Series 1100 Color TS Servo Manual
Registration System for Envelope and Cup Machines

ELECTRONIC
MACHINE
PARTS, LLC

400 Oser Avenue
Hauppauge NY 11788
631 434 3700 phone
631 434 3718 fax

www.empregister.com

December 1, 2005

TABLE OF CONTENTS

1 GENERAL

1.1 Unpacking and Inspection

Although every precaution is taken to ensure the equipment is delivered in good condition, a careful inspection should be made. EMP makes every effort to individually box and label each component for easy identification of the shipment. Please report and shortage immediately.

1.2 Installation

While most EMP Servo Systems come with all installation bracketing, please request the installation manual from EMP for additional assistance.

1.3 Introduction

The Series 1100 Servo Register System is designed to provide a reliable and economical solution to your registration control needs.

Based on information provided, EMP has preprogrammed your equipment for your specific application. The program and equipment have been selected based on your machine and web speed.

The EMP Servo System allows you to customize the program to set tolerances and all alarm settings. Please refer to the manual for more information.

1.4 Initial Set Up

For proper operation of the Servo System, the Initial Setup procedure must be completed. This one time setup provides vital information (Draw Roller Diameter, Reducer Ratio, Encoder and Motor Phasing) required for proper operation. See page 3 for assistance.

1.5 Description of Operation

Once a length is entered and the touch screen is in "Run" mode, the servo motor is ready to follow the movement of the encoder. As the machine starts, the encoder will begin rotating, the servo motor will follow and will maintain a 1:1 Relationship with the encoder.

1.6 Before the set button is pressed

The Series 1100 will produce cut sheets based on the length entered.
No Active Area LED - Since no set point has been established, the led will not flash
Scanner LED - will flash- The scanner LED will flash while sensing any print in its path.

1.7 Once the Set button is pressed

The Series 1100 is placed in a ready position awaiting the next scanner signal. Once the scanner sees the register mark, an active area and a set point pulse are created.
The size of active area is established in the initial set-up procedures.
The active area LED will start to flash on the arrival of the 2nd register mark and the SET point switch will be highlighted.
Both the scanner pulse and active area LED's will flash together.
The Series 1100 will correct the product length based on the arrival of the register mark at the scanner and the set point pulse.
The register mark arriving at the scanner before the set point pulse will create an advance correction.
The register mark arriving after the set point pulse will create a retard correction
Based on the trend of corrections, the Series 1100 will adjust the length.
The direction of corrections, size of corrections along with current and initial length can be viewed on the production screen.

1.8 Alarm Conditions

EMP has preprogrammed various alarms that will help in determining particular problems.

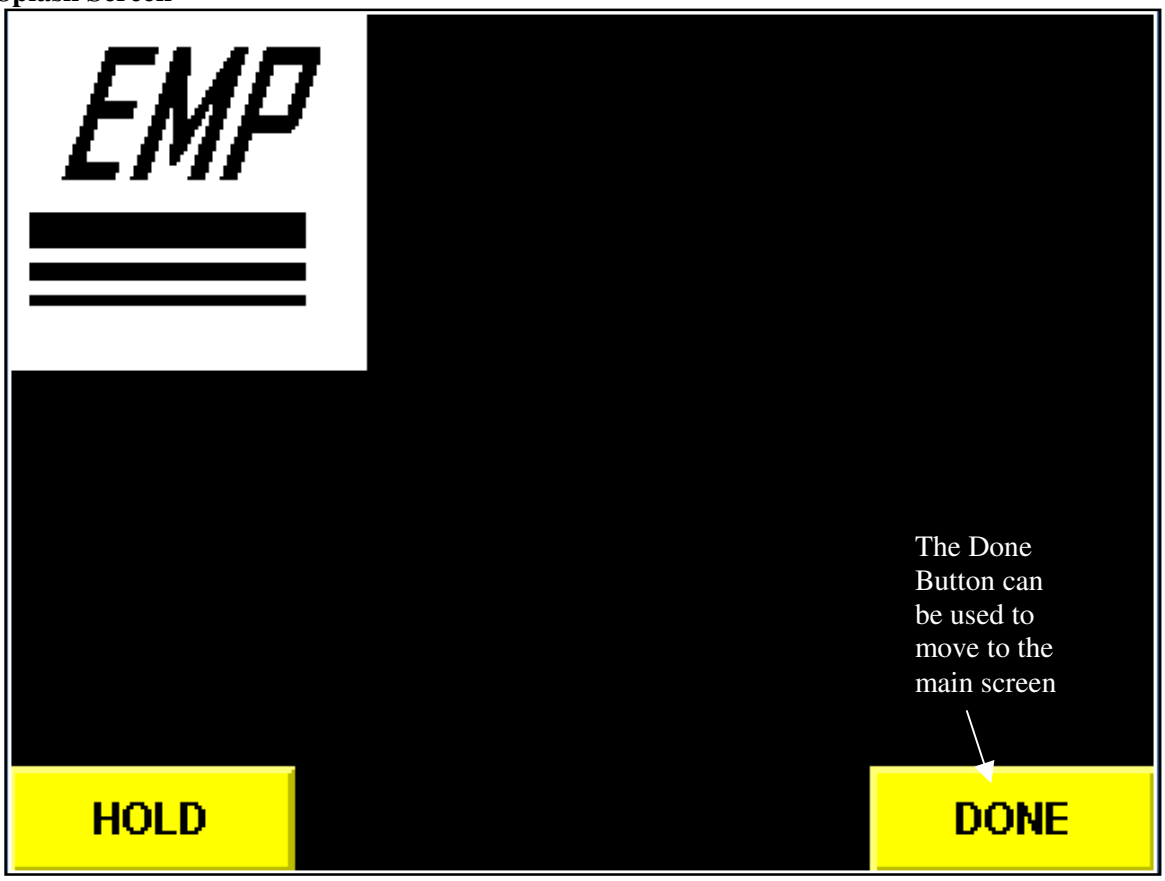
No Register Marks - The scanner is not seeing a register mark within the active area. The number of missed register marks that will counted before an alarm condition is established in the initial setup.

Out of Tolerance - The Series 1100 is not maintaining the desired tolerance. There are a number of reasons for this error.

Following Error - The Series 1100 system will shut down when a following error exists. When the relationship between the Motor's Resolver and the Knife's Encoder has been changed. To avoid an unexpected Motor movement, a Following Error stops the machine. The Machine must be set up again.

2 ACCESSING THE SETUP SCREEN.

Splash Screen

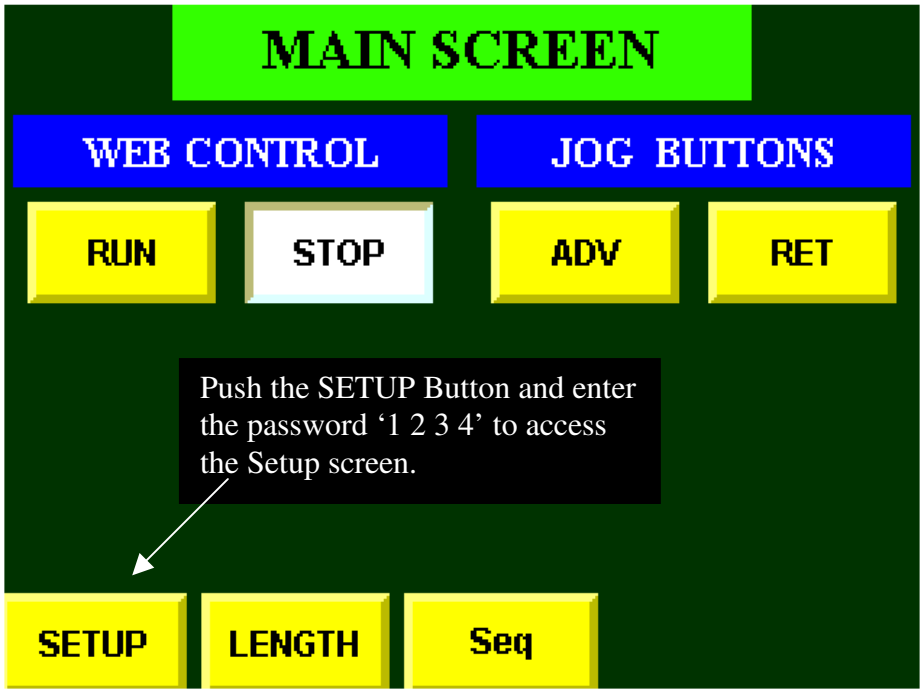


2.1 Splash Screen

On turning on the controller the Splash Screen above appears for a few seconds and is replaced by the Main Screen. This indicates proper communications between the Touch Screen and the Controller.

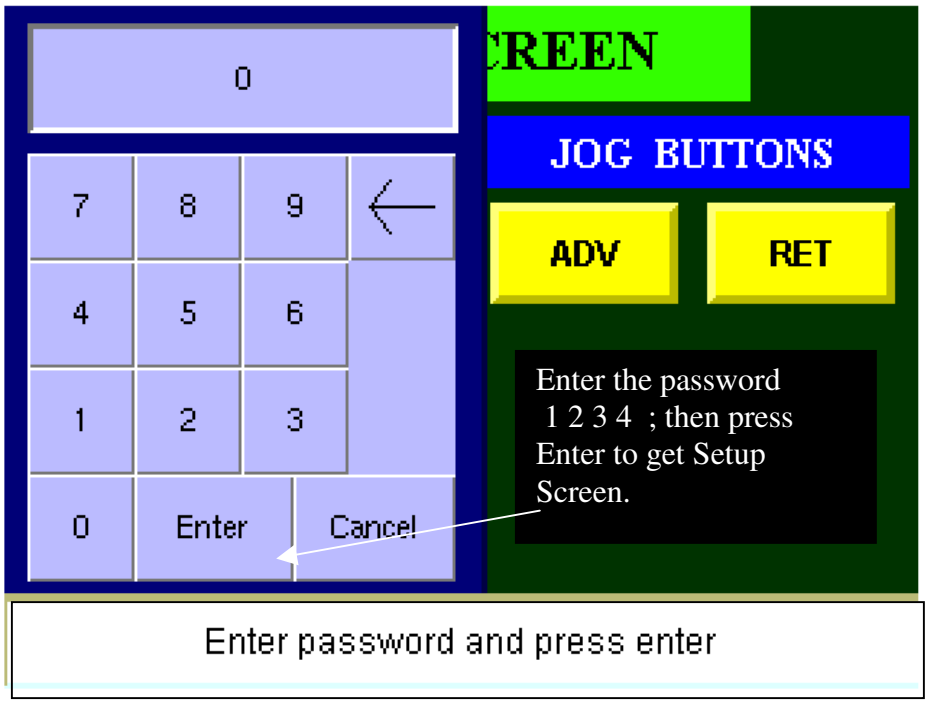
If the Main Screen does appear automatically, pressing the **DONE** button will force it to appear, this is however an indication of faulty communication between the Touch Screen and the Controller

Main Screen

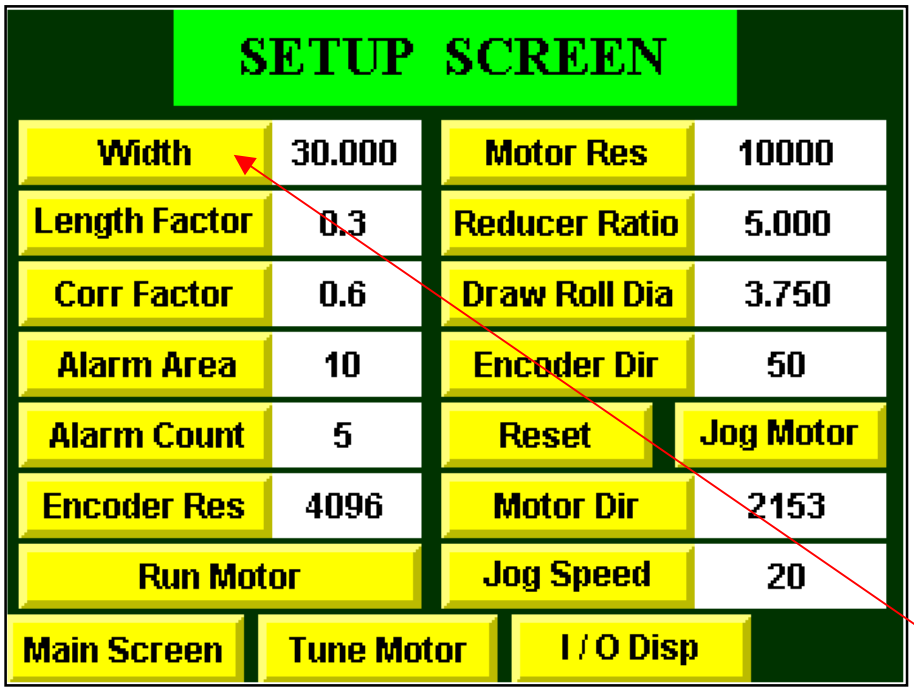


2.2 Main Screen Password Entry

Accessing this screen allows password entry to change the parameters on subsequent screens



2.3 Setup Screen (parameter entry)

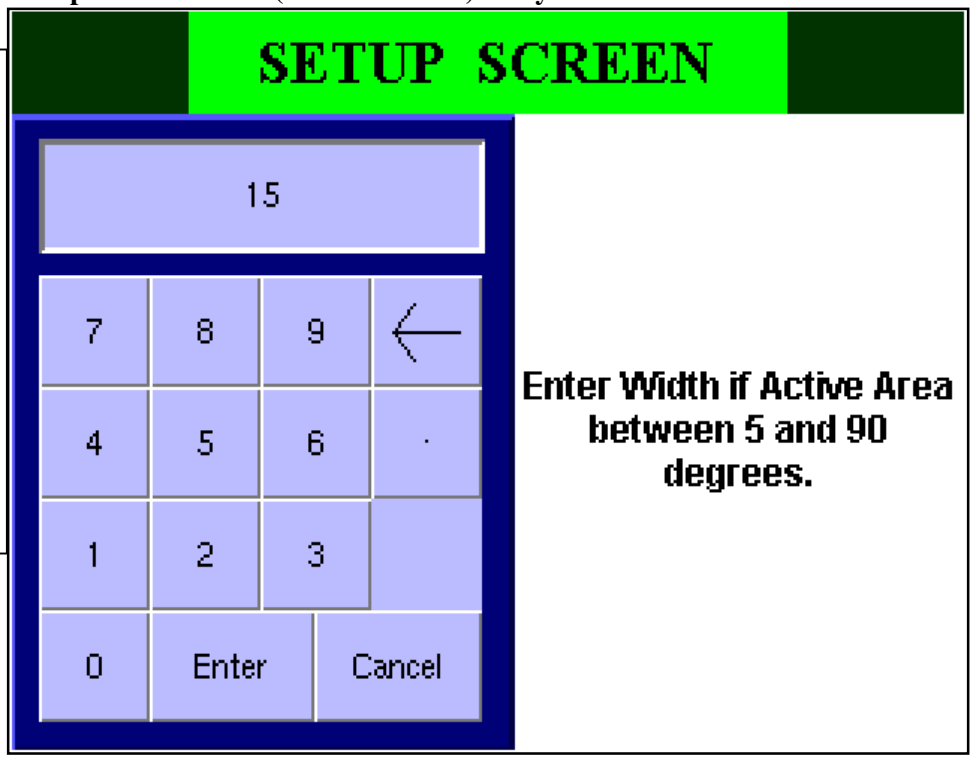


This is the Setup Screen which is used to enter the machine parameters, and correctly phase the Motor and Encoder. This manual describes the input of the Length parameter. A similar procedure works for all other parameters

Push Width

Setup Screen Width (of Active Area) entry

Simply enter the Width of the Active Area in Degrees, and press Enter. The Maximum and Minimum values are shown



2.4 Parameters

2.4.1 Width

This is the distance before the mark that the controller actively seeks a mark. For example if the repeat Length is 12 inches and the width parameter is set to 30^0, then the controller will start actively looking for a mark 12x30/360 = 1 inch before it arrives. Any value between 5 and 90 degrees is allowed.

2.4.2 Length Factor

During normal operation the ratio of encoder rotations to Motor Rotations will change to accommodate changes in tension, slippage at draw rollers, stretch in the web etc. This parameter changes the rate at which the ratio changes. It can take any value between 0 and 1. Note 0 turns off length correction.

2.4.3 Correction Factor

When the Controller determines that the web is out of position a correction is applied to bring it back in to position. Because machinery has cyclic errors (due to run out etc.) it is not always desirable to move the web back into position. This factor determines how much correction is actually made. The amount of correction made = Measured Error x Correction Factor. For example an error of 0.020 inches with a CF of 0.6 makes a correction of 0.012 inches on the first pass leaving 0.008 inches. Then on the next pass it makes a correction of 0 .0048 inches leaving 0.0032 inches and so on. The allowed values are between 0.2 and 1.

2.4.4 Alarm Area

This sets up a tolerance for the marks. If the mark does not occur within this tolerance of where it is expected it is counted as an alarm event and enough alarm events will cause an **Out Of Tolerance** alarm. If the mark does not occur in the Active Area it will cause a **No Register Mark** alarm. The allowed values are between 5^0 and 10^0.

2.4.5 Alarm Count

This sets up the Number of Alarm events required to cause an alarm. The Alarm events are no mark in the Alarm Area, and no mark in the Active area. The permitted values are between 4 and 20.

2.4.6 Encoder Resolution

This sets up the resolution of the auxiliary encoder. Note for quadrature encoders the resolution is equal to the line count x 4. So a 1024 line encoder has a resolution of 4096. This parameter is usually factory set for your particular encoder. Values between 100 and 20000 are allowed.

2.4.7 Motor Resolution

This sets up the resolution of the Servo Motor Feedback. 6. This parameter is usually factory set for your particular motor. Values between 100 and 20000 are allowed.

2.4.8 Reducer Ratio

This is the Ratio between the Servo Motor and the Draw Rollers. It should include both the reducer on the front of the Servo Motor (if one is used) and any further reduction between the Servo motor and the Draw Rollers. Any value between 1 and 40 is allowed .

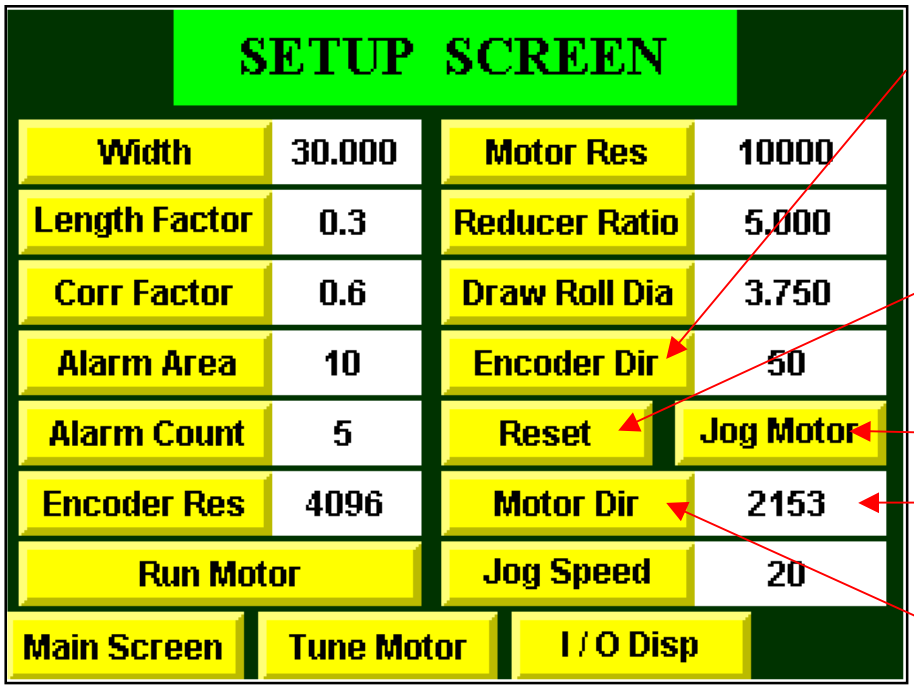
2.4.9 Draw Roll Dia

This is the diameter of the roller that the web in **inches.** The controller uses this information, the reducer ratio information, and the encoder position to determine the required position of the motor. Values between 1 and 20 inches are allowed.

2.4.10 Jog Speed

This is the speed at which the controller jogs the motor when commanded to do so. Values between 1 and 100 rpm are allowed.

2.5 Encoder and Motor Phasing



Encoder Dir button changes Encoder Phase

Reset button, Resets the Encoder and Motor Positions to 0.

Current position of encoder

Current Motor Position

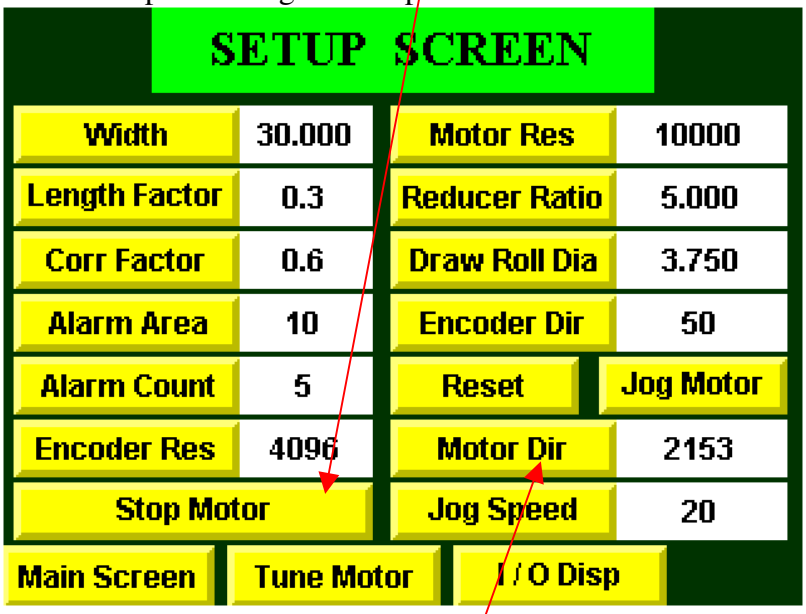
Motor Dir button changes Motor Phase

2.5.1 Encoder phasing

Push the Reset button to set the Encoder and Motor Positions to 0.
Jog the Machine slightly to turn the encoder.
The encoder position should be **Positive** and **increasing**, if it is not change the encoder phase by pushing the **Encoder Dir** button.

2.6 Motor Phasing

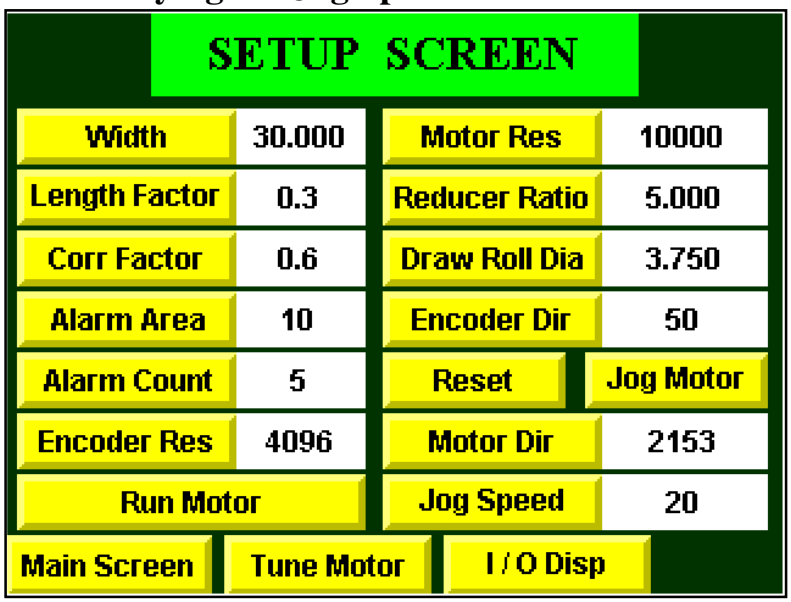
Push the **Run Motor** button. The Servo motor will now follow the encoder position. The Buttons Caption changes to Stop Motor.



Jog the Machine. The draw roller and observe the draw roller. If it is rotating in the wrong direction Push the **Motor Dir** button. The draw roller should now turn in the correct direction.

Push the stop Motor button. The caption on the Stop Motor button changes to Run Motor and the Draw rollers stop following the machine.

2.7 Verifying the Jog Speed.



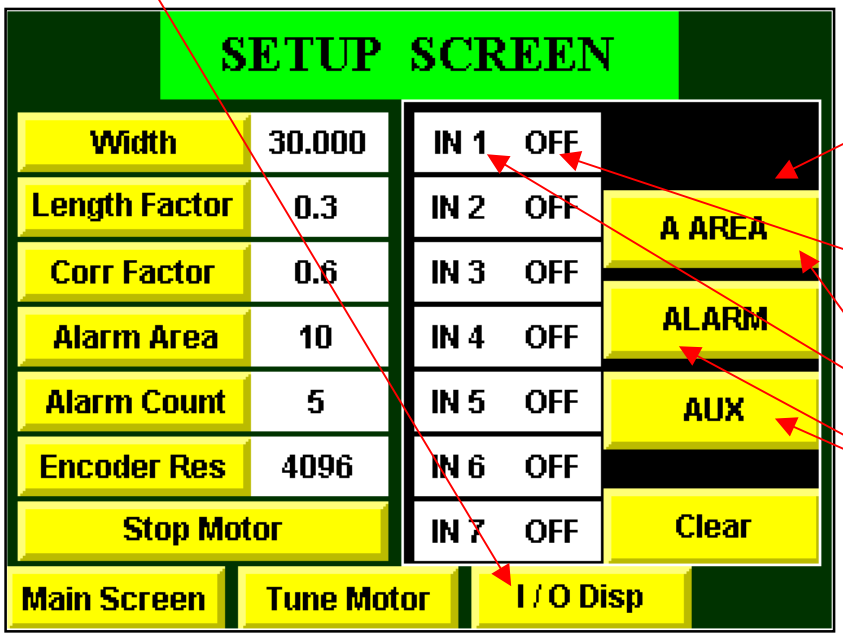
Push the **Jog Motor** Button. The draw rollers will turn continuously at jog speed. The Run Motor button's caption changes to sop motor.

Change the jog speed parameter to the desired speed. It is calibrated in Draw Roll rpm.

Push **Stop Motor** when done.

2.8 Check the I/O

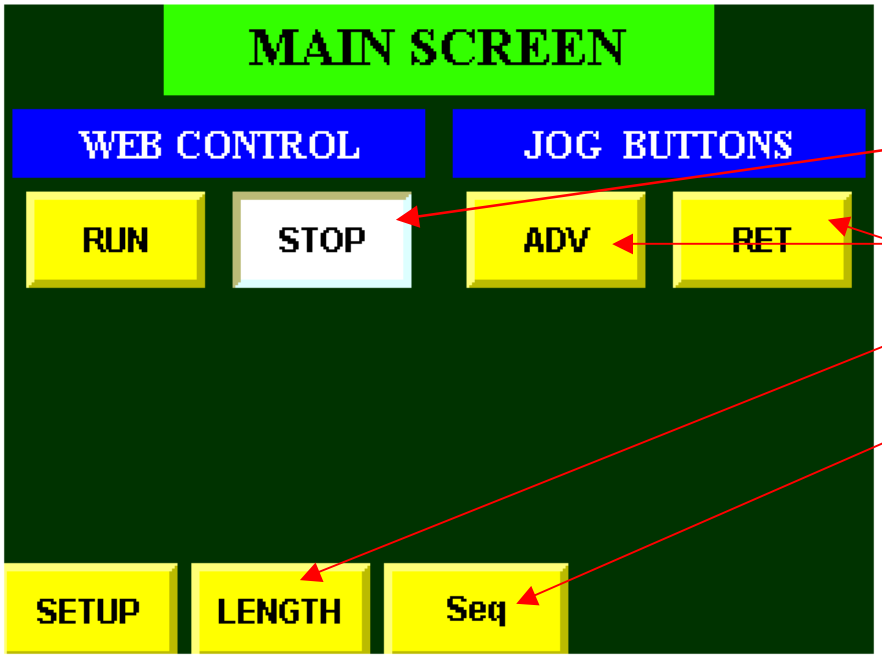
Press the **I /O Disp** button to begin checkout.



The states of the inputs are shown in the I/O screen above. IN 1 is always used to show the scanner state. If the output led on the scanner is on then the pickup LED should turn on and the **IN 1** display above should change to **"ON"**.
IN 2 .. IN 7 show the state on optional Jog and Reset switches.
The **Output buttons** are used to momentarily control the state of the Outputs. The A Area controls the Active Area Led. The **Alarm** controls the alarm and can be used to control external circuitry for checkout or diagnostic purposes. Press Main Screen to return to the Main Screen.

3 RUNNING THE MACHINE

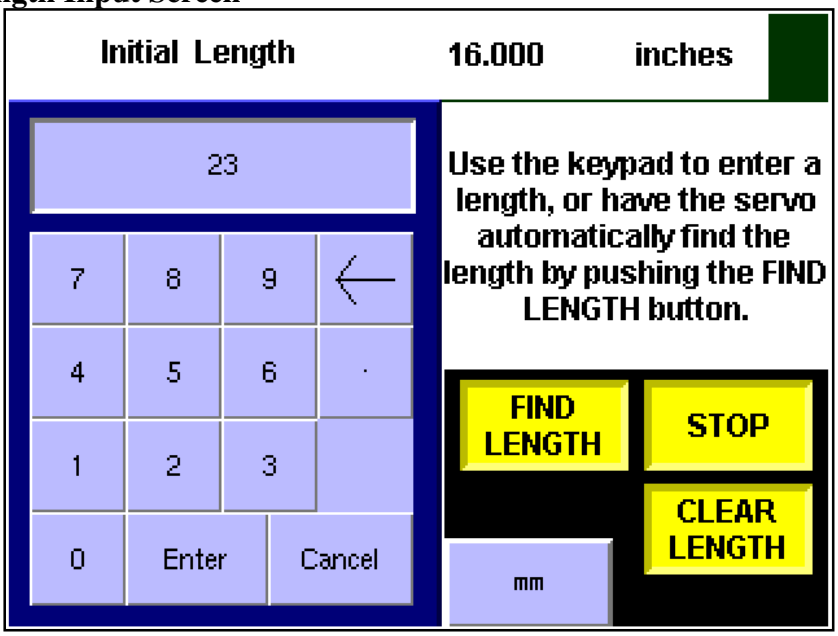
Main Screen



3.1 Entering Length

Press the Length button. The Length Input screen below appears

Length Input Screen

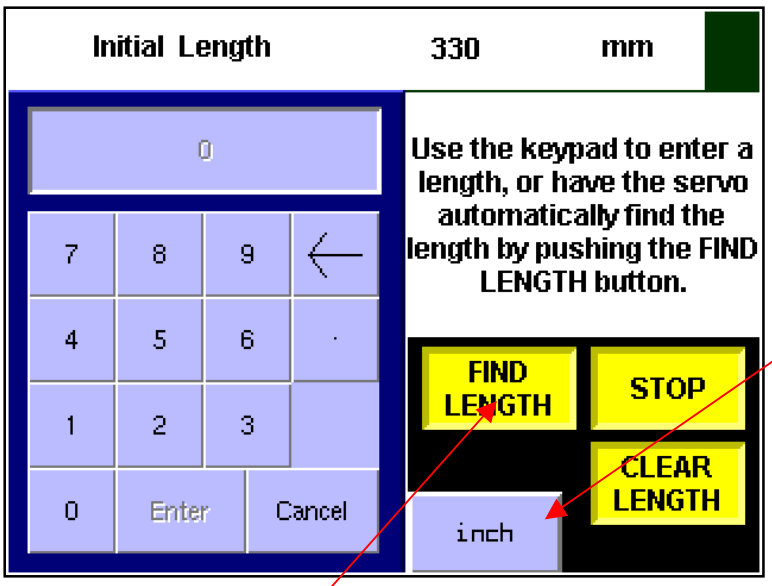


There are two methods to input the length. One is to Enter the Length directly in inches or millimeters.

The other method is to have the machine find the Length directly. This only works if there is no print between the register marks

3.1.1 Entering the Length Directly

To enter the Length in inches simply input the length in the above screen and press enter.
To input the Length in Millimeters push the mm button. The screen changes as shown.



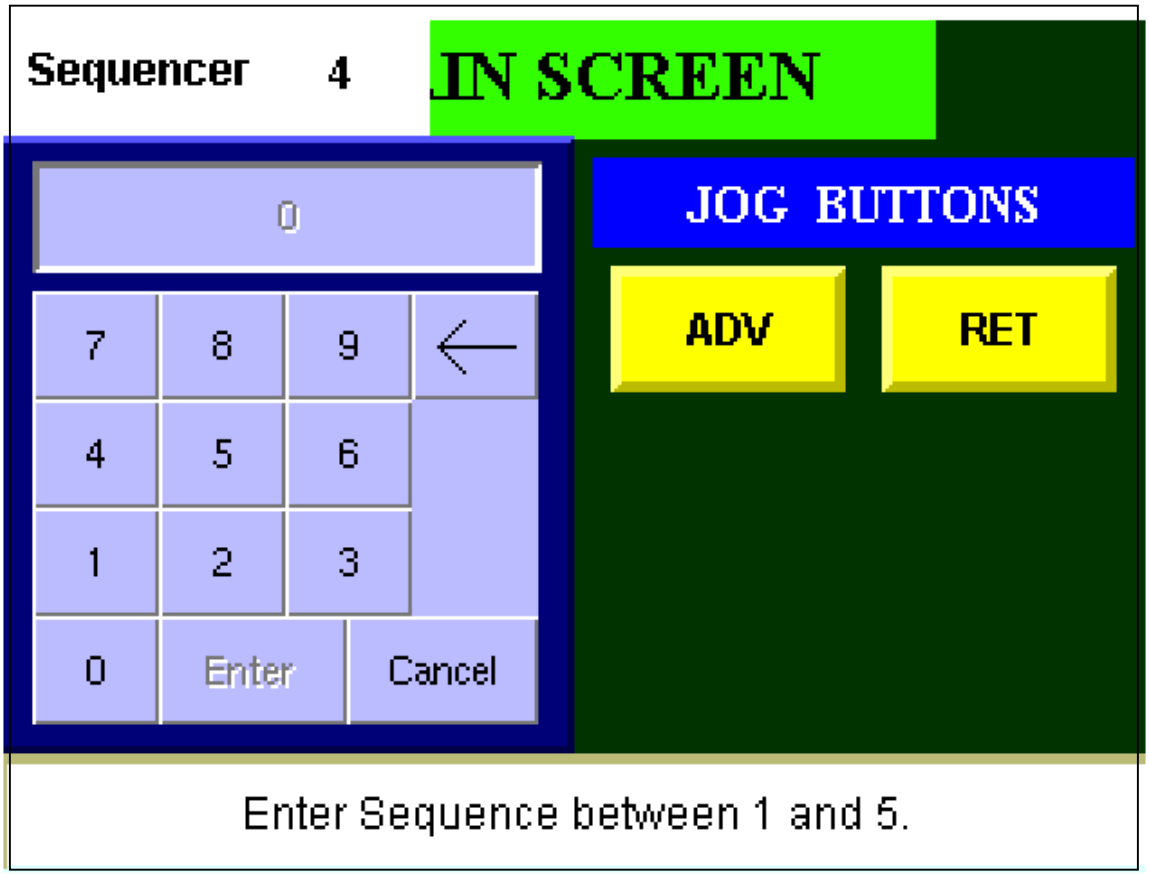
Button to change from inches to millimeters.

Input the length in the above screen and press enter.

3.1.2 Measuring the Length directly

Push the **Find Length** Button. The draw rollers will jog slowly until the second mark reaches the scanner and stops. The controller now automatically determines the correct length.
This method only works for print jobs with no Print in the path of the scanner except the Registration marks.

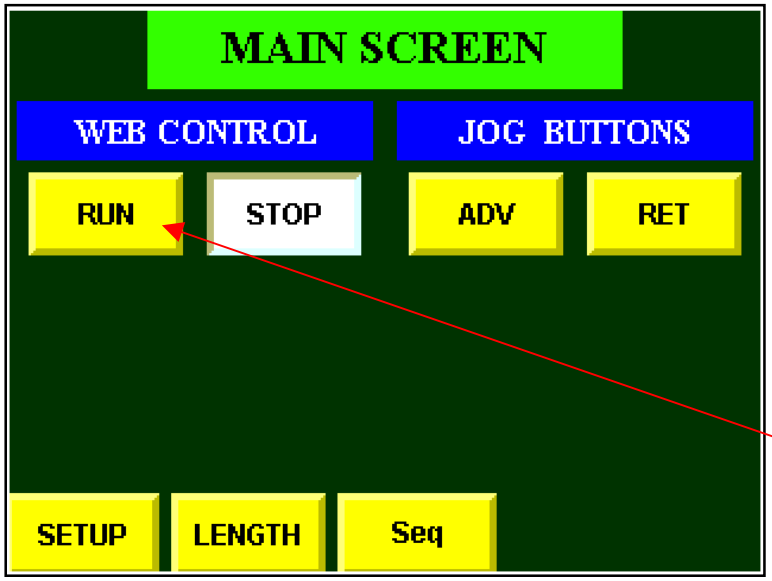
3.2 Entering a Sequence



The Sequence is used to make the Register system follow the same pattern as the original print cylinder. For example if two repeat patterns were printed per rotation of the Print Cylinder a sequence of two will cause the controller to look at every second mark, thereby following the original print cylinder pattern. The controller may be programmed to look at every mark Seq. = 1, every second mark Seq. = 2, every third mark Seq. = 3, every fourth mark Seq. = 4, or every fifth mark Seq. = 5,

To program a sequence simply press **Seq**., input the desired sequence and press enter.

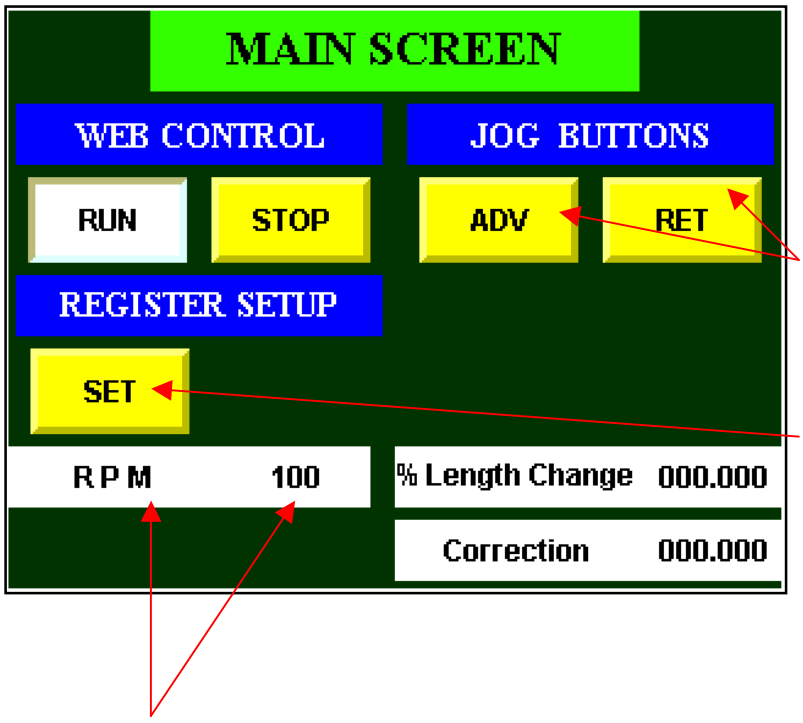
3.3 Running the machine.



This screen appears a couple of seconds after Turn On. The Draw Rollers are in the Stop Mode, and will not follow the machine. The Draw Rollers may be jogged using the **ADV** or **RET** Jog Buttons.

Push **Run** to Enter the Run Mode. The Draw Rollers begin to turn and Follow the machine, at the preprogrammed Length.

3.3.1 Run Mode



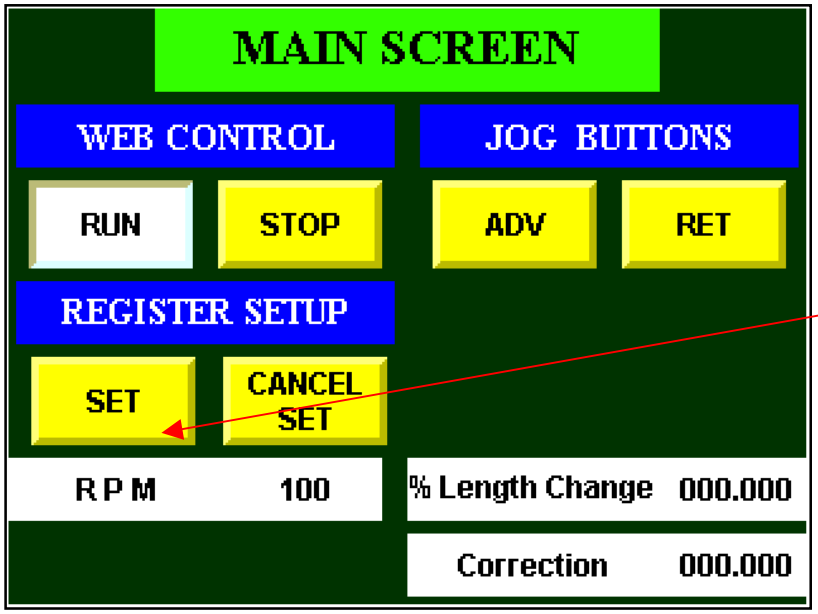
The Screen is in Run Mode. Begin running the machine, the draw rollers will feed the correct amount of web based on the previously entered length.

The **Adv** and **Ret** Jog Buttons may now be used to get the web in register.

Press the **Set** button to maintain register.

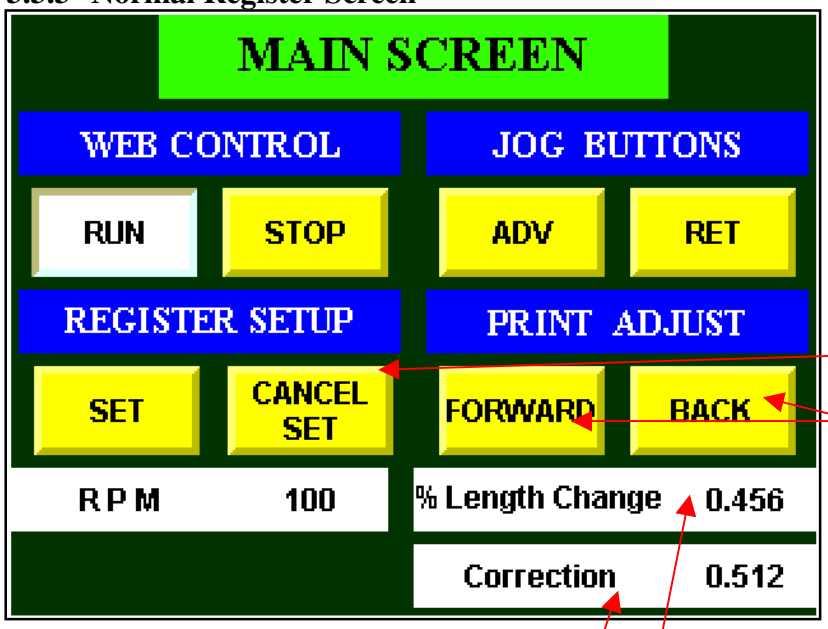
The RPM display shows the number of machine cycles per minute

3.3.2 Maintaining Register



At this point the **Set** button has been pushed and the controller is waiting to see the first register mark. The **Set** button will blink On and Off until a mark is seen.

3.3.3 Normal Register Screen



After the first mark arrives the Normal Register Screen Appears. The Jog buttons no longer move the print.

To Cancel the register push **CANCEL SET**

To Adjust the register push **FORWARD BACK**

Correction shows the Register error in degrees.

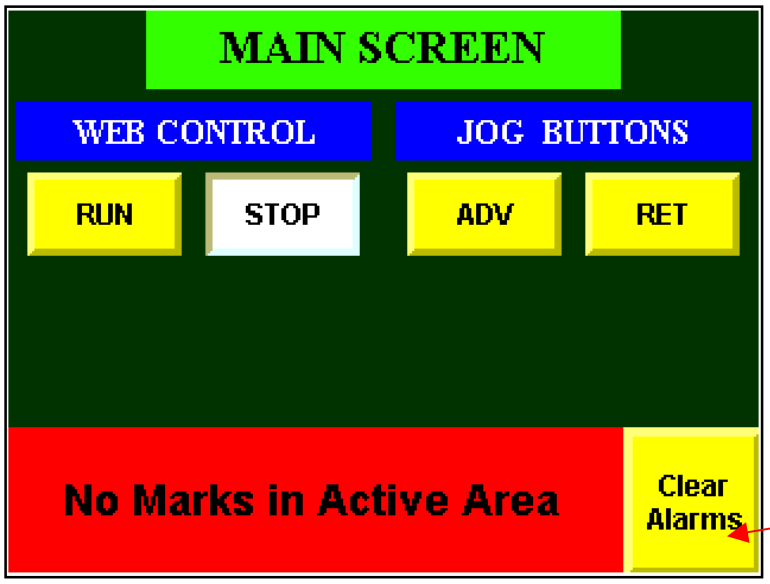
% Length Change shows the current error in Length.

3.4 ALARMS

Register alarms may be cleared but will recur unless the machine is put in register

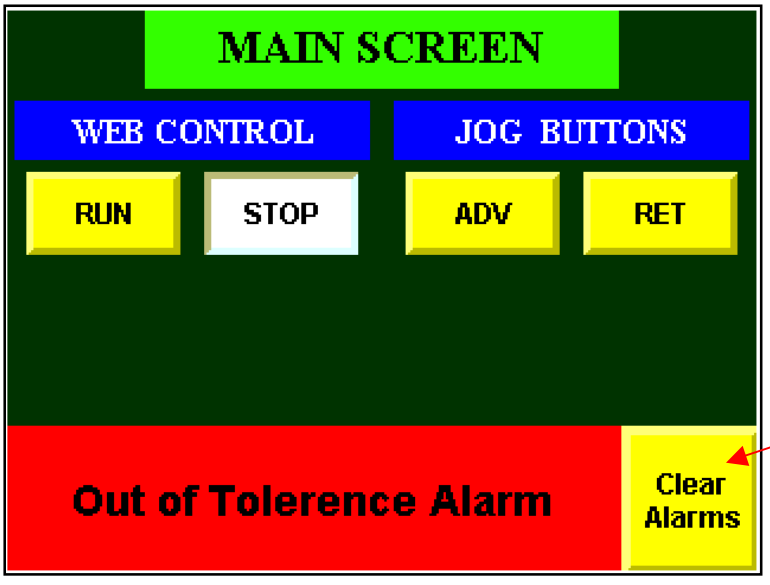
3.4.1 No Marks in Active Area.

No marks appear in the active area and Register is not currently being controlled. Alarm may be Cleared.



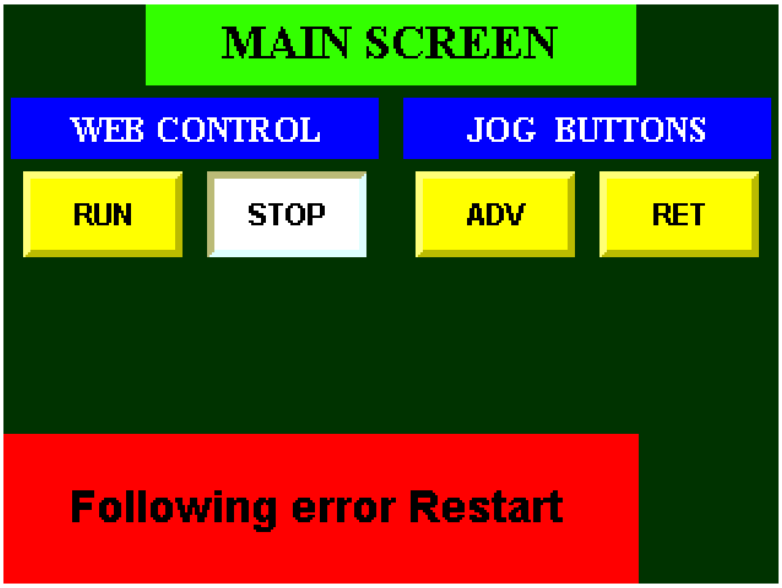
3.4.2 Out Of Tolerance.

Marks are occurring in the active area, but the register is not in normal tolerance. Alarm may be cleared.



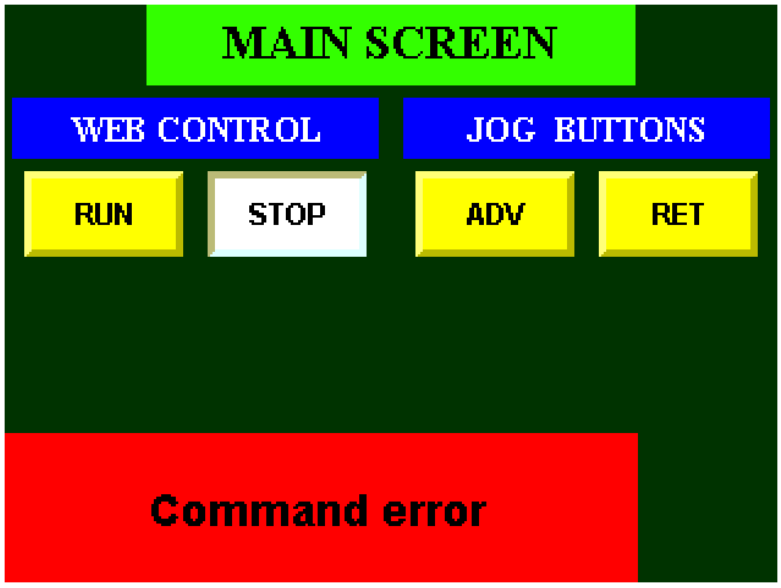
3.4.3 Following Error.

The servo motors are out of position. Normally caused by a jam at the drawrollers, but can also (though rarely) be caused by a hardware fault in the system. To clear this fault recycle the power.



3.4.4 Command Error.

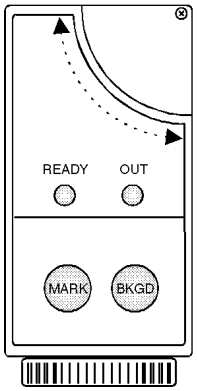
Caused by a program fault, normally indicates damage to the control board. Recycle the power to clear the fault.



4 Front Panel

Power On	Green Switch -Turns on the Servo System.
Power Off	Red Switch – Shuts power off to the Servo System.
Active Area	Red LED – Once "SET" is pressed, an active area is established. The active area LED will flash "ON" when the encoder is in its active area.
Scanner Pulse	Green LED – Will flash when the scanner sees the register mark. The Scanner will also flash when seeing any other print in its path. These extra scanner pulses are outside the Active Area and do not generate corrections.

5 TL-U Scanner Operation



(Ready) Green LED – Always "ON" when set-up is done properly.

(Output) Red LED – Flashes when scanner has sensed print.

(Mark) Learns the color of the register mark.

(Bkgd) Learns the color of the web's background. The background is the clear area directly in front of the register mark.

5.1 Proper Position of Scanner

1. The Scanner should be 3/8" (9mm) from the preprinted web.

2. The connector can be rotated in three positions by loosening the locking screw. Tighten the locking screw when finished.

3. The beam direction may be changed by swapping the cap and lens.

5.2 Scanner Set-Up

1. Position the register mark under the light spot of the scanner. Press and hold the MARK key until the GREEN LED turns off.

2. Position the label's background under the light spot of the scanner. Press and hold the BKGD key. The GREEN LED will blink briefly.

3. The GREEN LED stays on continuously. This indicates the register mark and background acquisition was correct and the TL-U is ready.

At the end of the above operations the following settings are made:

- The light emission was set for red or green to maximize the contrast between the mark and the background reading.
- The dark or light function was selected on the basis of the reading of a darker or lighter mark with respect to the background.

6 TROUBLE SHOOTING

Problem	Cause	Solution
No Register Mark Error	Scanner Signal is not being received during the Active Area Zone	1. Verify Touch Screen's Scanner Pulse LED is flashing. 2. Verify Scanner Output LED is flashing.
No Active Area LED.	No Active Area	1. Press Set Point. 2. Verify Encoder is rotating. 3. Verify encoder cable LED is flashing. 4. Check Direction of encoder
SET does not appear	System not in RUN mode.	Redo set-up procedure including Step 7.
No normal register screen.	Check encoder direction counts positive see page 9. Check scanner sees mark	Follow encoder phasing procedure page 9 Check scanner location.
Servo System walks out of register	Incorrect length entered. Encoder Failure.	1. Verify correct length is being entered. Using a ruler, measure the distance between Register marks. 2. Performs "System Checkout" .

6.1 Recommended Spare Parts

EMP maintains a file by serial number of each Servo System sold. The serial number will supply details on the:

1. Servo Program
2. Motor Amplifier
3. Style of Alarm Relay and Components Used
4. Motor Type
5. Reducer Ratio

Before contacting EMP, please obtain the serial number.

The Serial Number can be obtained by:

Check the label on the door o the control panel .

Recommended Spare Parts

SE 141	Power Supply
SE 329	1415 Control Board
B 3149	Encoder - 10 pin
TL - U	Scanner
C 1772 M	Motor
SE 313	6 Amp

Emergency Telephone Number

EMP provides service assistance Monday to Friday 8:30 AM (EST) to 6:00 PM (EST).

After normal business hours, an emergency phone number, **917.215.4639**, should be called.
The EMP web site www.empregister.com also provides trouble shooting assistance.