Series 1000TS Servo Registration System

Operator Manual

EMP ELECTRONIC MACHINE PARTS, INC.

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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 1000 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. To assure proper operation, the <u>initial set up procedure must be done before start up.</u>

1.4 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.

Before the set button is pressed,

?? The Series 1000 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.
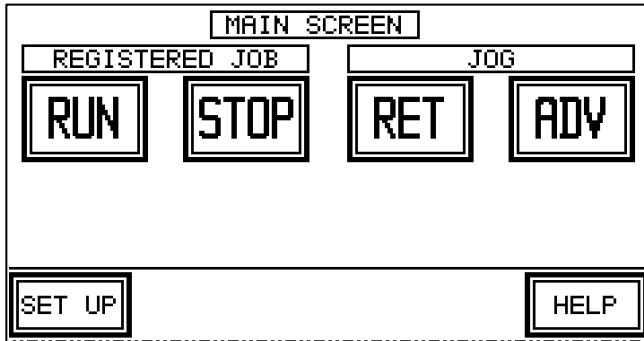
Once the Set button is pressed,

?? The Series 1000 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 1000 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 1000 will adjust the length.
?? The direction of corrections, size of corrections along with current and initial length can be viewed on the production screen.

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 1000 is not maintaining the desired tolerance. There are a number of reasons for this error.
?? **Following Error -** The Series 1000 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.

2.1 Accessing the Initial Set-Up Screen

```
┌─────────────────────────────────────┐
│          ┌ MAIN SCREEN ┐            │
│  ┌ REGISTERED JOB ┐    ┌── JOG ──┐  │
│  ┌─────┐ ┌──────┐   ┌─────┐ ┌─────┐ │
│  │ RUN │ │ STOP │   │ RET │ │ ADV │ │
│  └─────┘ └──────┘   └─────┘ └─────┘ │
│                                     │
│  ┌───────┐             ┌──────┐     │
│  │ SET UP│             │ HELP │     │
│  └───────┘             └──────┘     │
└─────────────────────────────────────┘
```

Press "SET-UP" to access the Set-Up Screen.

Press "INITIAL SET-UP" to access the Password Screen.
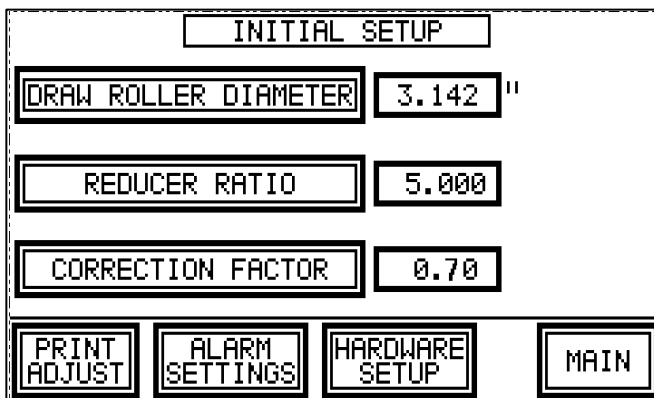
```
┌─────────────────────────────────────────┐
│  ┌───┐ ┌───┐ ┌───┐   Enter the 4 digit  │
│  │ 7 │ │ 8 │ │ 9 │   PASSWORD and press  │
│  └───┘ └───┘ └───┘   Enter               │
│  ┌───┐ ┌───┐ ┌───┐   ┌─────────────────┐ │
│  │ 4 │ │ 5 │ │ 6 │   │                 │ │
│  └───┘ └───┘ └───┘   └─────────────────┘ │
│  ┌───┐ ┌───┐ ┌───┐  ┌──────┐   ┌──────┐  │
│  │ 1 │ │ 2 │ │ 3 │  │Cancel│   │ Back │  │
│  └───┘ └───┘ └───┘  └──────┘   │Space │  │
│        ┌───┐        ┌──────────┴──────┐  │
│        │ 0 │        │      Enter       │  │
│        └───┘        └─────────────────┘  │
└─────────────────────────────────────────┘
```
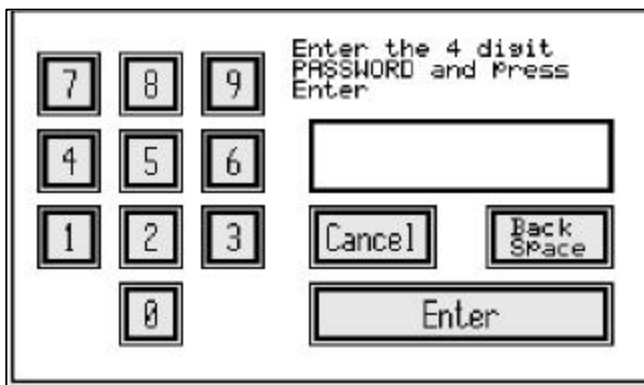
A password is required to access the initial set up screen.

2.2 Entering Initial Set-Up Data

```
┌─────────────────────────────────────────┐
│          ┌ INITIAL SETUP ┐               │
│  ┌─────────────────────┐ ┌───────┐       │
│  │DRAW ROLLER DIAMETER │ │ 3.142 │ "     │
│  └─────────────────────┘ └───────┘       │
│  ┌─────────────────────┐ ┌───────┐       │
│  │   REDUCER RATIO     │ │ 5.000 │       │
│  └─────────────────────┘ └───────┘       │
│  ┌─────────────────────┐ ┌───────┐       │
│  │  CORRECTION FACTOR  │ │ 0.70  │       │
│  └─────────────────────┘ └───────┘       │
│  ┌──────┐ ┌────────┐ ┌────────┐  ┌──────┐│
│  │PRINT │ │ ALARM  │ │HARDWARE│  │ MAIN ││
│  │ADJUST│ │SETTINGS│ │ SETUP  │  └──────┘│
│  └──────┘ └────────┘ └────────┘          │
└─────────────────────────────────────────┘
```
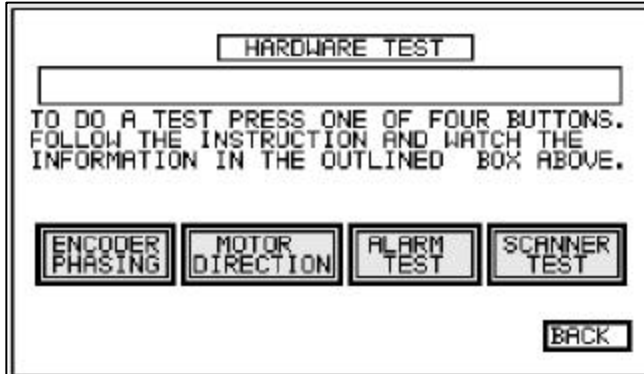
Press "DRAW ROLLER DIAMETER." The diameter of the feed roller must be accurately measured and entered into the program.

Press "REDUCER RATIO." The reducer ratio is shown on the reducer. If a complete servo system was supplied, EMP has already entered this ratio.

Correction Factor - The factory setting is .70 The correction factor is used to change the correction time.
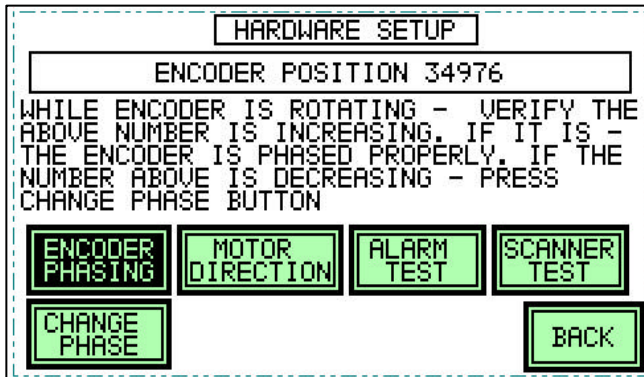
When Finished Press "HARDWARE SETUP"

2.3 Phasing Encoder and Motor

```
┌─────────────────────────────────────┐
│        ┌─ HARDWARE TEST ─┐           │
│        └─────────────────┘           │
│   ┌──────────────────────────────┐   │
│   └──────────────────────────────┘   │
│  TO DO A TEST PRESS ONE OF FOUR BUTTONS.│
│  FOLLOW THE INSTRUCTION AND WATCH THE │
│  INFORMATION IN THE OUTLINED  BOX ABOVE.│
│                                      │
│  ┌───────┐ ┌───────┐ ┌──────┐ ┌───────┐│
│  │ENCODER│ │ MOTOR │ │ALARM │ │SCANNER││
│  │PHASING│ │DIRECTION│ │TEST │ │ TEST ││
│  └───────┘ └───────┘ └──────┘ └───────┘│
│                            ┌──────┐   │
│                            │ BACK │   │
│                            └──────┘   │
└─────────────────────────────────────┘
```
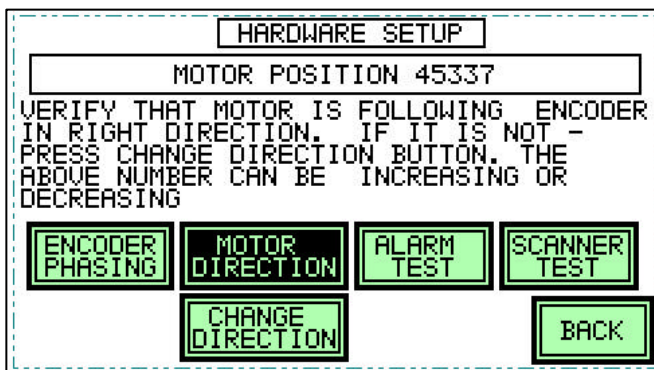
Press "Stop Running Program, Download Hardware Setup Program"

This hardware screen will allow you to:

a)   Phase the Encoder Direction
b)   Phase the Motor Direction.

Encoder Phasing -

```
┌─────────────────────────────────────┐
│        ┌─ HARDWARE SETUP ─┐          │
│        └──────────────────┘          │
│   ┌──────────────────────────────┐   │
│   │   ENCODER POSITION 34976     │   │
│   └──────────────────────────────┘   │
│  WHILE ENCODER IS ROTATING -  VERIFY THE│
│  ABOVE NUMBER IS INCREASING. IF IT IS -│
│  THE ENCODER IS PHASED PROPERLY. IF THE│
│  NUMBER ABOVE IS DECREASING - PRESS  │
│  CHANGE PHASE BUTTON                 │
│  ┌───────┐ ┌───────┐ ┌──────┐ ┌───────┐│
│  │ENCODER│ │ MOTOR │ │ALARM │ │SCANNER││
│  │PHASING│ │DIRECTION│ │TEST │ │ TEST ││
│  └───────┘ └───────┘ └──────┘ └───────┘│
│  ┌───────┐                 ┌──────┐  │
│  │CHANGE │                 │ BACK │  │
│  │PHASE  │                 └──────┘  │
│  └───────┘                           │
└─────────────────────────────────────┘
```

1.   "Press Reset Position

2.   With the encoder turning, a position number will be displayed. This number must be an increasing positive number. If the position number is decreasing press "CHANGE PHASE." Once the number is positive and increasing, the encoder phasing is correct.

Motor Phasing -

```
┌─────────────────────────────────────┐
│        ┌─ HARDWARE SETUP ─┐          │
│        └──────────────────┘          │
│   ┌──────────────────────────────┐   │
│   │    MOTOR POSITION 45337      │   │
│   └──────────────────────────────┘   │
│  VERIFY THAT MOTOR IS FOLLOWING  ENCODER│
│  IN RIGHT DIRECTION.   IF IT IS NOT - │
│  PRESS CHANGE DIRECTION BUTTON. THE  │
│  ABOVE NUMBER CAN BE  INCREASING OR  │
│  DECREASING                          │
│  ┌───────┐ ┌───────┐ ┌──────┐ ┌───────┐│
│  │ENCODER│ │ MOTOR │ │ALARM │ │SCANNER││
│  │PHASING│ │DIRECTION│ │TEST │ │ TEST ││
│  └───────┘ └───────┘ └──────┘ └───────┘│
│           ┌───────┐       ┌──────┐   │
│           │CHANGE │       │ BACK │   │
│           │DIRECTION│     └──────┘   │
│           └───────┘                  │
└─────────────────────────────────────┘
```

1.   Press "Jog" - The Motor must ADVANCE the feed roller and web.

If the motor is <u>not</u> advancing the web press "CHANGE DIRECTION."

2.   You may vary the motor jog speed by pressing INCR. or DECR. This should be done after running the system.

Press "Save" to save changes.

```
┌─────────────────────────────────────┐
│     PRINT ADJUST CORRECTION          │
│                                      │
│  THE CURRENT PRINT ADJUST IS SET FOR │
│                                      │
│              1.00 °                  │
│     INCR              DECR           │
│                                      │
│                          BACK        │
└─────────────────────────────────────┘
```

2.4 Print Adjust Setting

Press "PRINT ADJUST" at the Initial Setup screen to change print adjust settings.

Press "INCR" or "DECR" to increase or decrease the coarse and or fine print adjust.

```
┌─────────────────────────────────────┐
│          ALARM SETTINGS              │
│ NUMBER OF   OUT OF      5   INCR DECR│
│ TOLERANCE EVENTS                     │
│                                      │
│ REGISTER    AREA   10.00°  INCR DECR │
│                                      │
│ NUMBER OF MISSED       5   INCR DECR │
│ SCANNER MARKS                        │
│                                      │
│ ACTIVE    AREA     15.00°  INCR DECR │
│                                      │
│                            BACK      │
└─────────────────────────────────────┘
```

2.5 Alarm Setting

Using the alarm settings, you may adjust the:

1. Number of out of tolerance events before the alarm is activated.

2. The in-tolerance register area.

3. Number of missed marks before the alarm is activated.

4. Active Area Setting is 15 Degrees
If the distance between register marks is 12", a clear area of 1/2" BEFORE the register mark is required

With the settings displayed above, the following alarms will occur
1. "Out of Tolerance" will activate once the Series 1000 System has not seen 5 consecutive register marks within a 10-degree area.

2. "No Register Mark" will activate once the Series 1000 System has not seen a register mark within the 15 degree active area for five consecutive rotations of the encoder.

This completes the initial System Set up Procedure. For operation of the Series 1000 System, please refer to the operator's manual. For any problems encountered during this initial set up, please contact EMP.

3.1 FRONT PANEL SWITCHES

Emergency Stop   - Must be wired into the emergency stop circuit.

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.

3.2 Set-Up Procedure

Step 1. Main Screen
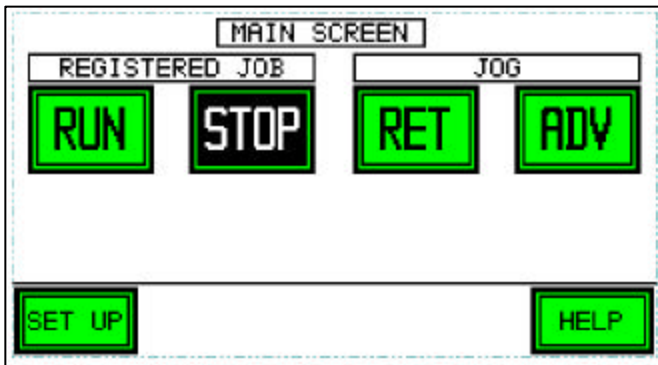
1. **Press "SET-UP"**

Note: For first time users, press "HELP."
The Help Screen will explain the function
of each switch.

Step 2. Set Up Screen
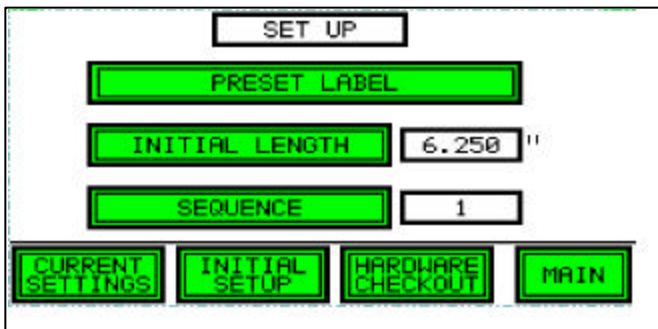
Press "Initial Length" - To access the
"key-pad"

Step 3.
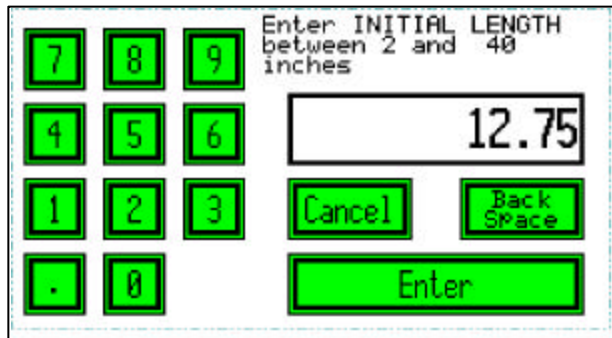
The "Keypad" Screen will be displayed.

1. Enter the new label length (in inches)
 (You may enter up to 3 decimals).

2. Press "Main" when finished.

Step 4.
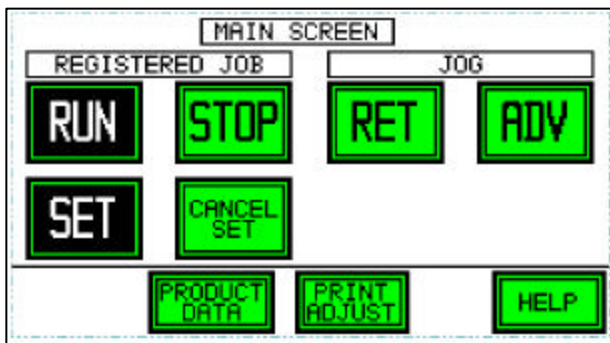
Press, "RUN" on the Touch Screen Panel.

Using the "RET" or "ADV" switches, position the label so the knife will cut the label at the desired point.

Note: If you currently align the Register mark to an "indicator" on the machine, continue that procedure

Step 5.
1.   Verify the Scanner is properly aligned with the register mark.

Step 6.
1.   Jog the web forward so the scanner is in the clear area before the register mark.
The Scanner must see the register mark next before any other print.

Step 7.
Press " Set." Once the scanner sees the next register mark, the set point and active
area is established. The set point switch will now be highlighted.

Series 1000TS Set-Up

Step 8. Print Adjust
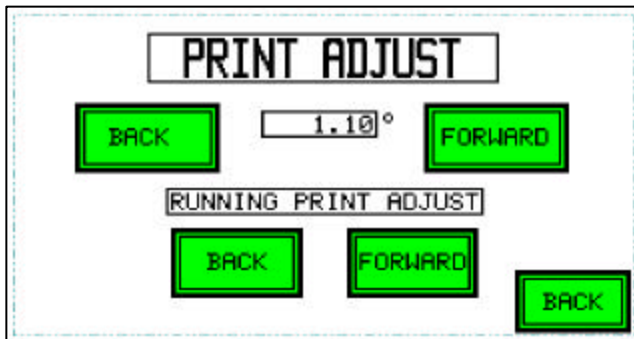
To reposition the actual cut position of the web, press "Forward or Back."

The size of the print adjustment can be changed (please reference the initial setup manual).

When pressed, the print will adjust 1.10° of your repeat length.

Production Data
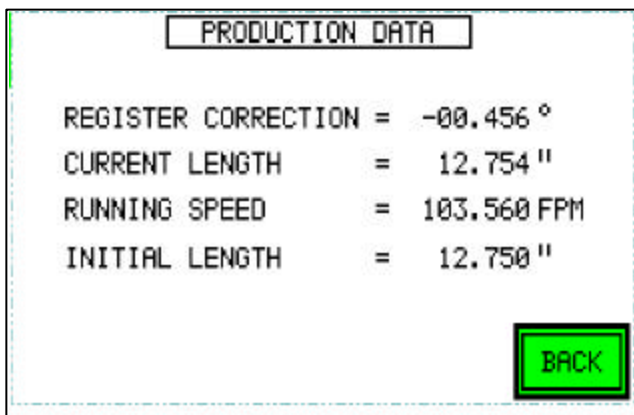
Register Correction shows the size of the correction of your repeat length measured in degrees. A negative number represents a retard correction.

Current Length shows the actual distance between register marks.

Running Speed shows machine speed in feet per minute.

Initial length is entered during set-up.

Help Screen
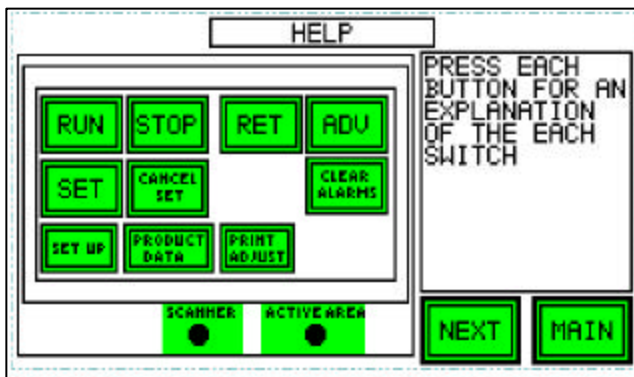
The "Help Screen" will explain the Operation of each switch.

3.3 Series 1000TS Alarm Settings

Alarm / No Register Mark
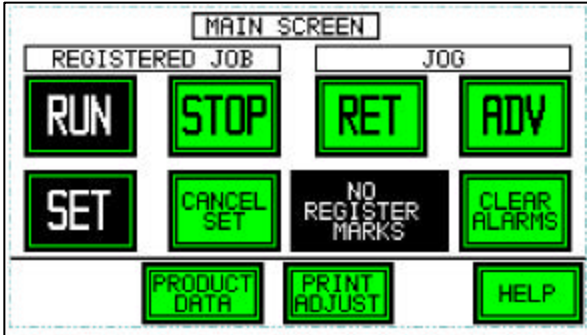
On the "Main Screen" two alarm warnings are provided.

The "No Register Mark" alarm will be activated if the scanner senses no register marks.

The "Out of Tolerance" alarm will be activated if for any reason, the Series 1000L is not able to maintain your selected tolerance
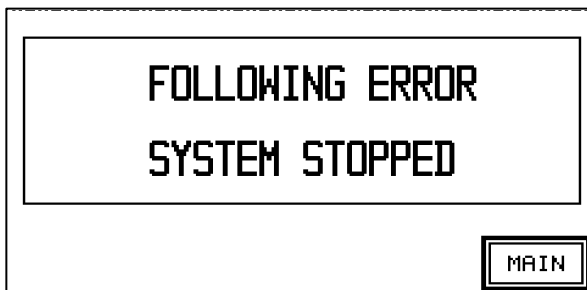
See Initial Setup for establishing your alarm settings

Alarm / Knife Disengaged
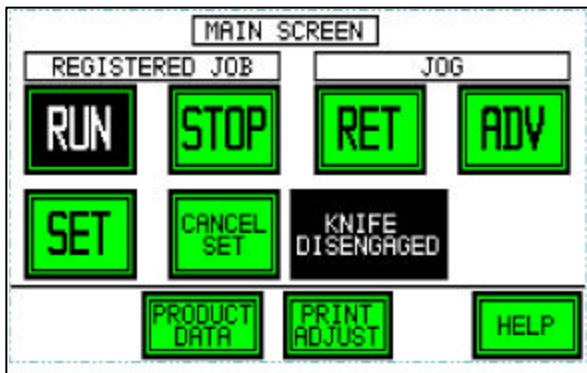
On labelers, an existing limit switch informs the EMP Servo System when the knife is disengaged. At this point the labeler is not ready to feed labels.
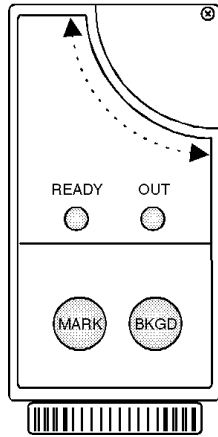
Alarm / Following Error

During machine jams, a following error may exist when the servomotor is two rotations out of position with the knife encoder. The following error will stop the Servo System.

To clear the following error, Press "Main," and restart the system.

3.4 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.

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.

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.

4. 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 Set Point Pulse.	1. Press Set Point. 2. Verify Encoder is rotating. 3. Verify encoder cable LED is flashing. 4. Perform "System Checkout" found on page 9.
SET does not highlight	System not in RUN mode.	Redo set-up procedure including Step 7.
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" found on page 9.

4.1 Diagnostic Testing Procedure

1. To access this screen
-Go to Set up Screen
- Press Hardware Checkout
- Press Download Hardware Setup

2. Scanner Test

    ✍✍ Scanner is OFF – the scanner pulse LED is OFF and the scanner is sensing the background of the printed web.

    ✍✍ Scanner is ON – the scanner pulse LED is ON and the scanner is sensing the register mark. The Scanner's OUT light will be ON.

3. Alarm Relay Test - Press the Alarm Button
    ✍✍ Alarm OFF – will display when no Alarm condition exists.
    ✍✍ Alarm On – will activate the Alarm Light / Signal wired in your machine.

4. ACTIVE AREA Test – Press ACT Area Button for testing Active Area LED
    ACT Area Off – The Front Panel Active Area LED is OFF
    ✍✍ ACT Area On – The Front Panel Active Area LED is ON

4.2 System Wiring

Connector	Cable	Color	Function	Remarks	
A-6	O/P Signal Cable-TS B-2861	Red	TX		
A-7		Brown	RX		
A-8		Orange+Green	12V		
A-9		Blue	Scanner		
A-10		White	Active Area		
A-12		Yellow	Common		
B-1	10 pin Encoder Cable B-2814	Brown	Signal A		
B-2		Orange	Signal B		
B-4		Red	+5V		
B-5		Black	Common		
B-6		Blue	Signal -A		
B-7		White	Signal -B		
B-9	Scanner Cable B-2827	Red	+12V	Brown	Cable for TLU-15 Scanner
B-10		Black	Common	Blue	
B-11		White	Output Signal	Black	
C-1	O/P Power Cable-TS B-2870	Brown	To Run		
C-7		Orange	Stop		
C-14		Red	From Run		
C-13		Blue	Frame		
C-2	Power Cable	Black	ACH		
C-3		White	ACN		
C-12		Green	Frame		
C-5	Alarm Inhibit Cable B-2852	Brown	E Stop		
C-6		Orange	E Stop		
C-8		Red	Alarm		
C-9		Yellow	Alarm		
C-10		Green	Hold		
C-11		Blue	Hold		
Power MPA-					
T	Motor Cable B-2749	Wire #3	Motor Phase T		
S		Wire #2	Motor Phase S		
R		Wire #1	Motor Phase R		
Frame		Green/Yellow	Frame		
FeedBack MPA-					
Therm 1	Resolver Cable B-2750	Black	Therm 1		
Therm 2		White	Therm 2		
Cos		Brown	Cos		
Cos Gnd		Red	Cos Gnd		
Sin		Orange	Sin		
Sin Gnd		Yellow	Sin Gnd		
Ref		Green	Ref		
Ref Gnd		Blue	Ref Gnd		
Shield		Shield	Shield		

4.3 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:

1. The touch screen upon start up will display the serial number for 5 seconds before defaulting to the main screen.

2. Inside the controller, a label with style of controller and serial number is displayed.

Recommended Spare Parts

SE 141	Power Supply
SE 143	Control Board
B2813	Encoder - 10 pin
TL U15	Scanner
B2964	Motor with Reducer

4.4 How to Contact Us for Trouble Shooting Assistance

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

The EMP web site www.empregister.com also provides trouble-shooting assistance.