



# SMACpro Manual

V1.0

June 21, 2010

## Introduction

The SMACpro system is designed to complement the SMAC system by adding certain control functions to the finishing range. The most common control includes rubber belt, palmer speed and can speed (where required). The SMACpro system includes relay inputs and outputs that allow for integration into most existing finishing ranges. A thorough range survey must be done to insure that the range is suitable for control and the responsibilities of the customer and Stanford Technologies must be agreed in advance.

### 1. Operator Use-

- a. The range operator's main objective is to engage the system in manual or automatic control. He will use the main screen (figure 1) to do most of his work with SMACpro.
  - i. The operator will manually setup the sanforizer for the current article (quality).
  - ii. Once he has determined that the shrinkage for the given article is correct, the operator will do the following:
    1. Press the **Run** button. The system will take the current **Shrink%** and **Belt Position** and load it into the **Shrink Target** and **Belt Setting** window. SMACpro is now calibrated to these two values.
    2. Press the **Manual/Automatic** button, switching the system to **Automatic**. The system is now in the **Automatic Mode**. SMACpro is now controlling the rubber belt, palmer speed and can speed based on the system configuration.
  - iii. It is important that the operator press the **Run** button first and then the **Manual/Automatic** button.
  - iv. **Main Screen** definitions-
    1. **Shrink %-** Current shrinkage reading according to the SMAC system.
    2. **Belt Position-** Current belt setting for the production run.
    3. **Web Distance-** Current length of the production run since the "Start New Batch" was pressed on the SMAC system.
    4. **Shrink Target-** Once the Run button is pressed, the Shrink % reading is loaded onto the Shrink Target. The auto-control function of SMACpro is centered around the Shrink Target.
    5. **Belt Setting-** Once the Run button is pressed, the Belt Position is loaded onto the Belt Setting. The Belt Setting is required for the given Article.

6. **Manual/Auto Switch-** Switches the system between Manual and Auto-Control.
  7. **Data-** Switches to the Data Screen
  8. **Diagnostic-** Switches to the Diagnostic Screen
  9. **Palmer and Cans Setup-** Switches to the Palmer and Cans Setup Screen
  10. **Belt Setup-** Switches to the Belt Setup Screen
  11. **Password-** Switches to the Password Setup Screen
- b. The operator should now press the **Data** button. This switches the system to the **Data Screen** (figure 2.). The operator can observe the shrinkage performance of the sanforizer from this screen.
  - c. For detailed information on the actual control of the range, the operator selects the **Diagnostic** button. This button switches to the **Diagnostics Screen** (figure 3).
    - d. **Diagnostic Screen** definitions-
      - i. **Article Name-** Current Article in production
      - ii. **Shrink %-** Current Shrinkage reading according to the SMAC system.
      - iii. **E1 (% Shrink)-** Difference between the Current Shrinkage and the Target Shrinkage
      - iv. **Web Distance-** Current length of the production run since the “Start New Batch” was pressed on the SMAC system.
      - v. **Alarm-** When illuminated, alerts a system malfunction
      - vi. **Palmer Window-** Arrows illuminate when SMACpro is commanding the palmer to speed-up or slow down. The operator can press the increase or decrease arrow to manually control the input relays.
        - a. **Law 1 or 2 Timer-** The time between cycles of adjusting Palmer Speed whether in Control Law 1 or Control Law 2. These Laws are discussed in detail in the Palmer/Cans Setup Screen in the Technician Use Section.
        - b. **Loop Pos. (in.) -** The current distance of the “Palmer Loop” from the ultrasonic sensor.
        - c. **Loop Error (in)-** Difference between the Current Loop Position and the Target Loop Position
      - vii. **Manual/Auto Switch-** Switches the system between Manual and Auto-Control.
      - viii. **Belt Window-** Arrows illuminate when SMACpro is commanding the increase or decrease of belt pressure. Current Belt Position is shown in the window. The operator can press the increase or

- decrease arrow to manually control the input relays.
- ix. **Can Window-** Arrows illuminate when SMACpro is commanding the increase or decrease the can speed. The operator can press the increase or decrease arrow to manually control the input relays.
    - a. **Timer-** The time between cycles of adjusting Can Speed.
    - b. **Loop Pos. (in.)** - The current distance of the “Can Loop” from the ultrasonic sensor.
    - c. **Loop Error (in)-** Difference between the Current Loop Position and the Target Loop Position
  - x. **SMAC Connect-** Used in the rare event that the SMACpro has lost communication with SMAC.
  - xi. **Alarm Reset-** Resets the Alarm
  - xii. **System Reset-** Resets the SMACpro system
  - xiii. **Done-** Switches to the Main Screen

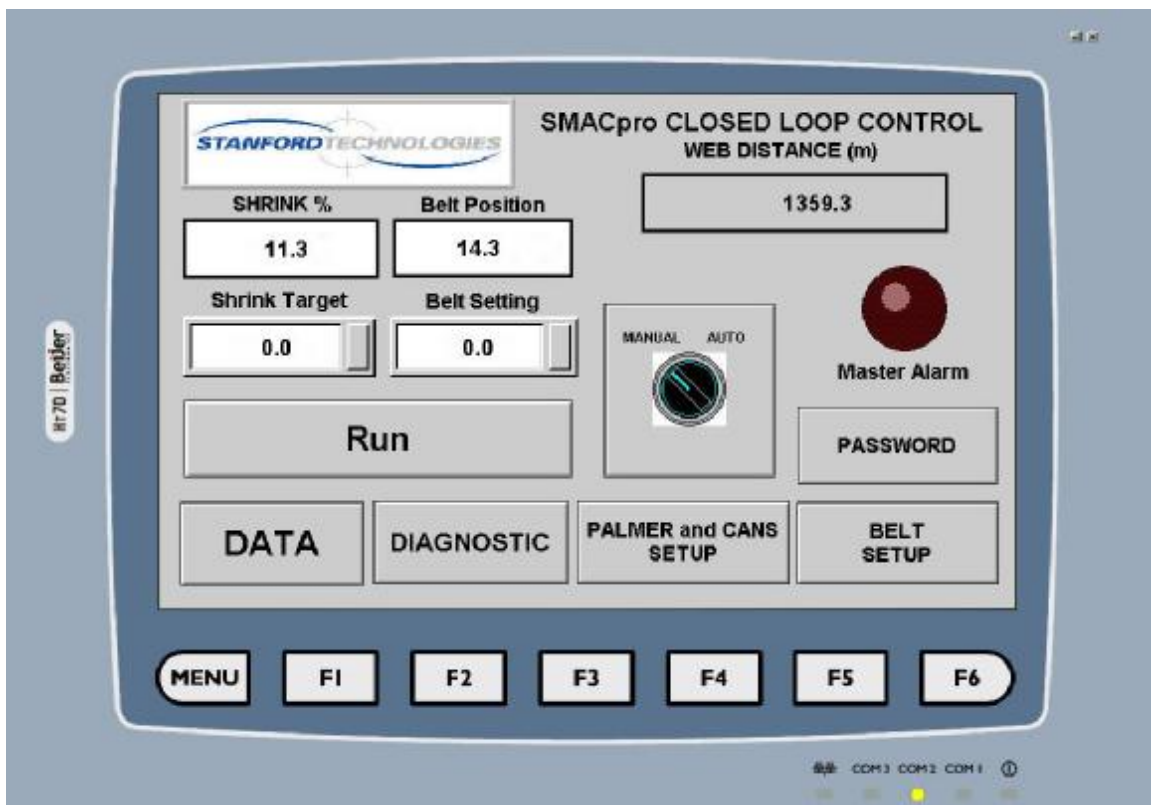


Figure 1

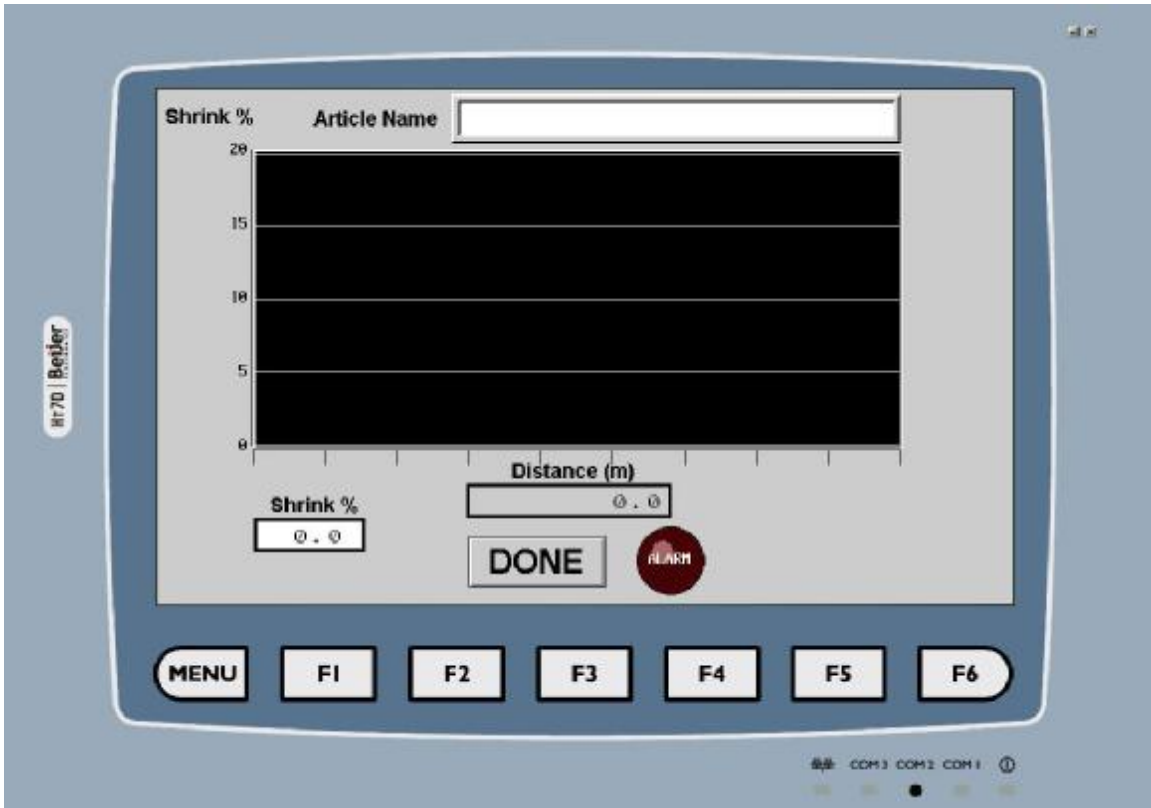


Figure 2

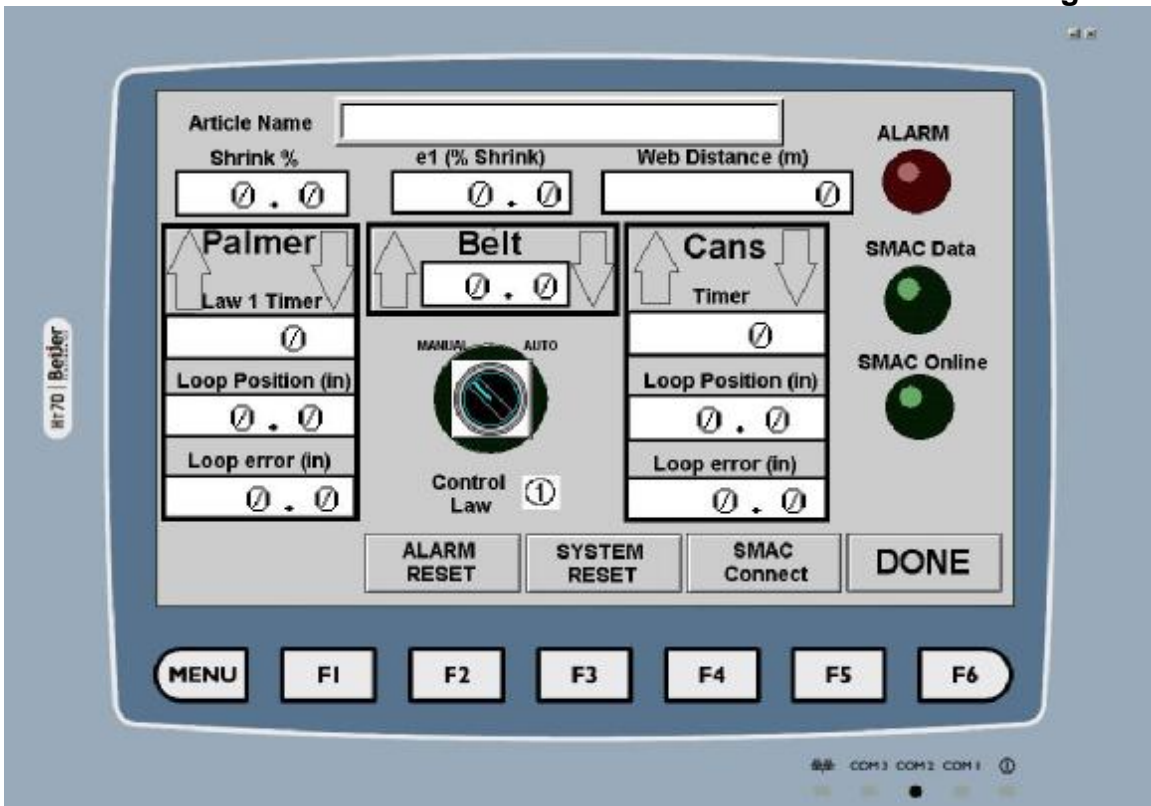


Figure 3

## 2. Technician Use-

- a. The technician is understood to have the same training and use as the operator. However, in addition to the operator duties, the technician is responsible for the setup and maintenance of the system.
- b. **Control Law 1 and Control Law 2-** The system utilizes two “Laws” that controls the behavior of SMACpro depending on the conditions. The system switches between the two laws automatically and cannot be manually controlled.
  - i. **Control Law 1-** Used to make the initial setting of the rubber belt and loops without taking into consideration the shrinkage values of SMAC.
  - ii. **Control Law 2-** Used most of the time by the system. SMACpro automatically switches into Control Law 2 when the rubber belt and loop positions are correct. Control Law 2 utilizes the shrinkage values from SMAC to make the adjustments for palmer and can speeds. Control Law 2 does not have any control on the rubber belt. Fine tuning of the shrinkage is managed by increasing/decreasing palmer speed.
  - iii. **Auto Switching from Control Law 2 to Control Law 1-** If the system determines that a further decrease in palmer speed will not result in a needed increase in shrinkage and the palmer loop has reached the lower loop limit and further decreases in palmer speed could result in damaging the fabric because it is too slack, the system will switch to Control Law 1. Since the system has determined that the rubber belt isn't providing enough shrinkage, the belt pressure will be increased according to the value in the **Rubber Belt Setup**. It is known as **Belt Boost**. The increase in pressure will also result in a tightening of the palmer loop. Once the increased pressure is realized, the system will switch back into Control Law 2, continuing in the normal fine tuning of shrinkage by increasing/decreasing palmer speeds.
- c. **Palmer and Cans Setup-** This screen is used to make the settings necessary for the adjustment of palmer and can speed. In order to keep the system synchronized and working properly, SMACpro must keep the loops associated with each control in the proper position just as the operator does visually. The difference is that we manage the process with ultrasonic sensors.
  - i. **Shrink DB (%)** - This setting is the ‘Dead Ban’ (DB) around the Shrink Target. It is an upper and lower control limit, if you will that allows the shrink % to vary before the system makes an adjustment. This value is normally 0.1-0.2%.

- ii. **Palmer Settings-** See figure 4.
1. **Loop Setpoint (in)** - This setting is used to establish the palmer loop position in relation to the sensor while in Control Law 1.
  2. **Loop Limit (in)** - This setting is used to establish the minimum allowable position of the palmer loop in relation to the sensor while I Control Law 2. Once this limit has been reached and actual shrinkage is too low for the article, the system will switch into Control Law 1 as described above in "Auto Switching from Control Law 1 to Control Law 2".
  3. **Loop DB (in)** - This setting is used to establish a "dead ban" or allowable tolerance in relation to the Loop Position.
  4. **K- Law 1(sec per in)** - Konstant or "K" while the system is in Control Law 1. This is the number of seconds the system will engage the palmer speed relays per inch of out of tolerance from the Loop Setpoint.
  5. **K- Law 2 (sec per %)** - Konstant or "K" while the system is in Control Law 2. This is the number of seconds the system will engage the appropriate palmer speed relay per % shrinkage of actual versus target shrinkage.
  6. **Cycle Time Law 1-** This is the number of seconds between Palmer adjustments while in Control Law 1.
  7. **Cycle Time Law 2-** This is the number of seconds between Palmer adjustments while in Control Law 2. It is important that the cycle time in this condition is long enough to allow the palmer adjustment to affect the shrinkage and be reported by the SMAC to SMACpro. Typically, when the cycle times are too short, the system will overshoot the target shrinkage and vary between too little and too much shrinkage. Conversely, if the cycle time is too long, it will take much longer to regain the target shrinkage than is desired.
- iii. **Can Settings-**
1. **Loop Setpoint (in)** - This setting is used to establish the can loop position in relation to the sensor.
  2. **Loop DB (in)** - This setting is used to establish a "dead ban" or allowable tolerance in relation to the Loop Position.
  3. **K (sec per in)** - Konstant or "K" while the system is in Control Law 2. This is the number of seconds the

system will engage the can speed relays per inch of out of tolerance from the Loop Setpoint.

4. **Cycle Time** - This is the number of seconds between Can adjustments while in Control Law 2.

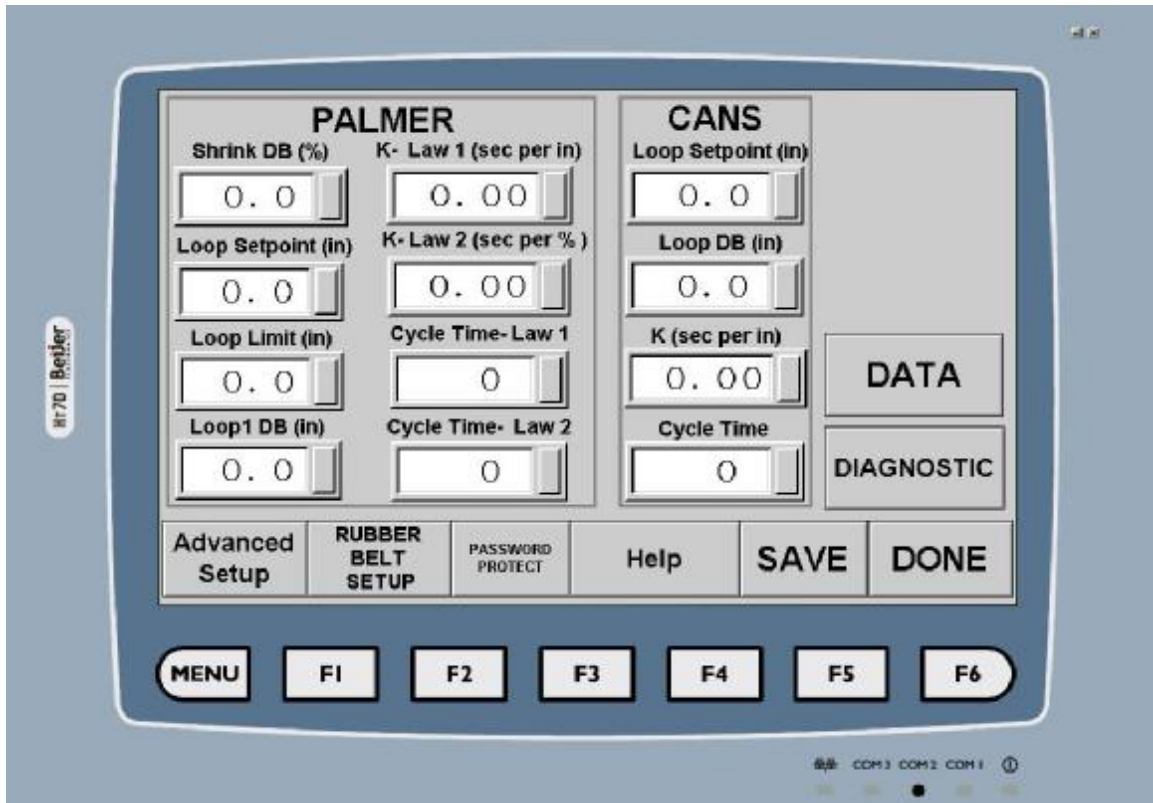


Figure 4

- d. **Rubber Belt Setup**- See Figure 5. The Rubber Belt Setup is a simple, but important component to the performance of the SMACpro system. During the installation, an ultrasonic sensor is installed and calibrated that shows the position of the rubber belt usually correlating with the manual belt setting that is used by the operator.
  - i. **Position DB (mm)** - This setting is the “Dead Ban” or tolerance allowed in relation to the belt setting for a specific article (quality).
  - ii. **Belt Boost (+ mm)** – In the section “Auto Switching from Control Law 1 to Control Law 2”, we discussed **Belt Boost**. This is the number of mm of additional compression that will be applied to the rubber belt if it is determined that the belt compression is not supplying the desired shrinkage to the fabric.
  - iii. **Maximum Position** – This is the maximum position in mm that the system will allow the sanforizer to apply to the belt

pressure. This is helpful in preventing overcompression that can damage the fabric and various mechanical and electrical components of the sanforizer.

- iv. **Minimum Position** – This is the minimum position in mm that the system will allow the sanforizer to apply to the belt. The value is usually “0” and is far less critical than the maximum position.
- v. **Calibration Offset (mm)** – This setting is used anytime the rubber belt has been ground and it isn’t possible to recalibrate the mechanical setting of the belt sensor.
- vi. **Sensor Calibration following belt grinding** – Most customers have some sort of gauge or sensor that is used to make the mechanical setting of the rubber belt. After belt grinding, it is common for the customer to adjust his gauge or sensor so that the operator will have the same belt settings as prior to belt grinding. This procedure is required because the belt is now thinner. It is important that the belt grinding technician reposition the SMACpro belt sensor at the same time he adjusts his mechanical gauge or sensor. The technician will be trained how to adjust the SMACpro sensor during the training portion of the commissioning of the system.

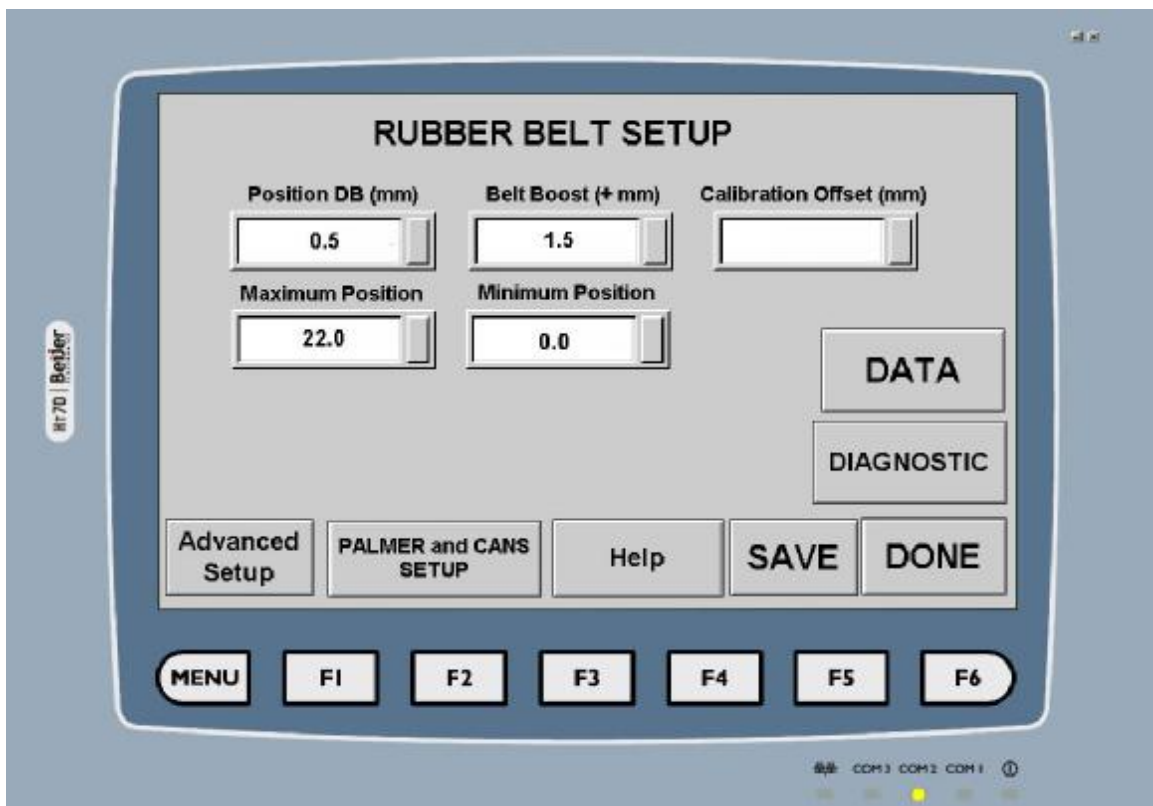


Figure 5

- e. **Advanced Setup** – See Figure 6. The advanced setup is rarely used by the technician.
- i. **t7 Total Limit (sec)** – Only used in special circumstances.
  - ii. **t7 Total (sec)** – Only used in special circumstances.
  - iii. **t3 Total Limit (sec)** – Only used in special circumstances.
  - iv. **t3 Total (sec)** – Only used in special circumstances.
  - v. **Palmer Loop Freq. (Hz)** - Signal from the Palmer Loop ultrasonic sensor.
  - vi. **Can Loop Freq. (Hz)** - Signal from the Can Loop ultrasonic sensor.
  - vii. **Rubber Belt Pos Freq. (Hz)** – Signal from the Rubber Belt ultrasonic sensor.
  - viii. **Can Loop Limit (in)** - This setting is used to establish the minimum allowable position of the can loop in relation to the sensor while I Control Law 2.
  - ix. **SMAC Data T.O. (sec)** – This setting is used to establish the maximum amount of time the SMACpro will allow passing without receiving data from the SMAC system. When this limit is exceeded, the alarm will illuminate.
  - x. **Shrink Limit %** - If the preset shrink limit is exceeded, the alarm will illuminate.

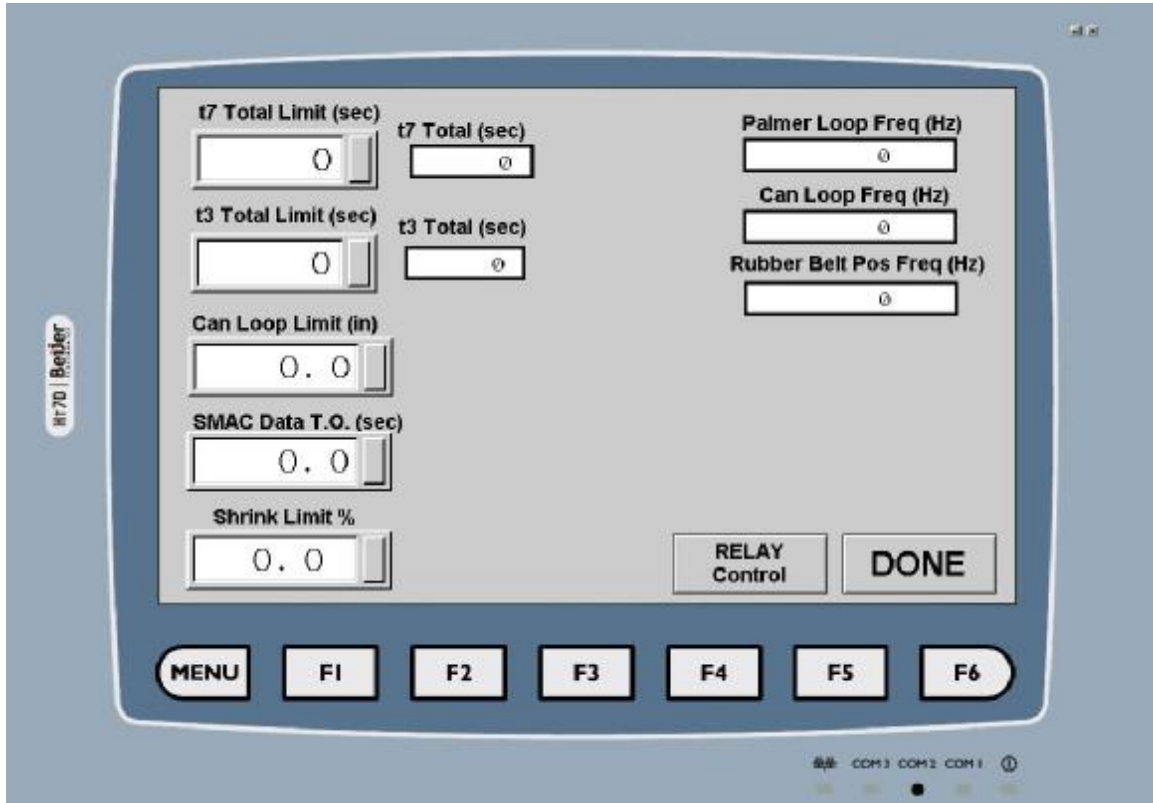


Figure 6

- f. **Password** – Passwords are configured just like the SMAC system. Please see the SMAC documentation.