

SMAC System Table of Contents

1.0 Introduction.....	page 3
2.0 Contact Information.....	page 4
3.0 SMAC Configuration and Installation.....	page 5
3.1 The SMAC System Components.....	page 5
3.2 Marking Module.....	page 5
3.3 Detection Module.....	page 6
3.4 SMAC Controller.....	page 6
4.0 Graphical User Interface.....	page 10
4.1 Main Menu Screen.....	page 10
4.2 Setup Screen.....	page 11
4.2.1 Batch Setup Screen.....	page 11
4.2.2 Repeat Length.....	page 11
4.2.3 Mark Duration.....	page 11
4.2.4 Applicator Spacing.....	page 11
4.2.5 Mark Encoder.....	page 11
4.2.6 Missed Read Limit.....	page 11
4.2.7 +MAX Filter Limit%.....	page 12
4.2.8 -MIN Filter Limit.....	page 12
4.2.9 Sample Size.....	page 12
4.2.10 Shrink Limit Count.....	page 12
4.2.11 Done.....	page 12
4.2.12 Password Protect.....	page 12
4.3 Batch Screen.....	page 12
4.3.1 Shrink Target.....	page 13
4.3.2 Shrink Limit+.....	page 13
4.3.3 Shrink Limit-.....	page 13
4.3.4 Fabric Factor.....	page 13
4.3.5 Article Name.....	page 13
4.3.6 Batch #.....	page 13
4.3.7 Operator.....	page 13
4.3.8 Shift.....	page 13
4.3.9 Load Article.....	page 13
4.3.10 ON/OFF.....	page 13
4.3.11 Start New Batch.....	page 13
4.4 Data Screen.....	page 14
4.4.1 Article Name.....	page 14
4.4.2 Shrink Target.....	page 14
4.4.3 Shrink Limit.....	page 14
4.4.4 Shrink Limit.....	page 14
4.4.5 Shrink %.....	page 14
4.4.6 Distance (m).....	page 15
4.4.7 Max Shrink%.....	page 15
4.4.8 Avg. Shrink%.....	page 15
4.4.9 Done.....	page 15
4.4.10 Alarm.....	page 16
4.4.11 Batch.....	page 16
4.4.12 Min. Shrink %.....	page 15

4.5 Diagnostic Screen.....	page 15
4.5.1 Mark Encoder.....	page 15
4.5.2 Detector Encoder.....	page 15
4.5.3 Applicator Manual Control.....	page 16
4.5.4 On/OFF.....	page 16
4.5.5 Detector Status.....	page 16
4.5.6 Applicator Status.....	page 16
4.5.7 Alarm Reset.....	page 16
4.5.8 System Reset.....	page 16
4.5.9 Fluid Low.....	page 16
4.5.10 Shrink Limit.....	page 16
4.5.11 Missed Reads.....	page 16
4.5.12 Done.....	page 16
4.6 Language Screen.....	page 16
4.6.1 English.....	page 16
4.6.2 Italian.....	page 16
4.6.3 Turkish.....	page 16
4.6.4 Greek.....	page 16
4.6.5 Done.....	page 16
4.7 Password Screen.....	page 17
4.7.1 Set Password.....	page 18
4.7.2 Enter Password.....	page 18
4.7.3 Password Protect.....	page 18
4.7.4 Done.....	page 18
4.8 Raw Data Screen.....	page 18
5.0 Routine Maintenance.....	page 20
5.1 Cleaning Marking Heads.....	page 20
5.2 Cleaning Reflector Tape.....	page 20
5.3 Purging the System's SMAC fluid.....	page 20
5.4 Cleaning Detector Lenses.....	page 20
5.5 Check Encoders.....	page 20
6.0 Wiring Diagram.....	page 21
6.1 SMAC Controller Board Wiring Summary.....	page 21
6.2 Connectors J3, J6, J7, J8, J9 (barcode setup).....	page 22
6.3 Connector J2.....	page 23
6.4 Connector J4.....	page 24
6.5 Connector J5.....	page 25
7.0 Troubleshooting.....	page 26

Introduction

The SMAC system is designed to measure shrinkage at the compressive shrinkage range.

The principle of measurement is comparing a sample length of fabric at the entry end of the compressive shrinkage range with the same sample at the exit end of the machine. The difference in length is the effective warp shrinkage of the fabric.

SMAC applies invisible marks at specific distances prior to entry into the rubber belt. The marks are applied using SMAC non-contact ink applicators. At the exit end of the range, SMAC laser based detectors measure the distance between the marks.

The shrinkage value is calculated and displayed on the SMAC Controller. Shrinkage data is sent to the SMACsoft central software system for statistical analysis. Data can be sorted by shrinkage range, shift, operator, and article.

2.0 Contact Information

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3.0 SMAC CONFIGURATION and Installation



Basic Installation- Each Installation can vary as to the specific location of Components

3.1 The SMAC System Components-

Marking Module (MM)

Detection Module (DM)

SMAC Controller

SMACsoft software to be loaded on a customer provided PC

3.2 Marking Module (figure 1)-

- The MM is located at the entry end of the shrinking range
- The MM is mounted on an edge tracking system with a 60CM stroke
- MM can be mounted on the left hand or right hand side of the fabric (it is configured from the factory for a right hand side installation, but it can be reversed in the field)
- MM can be mounted to either mark on the “face” or the “back” of the fabric (most customers choose “back”)
- The location of the MM needs to take into account a smooth, steady fabric flow.
- The customer must fabricate a bracket in order to attach the MM with 4, 6MM screws
- The MM must be mounted to where the marking head is parallel to the fabric, optimally, the MM is mounted vertically, however, there is no problem to mount the device at up to a 45 degree angle as long as the module is parallel to the surface of the fabric
- The face of the marking head is adjustable to allow for movement closer to the surface of the fabric, after adjustment, the face of the marking head must be approximately 1CM from the surface of the fabric

- In order for the edge guiding sensor to adjust the MM to the edge of the fabric, the customer must attach a bracket that is behind the fabric and allows for the attachment of reflective tape, the length of this bracket should be long enough that the reflective tape covers the length of the stroke (60) of the MM
- The distance of the reflective tape from the eye of the edge guider should be from 10-14CM
- The MM comes with an umbilical cable set that is approximately 6M long, it includes the signal cable, air line, and marking fluid line, this umbilical will connect to the SMAC Controller
- The MM comes with a measuring encoder (figure 3) that must be fixed to an existing roller near the mounting of the MM
- The MM receives its power, air, etc. from the umbilical set, in other words, the SMAC controller supplies everything, no independent connections needs to be made by the customer for this module

3.3 Detection Module (Figure 2)-

- The DM is located at the exit end of the compressive shrinking range
- The DM is mounted on an edge tracking system with a 60CM stroke
- The requirements for the DM are the same as for the MM with the following exceptions:
 - The detector face must be approximately 3CM from the surface of the fabric (the detector is adjustable)
 - A 30M cable connects the DM to the SMAC controller
 - The DM needs an air connection provided by the customer, the air supply needs a filter regulator with a minimum of 5 BAR pressure, the air connection is made with plastic air tubing from the regulator to the DM

3.4 SMAC Controller (Figure 4)-

- The SMAC Controller is mounted close to the MM (please note the length of the MM umbilical set- 6M)
- It should be mounted at a comfortable height for the typical operator
- An electrical connection of 110-240VAC 50/60Hz is required, this is the only AC connection for the entire system
- The SMAC Controller is equipped with an air filter regulator, the customer is required to make an air connection to this filter regulator with a minimum of 5 BAR pressure
- A serial cable from the SMAC Controller to the customer supplied PC for SMACsoft software must be prepared by the customer
 - The cable is a typical CAT 5 cable. On the PC end, the customer will fix a DB9 female connector with pin 2=TX, pin 3=RX and pin 5=GND
 - On the Controller end, we provide a Phoenix connector where 1= TX, 2=RX, 3=GND (RS232)
 - The PC must be connected to a hi-speed internet connection
 - § Allows for future SMACsoft upgrades
 - § Allows for remote troubleshooting of the SMAC system
 - § Required to validate warranty

In summary, the installation is very straightforward. The most important point is that the MM and DM require a steady fabric path in order to make precise marks on the fabric

and precise detection of the marks. Usually, we can find a place on the shrinking range without the customer adding additional rollers. However, occasionally a customer will need to add one or two rollers.

The normal installation time from when we open the shipment to machine startup is around 1.0-1.5 work days. Most of the work can be accomplished while the range is running.

If you have any questions, contact Stanford Technologies at info@stanfordtechnologies.us or +1 678 884 0527.



Marking Module (figure 1)



Detection Module (Figure 2)



Encoder, Located at MM and DM (Figure 3)



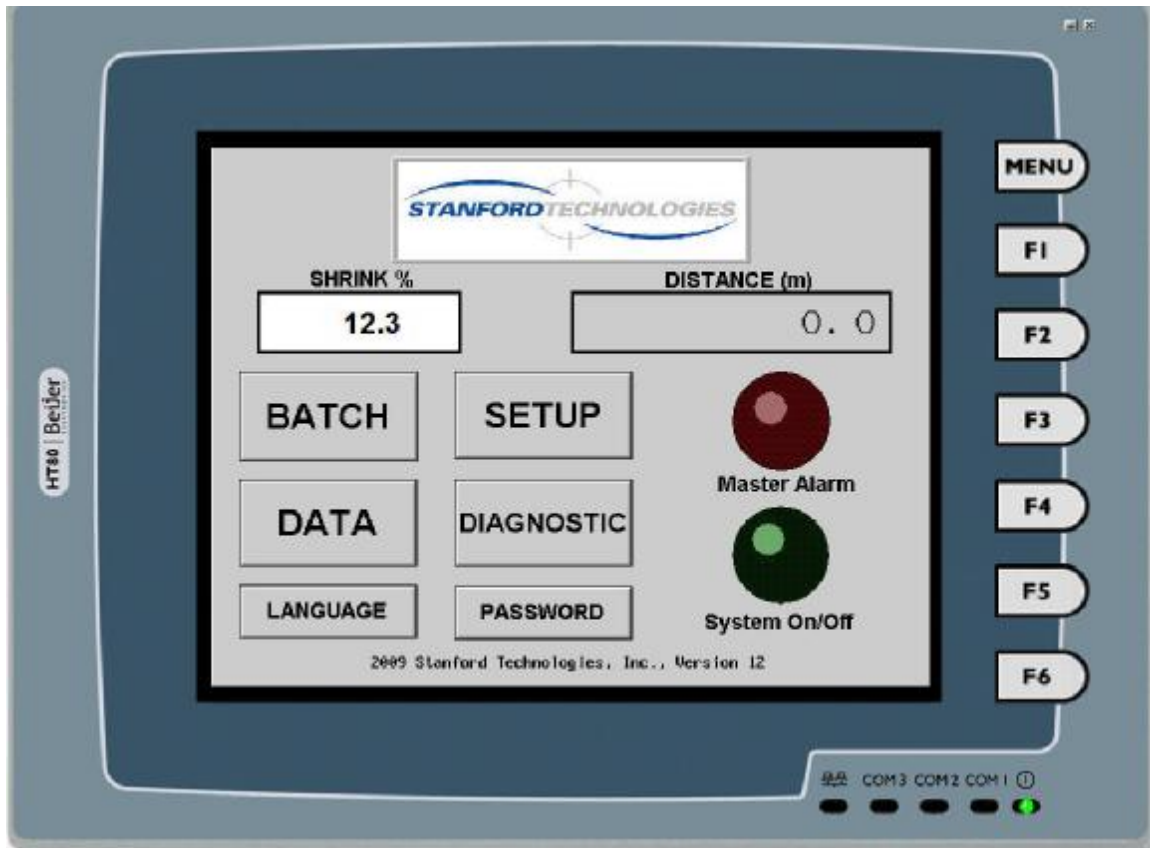
SMAC Controller (Figure 4)

4.0 Graphical User Interface Version 1.0

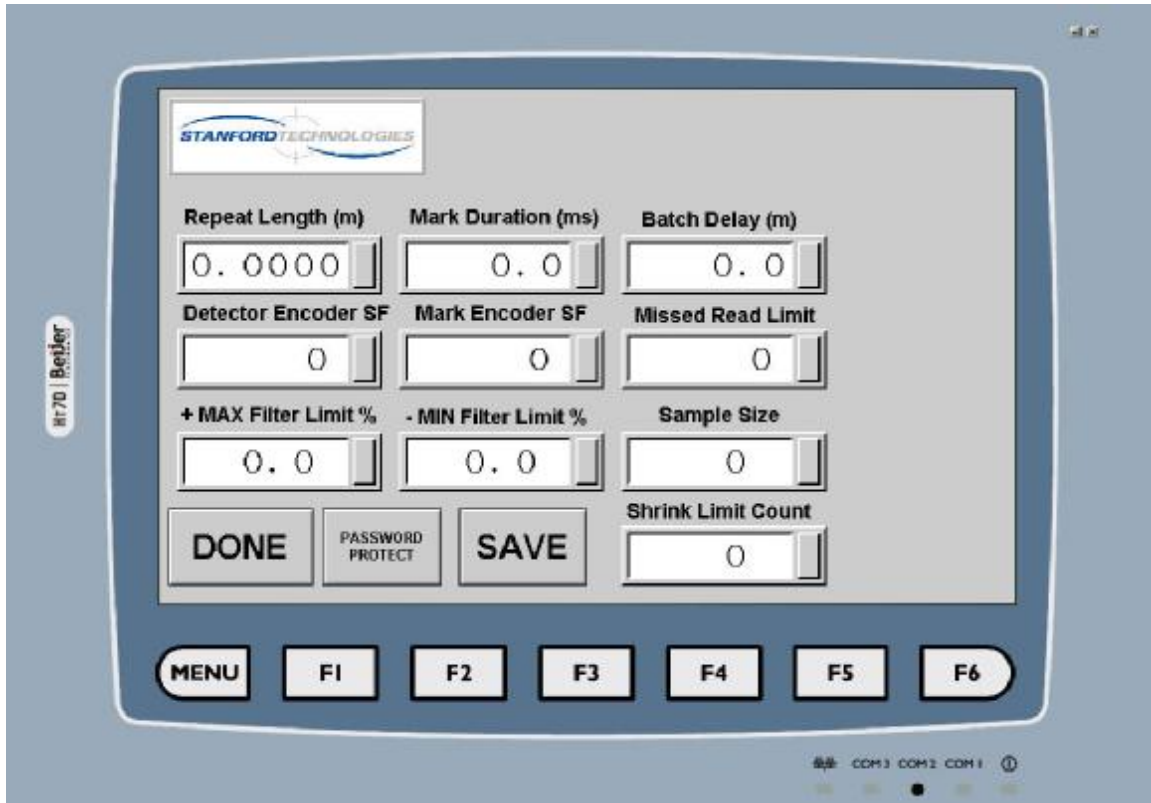
The SMAC system utilizes a graphical touchscreen interface.

4.1 Main Menu Screen-The Main Menu Screen shows the operator the current shrinkage value as well as the current length of the batch that is being processed, Alarm Status, and System Status. From the Main Menu, you can navigate to the following screens:

- Batch**- Allows for the input of new batch, operator, & shift information
- Setup**- System configuration including filter and alarm settings
- Data**- Displays shrinkage information for the current Batch
- Diagnostic**- Screen provides MM and DM as well as alarm conditions
- Language**- Select from multiple languages
- Password**- Configure and enter passwords



4.2.0 Setup Screen- From the Main Menu, press the Setup Button.



4.2.1 Batch Delay- Number of Meters “delayed” after the Start New Batch Button is pressed until the current Batch is closed and the New Batch Begins

4.2.2 Repeat Length- Distance between Marks

4.2.3 Mark Duration- The time duration that the Marking Head is applying ink (milliseconds).

4.2.4 Detector Encoder- The number of encoder pulses necessary at the DM (Detector Module) for one meter. This setting is normally fixed at 3936, however it can be adjusted to calibrate the SMAC length with measuring wheels downstream

4.2.5 Mark Encoder- The number of encoder pulses necessary at the MM (Marking Module) for one meter. This setting is normally fixed at 3936, however it can be adjusted to calibrate the SMAC length with measuring wheels downstream

4.2.6 Missed Read Limit- The number of consecutive missed readings (shrinkage values that did not pass the various filter tests) of an invisible mark before the alarm is activated.

4.2.7 +MAX Filter Limit%-Maximum acceptable shrinkage value. Any shrinkage value above this setting is discarded.

4.2.8 -Min. Filter Limit%- Minimum acceptable shrinkage value. Any shrinkage value above this setting is discarded. Minimum value is 0.1%.

4.2.9 Sample Size- The number of consecutive shrinkage readings averaged together to be the displayed shrinkage value for the operator. The Sample Size is a moving average. In other words, once a new shrinkage reading is realized, the oldest shrinkage reading is dropped off in order to create the new moving average.

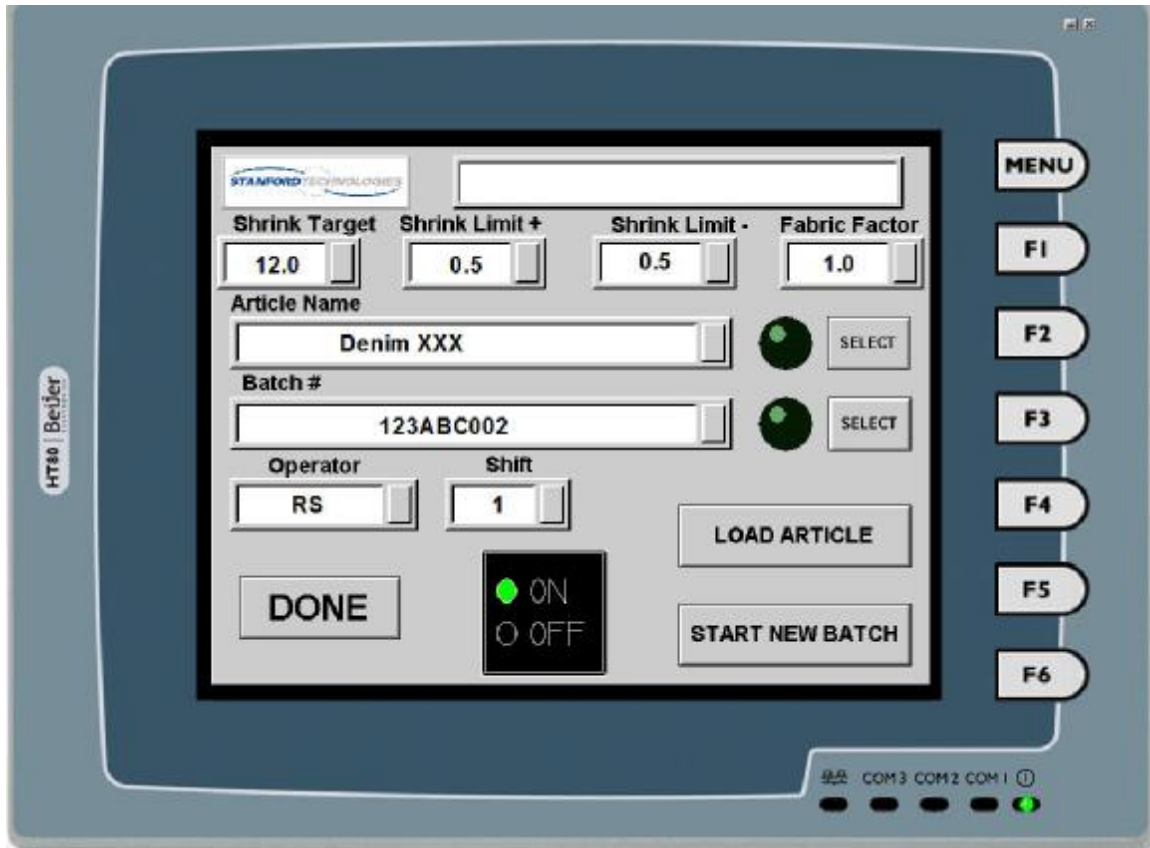
4.2.10 Shrink Limit Count- Number of consecutive shrinkage values that exceed the target limits for a given Article in the Batch Screen. Once this number is exceeded, the Shrinkage Limit Alarm will be activated.

4.2.11 Done- Takes you to the Main Menu Screen.

4.2.12 Password Protect- Locks the Setup Screen and Filter submenu Screen so that you must have a password to access or change the information

4.2.13 Save- Saves any settings change

4.3.0 Batch Screen- The Batch Screen is where the Operator manages the new batch information. This is also where the New Batch is started.



4.3.1 Shrink Target- The Shrink Target is the optimal shrinkage value for the given Article.

4.3.2 Shrink Limit+- Maximum allowed shrinkage value for the given Article when added to the Shrink Target before the Shrinkage Limit Alarm is activated. When the actual shrinkage value exceeds this limit the number of occurrences as entered in the Shrink Limit Count in the Filter Setup Screen, the Shrinkage Limit Alarm is activated.

4.3.3 Shrink Limit--Minimum allowed shrinkage value for the given Article when subtracted from the Shrink Target before the Shrinkage Limit Alarm is activated. When the actual shrinkage value exceeds this limit, the number of occurrences as entered in the Shrink Limit Count in the Filter Setup Screen, the Shrinkage Limit Alarm is activated.

4.3.4 Fabric Factor- The Fabric Factor value is used to calibrate the SMAC system to the Operator's manual reading. It is not uncommon for the SMAC system's shrinkage value to not match the Operator's manual reading. This is due to fabric elongation or shrinkage measurement under tension with SMAC. For example, if the SMAC shrinkage value is 10.0% and the Operator's manual reading is 11.0%, simply set the Fabric Factor to 1.10 and the SMAC value will be 11% and is calibrated to the manual reading. Fabric Factors are organized according to the Article. It is not necessary to change the Fabric Factor every time you start a new batch.

4.3.5 Article Name- The Article Name can be entered by touching the screen and an alphanumeric keypad will appear or if the Article Table is downloaded into the SMAC

Controller, you can press the adjacent Select button and barcode the Article Name. When the Article Table is loaded and the information is barcoded or entered manual and then pressing the Load Article button, the Shrink Target, Shrink Limits and Fabric Factors will be automatically loaded.

4.3.6 Batch #- The Batch Number can be entered by touching the screen and an alphanumeric keypad will appear, or the number can be entered via barcode by pressing the adjacent Select button and barcoding the information.

4.3.7 Operator- Operator information is entered via a popup alphanumeric keypad. You only need to enter the Operator information one time at the beginning of a shift.

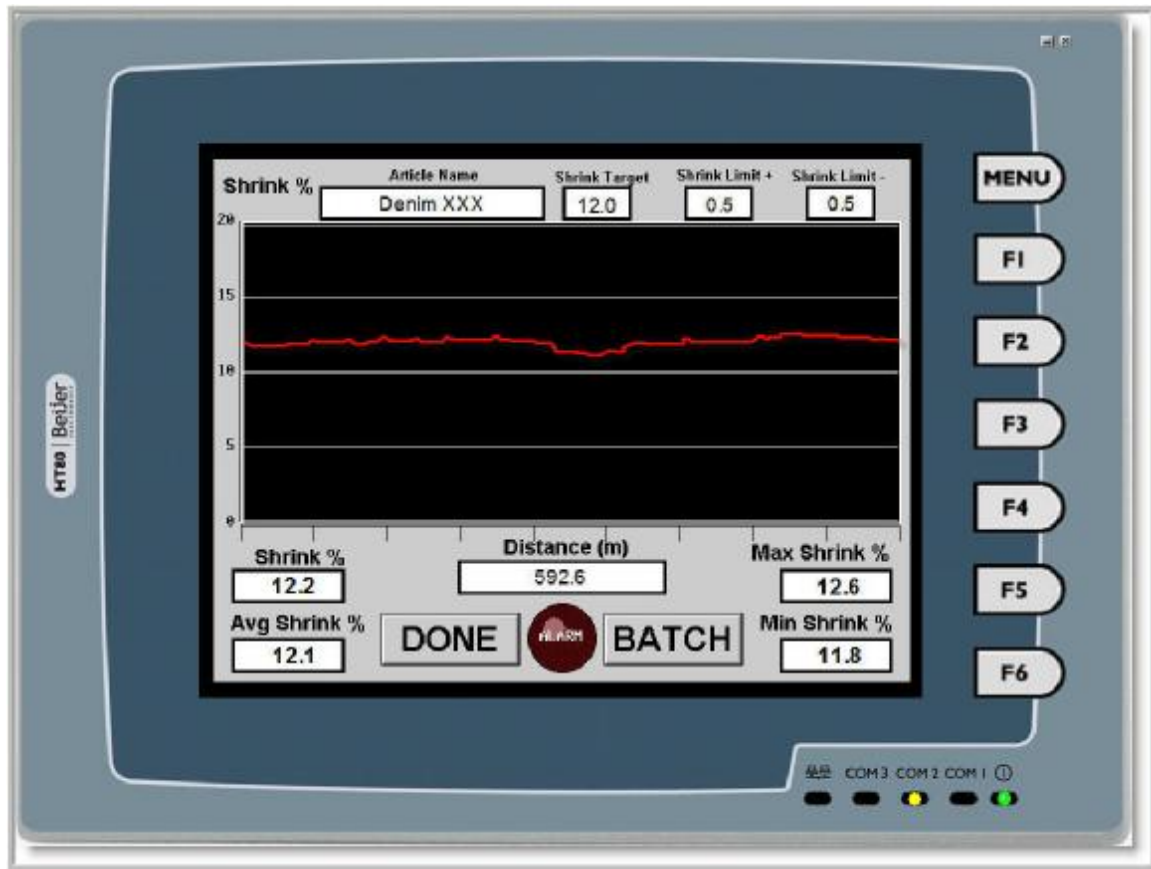
4.3.8 Shift- Shift information is entered via a popup alphanumeric keypad. You only need to enter the Shift information one time at the beginning of the shift.

4.3.9 Load Article- Pressing the Load Article button after entering the Article Name manually (Article Table must be downloaded into the Controller) will load the Shrink Target, Shrink Limits, and Fabric Factor onto the system.

4.3.10 ON/OFF- Activates/Deactivates the SMAC System.

4.3.11 Start New Batch- Pressing the Start New Batch button closes the current Batch data and starts collecting data for the New Batch. The Screen is then automatically changed to the Data Screen.

4.4.0 Data Screen- Displays the running shrinkage value graphically and numerically for the current batch.



4.4.1 Article Name- Article for the current Batch.

4.4.2 Shrink Target- Shrink Target for the current Batch.

4.4.3 Shrink Limit+- Upper Shrinkage Limit when added to the Shrinkage Target for the current Batch.

4.4.4 Shrink Limit-- Lower Shrinkage Limit when subtracted to the Shrinkage Target for the current Batch.

4.4.5 Shrink %- Current Shrinkage Value.

4.4.6 Distance (m)- Processed length of the current Batch.

4.4.7 Max Shrink %- Maximum shrinkage value realized during the current Batch.

4.4.8 Avg Shrink %- Moving Average shrinkage value for the processed length of the current Batch.

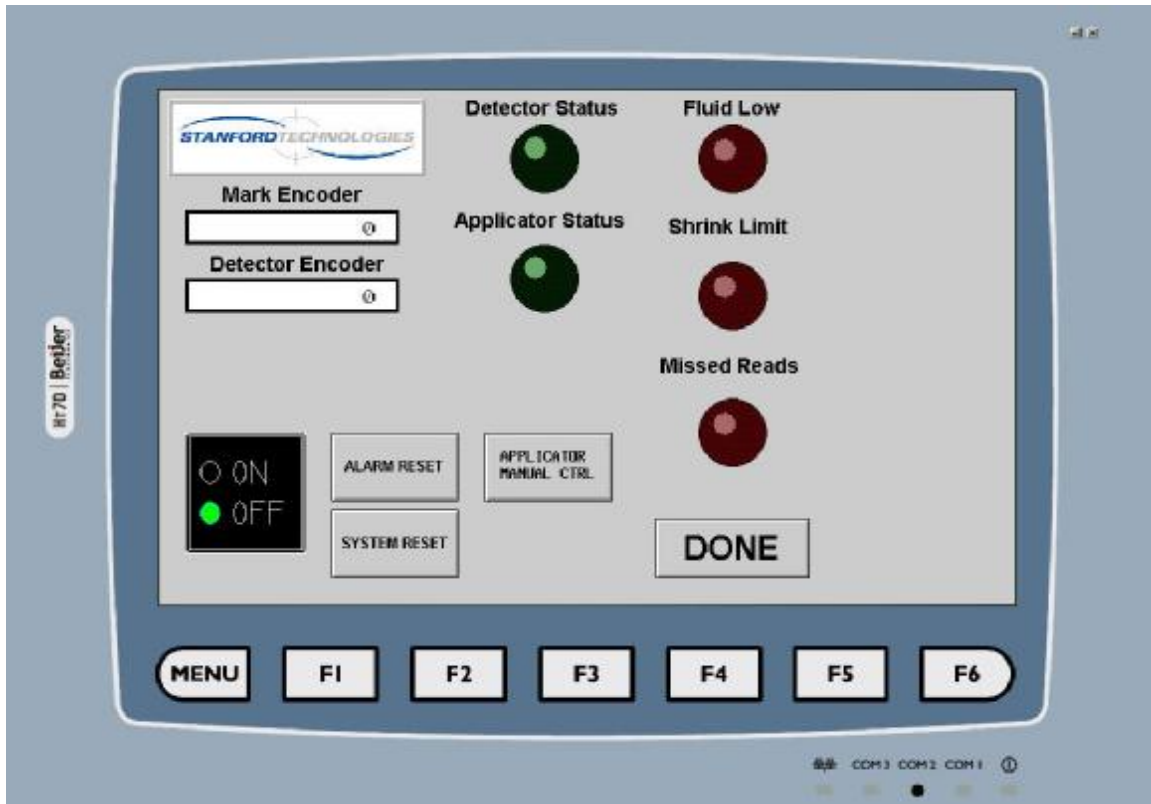
4.4.9 Done- Pressing the Done button takes you to the Main Menu Screen.

4.4.10 Alarm- Alarm lamp is activated whenever one or more of the SMAC System's alarms are active. Please see the Diagnostics Section 4.6.0.

4.4.11 Batch- Pressing the Batch button takes you to the Batch Screen.

4.4.12 Min Shrink %- Minimum shrinkage value realized during the current Batch.

4.5.0 Diagnostic Screen- Displays important diagnostic information regarding the performance of the SMAC System.



4.5.1 Mark Encoder- Displays the current value for the Marking Module encoder. Values must always increment while the system is activated.

4.5.2 Detector Encoder- Displays the current value for the Detection Module encoder. Values must always increment while the system is activated.

4.5.3 Applicator Manual Control- Pressing the Manual Control button activates the Marking (Applicator) Head.

4.5.4 On/Off Button- Activates/Deactivates the SMAC System.

4.5.5 Detector Status- Illuminates when the Detector senses the SMAC mark.

4.5.6 Applicator Status- Illuminates when the Marking Module applies the SMAC marks.

4.5.7 Alarm Reset- Pressing the Alarm Reset button clears any active SMAC Alarms.

4.5.8 System Reset- Pressing the System Reset button resets all of the SMAC data. The System must be deactivated utilizing the On/Off button before the system will reset.

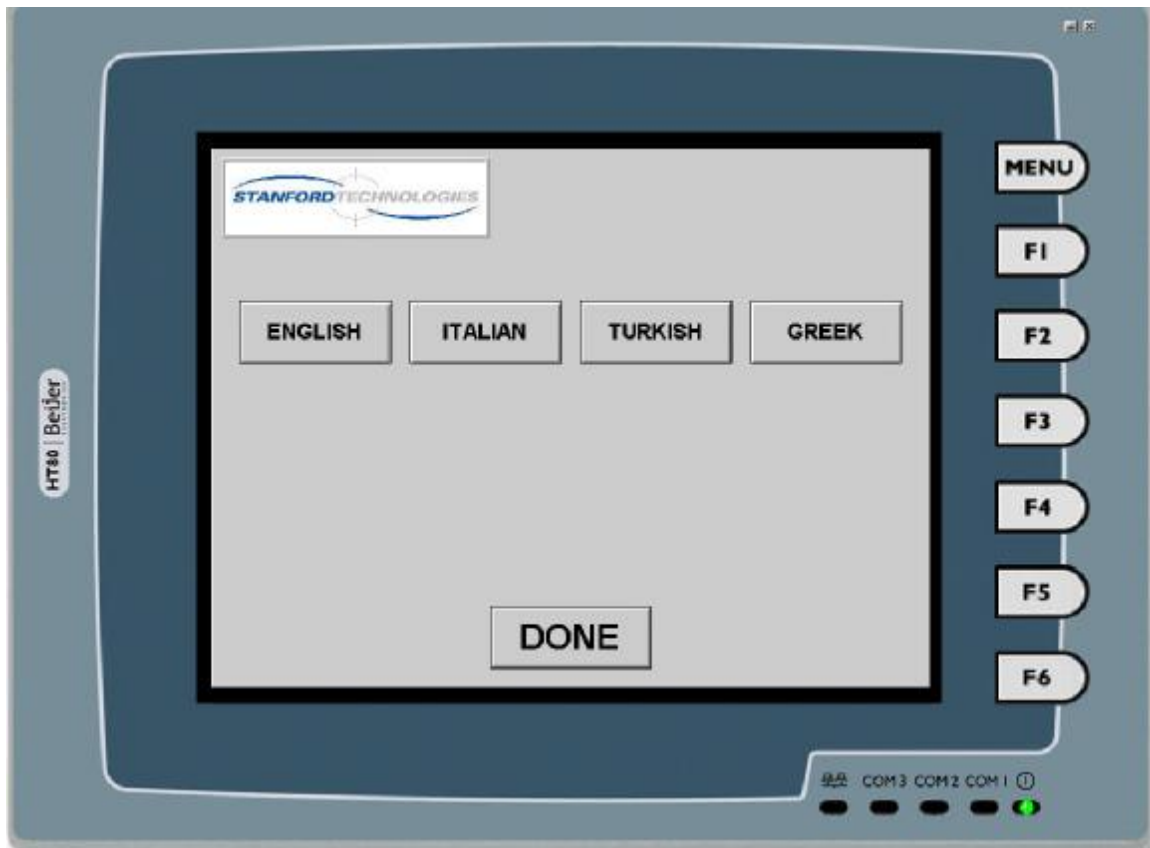
4.5.9 Fluid Low- Indicates that the SMAC fluid level is low.

4.5.10 Shrink Limit- Indicates that the SMAC shrink limits have been exceeded according to the Article's Shrink Target limits and the Shrink Limit Count (4.3.6).

4.5.11 Missed Reads- Indicates that the number of consecutive Missed Reads (shrinkage values that did not pass the various filter tests) by the SMAC system has been reached. The system will automatically reset this alarm when the next acceptable read is realized. Please see section 4.2.7.

4.5.13 Done- Pressing the Done button takes you to the Main Menu Screen.

4.7.0 Language Screen- Language selection is managed in this screen.



4.6.1 English- Choose this selection for English and then press the Done button to return to the Main Menu Screen.

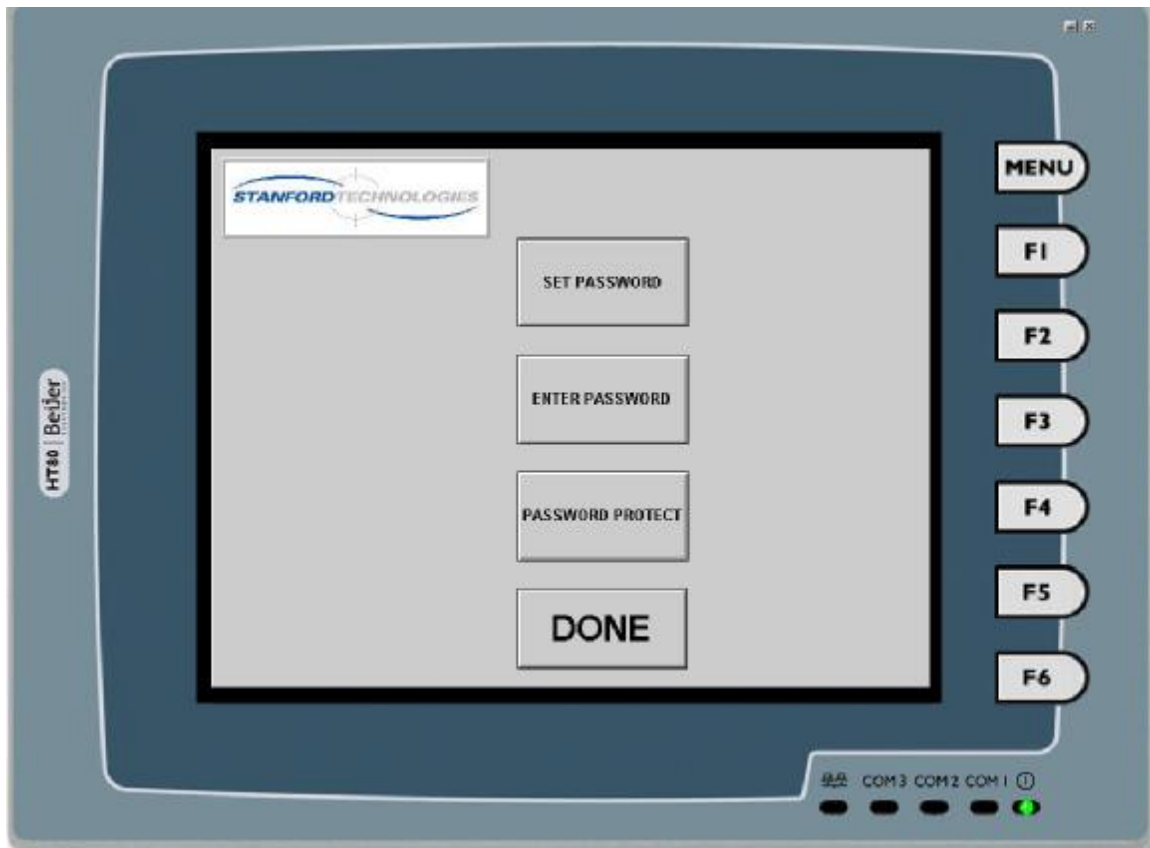
4.6.2 Italian- Choose this selection for Italian and then press the Done Button to return to the Main Menu Screen.

4.6.3 Turkish- Choose this selection for Turkish and then press the Done Button to return to the Main Menu Screen.

4.6.4 Greek- Choose this selection for Greek and then press the Done Button to return to the Main Menu Screen.

4.6.5 Done- Pressing the Done button takes you to the Main Menu Screen.

4.7.0 Password Screen- Passwords are managed in this screen.



4.7.1 Set Password- Pressing the Set Password button activates a popup menu to allow the customer to setup passwords to protect settings in the Setup Menu Screen.

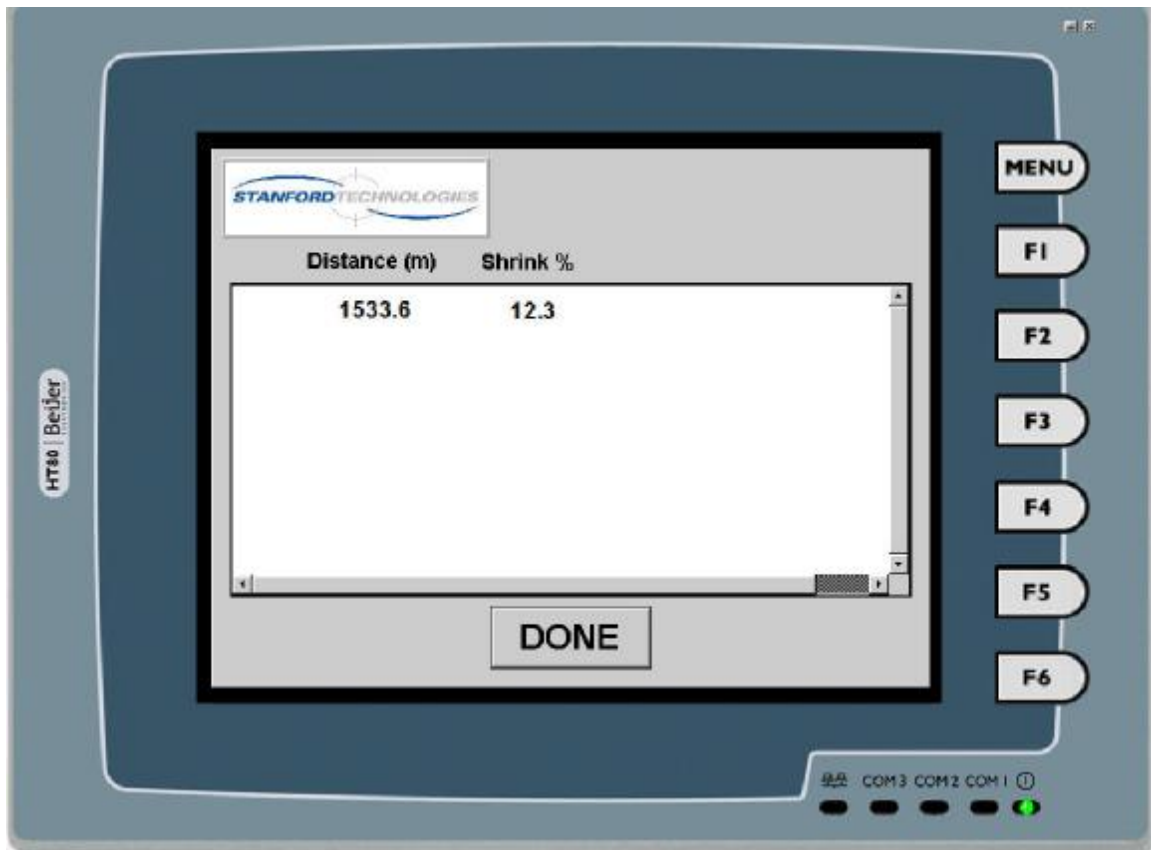
4.7.2 Enter Password- Pressing the Enter Password button activates the popup menu for entering the password. Once the password is successfully entered, the Setup Menu Screen and Filter submenu Screen is unprotected and available for editing.

4.7.3 Password Protect- Locks the Setup Screen and Filter submenu Screen so that you must have a password to access or change the settings.

4.7.4 Done- Pressing the Done button takes you to the Main Menu Screen.

4.8.0 Raw Data Screen (F1)- The Raw Data Screen is accessed from the Data Screen or from the Diagnostics Screen by pressing the F1 button on the display. This menu is

for technician use only. Customer technicians will be trained by SMAC technicians on the use of this screen.



5.0 Routine Maintenance

5.1 Cleaning the Marking Heads- The marking heads should be cleaned at least once per week. It is possible that they will need to be cleaned more often depending on the manufacturing conditions. It is best to clean the heads without removing them from the marking module. Turn off the system and cut off the air to the marking module's edge tracking system.

- Slide the marking module to the edge of the tracking system in order to service the heads.
- With a toothbrush and water or a water and alcohol mixture, clean the face of the heads to remove lint and dirt.
- Clean the edge sensor reflector tape while you are servicing the heads.
- Reposition the heads back to their original location.
- Turn on the air to the edge tracking system.
- Power on SMAC.
- Push the manual purge buttons on the back of the marking heads for 3-5 seconds. Do not hold the purge button for more than 5 seconds as you may damage the internal valves of the head! With a piece of paper in front of the markers, test the spray pattern to insure that there are no clogged nozzles.
- If the nozzles are blocked, you can clean them with a guitar string that is no greater than .014 diameter.

5.2 Clean the Reflector Tape- The reflector tape for the marking and detection modules should be cleaned once per shift.

5.3 Purge the System's SMAC fluid during extended shutdown- If the system will not run for more than two days; it is recommended that the SMAC fluid in the marking module lines be purged with water.

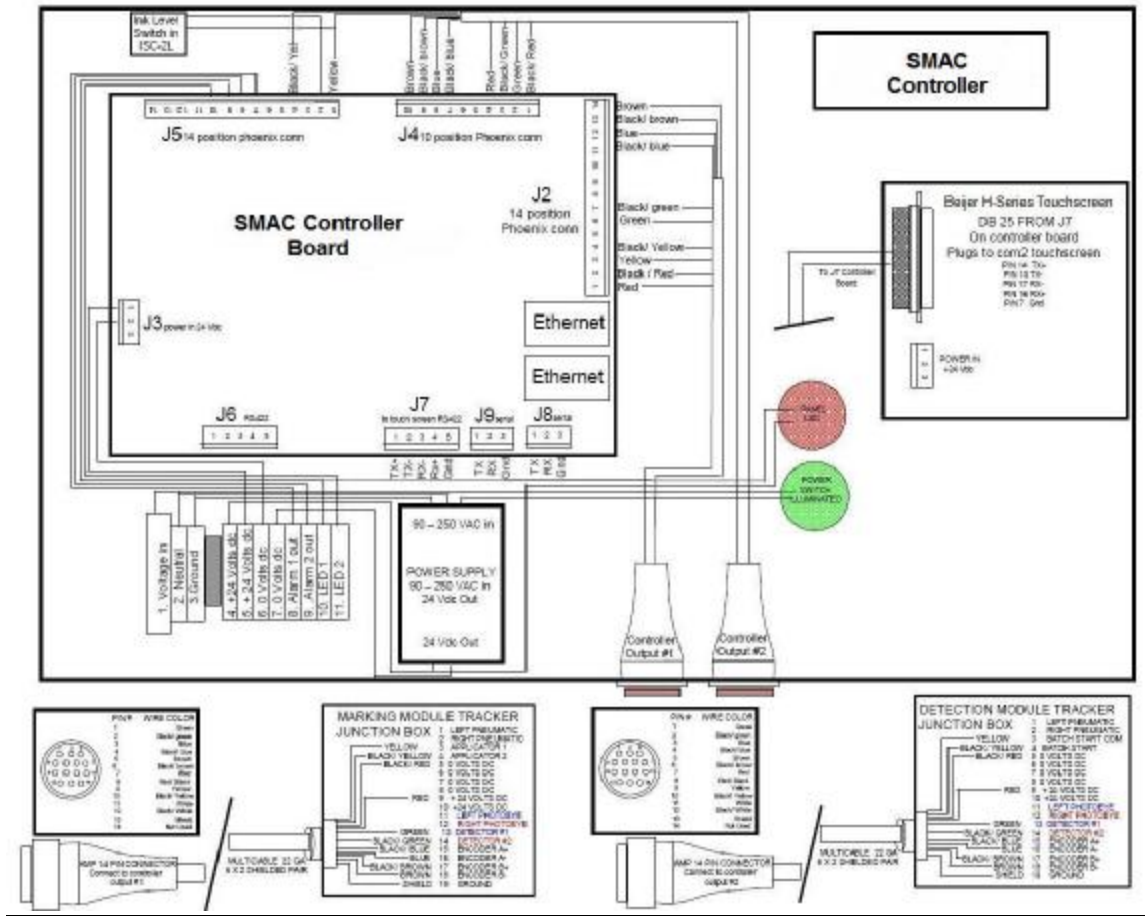
- On the touchscreen, turn the system "off".
- Switch the air off to the ink vessel by "flipping" the toggle switch underneath the Controller to the off position.
- Remove the bottle of SMAC fluid.
- Install a bottle with water.
- Switch the air on.
- With an empty cup to catch the fluid, remove the fluid hose from the back of each of the marking heads, draining the fluid of any SMAC fluid. Drain until the fluid runs clear.
- Reattach the fluid hoses. Purge each marking head for 5-10 seconds.
- Follow the same procedure when reinstalling the SMAC fluid.

5.4 Clean the Detector Lenses- Periodically clean the detector's lens with air.

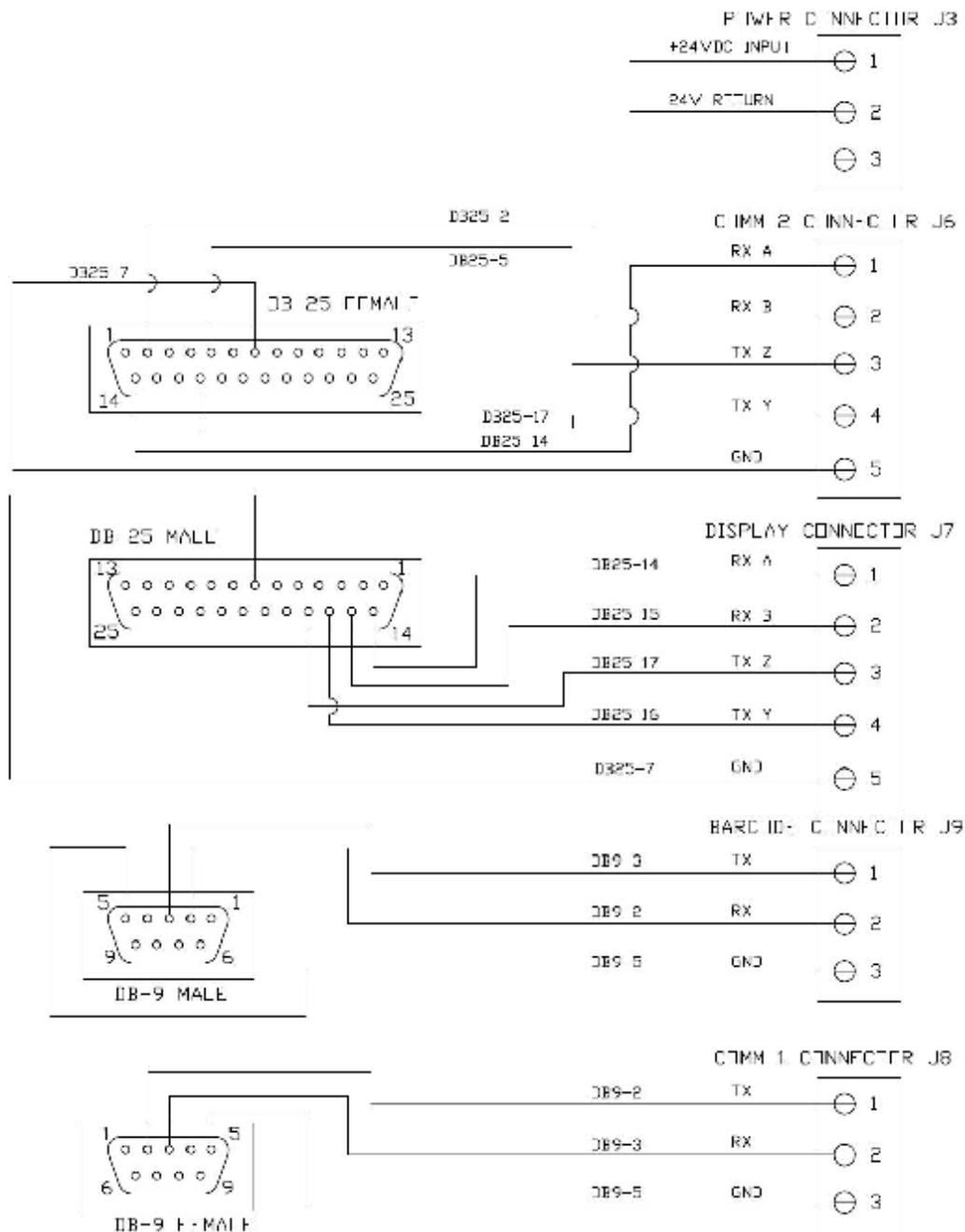
5.5 Check Encoders- Once per week, check the encoder wheels to make sure they move freely and are not dirty.

6.0 Wiring Diagrams

6.1 SMAC Controller Board Wiring Summary



6.2 Connectors J3, J6, J7, J8, J9

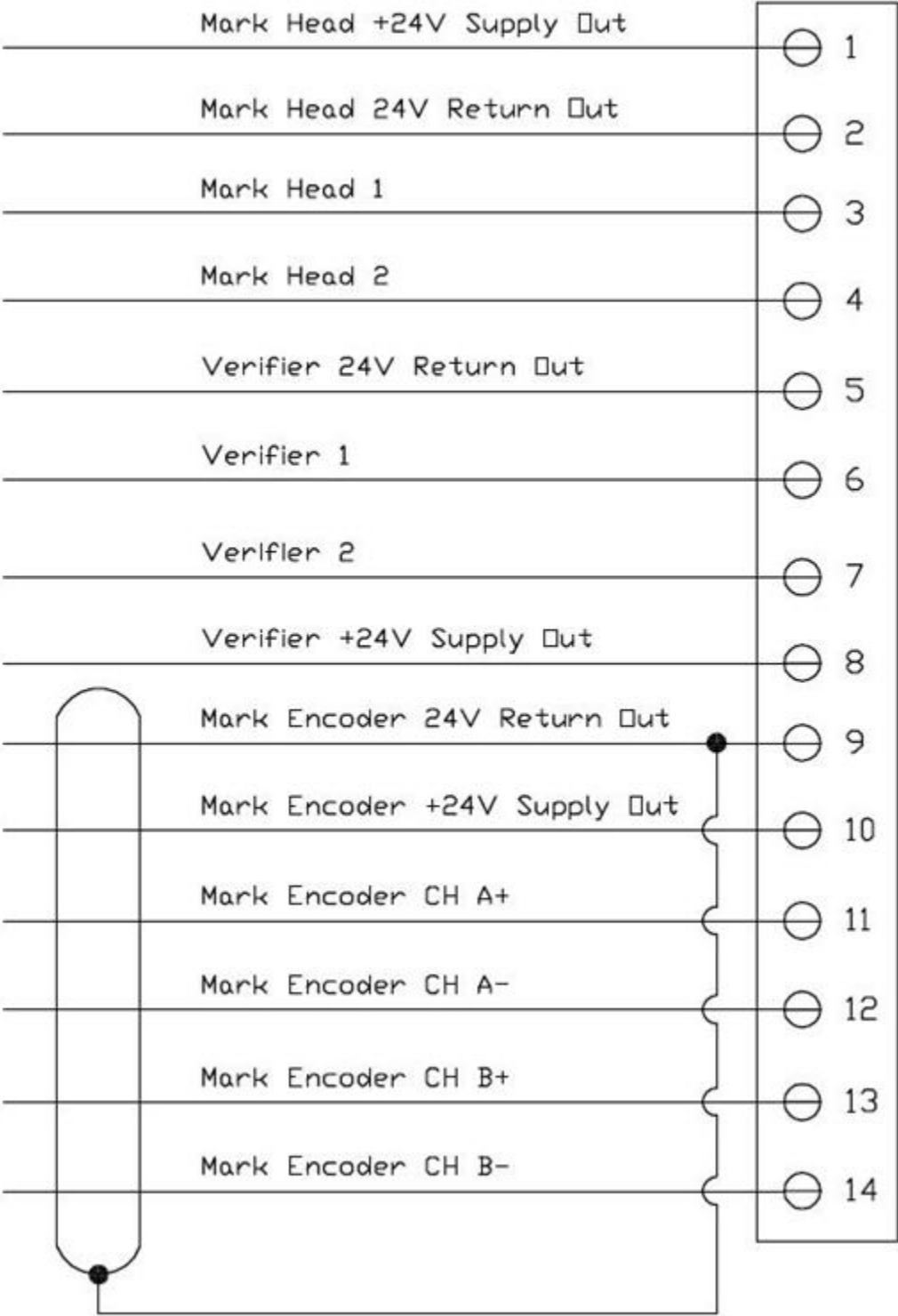


Note: J6 Connections for Model 422_LCD RS422 converter from BB Electronics.

REV	DATE	APPROVED	BY	APP'D
DATE		YIELDING		
DATE	DATE	DATE	DATE	DATE
DATE	DATE	DATE	DATE	DATE

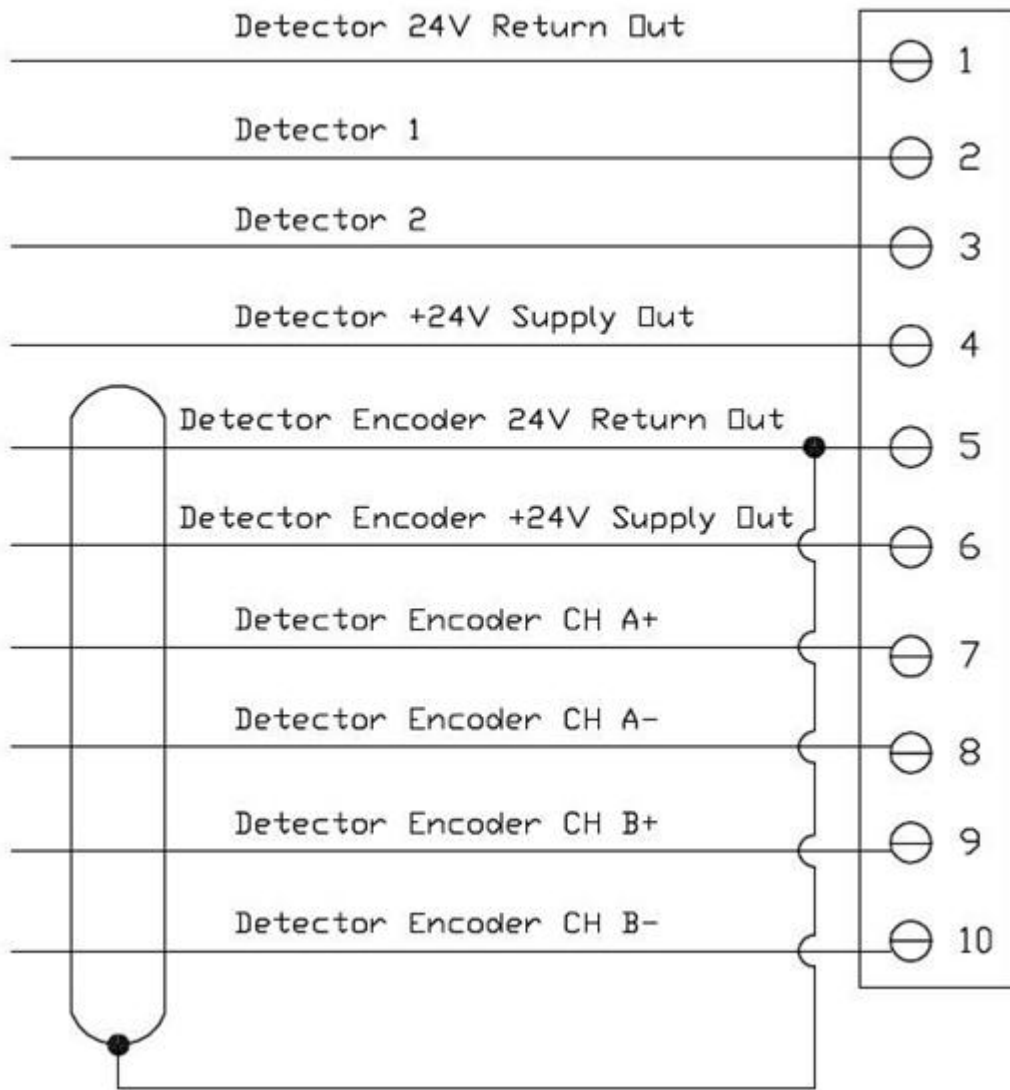
*****Barcode Reader must include serial connection*****
*****Configure Barcode Reader for "Fujitsu RS232"*****
6.3 Connector J2

CONNECTOR J2



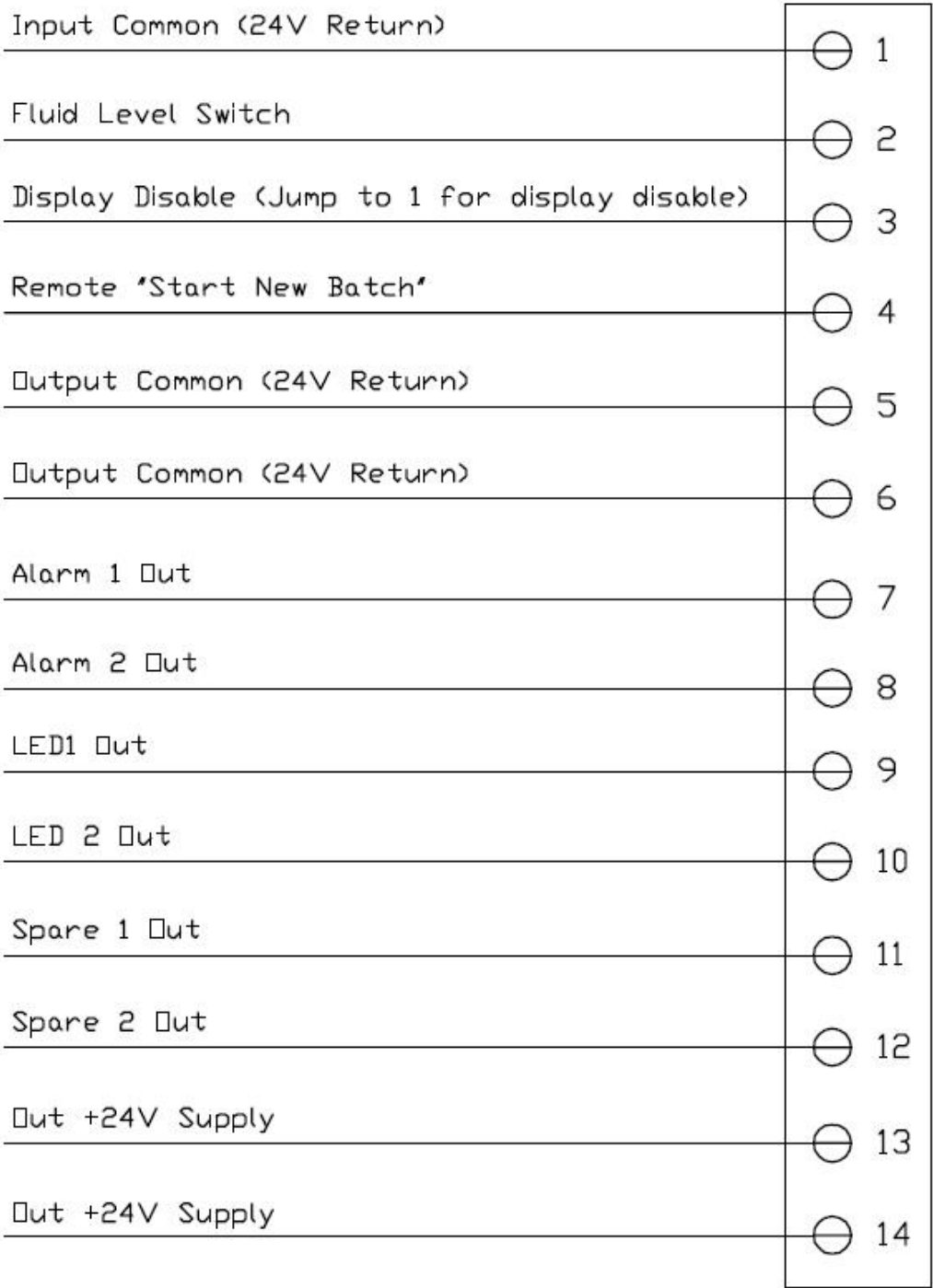
6.4 Connector J4

CONNECTOR J4



6.5 Connector J5

CONNECTOR J5



7.0 Troubleshooting

With proper maintenance, the SMAC system will provide accurate shrinkage results. To determine that the system is operating properly, go to the Diagnostics Screen. The Applicator lamp should flash based on the Repeat Length. The Mark and Detector Encoder counters should be increasing. When the system is operating as described, the system should be reporting an accurate shrinkage value.

- **The Diagnostic Screen is reporting mark application and detection properly, but the shrinkage is not calculating.**
 - Go to the “F1” Screen.
- **The Diagnostic Screen reports that the detector is illuminating erratically.**
 - Check to make sure the Marking Module is correctly applying marks to the fabric. You can do this by visually check with a UV lamp (SMAC fluid must have UV additive) or take a piece of paper and place it between the marking heads and the fabric. Visually check the mark on the fabric. If the marks are ok, go to the next step; otherwise troubleshoot why the marks aren’t being applied.
 - Note the distance from the edge of the fabric by the applicator head and the detector to assure that the marking module and detector module are properly aligned. Note that the edge guiders are working properly.
 - Note that the green LEDs on the back of the Detector are illuminated.
 - Note the distance from the end of the detector lens to the fabric. The distance should be approximately 3CMs and the lens should be parallel to the fabric.
 - Take the piece of paper that was used to in step one and place the paper under the detector lens. Position the paper where the detector does not detect the mark and then slowly direct the mark under the laser from the detector. The red LED on the back of the detector should illuminate.
 - With UV additive in the SMAC fluid, visually check the quality of the mark as it passes under the detector. Make sure the marks are aligned properly. If your SMAC fluid does not have UV additive, please add approximately 20ML of UV additive (provided by Stanford Technologies, Inc.) for every 1 liter of SMAC “ready to use” fluid.
- **The applicator does not apply a mark or the quality of the mark is of poor quality.**
 - Make sure the SMAC system is “ON”.
 - The air pressure should be at least 0.7 BAR.

- Note that the Applicator LED in the Diagnostics Screen is illuminating.
- Check the connector on the back of the applicator to make sure you see a green lamp.
- Check the connector on the back of the applicator to make sure you see a yellow flash every time the applicator is suppose to apply fluid.
- Make sure the fluid lines are properly purged and there is no air in the lines.
- Make sure the applicator head is clean.
- Press the manual applicator button on the back of the applicator to be sure the unit is working properly. If the system does not apply fluid properly, the unit is defective. Replace the defective applicator with a spare and return the defective unit to Stanford Technologies for repair.