blow cannot be turned on if the vacuum is on.
- **TABLE INCH:** these buttons jog the table in either direction while the buttons are pressed. Motion stops when the buttons are released.
- **UNITS:** these buttons select whether the numeric parameters are displayed in English (mils) or Metric (microns) units.
- **PARAMATER DISPLAY:** these fields display the real-time slide position and some of the key program parameters.
- **DRESS CHUCK:** this button allows the machine to run in Auto Mode without the vacuum turned on. This is commonly needed when dressing the chucks.
- **RETURN:** this button returns back to the ***MAIN*** screen.

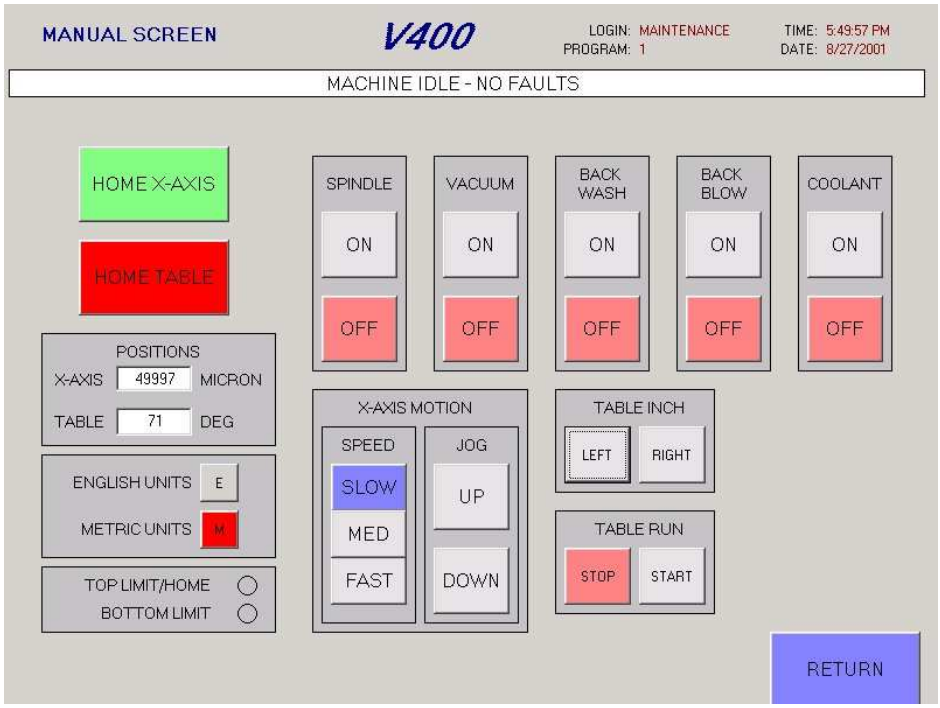
THICKNESS CORRECTION SCREEN



This screen is accessed by touching the **THICKNESS CORRECTION** button on the ***AUTO MODE*** screen. This screen is used to make a correction to the overall thickness of a wafer. The value of the thickness correction entered is added to the X-Axis reference position shown on the ***PROGRAM*** screen. For example, if the last wafer ground were 300 microns then a thickness correction of 10 microns would produce the next wafer with a thickness of 290 microns.

- **THICKNESS CORRECTION**: when this field is pressed a numeric keypad is displayed for entry of the desired thickness correction value.
- **UNITS:** these buttons select whether the numeric parameters are displayed in English (mils) or Metric (microns) units.
- **RETURN:** this button returns back to the ***AUTO MODE*** screen.

MANUAL MODE SCREEN

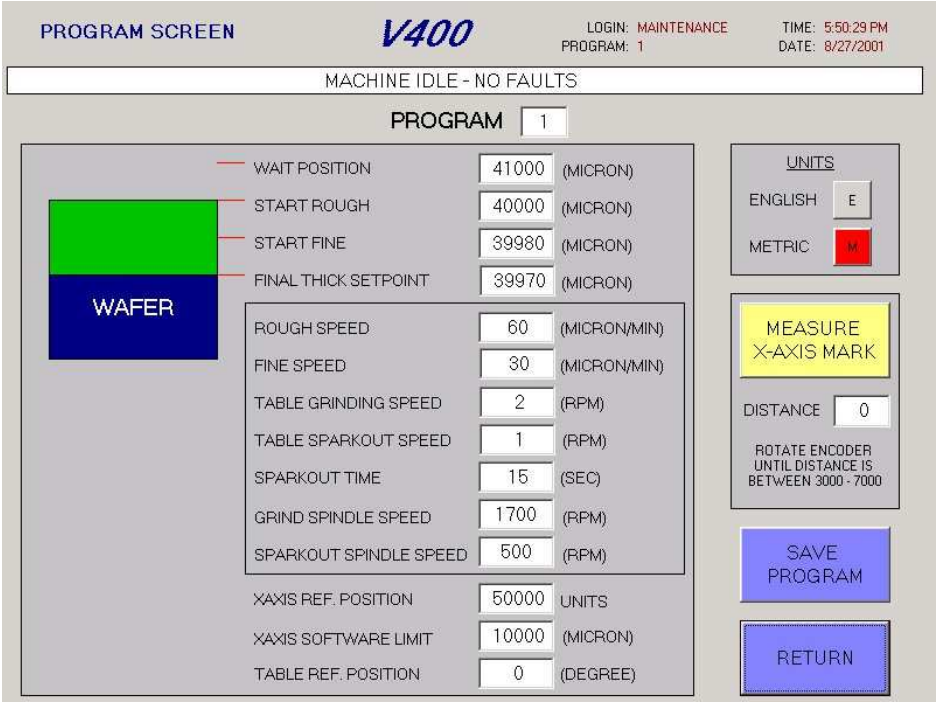


This screen is accessed by touching the **AUTO MODE** button on the ***MAIN*** screen. This screen is used to run the machine in automatic mode. Following is a description of each of the functions on the screen:

- **HOME X-AXIS:** this button homes the slide. The home sequence is as follows:
  - The slide moves upward until the home switch is made.
  - The slide then moves down slowly until the marker pulse on the motor resolver is sensed.
  - The slide moves to the Wait Position.
- **CHUCK POSITION:** these two buttons move the table to either chuck position 1 or 2.
- **VACUUM:** these buttons turn the vacuum on and off. Vacuum must be on before the machine can be started in auto mode. When the vacuum is turned off the back wash and back blow are automatically turned off.

- **BACK WASH:** these buttons turn the back wash on and off. The backwash cannot be turned on if the vacuum is on.
- **BACK BLOW:** these buttons turn the back blow on and off. The back blow cannot be turned on if the vacuum is on.
- **COOLANT:** these buttons turn the coolant on and off. The coolant is automatically turned on at the beginning of an auto cycle and turned off at the end.
- **SPINDLE:** these buttons turn the Spindle on and off. The spindle run speed is set to the Grind Spindle Speed shown on the ***PROGRAM*** screen.
- **X-AXIS MOTION:** these buttons jog the X-Axis up and down at the selected speed. Only slow speed is enabled in the downward direction if the X-Axis position is less than the X-Axis Software Overtravel shown on the ***PROGRAM*** screen.
- **TABLE INCH:** these buttons jog the table in either direction while the buttons are pressed. Motion stops when the buttons are released.
- **TABLE RUN:** these buttons start and stop the table. When the Start button is pressed the table continues to run until the stop button is pressed. These buttons are particularly useful when dressing the chucks.
- **UNITS:** these buttons select whether the numeric parameters are displayed in English (mils) or Metric (microns) units.
- **POSITIONS:** these fields display the real-time slide and table positions.
- **TOP LIMIT/HOME:** this pilot light is on when the top overtravel switch is triggered. The top switch is used as a home switch as well as an overtravel.
- **BOTTOM LIMIT:** this pilot light is on when the bottom overtravel switch is triggered.
- **RETURN:** this button returns back to the ***MAIN*** screen.

PROGRAM SCREEN



This screen is accessed by touching the **MAINTENANCE MODE** button on the ***MAIN*** screen. This screen is used to setup machine run parameters used in automatic mode. Pressing on any one of the numeric fields brings up a numeric keypad to enter new value. There are a total of ten programs that are saved. Any program can be retrieved by pressing the PROGRAM numeric field and selecting the program number. Any User Level can change program numbers. Following are the user privileges based on user login:

- **OPERATOR:** when logged in as operator none of the parameters can be edited.
- **MAINTENANCE:** when logged in as maintenance, parameters of programs 1-9 can be edited.
- **OEM:** when logged in as OEM, parameters of all programs (1-10) can be edited.

Following is a description of each of the parameters and buttons on the screen:

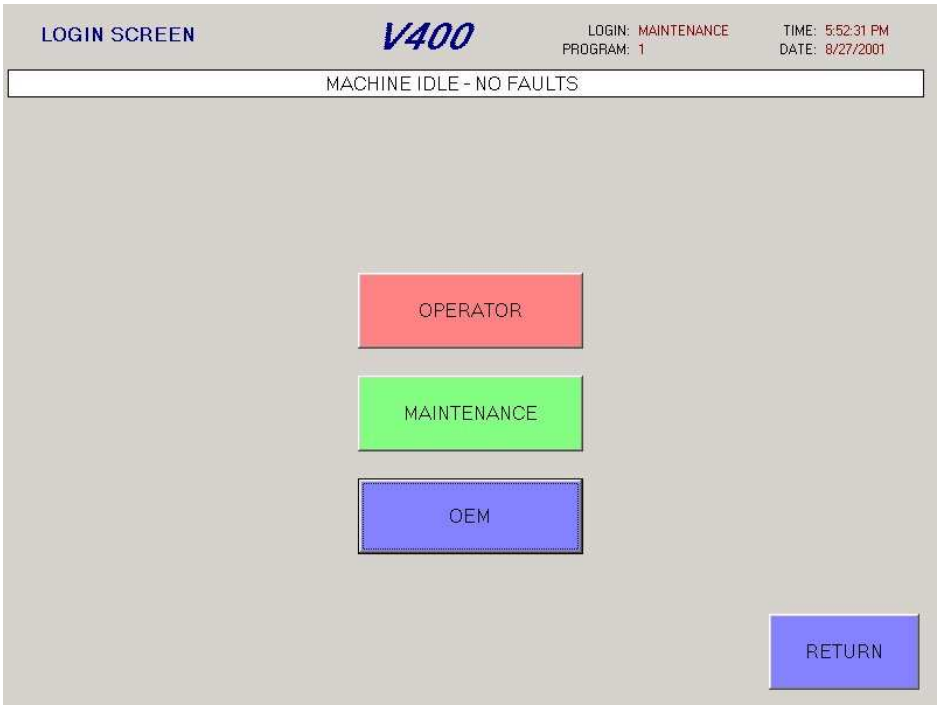
- **PROGRAM:** this parameter defines which program set is displayed on this screen and used during auto cycle.

- **WAIT POSITION:** this parameter defines the position that the slide starts from at the beginning of an auto cycle. It returns to this same position when the cycle is complete or when the **EMERGENCY RETURN** button is pressed on the ***AUTO MODE*** screen.
- **START ROUGH:** this parameter defines the position that the slide speed runs at ROUGH SPEED.
- **START FINE:** this parameter defines the position that the slide speed starts running at the FINE SPEED.
- **FINAL THICKNESS SETPOINT:** this parameter defines the position that the slide stops and performs sparkout.
- **ROUGH SPEED:** this parameter defines the slide speed moving from the START ROUGH position to the START FINE position.
- **FINE SPEED:** this parameter defines the slide speed moving from the START FINE position to the FINAL THICKNESS SETPOINT position.
- **TABLE GRINDING SPEED:** this parameter defines the table speed when the slide is moving from the START ROUGH position to the START FINE position.
- **TABLE SPARKOUT SPEED:** this parameter defines the table speed while the slide is moving from the START FINE position to the FINAL THICKNESS SETPOINT position.
- **SPARKOUT TIME:** this parameter defines the time the slide dwells in the FINAL THICKNESS SETPOINT position for sparkout.
- **GRIND SPINDLE SPEED:** this parameter defines the spindle speed when the slide is moving from the START ROUGH position to the FINAL THICKNESS SETPOINT position.
- **SPARKOUT SPINDLE SPEED:** this parameter defines the spindle speed while the slide dwells in the FINAL THICKNESS SETPOINT position for sparkout.
- **X-AXIS REF. POSITION:** this parameter defines the X-Axis zero reference. This number is set so the X-Axis position displays zero when the grinding wheel just makes contact with a chuck.
- **X-AXIS SOFTWARE LIMIT:** this parameter defines the X-Axis lower software limit. The software limit is enabled after the X-Axis is homed. When this

parameter is enabled, motion in the downward direction is forced to slow speed (1 micron/sec) when the X-Axis position is less than the X-AXIS SOFTWARE LIMIT.

- **TABLE REF. POSITION:** this parameter defines the table zero reference. This number is set so the table chuck 1 lines up with operator side of machine after homing.
- **MEASURE X-AXIS MARK:** this button is used to start the X-Axis homing sequence. While homing the distance between the home switch and motor resolver marker pulse is recorded and displayed. As shown on the screen, the value should read between 3000 and 7000 counts. If the value does not fall within this range the motor should be rotated 90 degrees. This is required to make sure the switch and marker pulse do not trigger very close to each other.
- **SAVE PROGRAM:** this button saves the current program to disk.
- **UNITS:** these buttons select whether the numeric parameters are displayed in English (mils) or Metric (microns) units.
- **RETURN:** this button returns back to the ***MAIN*** screen.

LOGIN SCREEN



This screen is accessed by touching the **USER LOGIN** button on the ***MAIN*** screen. This screen is used to change the user privileges. Any User Level can change program numbers. Following is a description of each of the buttons on the screen:

- **OPERATOR:** this button selects Operator user level. No password is required. At this user level the user can change program numbers but cannot change any program parameters.
- **MAINTENANCE:** this button selects Maintenance user level. When pressed a numeric keypad is displayed prompting the user for a password. If the correct password is entered the user level changes to Maintenance. At this level the user can change parameters for program numbers 1-9. Program number 10 cannot be changed.
- **OEM:** this button selects OEM user level. When pressed a numeric keypad is displayed prompting the user for a password. If the correct password is entered the user level changes to OEM. At this level the user can change parameters for all ten programs.