Series 1000LTS Servo Registration System

(Black and White Touch Screen Labeler)

Operator Manual



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1000LTS11-00

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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. Please refer to the manual for more information.

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

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.

Description of operations - 3

Series 1000L TS Servo Manual

2.1 Accessing the Initial Set-Up Screen



2.2 Entering Initial Set-Up Data



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 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 ALARM TEST CHANGE DIRECTION 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 -

- 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 -

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.

Initial Set-Up -6

Series 1000L TS Servo Manual



ALARM SETTINGS NUMBER OF OUT OF TOLERANCE EVENTS OUT OF INCR 5 DECR 10.00 INCR DECR REGISTER AREA NUMBER OF MISSED 5 INCR DECR SCANNER MARKS ACTIVE AREA 15.00INCR. 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.

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

MAIN SCREEN					
RUN STOP					
SET UP HELP					

Step 2. Set Up Screen



SET	Label #1	10.000
SET	Label #2	9.250
SET	Label #3	8.000
SET	Label #4	7.250
SET	Label #5	6.750
SET	Label #6	5.500 " BACK

1. Press "SET-UP"

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

Press " Preset Label" – For jobs frequently run. The label selected is automatically loaded in the program . The Screen is shown in Step 3.

Press "Initial Length" - To access the "key-pad" for Labels not in the Preset feature.

Select Label length of new job.

For changing Preset Label Lengths, contact EMP

Step 3.



Step 4.



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.

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. Using the Labeler's Jog and Manual Label feed, Jog the web forward.
- 2. 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 1000L Set-Up

Step 8. Print Adjust



Production Data



Help Screen



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.

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.

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

3.3 Series 1000L Alarm Settings

Alarm / No Register Mark



Alarm / Knife Disengaged



Alarm / Following Error



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

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.

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.

Alarm Settings - 12

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	 Verify Touch Screen's Scanner Pulse LED is flashing. Verify Scanner Output LED is flashing. 		
No Active Area LED.	No Set Point Pulse.	 Press Set Point. Verify Encoder is rotating. Verify encoder cable LED is flashing. Perform "System Checkout" found on page 9. 		
SET does not highlight	System not in RUN mode.	Redo set-up procedure including Step 7.		
Knife Disengage Message while running.	The Labeler's CR-Relays controls the knife disengage circuitry of the servo unit.	Replace Relays		
Servo System walks out of register	Incorrect length entered. Encoder Failure.	 Verify correct length is being entered. Using a ruler, measure the distance between Register marks. 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

MOTOR			ENCODER	
POSITION	2 2	3	POSITION	1432
CHANGE RESET DIRECTION POSITION			CHANGE	RESET POSITION
RUN	STOP	JOG	SCANNER	R IS OFF
			HOLD SWIT	ICH IS OFF
SAVE			ALARM OFF	ACT AREA OFF

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. Hold Circuit - For Labeling Machines Only-

To test the Knife Disengage / Inhibit Relay – Stop Labeler – Hold Switch is ON

4. Alarm Relay Test - Press the Alarm Button

Alarm OFF – will display when no Alarm condition exist.
 Alarm On – will activate the Alarm Light / Signal wired in your machine.

5. ACT AREA Test – Press ACT Area Button for testing Front Panel Active Area LED

 \mathscr{A} CT Area Off – The Front Panel Active Area LED is OFF \mathscr{A} CT Area On – The Front Panel Active Area LED is ON

4.2 System Wiring

A-6 OP Signal Red TX Image: Signal A A-7 Cable-TS Orange-Green 12V Image: Signal A A-9 Blue Scanner Image: Signal A A-10 B-2861 White Active Area Image: Signal A B-1 Image: Signal A Image: Signal A Image: Signal A B-2 10 pin Encoder Red 45V Image: Signal A B-3 B-3 Base Signal A Image: Signal A B-4 Cable Blue Signal A Image: Signal A B-5 B-2814 Blue Signal A Image: Signal A B-6 B-2814 Blue Signal A Image: Signal A B-7 White Output Signal A Image: Signal A B-7 White Signal A Image: Signal A B-7 White Output Signal B Image: Signal A B-7 White Output Signal B Image: Signal A B-7 White Output Signal A Image: Signal A C1 O/P Power Motor Signal A Image: Signal A C13 B-2870 Blue Frame Image: Signal A C21 Orange Stop Image: Signal A	Connector	Cable	Color	Function	R	emarks
A-7 A-8 Cable-TSOP Signal Cable-TSBrownRXA-9 A-10B-2861Orage+Green12VA-10B-2861WhiteActive AreaA-12WhiteActive AreaA-12YellowCommonB-1B-2861YellowCommonB-210 pin Encoder CableOrageSignal AB-3CableRed+5VB-4CableRed+5VB-5BlackCommonSignal -AB-6B-2814BlueSignal -BB-7WhiteSignal -BB-6B-2817BlackCommonBlueB-7WhiteSignal -BTLm-15B-7Scanner CableBlackCommonBlueB-10B-2WhiteOutput SignalBlackB-11B-2870BlueFrom RunC-14OP PowerBrownTO RunC-13B-2870BlueFrameC-14B-2870BlueFrameC-13B-2870BlueFrameC-14Cable TSGreenFrameC-15Alarm InhibitGreenFrameC-2BrownE StopC-16Alarm InhibitGreenHoldC-17Motor CableRedAlarmC-10B-2852Green	A-6		Red	TX		
A-8 A-9 A-10Cable-TS BlueOrange+Green12VImage of the second of t	A-7	O/P Signal	Brown	RX		
A-9 A-10B-2861BileScannerA-12WhiteActive AreaM-12WhiteActive AreaB-1 B-210 pin Encoder CableOrangeSignal BB-3CableRed $+5V$ B-5B-5BlackCommonB-6B-2814BlaeSignal -AB-7WhiteSignal -AImage CommonB-80Scanner Cable B-20Red $+12V$ Brown BlackCable for Tim-15B-10Scanner Cable B-20BlackCommonBlaeScannerB-10Scanner Cable B-20Red $-12V$ Brown Stanal -BCable for Tim-15B-11O/P Power Cable-TSBlackCommonBlaeScannerC-1O/P Power Cable-TSBrownTo RunScannerC-14B-2870BlueFrameScannerC-13B-2870BlueFrameScannerC-2BlackACHScannerC-3Power CableWhiteACHC-3Power CableBrownE StopC-5Alarm InhibitOrangeE StopC-10B-2852GreenHoldC-10B-2852GreenHoldC-10B-2749Wire #3Motor Phase RFrameB-2749Wire #3Motor Phase RFrameB-2749BrownCosFrameB-2749BrownCosFrameB-2749BrownCos	A-8	Cable-TS	Orange+Green	12V		
A-10B-2861WhiteActive AreaA-12YellowCommonB-1YellowCommonB-110 pin EncoderOrangeSignal AB-210 pin EncoderOrangeSignal AB-4CableRed $+5V$ B-5B-2814BlackCommonB-6B-2814BlackCommonB-7WhiteSignal -BB-8B-2814BlackCommonB-9Scanner CableBlackCommonB-10B-2827Red $+12V$ BrownB-11O/P PowerBlackCommonBlueC-1O/P PowerOrangeStopC-1O/P PowerBrownTo RunC-13B-2870BlueFrameC-2Power CableGreenFrameC-2BrownE StopC-14GreenFrameC-2BrownE StopC-3Power CableGreenC-4RedAlarmC-5Alarm InhibitOrangeC-6Alarm InhibitOrangeC-10B-2852GreenRB-2749Wire #3Motor CableGreen/YellowRB-2749FrameCos GndSin GndSieldSieldGreenSieldGreenRef GndSieldSieldSield	A-9		Blue	Scanner		
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	C-12		Green	Frame		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	C-5		Brown	E Stop		
C.8CableRedAlarmC.9 $B-2852$ Fed $Alarm$ C.10 $B-2852$ $Green$ $Hold$ C.11 $Blue$ $Hold$ Power MPA-06 $Hold$ T $Motor Cable$ $Wire #3$ S $Motor Phase T$ R $B-2749$ $Wire #1$ Frame $Green/Yellow$ $Frame$ FeedBack MPA-06 $Green/Yellow$ $Frame$ FeedBack MPA-06 $Motor Phase R$ Ref $B-2749$ $Wire #1$ Motor Phase R $Green/Yellow$ $Green/Yellow$ $Frame$ $FeedBack MPA-06$ $Motor Phase R$ $FeedBack MPA-06$ $Motor Phase R$ $B-2749$ $Black$ $Mire #1$ $Motor Phase R$ $Green/Yellow$ $Frame$ $FeedBack MPA-06$ $Green$ Ref $Green$ Ref $Green$ Ref $Blue$ $Ref Gnd$ $Shield$	C-6	Alarm Inhibit	Orange	E Stop		
$ \begin{array}{c c c c c c } \hline C-9 \\ \hline C-10 \\ \hline C-11 \\ \hline B-2852 \end{array} \begin{array}{c c c c c } \hline Yellow & Alarm \\ \hline Green & Hold \\ \hline Blue & Ref \\ \hline Blue & Ref Gnd \\ \hline Blue & Ref Gnd \\ \hline Blue & Ref Gnd \\ \hline \end{array} $	C-8	Cable	Red	Alarm		
$ \begin{array}{c c c c c c c } \hline C-10 & B-2852 & Green & Hold \\ \hline C-11 & Blue & Hold \\ \hline Power MPA-06 & & & & \\ \hline T & Motor Cable & Wire #3 & Motor Phase T \\ \hline S & Motor Cable & Wire #2 & Motor Phase S \\ \hline R & B-2749 & Wire #1 & Motor Phase R \\ \hline Frame & Green/Yellow & Frame \\ \hline FeedBack MPA-06 & & & & \\ \hline Therm 1 & & & \\ \hline Therm 1 & & & \\ \hline Therm 2 & & & \\ \hline Cos & & & & \\ \hline Cos Gnd & Resolver Cable & Red & Cos Gnd \\ \hline Sin & & & \\ \hline Sin & & & \\ \hline Sin Gnd & B-2750 & Yellow & Sin Gnd \\ \hline Ref & & & \\ \hline Ref Gnd & & & \\ \hline Shield & & & \\ \hline \end{array} $	C-9		Yellow	Alarm		
$ \begin{array}{c c c c c c c } \hline C-11 & Blue & Hold & \\ \hline Blue & Hold & \\ \hline Power MPA-06 & & \\ \hline T & Motor Cable & Wire #3 & Motor Phase T & \\ \hline Wire #2 & Motor Phase S & \\ \hline R & B-2749 & Wire #1 & Motor Phase R & \\ \hline Frame & Green/Yellow & Frame & \\ \hline FeedBack MPA-06 & & & \\ \hline Therm 1 & & & \\ \hline Therm 2 & & & \\ \hline Cos & & & \\ \hline Sin & & & \\ \hline Sin & & \\ \hline Ref & & \\ \hline Blue & Ref Gnd & \\ \hline Shield & & \\ \hline Shield & & \\ \hline \end{array} $	C-10	B-2852	Green	Hold		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	C-11		Blue	Hold		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Power MPA-06					
SMotor CableWire #2Motor Phase SRB-2749Wire #1Motor Phase RFrameGreen/YellowFrameFeedBack MPA-06Green/YellowFrameTherm 1Motor Phase RMotor Phase RTherm 1Motor Phase RGreen/YellowTherm 2BlackTherm 1CosBrownCosCos GndResolver CableRedSin GndB-2750YellowSin GndB-2750YellowRefGreenRefRef GndShieldShield	Т		Wire #3	Motor Phase T		
R FrameB-2749Wire #1Motor Phase RFrameGreen/YellowFrameFeedBack MPA-06FrameTherm 1Part of the second	S	Motor Cable	Wire #2	Motor Phase S		
FrameB-2/49Green/YellowFrameFeedBack MPA-06 </td <td>R</td> <td>P 2740</td> <td>Wire #1</td> <td>Motor Phase R</td> <td></td> <td></td>	R	P 2740	Wire #1	Motor Phase R		
FeedBack MPA-06Image: Constraint of the state	Frame	D-2/49	Green/Yellow	Frame		
Therm 1BlackTherm 1Therm 2WhiteTherm 2CosBrownCosCos GndResolver CableRedSinOrangeSinSin GndB-2750YellowRefGreenRefRef GndBlueRef GndShieldShieldShield	FeedBack MPA-06					
Therm 2WhiteTherm 2CosBrownCosCos GndResolver CableRedCos GndSinB-2750YellowSin GndRefGreenRefRef GndBlueRef GndShieldShieldShield	Therm 1		Black	Therm 1		
CosBrownCosCos GndResolver CableRedCos GndSinB-2750OrangeSinRefB-2750YellowSin GndRef GndBlueRef GndShieldShieldShield	Therm 2		White	Therm 2		
Cos GndResolver CableRedCos GndSinOrangeSinSin GndB-2750YellowRefGreenRefRef GndBlueRef GndShieldShieldShield	Cos		Brown	Cos		
SinOrangeSinSin GndB-2750YellowSin GndRefGreenRefRef GndBlueRef GndShieldShieldShield	Cos Gnd	Resolver Cable	Red	Cos Gnd		
Sin GndB-2750YellowSin GndRefGreenRefRef GndBlueRef GndShieldShieldShield	Sin		Orange	Sin		
RefGreenRefRef GndBlueRef GndShieldShieldShield	Sin Gnd	B-2750	Yellow	Sin Gnd		
Ref Gnd Blue Ref Gnd Shield Shield Shield	Ref		Green	Ref		
Shield Shield	Ref Gnd		Blue	Ref Gnd		
	Shield		Shield	Shield		

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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.

SE 141	Power Supply		
SE 143	Control Board		
B2813	Encoder - 10 pin		
TL - U	Scanner		
B2799	Motor with 5:1 Reducer		

Recommended Spare Parts

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.