

BESSER

LSC-40C **TRANSFER CAR SYSTEM**



INSTALLATION MANUAL
466367F9901

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BESSER

COMPANY NAME:

SERIAL NUMBER:

ASSEMBLY NUMBER:

WIRING DIAGRAM NUMBER:

INSTALLATION DRAWING NUMBER:

LSC-40C

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LSC-40C SPECIFICATIONS

TOTAL WEIGHT:

CAR: 3,700 pounds [1,682 kg]

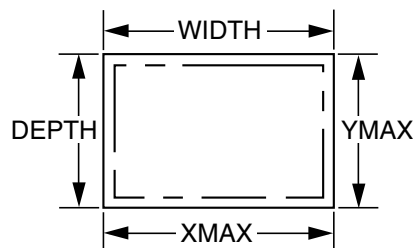
CRAWLER: 4,250 pounds [1,932 kg]

MINIMUM HYDRAULIC PRESSURE: 850 psi [59 bar]

MACHINE SPEED: Up to 10 cycles per minute

PRODUCTION CAPACITY: Up to 3 bay x 9 high x 6 deep

PALLET REQUIREMENTS:



WIDTH & DEPTH = Actual size of steel pallet.

XMAX & YMAX = Maximum production area of steel pallet.

WIDTH	DEPTH	THICK	X	Y	PALLET #
26.000 (660)	18.500 (470)	.313 (8)	25.000 (635)	17.500 (445)	470750F0001
26.000 (660)	20.500 (521)	.313 (8)	25.000 (635)	19.500 (495)	470750F0002
26.000 (660)	26.000 (660)	.313 (8)	25.000 (635)	25.000 (635)	470750F0003
29.000 (737)	18.500 (470)	.313 (8)	28.000 (635)	17.500 (445)	470750F0004
29.000 (737)	20.500 (470)	.313 (8)	28.000 (635)	19.500 (495)	470750F0005
35.433 (900)	21.654 (550)	.315 (8)	34.433 (875)	20.654 (525)	470750F0006
37.000 (940)	21.654 (550)	.375 (10)	36.000 (914)	20.654 (525)	470750F0007
37.000 (940)	18.500 (470)	.375 (10)	36.000 (914)	17.500 (445)	470750F0008
37.000 (940)	20.500 (521)	.375 (10)	36.000 (914)	19.500 (495)	470750F0009
37.000 (940)	26.000 (660)	.375 (10)	36.000 (914)	25.000 (635)	470750F0010
37.750 (940)	18.500 (470)	.375 (10)	36.750 (934)	17.500 (445)	470750F0011
38.500 (978)	18.500 (470)	.375 (10)	37.500 (953)	17.500 (445)	470750F0012
38.500 (978)	20.500 (521)	.375 (10)	37.500 (953)	19.500 (495)	470750F0013
38.500 (978)	26.000 (660)	.375 (10)	37.500 (953)	25.000 (635)	470750F0014
39.375 (1000)	18.500 (470)	.375 (10)	38.375 (975)	17.500 (445)	470750F0015
39.375 (1000)	20.500 (521)	.375 (10)	38.375 (975)	19.500 (495)	470750F0016

Table A Steel Pallet Specifications

OPERATING CONDITIONS:

Besser machinery and equipment is designed to comply with the essential health and safety regulations (EHSR) that apply to directives which are applicable to an industrial environment.

Buyer shall utilize this equipment in a manner consistent with its design and only in an industrial environment.

OPERATING RANGES:

Here are the normal operating ranges for machine sensors (limit, proximity) and control devices contained within the control panels.

Ambient operating temperature range:

32° to 122°F [0° to 50°C]

Humidity range:

10 to 95% (non-condensing)

Line voltage:

90 to 132 volts – AC 50/60 Hz

LSC-40C ELECTRICAL DATA

PLANT POWER SUPPLY (VOLTS)	TOTAL HORSEPOWER	TOTAL KILOWATTS (KW)	CONTROL PANEL TRANSFORMER (VOLT-AMPS)	BRANCH CIRCUIT DISTRIBUTION SEARCH (AMPS)	BRANCH CIRCUIT FUSE PRS-R (AMPTS)	BRANCH CIRCUIT FEEDER THHN	BRANCH CIRCUIT FEEDER CONDUIT	SHORT CIRCUIT INTERRUPTING CAPACITY (AIC)
380V 50 HZ	10	7.5	1250	60	35	10 AWG 5.3 MM ²	.5 IN 15 MM	200,000
415V 50 HZ	10	7.5	1250	30	30	10 AWG 5.3 MM ²	.5 IN 15 MM	200,000
440V-480V 50HZ	10	7.5	1250	30	30	10 AWG 5.3 MM ²	.5 IN 15 MM	200,000
440V-480V 60 HZ	10	7.5	1250	30	30	10 AWG 5.3 MM ²	.5 IN 15 MM	200,000
575V 60 HZ	10	7.5	1250	30	20	10 AWG 5.3 MM ²	.5 IN 15 MM	200,000

Table B Electrical Data

Please consult the table above to find the appropriate electrical data for your LSC-40C. First, find your corresponding plant power supply in the left column. Then find the corresponding electrical data on the same row as your power plant supply.

Ex: Your power plant supply is 460V at 60 Hz. According to the table, you will then get these values:

















- PLANT POWER SUPPLY:** 460 volt – 60 hertz
- TOTAL HORSEPOWER:** 10
- TOTAL KILOWATTS:** 7.5
- TOTAL ELECTRICAL CAPACITY:** 10.0 Hp [7.46 Kw]
- CAR PANEL CONTROL TRANSFORMER:** 750 volt-amps
- CRAWLER PANEL CONTROL TRANSFORMER:** 500 volt-amps
- BRANCH CIRCUIT**
 - Distribution Switch Recommended: 30 amp
 - Fuse Recommended [FRS–R]: 30 amp
 - Feeder Recommended [THHN]: No. 10 AWG – [5.3 sq. mm]
 - Feeder Conduit Recommended: 0.5 in. – [15 mm]
 - Short Circuit Interrupting Capacity: 200,000 AIC

SAFETY BULLETIN

This notice is issued to advise you that some previously accepted shop practices may not be keeping up with changing Federal and State Safety and Health Standards. Your current shop practices may not emphasize the need for proper precautions to insure safe operation and use of machines, tools, automatic loaders and allied equipment and/or warn against the use of certain solvents or other cleaning substances that are now considered unsafe or prohibited by law. Since many of your shop practices may not reflect current safety practices and procedures, particularly with regard to the safe operation of equipment, it is important that you review your practices to ensure compliance with Federal and State Safety and Health Standards.

IMPORTANT

The operation of any machine or power-operated device can be extremely hazardous unless proper safety precautions are strictly observed. Observe the following safety precautions:

-  Always be sure proper guarding is in place for all pinch, catch, shear, crush and nip points.
-  Always make sure that all personnel are clear of the equipment before starting it.
-  Always be sure the equipment is properly grounded.
-  Always turn the main electrical panel off and lock it out in accordance with published lockout/tag-out procedures prior to making adjustments, repairs, and maintenance.
-  Always wear appropriate protective equipment like safety glasses, safety shoes, hearing protection and hard hats.
-  Always keep chemical and flammable material away from electrical or operating equipment.
-  Always maintain a safe work area that is free from slipping and tripping hazards.
-  Always be sure appropriate safety devices are used when providing maintenance and repairs to all equipment.
-  Never exceed the rated capacity of a machine or tool.
-  Never modify machinery in any way without prior written approval of the Besser Engineering Department.
-  Never operate equipment unless proper maintenance has been regularly performed.
-  Never operate any equipment if unusual or excessive noise or vibration occurs.
-  Never operate any equipment while any part of the body is in the proximity of potentially hazardous areas.
-  Never use any toxic flammable substance as a solvent cleaner.
-  Never allow the operation or repair of equipment by untrained personnel.
-  Never climb or stand on equipment when it is operational.

It is important that you review Federal and State Safety and Health Standards on a continual basis. All shop supervisors, maintenance personnel, machine operators, tool operators, and any other person involved in the setup, operation, maintenance, repair or adjustment of Besser-built equipment should read and understand this bulletin and Federal and State Safety and Health Standards on which this bulletin is based.

SAFETY SIGNS

Sign	Description	Required
1	All Panels	1
2	Mixer	4
3	Concrete Products Machine.....	1
	Depalleter.....	2
4	Mixer	2
5	Skiploader	4
6	Skiploader/Mixer Platforms	8
7	Skiploader/Mixer Platforms	8
8	Vertical: Pallet Transport System	2
	Horizontal: LSC-40/LSC-100.....	6
	Pallet Transport System	4
9	Besser-Matic	4
10	Besser-Matic	4
11	Skiploader	4
12	All Panels	1
13	Overhead Block Transfer	4
14	Concrete Products Machine.....	1
15	Concrete Products Machine.....	2
16	Conveyors	12
17	Cuber	8
18	Cuber	3
	Block Turnovers.....	2
	Slat Conveyors	2

**To order safety decals, contact your local Besser representative
or the Besser Central Order Department.**

Thank you!



1
Large 113236F0409
High Voltage
Width 4 1/2 inch
Height 9 5/8 inch
Small 113236F0204
High Voltage
Width 2 inch
Height 4 1/8 inch



2
113237F0410
Mixer Blade Hazard
Width 4 1/2 inch
Height 10 1/4 inch



3
113240F0307
Crush Hazard
Width 3 1/2 inch
Height 7 1/2 inch



4
114692F1006
Nip Points
Width 5 3/4 inch
Height 9 1/2 inch



5
114688F0906
Crush Hazard
Width 6 1/4 inch
Height 9 1/2 inch



6
114689F0804
Fall Hazard
Width 4 1/2 inch
Height 7 3/4 inch



7

114690F0805
Falling Objects
Width 4 3/4 inch
Height 8 inch



8

Vertical: 113245F0704
Crush Hazard
Width 4 1/8 inch
Height 7 inch
Horizontal: 113245F1005
Crush Hazard
Width 10 inch
Height 5 3/4 inch



9

113242F0409
Crush Hazard
Width 4 1/2 inch
Height 9 5/8 inch



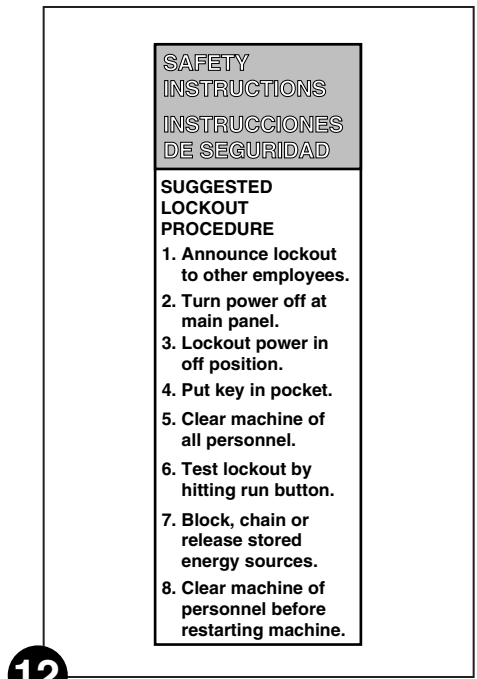
10

113243F0410
Falling Objects
Width 4 1/2 inch
Height 10 inch



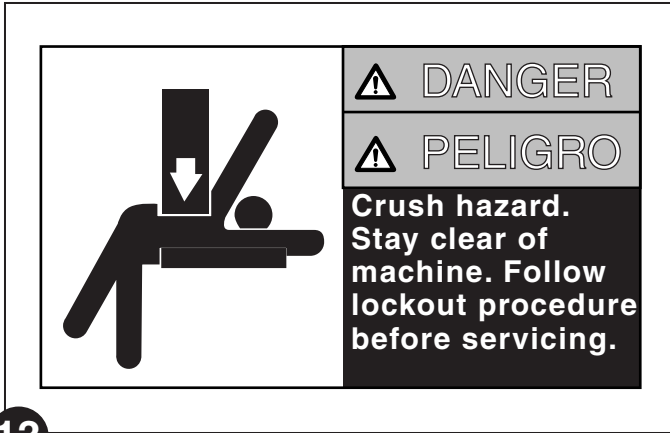
11

114691F1006
Shear and Fall Hazards
Width 5 3/4 inch
Height 9 3/4 inch



12

113249F0410
Safety Instructions Decal –
Suggested Lock-out Procedure
Width 4 inch
Height 10 inch



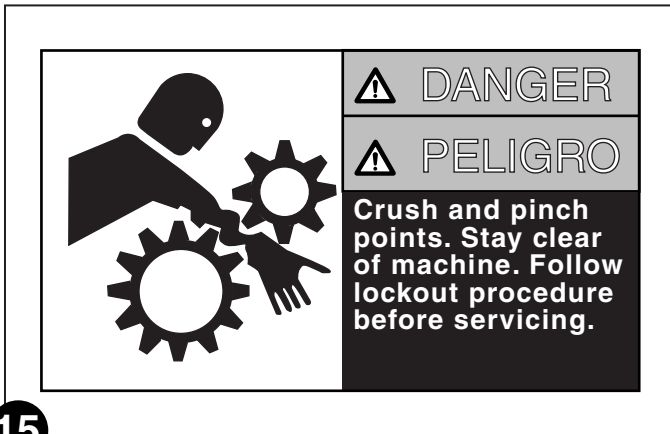
13

113238F1005
Crush Hazard
Width 10 inch
Height 5 3/4 inch



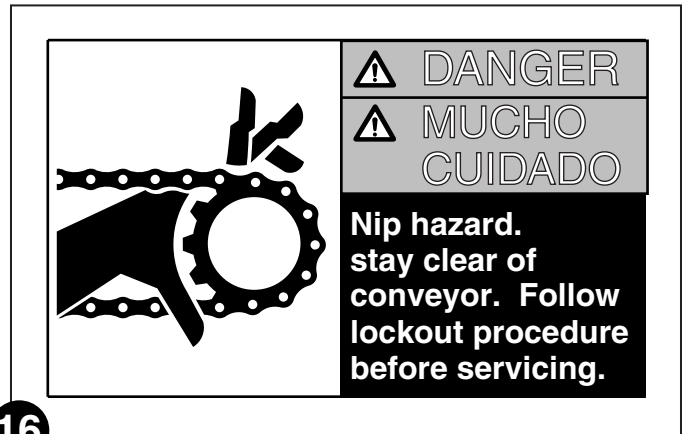
14

113239F0604
Crush Hazard
Width 6 5/8 inch
Height 4 inch



15

113241F0605
Crush and Pinch Points
Width 6 5/8 inch
Height 4 inch



16

113246F0704
Nip Hazard
Width 7 inch
Height 4 1/2 inch



17

113427F1006
Crush Hazard
Width 10 inch
Height 6 inch



18

113250F1006
Crush and Pinch Hazard
Width 10 inch
Height 6 inch

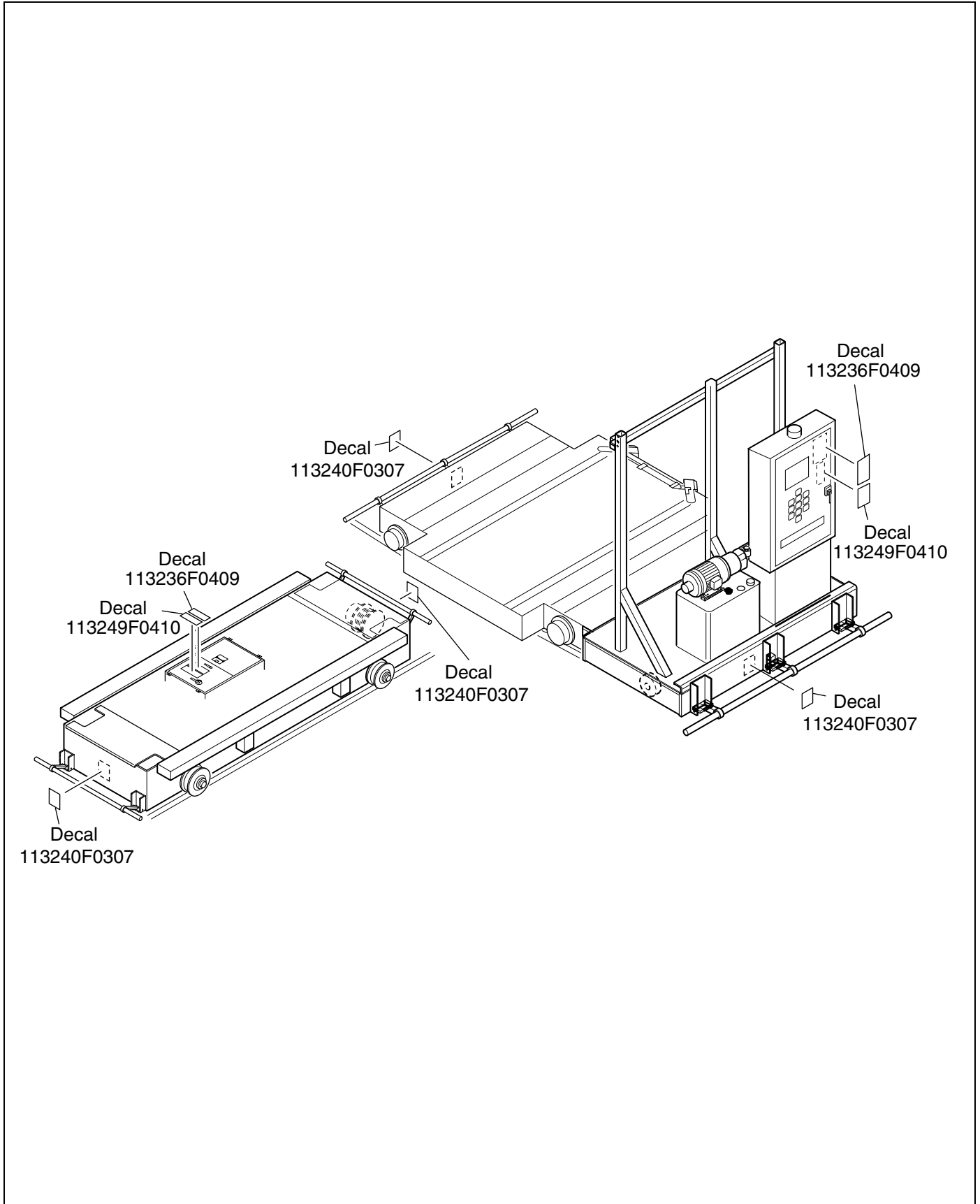


Figure A Decals

SECTION 1

INTRODUCTION

1.1 INSTALLATION OVERVIEW

This section is a simplified overview of the LSC-40C system installation. Since the purpose of this overview is to explain the general flow of installation stages, detailed steps and procedures are not covered in this section. Refer to other sections for detailed procedures and information.

Figures 1.1 through 1.6 show the main stages of a typical LSC-40C installation.

1.1.1 Prepare Concrete Foundation

Figure 1.1 shows the concrete foundation levels prior to installation of the rail system.

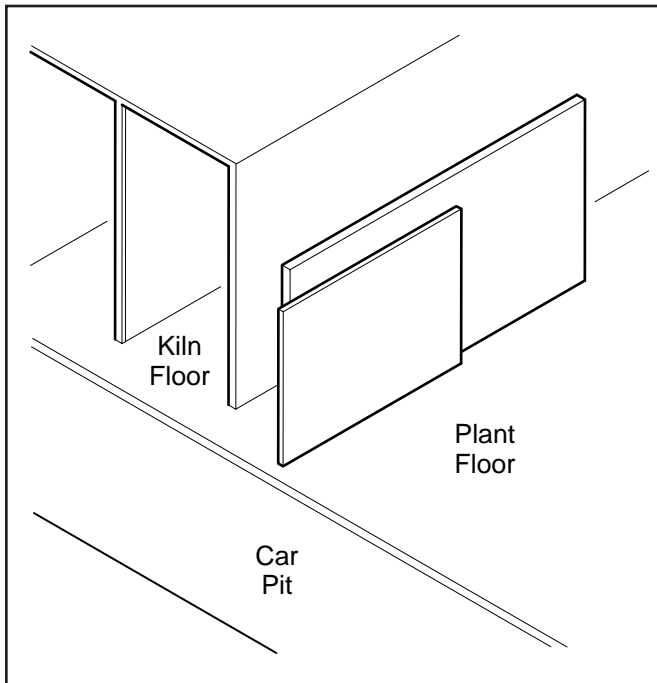


Figure 1.1 Concrete Foundation

1.1.2 Install Rail Supports

Figure 1.2 shows rail anchors and spacer shims installed along all rail paths. This stage also includes installation of the end-of-rail safety stops at the terminations of all rails.

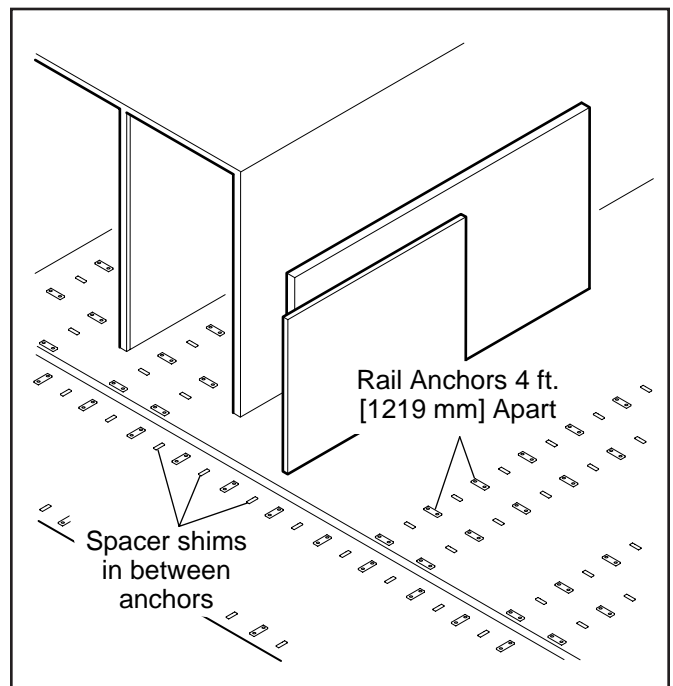


Figure 1.2 Rail Supports

1.1.3 Install Rails

Figure 1.3 shows the car, crawler and kiln rails in position.

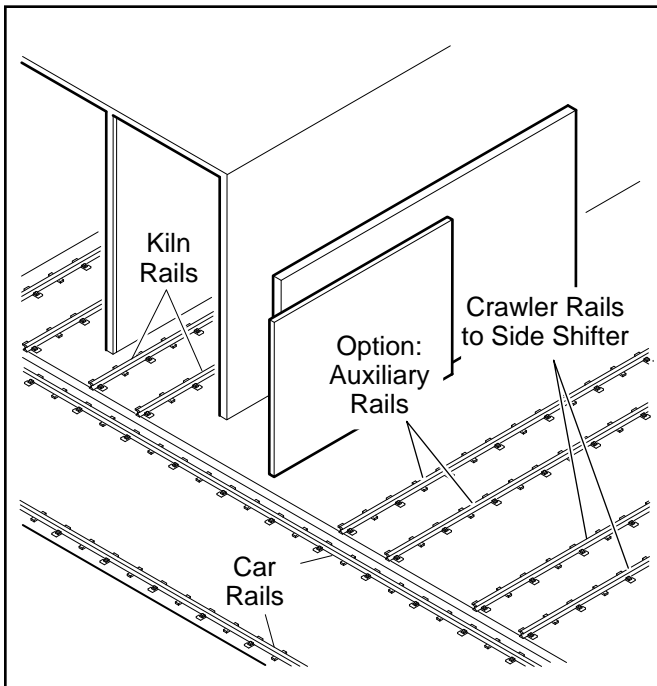


Figure 1.3 Rails

1.1.4 Install Curbs

Figure 1.4 shows elevated curbs along the kiln and crawler rails. Elevated curbs allow for the placement of racks and provide space for the crawler to move underneath the racks to deposit and retrieve racks inside the kilns. Elevated curbs on crawler rails provide space for the crawler to:

- Enter the side shifter
- Option: Place racks in the auxiliary rail area

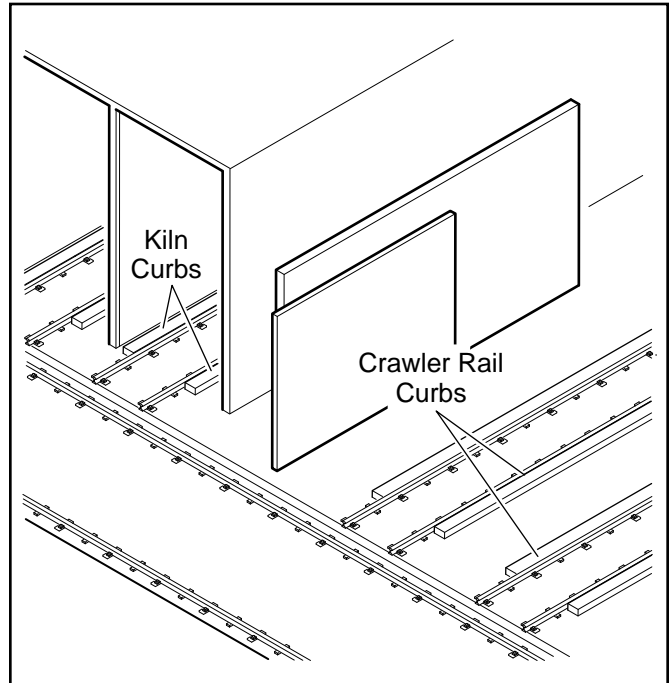


Figure 1.4 Curbs

1.1.5 Install Actuators and Stabilizers

Figure 1.5 shows the actuators and stabilizers. The actuators are installed at the centerline of each set of kiln and crawler rails. Proximity sensors on the car use these actuators to guide car movements.

The stabilizers are installed in front of each kiln and crawler rail. The stabilizers prevent the car from tilting as the loaded crawler moves on and off the car.

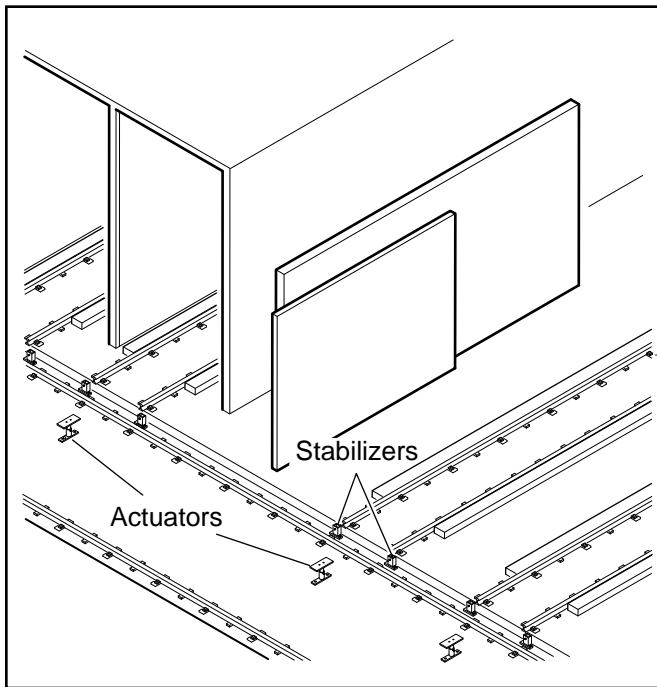


Figure 1.5 Actuators and Stabilizers

1.1.6 Install Car and Crawler

At this stage, the car and crawler are prepared and checked out for proper operation. A fully loaded trial run verifies the function of all automatic controls.

1.1.7 Place Final Concrete Layer

Figure 1.6 shows the final concrete layer along the car rails. The final concrete layer brings the car path up to the plant floor grade. The tops of the actuators and car rails extend 1/4 inch [6 mm] above the final concrete layer. The tops of the stabilizers extend 1/2 inch [13 mm] above the final concrete layer.

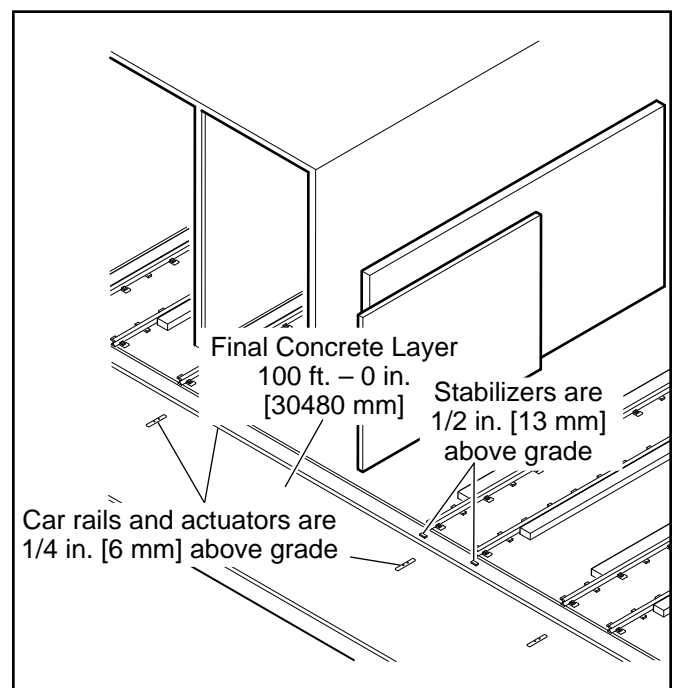


Figure 1.6 Final Concrete Layer

1.2 INSTALLATION DRAWINGS

This manual provides guidelines and procedures for installing typical LSC-40C systems. Because individual plants and applications will vary, Besser provides detailed Installation Drawings to support every installation. For best results in preparing and completing an LSC-40C installation, Besser suggests that both this manual and the Installation Drawings be used together. The Installation Drawings will provide all required dimensions and will also identify any unique requirements of a particular site. This manual provides overviews, check-out procedures and instructions for preparing the site and equipment.

1.3 ACCURACY REQUIRED

LSC-40C installations require a high level of accuracy for finishing the concrete and installing the rail system. The required dimensions must be maintained for the LSC-40C to work as designed. At every stage, invest the necessary time and care to ensure that the installation is meeting the standards specified in the Installation Drawings.

Accurate procedures are especially important during the initial stages such as placing the foundation concrete layers and installing the rail supports. Any errors made in early stages will be very difficult to correct during the later stages.

Section 1.4 explains important dimensions and tolerances.

1.4 DIMENSIONS

Because LSC-40C systems are installed on different rail styles, the installation instructions in this manual do not include specific rail dimensions. The Installation Drawings that Besser provides are specific for each application and contain all required measurements and dimensions.

The instructions in this manual cover the use of any Besser-approved rail. Since rail height can vary, this manual does not provide dimensions that involve rail height. The following dimensions and elevations apply to all LSC-40C installations regardless of the type of rail used.

Plant floor elevation	100 ft. – 0 in.	[30480 mm]
Car rail path after second concrete layer	100 ft. – 0 in.	[30480 mm]
Tops of car rails	100 ft. – 1/4 in.	[30486 mm]
Tops of stabilizers	100 ft. – 1/2 in.	[30493 mm]
Tops of actuators	100 ft. – 1/4 in.	[30486 mm]
Tops of crawler rails	100 ft. – 6 3/4 in.	[30651 mm]
Tops of curbs	100 ft. – 6 3/4 in.	[30651 mm]
Car rail gauge	6 ft. – 7 7/8 in.	[2029 mm]
Crawler rail gauge	3 ft. – 10 in.	[1168 mm]

Table 1.1 Critical Dimensions and Elevations

Figures 1.7 and 1.8 show the relationship of these critical dimensions. Refer to Besser

Installation Drawings for detailed information on all required dimensions and placements.

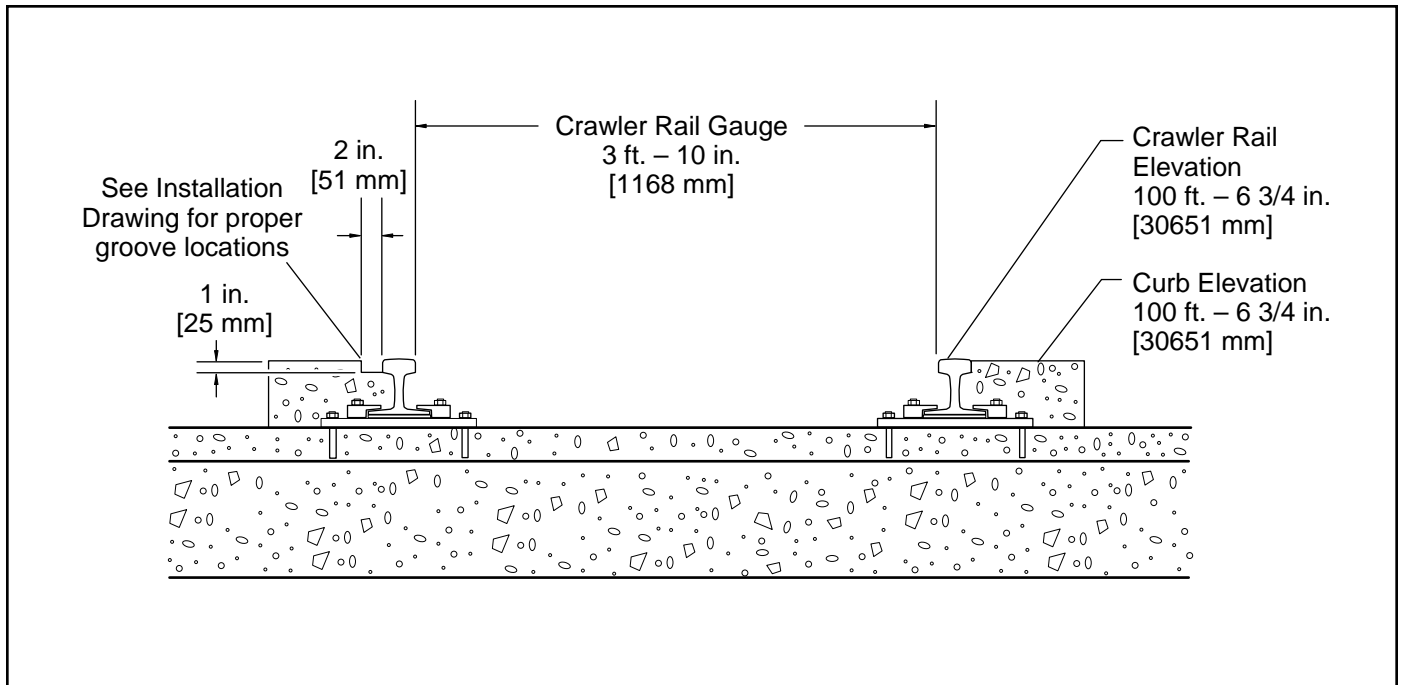


Figure 1.7 Critical Dimensions and Elevations

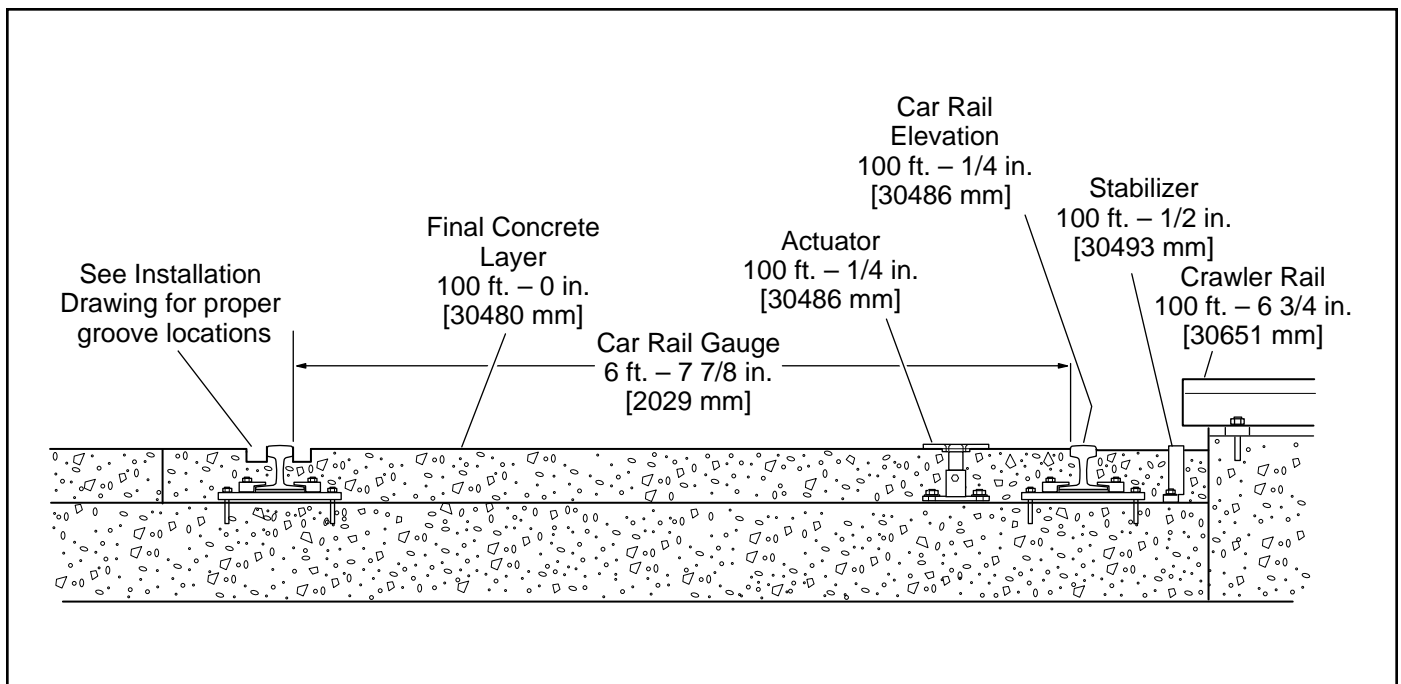


Figure 1.8 Critical Dimensions and Elevations

1.4.1 Tolerances

The Besser Installation Drawings specify dimension tolerances for all installation stages. General dimension tolerances are:

- Concrete levels: +0 -1/4 inch [6 mm]
- Rail gauges (single flange): + 1/8 inch [3 mm] -0
- Rail gauges (double flange): \pm 1/8 inch [3 mm]
- Other hardware: \pm 1/16 inch [2 mm]

1.5 REQUIRED PARTS AND EQUIPMENT

The LSC-40C system includes the transfer car, crawler and the electrical connections between the plant and the LSC-40C. Besser does not provide the tools or supply items needed to prepare the site and install the equipment.

Examples of items and utilities not supplied by Besser that must be provided by the customer:

- Anchor studs
- Shims
- Stop blocks
- Electrical conduit
- Power to electric panels, including fuse box, circuit breakers and disconnect panel
- Support for box track for festoon cable system
- Hydraulic tubing

1.6 RAIL PACKAGE

The rail package of the LSC-40C may be either supplied by Besser or provided by the customer. If not supplied by Besser, the customer must obtain the components listed below. Refer to the Installation Drawings for actual Besser part numbers.

- Rail lengths
- Anchor plates
- Rail splice bars with track bolts
- Rail clips

SECTION 2

PREPARE SITE

The LSC-40C system must be installed on a concrete foundation with a 16,000 pound [7,273 Kg] load support rating. Required thickness of the base concrete and other specifications for the foundation layer depend on soil conditions and other factors that are unique to the plant site.

Installation occurs in these steps:

- 2.1 Prepare Concrete Base Layers
- 2.2 Install Rail Anchors
- 2.3 Prepare Rails
- 2.4 Install Rails
- 2.5 Install Actuators
- 2.6 Install Stabilizers
- 2.7 Install Curbs
- 2.8 Install Festoon Power System

2.1 PREPARE CONCRETE BASE LAYERS

Figure 2.1 shows the three concrete layers for the base of the LSC-40C.

- The main plant floor is at an elevation of 100 feet -0 inches [30480 mm]. This elevation is the base for the Loader, Unloader, side shifter and other associated equipment.
- The car pit is the installation area for the car rails. The exact elevation depends on the rail height. Following installation of car rails and actuators, the car pit will be filled in with a second layer of concrete to bring the elevation up to 100 feet - 0 inches [30480 mm]. See the Installation Drawings for required elevation of car pit.
- The kiln floor supports all crawler rails inside the kilns. See the Installation Drawings for required elevation of the kiln floor.

All concrete base layers must be installed to a tolerance level of +0 -1/4 inch [6 mm]. For proper LSC-40C operation, it is essential to maintain this tolerance for the concrete top surfaces.

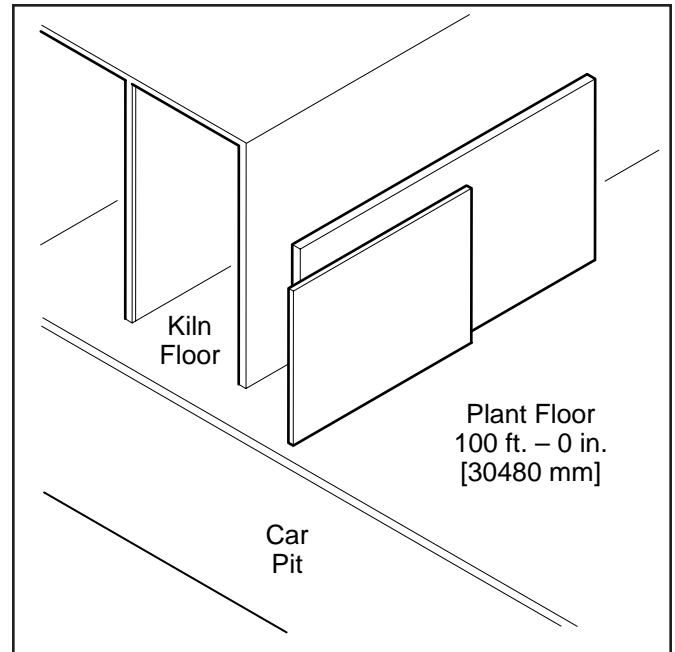


Figure 2.1 Concrete Base Layers

2.2 INSTALL RAIL ANCHORS

Car and crawler rails will be placed on two types of supports:

- 2.2.1 Rail Anchors and Safety Stops
- 2.2.2 Shims

2.2.1 Install Rail Anchors and Safety Stops

Figure 2.2 shows the rail anchor assembly that is installed at four foot [1219 mm] intervals along all rail paths. Figure 2.3 shows the depth and placement using the anchor plate as a template for drilling anchor stud holes. Mark and drill anchor stud holes with care and precision. In order for rail gauge to be accurate, the holes for rail anchors must be within a tolerance of $\pm 1/16$ inch [2 mm].

Figure 2.4 shows the safety stop that is installed at:

- The end of one rail at the back of each kiln
- The end of one rail at the back of the auxiliary rails
- The end of one rail at both ends of the car path

Rails may be bolted or notched and welded to the stops. See the Installation Drawings for the proper assembly.

2.2.2 Shims

Shims are used in two ways during rail installation:

- Spacer shims are required for proper support. Position spacer shims every four feet [1219 mm] between each rail anchor. Weld spacer shims to rail.
- Optional shims may be used to obtain the correct elevation of the rails but are not required for correct support.

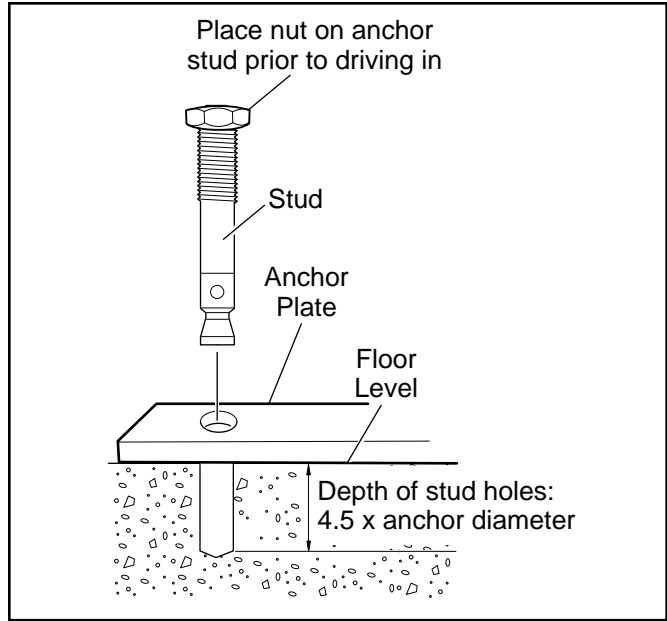


Figure 2.3 Anchor Stud

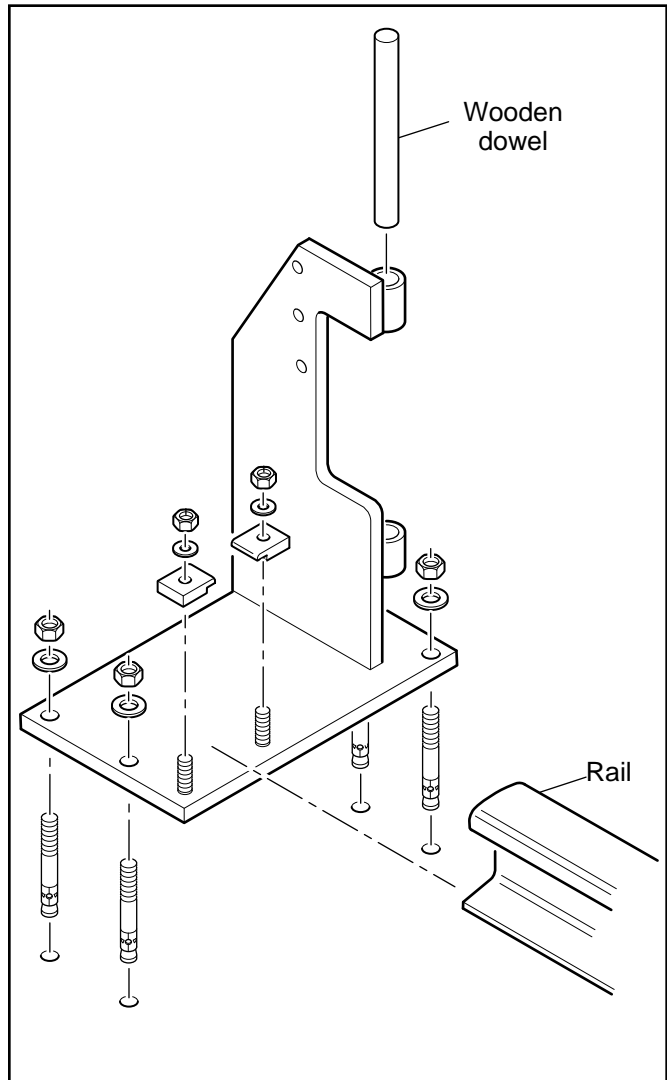


Figure 2.4 Safety Stop

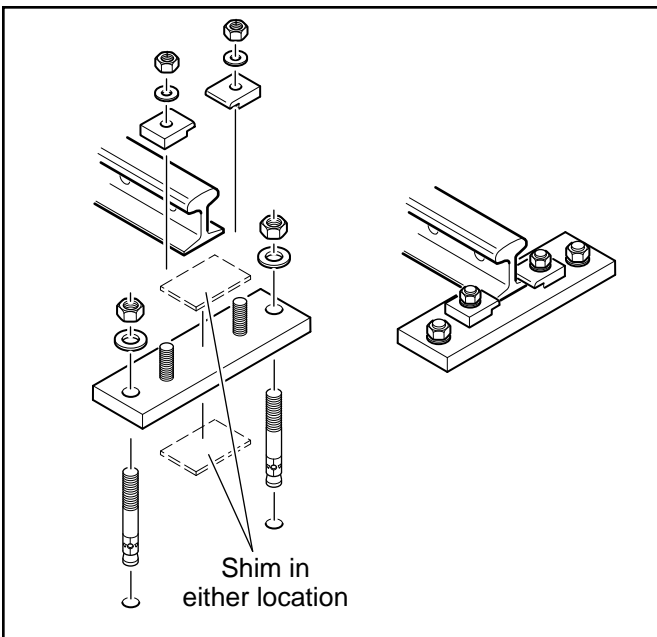


Figure 2.2 Rail Anchor

2.3 PREPARE RAILS

2.3.1 Notch Rail Ends

The crawler rail ends must have an inset notch to allow operation of the car raillocks at all locations where:

- Car and crawler rails intersect
- Crawler and side shifter rails intersect

Figure 2.5 shows the form and dimensions of the notch.

2.3.2 Plan Splices

See Installation Drawings for required lengths of rails. Plan and prepare rail splices using splice kits.

2.4 INSTALL RAILS

Position rail sections on rail anchors for both car and crawler paths. As required, install splice bars to secure end-to-end rail joints. During rail installation, check rail gauge frequently to ensure that the distance between the inner edges of the tops of the rails is equal. Required rail gauges and tolerances are:

- Crawler rails: 46 inches +1/8 inch -0
[1168 mm +3 mm -0]
- Car rails: 79 7/8 inches +1/8 inch -0
[2029 mm +3 mm -0]

After positioning all rails and checking gauge, complete installation as follows:

1. Install splice bars to join rail sections.
2. Install rail anchor clips, lock washers, and nuts. Shims may be used to obtain the correct elevation of the rails. See Figure 2.6.
3. Install horizontal probes on the safety stops for:
 - Kiln rails
 - Auxiliary rails

See Figure 2.7.

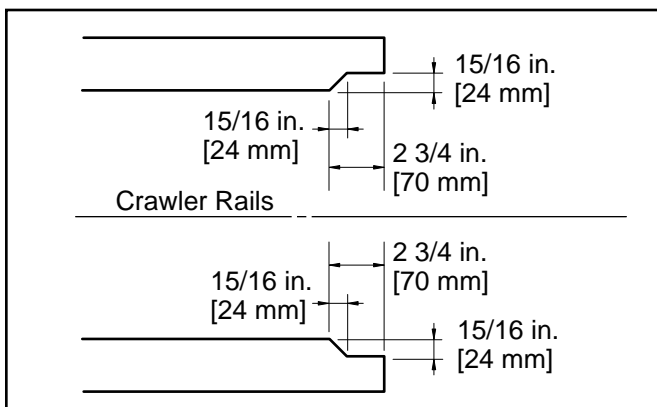


Figure 2.5 Rail End Notches

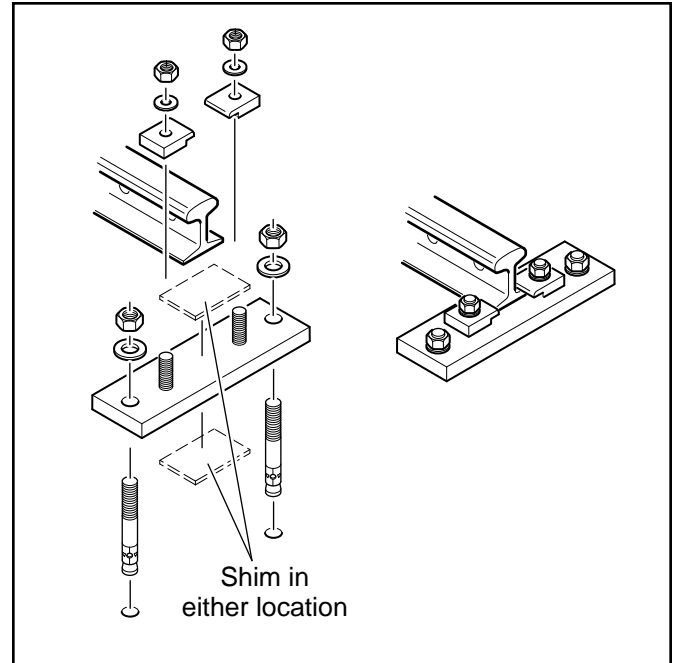


Figure 2.6 Rail Anchor

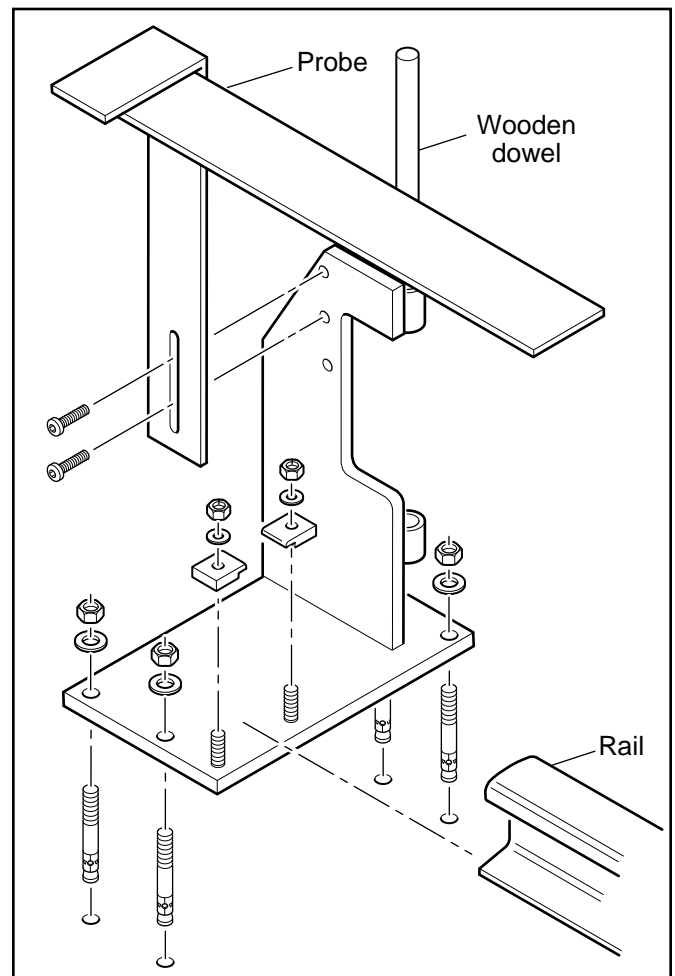


Figure 2.7 End-of-Rail Safety Stop

2.5 INSTALL ACTUATORS

Actuators are imbedded steel plates that are utilized by proximity sensors on the car to guide car movements. Install actuators at the centerline of every set of crawler and kiln rails. Adjust all actuators to correct elevation, then weld in position. Mount actuators to foundations using anchor studs and nuts. See Installation Drawings for all actuator locations. Figure 2.8 shows the actuator assembly.

2.6 INSTALL STABILIZERS

Stabilizers are imbedded steel plates that support the weight of the car and prevent the car from tilting when the crawler moves on and off the car. Position stabilizers so that as you look directly into the kiln, the left stabilizer is 2 1/2 inches further from the centerline of transfer car than the

right stabilizer. See Figure 2.10. Adjust stabilizers to correct elevation, then weld in position. Mount stabilizers to the foundation using anchor studs and nuts. See Installation Drawings for proper assembly and stabilizer locations. Figure 2.9 shows the stabilizer assembly.

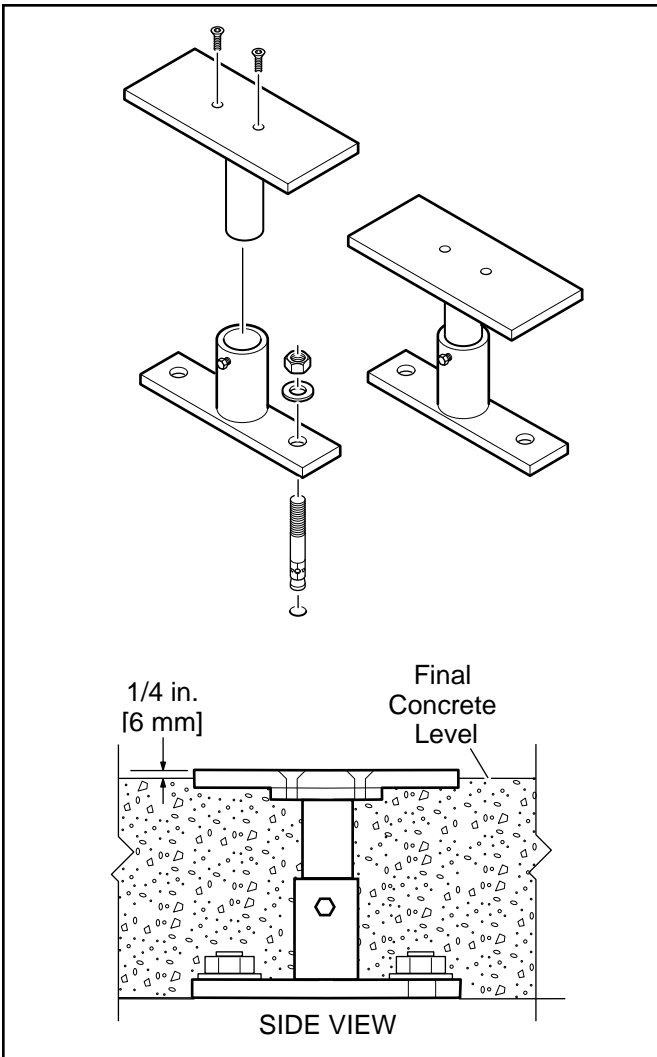


Figure 2.8 Actuator Assembly

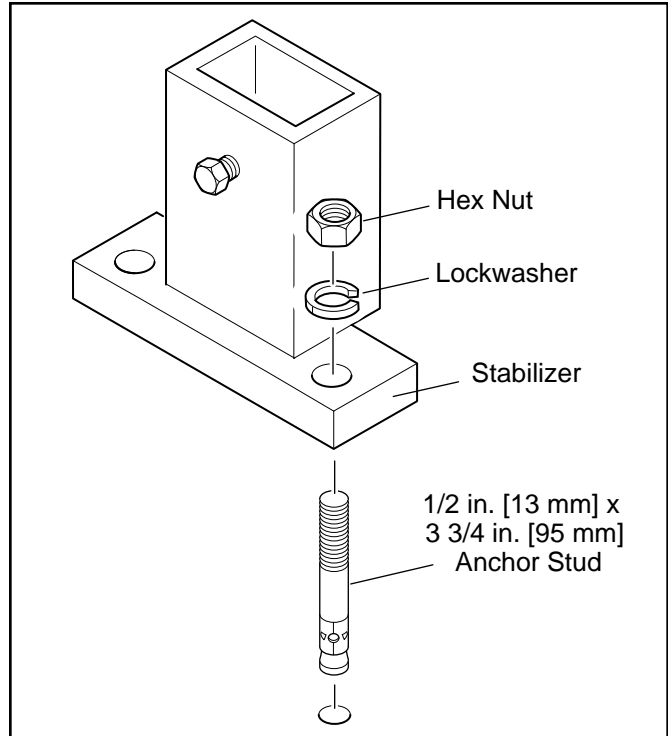


Figure 2.9 Stabilizer

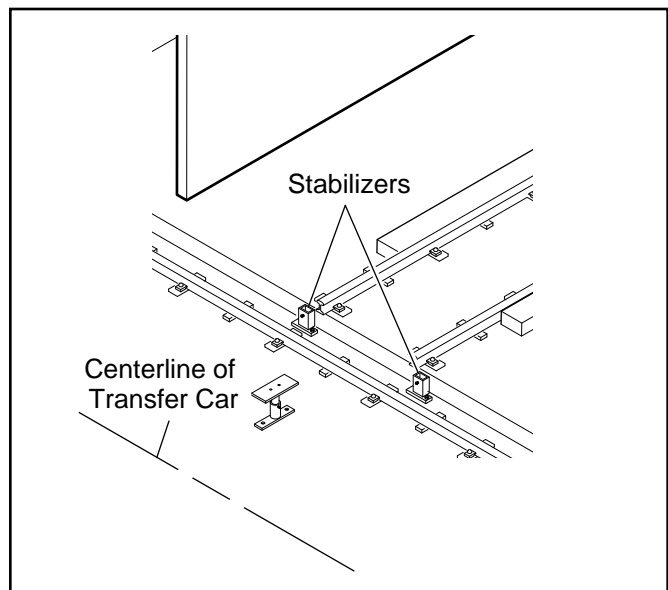


Figure 2.10 Position of Stabilizers

2.7 INSTALL CURBS

Curbs are concrete forms that support the racks:

- In the kilns
- On the auxiliary rails
- On crawler rails leading to the side shifter

Figure 2.11 shows curb placement and dimensions. All curbs are at an elevation of 100 feet - 6 3/4 inches [30651 mm].

2.8 INSTALL FESTOON POWER SYSTEM

The LSC-40C receives all electrical power and control signals through elevated festoon cables. There are two required power installations:

- 2.8.1 Install Festoon Track and Cable
- 2.8.2 Install Festoon Support Pole

2.8.1 Install Festoon Track and Cable

Besser supplies the festoon cable pre-assembled and connected to the trolleys which travel on the track. The customer must install the suspended track and support it every 6 feet [1829 mm]. After installing the suspended upper track, load the trolleys and cable onto the track.

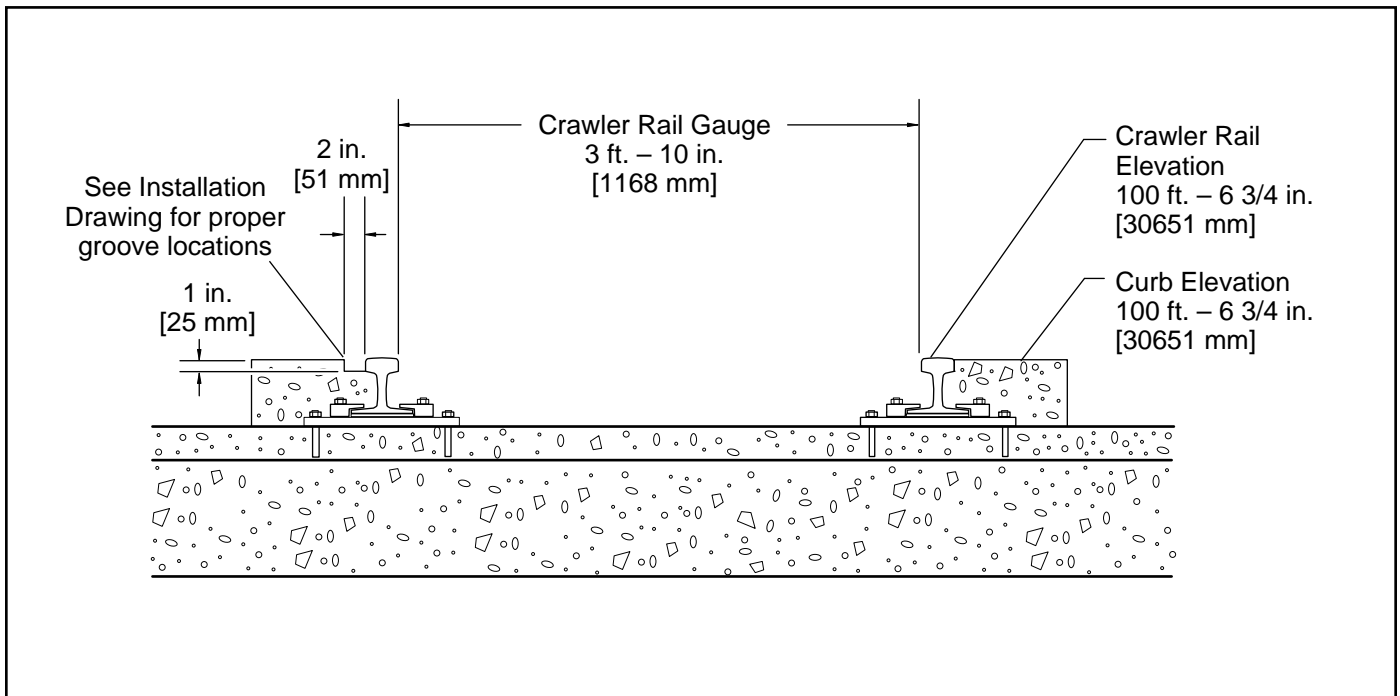


Figure 2.11 Curb and Rail Gauge

2.8.2 Install Festoon Support Pole

Figure 2.12 shows a typical festoon support pole.

1. Mount safety switch and connector for flat power cable to festoon support. Secure power cable (4 conductor) from festoon system through cable connector in top of box.
2. Optional: Mount terminal box to festoon support and secure control cable (12 conductor) from festoon system through cable connector in top of box. The wire bundle from the control panel door will be connected to the bottom of the box.

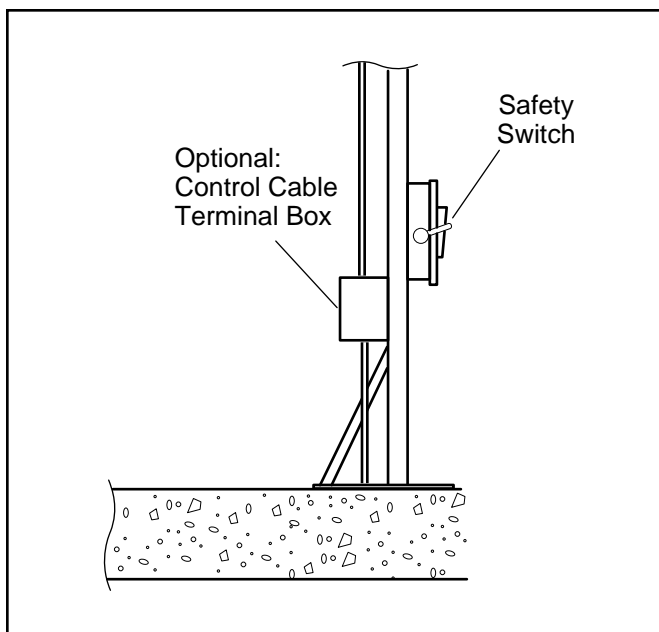


Figure 2.12 Festoon Support Pole

SECTION 3

PREPARE TRANSFER CAR


Moving the car onto the rails and preparing the car for operation requires the following steps:

- 3.1 Place Car on Rails
- 3.2 Connect Power System
- 3.3 Fill Hydraulic System
- 3.4 Check Input/Output Indicators
- 3.5 Check Operation of Safety Bars
- 3.6 Match Car with Crawler Rails
- 3.7 Check Car Operation
- 3.8 Apply Safety Decals

3.1 PLACE CAR ON RAILS

The method used to move the transfer car onto the car rails will depend on available equipment and plant layout. The car weight requires a lifting capacity of 3700 pounds [1682 Kg] for the heavy duty rigging system for protection of plant personnel during the placement. See Figure 3.1 for the lifting points of the car. Use necessary safeguards and ensure that all transfer equipment is properly rated for the load.

The car must be moved onto the rails and placed in the position shown in Figure 3.2. Refer to the Installation Drawings for exact specifications. Note the location on the installation drawing of the car's control panel for proper orientation.



WARNING: Use of a non-professional rigging crew may result in personal injury and/or property damage.

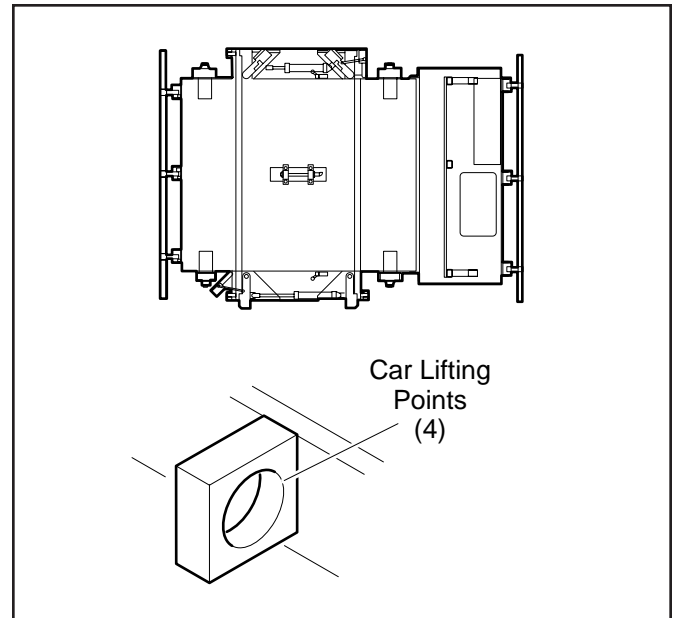


Figure 3.1 Car Lifting Points

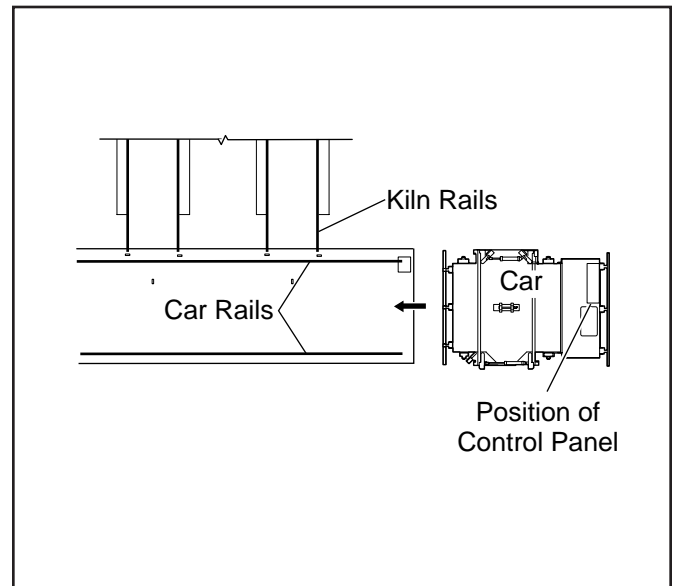


Figure 3.2 Car Placement

3.2 CONNECT POWER SYSTEM

Assemble the car's vertical power mast as shown in Figure 3.3. Secure the system power cable to the festoon cable through a cable connector at the bottom of the car control panel. Figures 3.4 and 3.5 show the required terminal connections inside the car control panel.

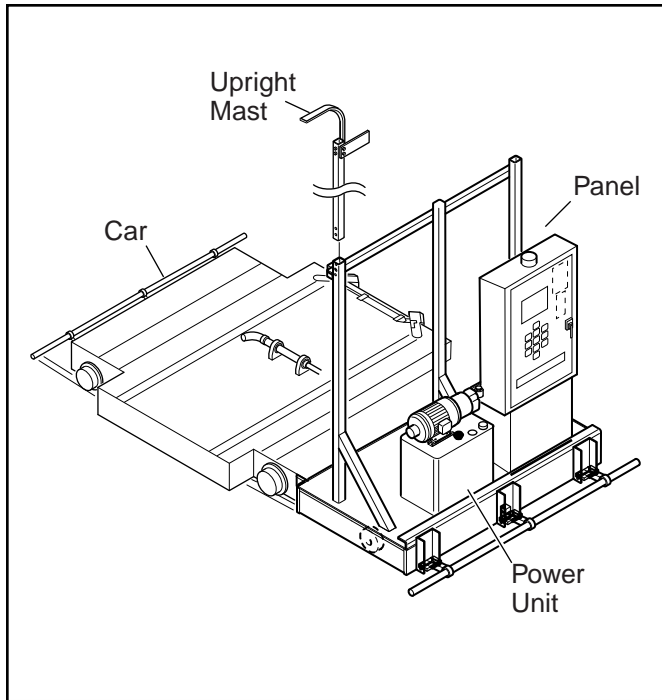


Figure 3.3 Car Power Mast

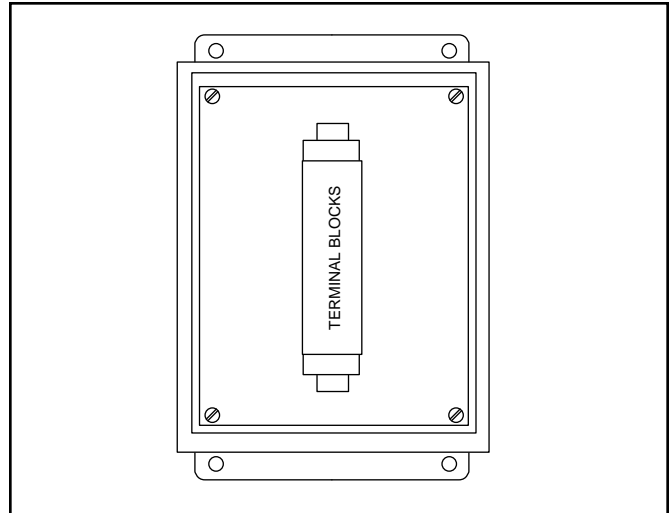


Figure 3.4 Termination of Control

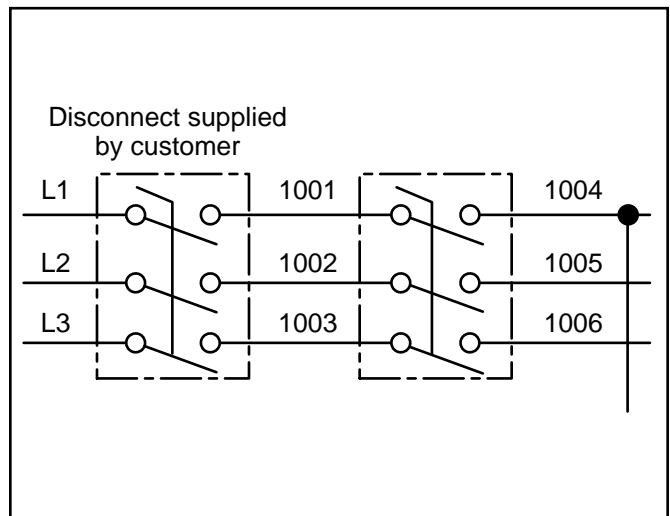


Figure 3.5 Termination of Power

3.3 FILL HYDRAULIC SYSTEM

The car hydraulic system capacity is 40 gallon [151 L].

NOTE:

Use Shell Tellus 46 hydraulic fluid or equivalent.

In order to fill the system, power must be available to operate the different hydraulic movements. Fill the system as follows:

1. Fill tank.
2. Start the hydraulic pump and check rotation as shown in Figure 3.6.
3. Manually operate controls to fill the system:
 - Forward and reverse direction
 - Fast, medium and slow speeds
 - Raillocks extended and retracted
4. Continue adding fluid to tank while operating the controls until the 40 gallon [151 L] capacity has been reached.

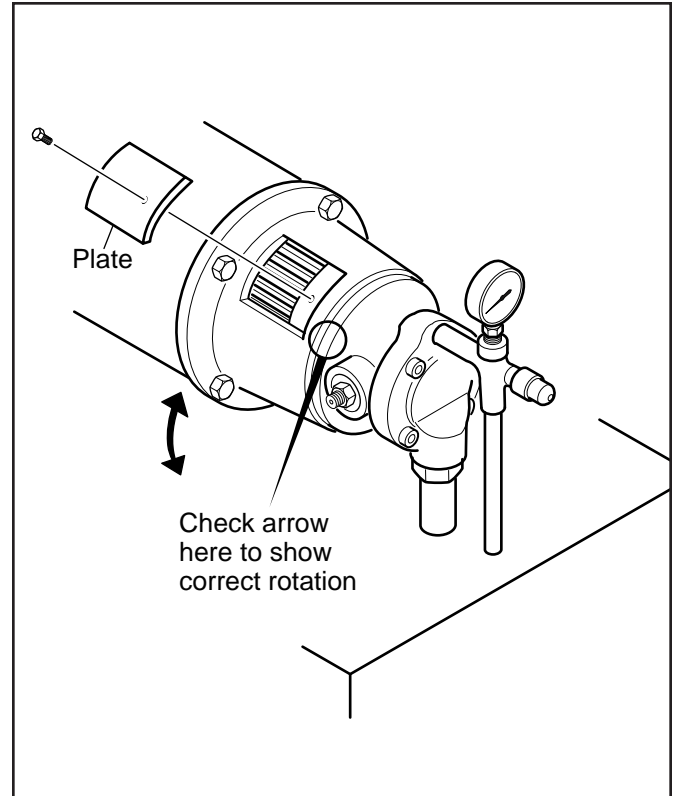


Figure 3.6 Check Pump Rotation

3.4 CHECK INPUT/OUTPUT INDICATORS

Car function will be checked by observing the various input and output functions from the car control processor. Figure 3.7 shows the input and output (I/O) modules of the SLC-500 Controller. In the sections that follow, match the various functions with the LEDs on the I/O modules.

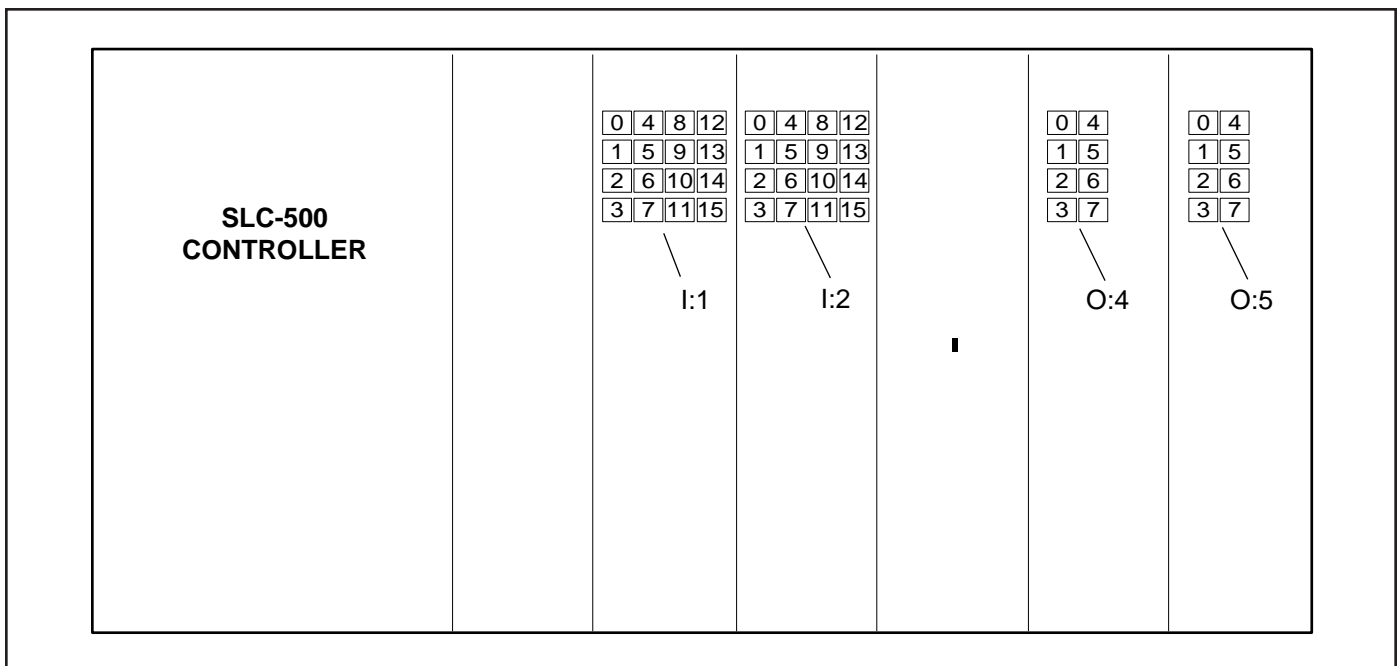


Figure 3.7 Car Input/Output Modules

3.5 CHECK OPERATION OF SAFETY BARS

The safety bars stop car operation whenever they hit an obstacle. The safety bars are essential components for protection of plant personnel. At all times, ensure they are in proper working order. To check safety bars in the manual mode:

1. Lift up on one safety bar to simulate a safety stop.
2. Verify that the pump stops.
3. From the graphic control screen, verify function of both limit switches by looking at the fault screen.
4. Adjust position of any inoperative limit switches. Check the wiring for faulty connections as directed by the instructions on the fault screen.
5. Repeat for the other safety bar limit switch.

3.6 MATCH CAR WITH CRAWLER RAILS

This step aligns the car with the crawler rails to ensure a proper match with the top-of-car rails. An accurate actuator/proximity relay sensor (PRS) match is required to stop the car at the proper location. Proper rail match provides a good transition for the crawler to move on and off the transfer car. There are two parts to this step:

- 3.6.1 Match Actuators and Proximity Sensors
- 3.6.2 Shim Crawler Rail Ends

3.6.1 Match Actuators and Proximity Sensors

As a precaution, first check all actuators along the car path to verify that there is no interference of actuators and the downward-sensing proximity sensors. This check will avoid damage to a sensor from a protruding actuator. Figure 3.8 shows the location of PRS-3, PRS-4 and PRS-5 for cars in LSC-40C systems with kilns on the left side of car travel. For LSC-40C systems with opposing kilns, the car will carry sensors PRS-9, PRS-10 and PRS-11 on the opposite side. For LSC-40C systems that use kilns off both sides of the car path, the car will carry all six sensors. The function of the downward-facing sensors on both sides of the car are identical. Continue as follows:

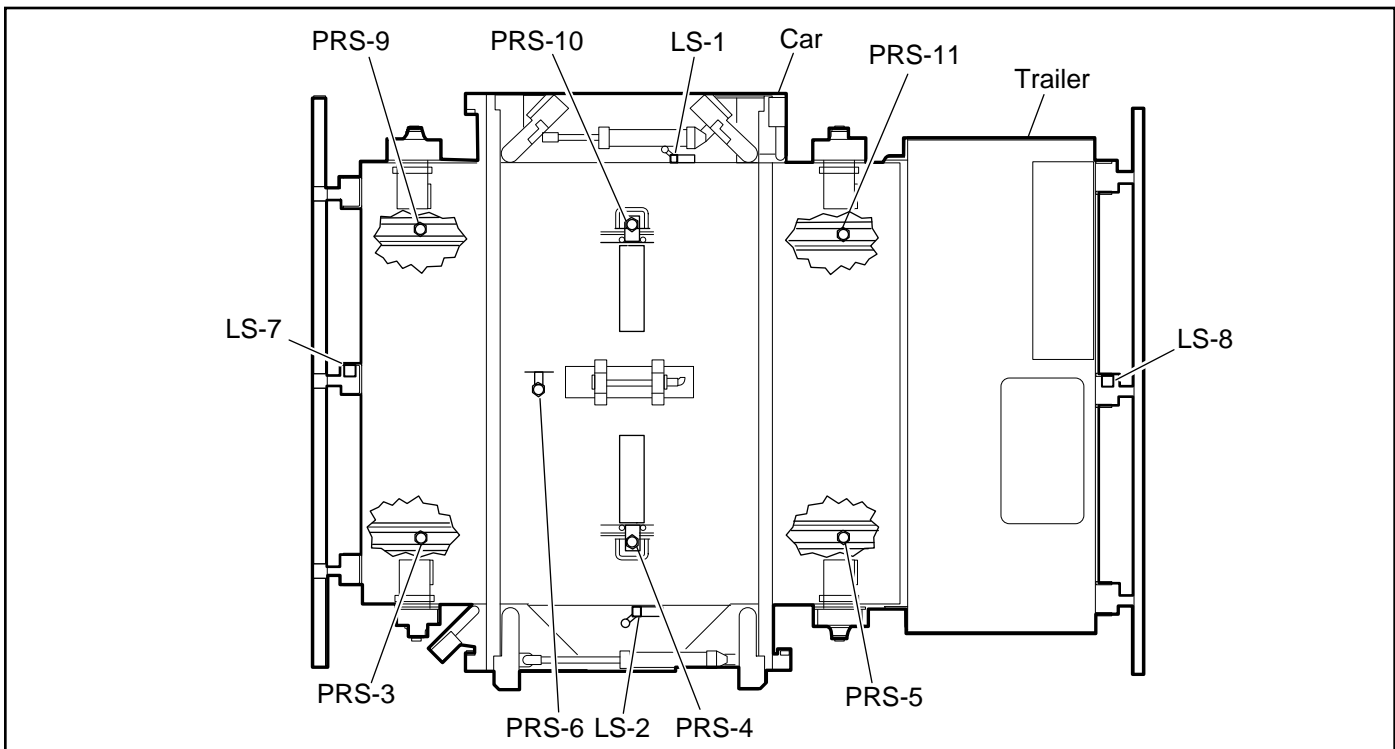


Figure 3.8 Car Sensor Locations

1. Using manual speed and direction controls, move car to each set of crawler rails.
2. Use the input status screen to observe sensor function.
3. Depending on travel direction, either PRS-3 (PRS-9) or PRS-5 (PRS-11) will sense the actuator and signal the car to change to slow speed. When PRS-4 (PRS-10) senses the actuator, the car will stop. In order for these sensors to work as designed, the sensor faces must be within 1/4 inch [6 mm] of the actuator.
4. As needed to obtain the 1/4 inch [6 mm] clearance, adjust sensor position by loosening the nut on the sensor. Raise or lower the sensor to the correct height as shown in Figure 3.9. Tighten the nut.
5. There will likely be variation in height of the different actuators. Exercise care in lowering a sensor to match a low actuator to prevent damage to that sensor by hitting a higher actuator. In case of significant variation in actuator height, position the sensor mounting bracket to obtain a 1/4 inch [6 mm] gap with the highest actuator. Actuators that are too low to trigger the sensor must be adjusted to raise the top of the actuator into the sensor field.
6. With PRS-4 or PRS-10, the stop must also be centered on the crawler rails. If necessary, adjust PRS-4 or PRS-10 bracket laterally to adjust for the center stop. See Figure 3.9.

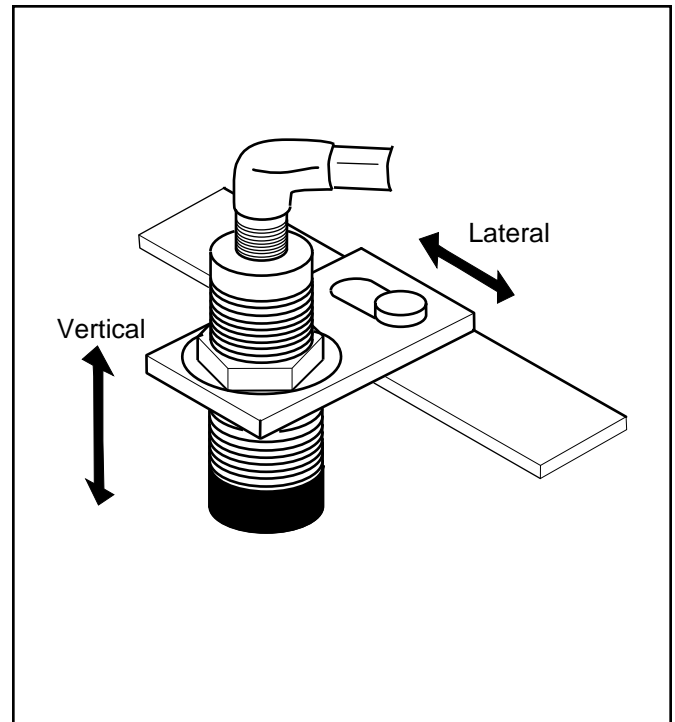


Figure 3.9 PRS Adjustment

3.6.2 Shim Crawler Rail Ends

The elevation of the crawler rail ends and the top-of-car rails should match within a tolerance of $\pm 1/32$ inch [0.8 mm]. As needed, shim the ends of both crawler rails. The end-to-end or lateral gap between the rail ends should be $1/2$ inch [13 mm] maximum. See Figure 3.10.

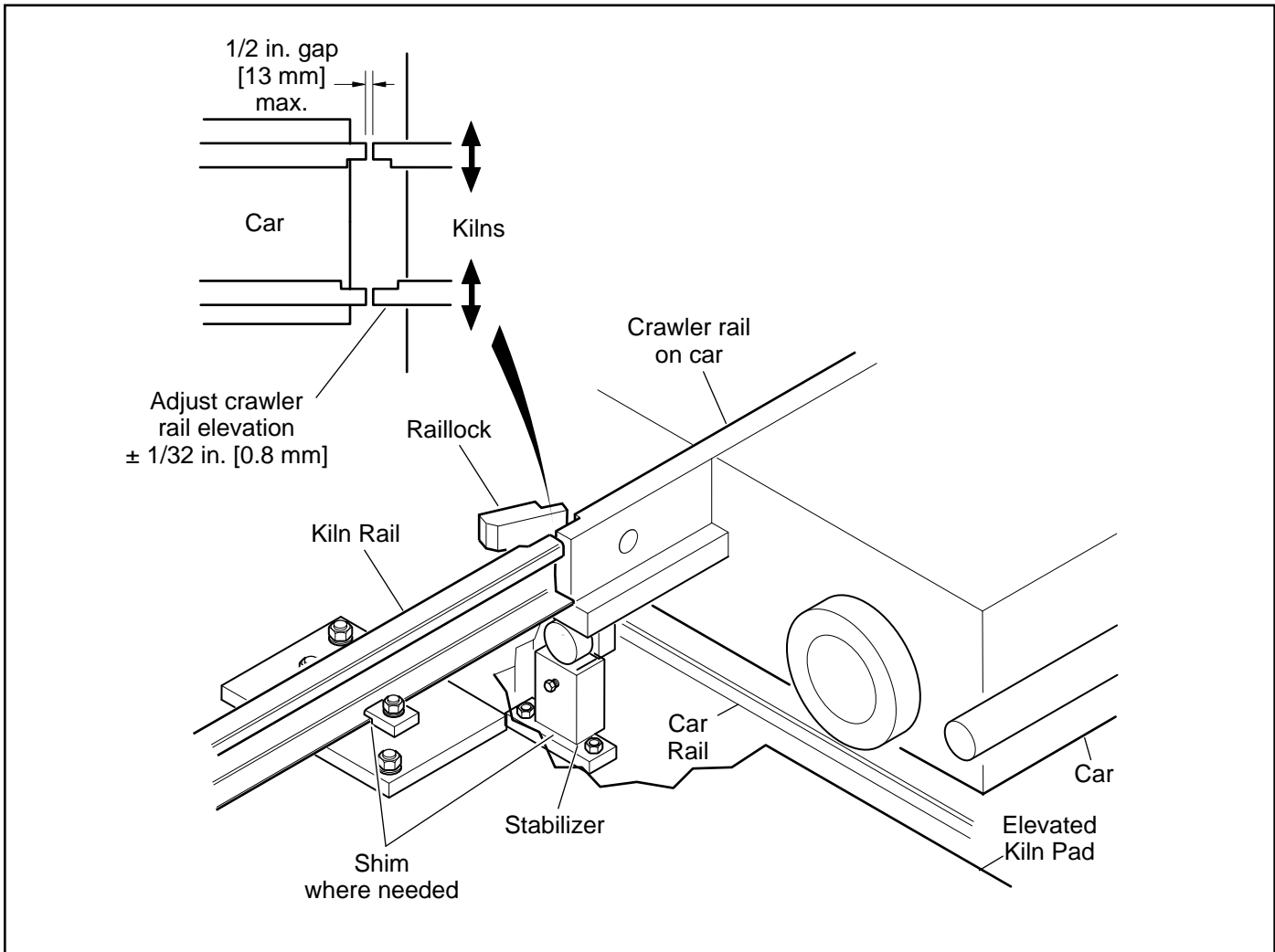


Figure 3.10 Rail End Match

3.7 CHECK CAR OPERATION

The purpose of this step is to conduct a trial run with the car before placing the crawler. In the manual mode, move the car the full length of car tracks in both directions and make the following checks and adjustments:

- 3.7.1 Check Actuator/PRS Signal Interface
- 3.7.2 Check End-Of-Rail Safety Stop
- 3.7.3 Check Raillock Operation
- 3.7.4 Calibrate Car Speed

3.7.1 Check Actuator/PRS Signal Interface

In the manual mode, operate the car in both directions along the full car rail path. Use the input status screen to verify the proper function of PRS-3, PRS-4 and PRS-5 with every actuator. In LSC-40C systems with opposing kilns, check sensors PRS-9, PRS-10 and PRS-11 in the same manner.

3.7.2 Check End-of-Rail Safety Stop

Using manual controls, continue operating car in slow speed. Move the car to the extreme ends of car rails. Verify that the safety stop activates the car safety bar. The car should stop moving and the horn signal should change from slow to fast.

3.7.3 Check Raillock Operation

Continue operating the car in manual mode. Move the car to positions centered on each set of crawler rails. From the car control panel, manually extend and retract raillocks. From the input status screen, verify that LS-1 and LS-2 show the correct status of the raillocks when extended and retracted. When raillocks are extended, verify that the raillocks bridge the gap between ends.

3.7.4 Calibrate Car Speed

The car operates at three speeds:

- Slow: 15 feet [4572 mm] per minute
- Medium: 30 feet [9144 mm] per minute
- Fast: 45 feet [13716 mm] per minute

Figure 3.11 shows the six knobs used to adjust car speed. To calibrate car speed:

1. Mark a 10 foot [3048 mm] interval on car path.
2. Using manual control, run car both forward and reverse.
3. Rated travel time at slow speed is 20 seconds
4. If actual speeds differ from rated speeds, adjust speed control knobs.

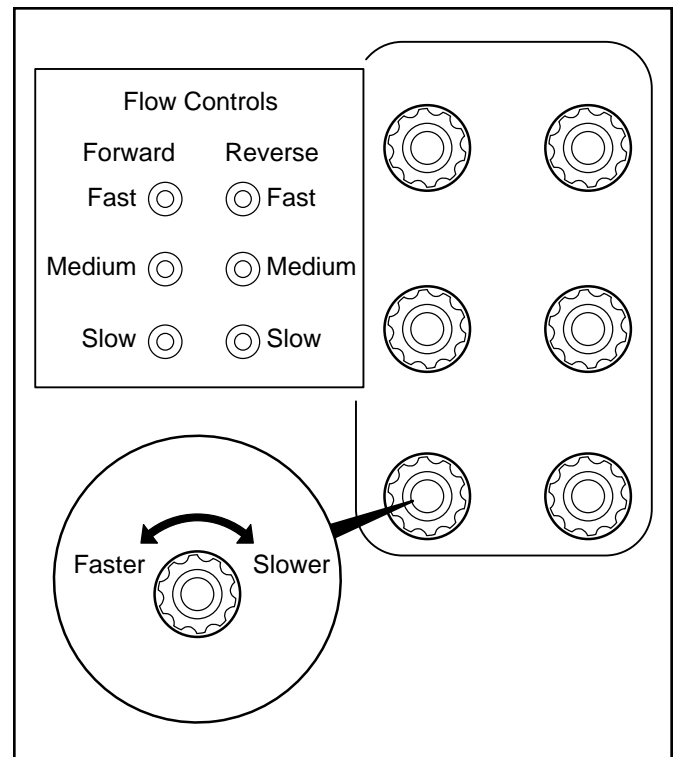


Figure 3.11 Speed Adjustments

3.8 APPLY SAFETY DECALS

Safety decals highlight areas of potential danger. Place the decals in the areas shown in Figure 3.12. See the Safety Section at the front of this manual for decal part numbers.

**CAUTION:**

Keep safety decals clean and readable.

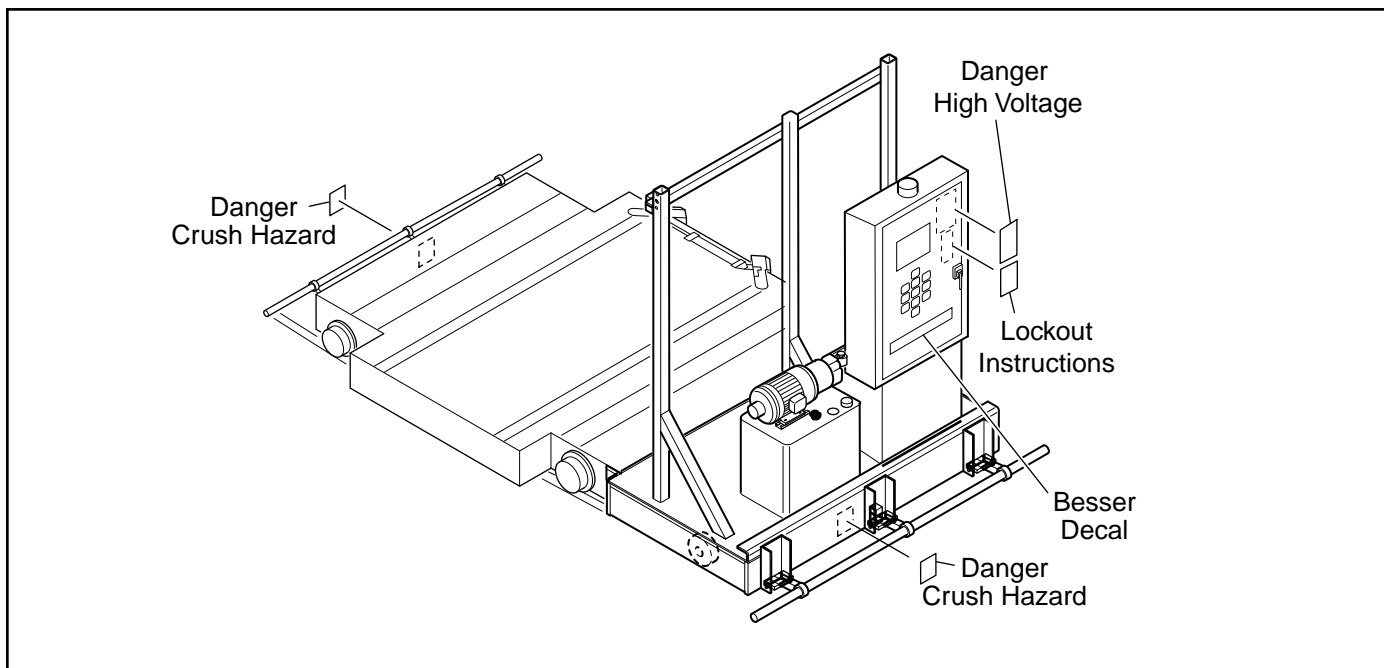


Figure 3.12 Car Safety Decals

SECTION 4

PREPARE CRAWLER

Moving the crawler onto the rails and preparing the crawler for operation requires the following steps:

- 4.1 Place Crawler On Rails
- 4.2 Connect Power Cable
- 4.3 Fill Hydraulic System
- 4.4 Check Input/Output Indicators
- 4.5 Check Operation Of Safety Bars
- 4.6 Check Crawler Movement
- 4.7 Check Elevator Operation
- 4.8 Check Crawler Proximity Sensors
- 4.9 Check End-Of-Kiln Safety Stops
- 4.10 Check End-Of-Kiln Actuators
- 4.11 Calibrate Crawler Speed
- 4.12 Apply Safety Decals

4.1 PLACE CRAWLER ON CRAWLER RAILS

The method used to move the crawler onto the crawler rails will depend on available equipment and plant layout. The crawler weight requires a lifting capacity of 4250 pounds [1932 Kg] for the heavy duty rigging system for protection of plant personnel during the placement. See Figure 4.1 for the lifting points on the crawler. Use necessary safeguards and ensure that all transfer equipment is properly rated for the load.

The crawler must be moved onto the rails in the position as shown in Figure 4.2 so that the tank end of the crawler goes into the Besser-Matic first. Refer to the Installation Drawings for correct orientation.

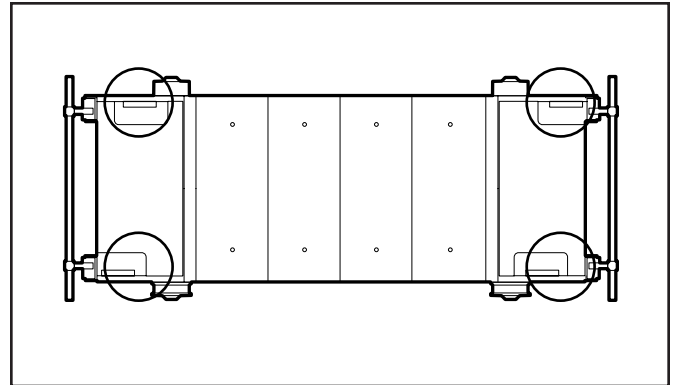


Figure 4.1 Crawler Lifting Points

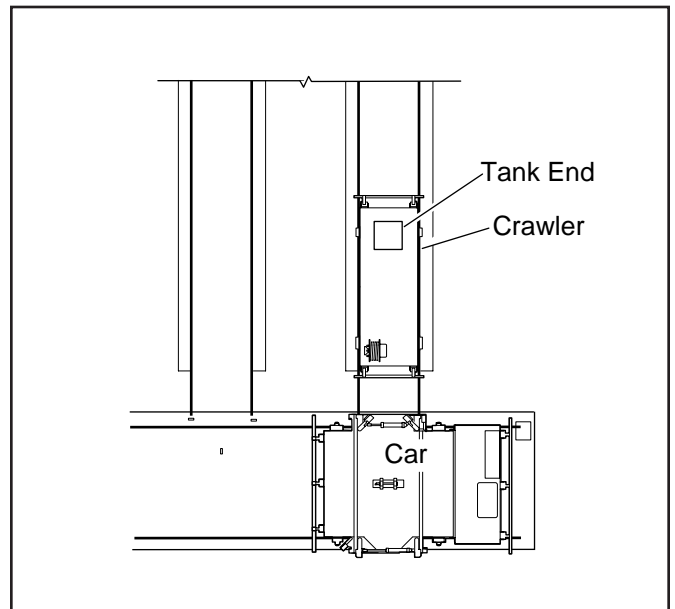



Figure 4.2 Crawler Placement



WARNING:
Use of a non-professional rigging crew may result in personal injury and/or property damage.

4.2 CONNECT POWER CABLE

There are three steps to connect the power cable between the car and the crawler:

1. Move crawler on rails next to car.
2. Pre-tension cable reel spring by turning the reel seven times in direction of arrow.
3. Pull cable off reel from underside and route cable through crawler guide rollers.

Figure 4.3 shows the path for feeding the cable from the reel on the crawler through the pivot fitting on the car and into the car control panel. Figure 4.4 shows the terminal connections inside the car junction box.

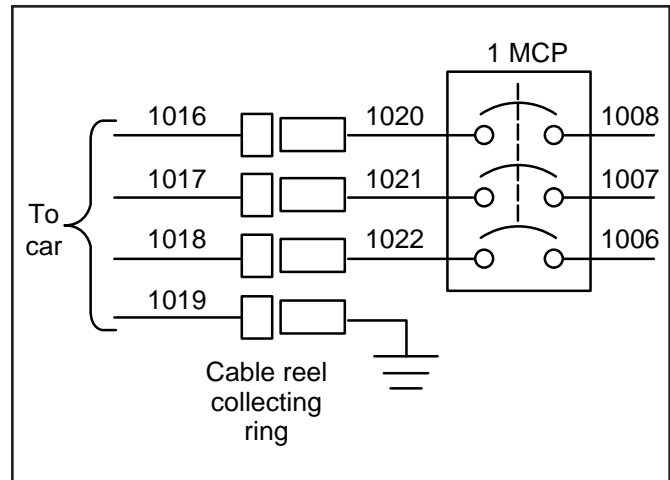


Figure 4.4 Power Cable Connections

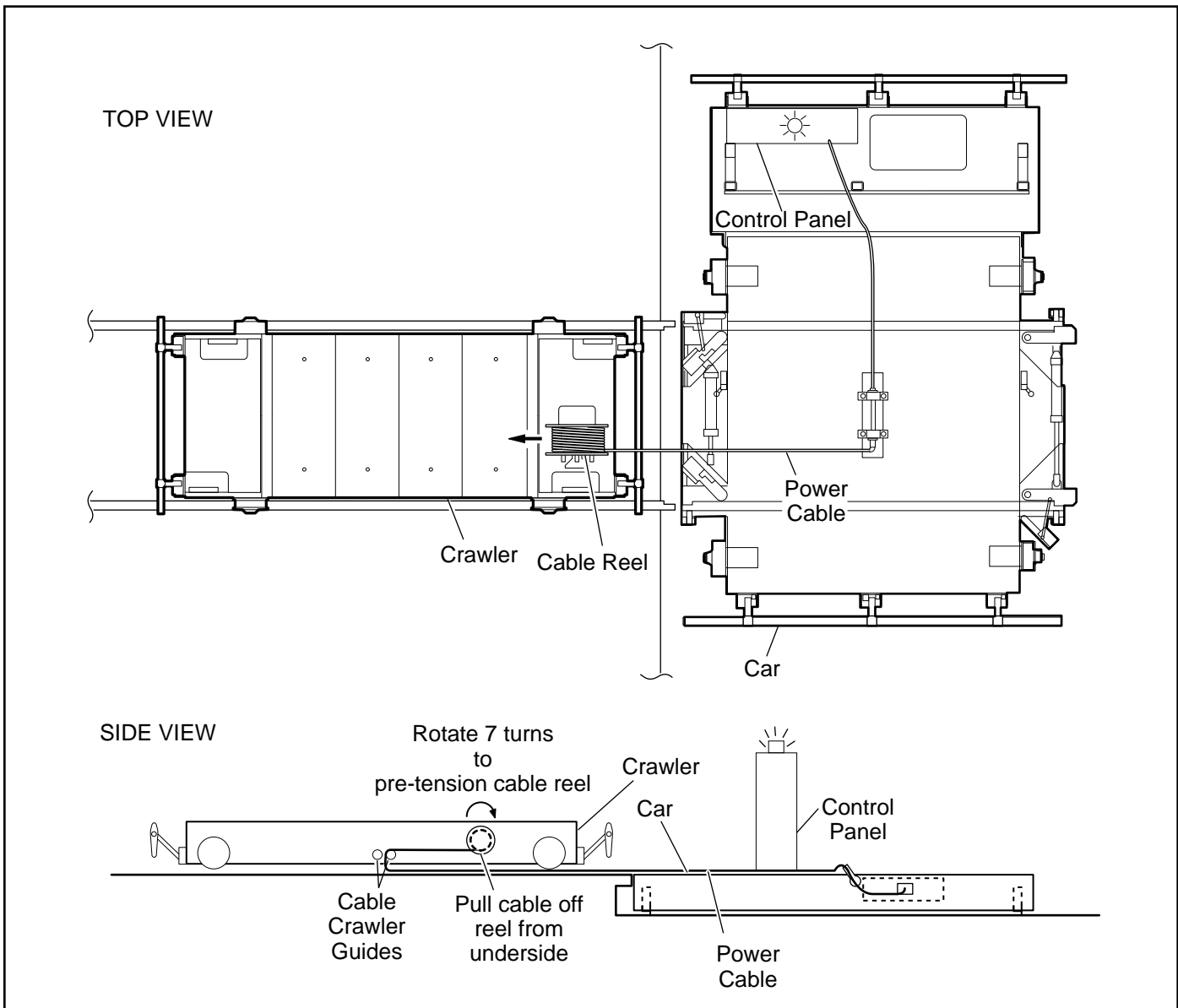


Figure 4.3 Power Cable Routing

4.3 FILL HYDRAULIC SYSTEM

The crawler hydraulic system capacity is 40 gallons [151 L].

NOTE:

Use Shell Tellus 46 type hydraulic fluid or equivalent.

In order to fill the system, the hydraulic pump must be running while operating the different hydraulic movements. Fill the system as follows:

1. Fill tank.
2. Start the hydraulic pump and check rotation as shown in Figure 4.5.
3. Manually operate controls to fill the system:
 - Forward and reverse direction
 - Elevator up and down
4. Continue adding fluid to tank while operating the controls until the full 40 gallon [151 L] capacity is reached.

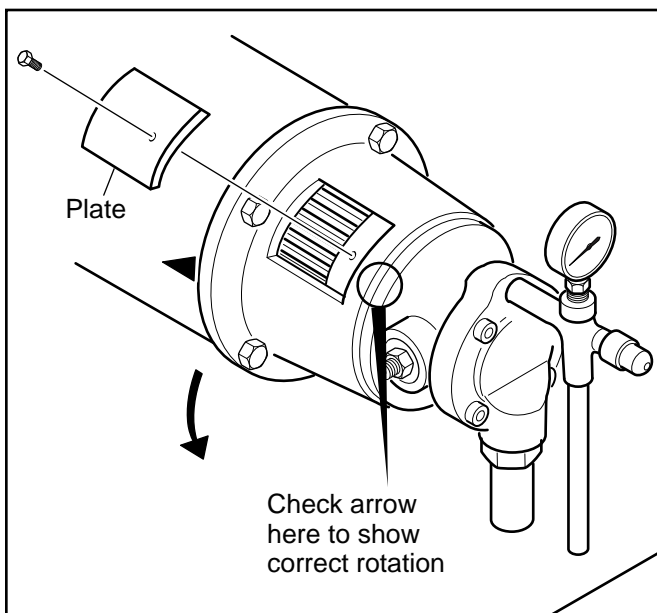


Figure 4.5 Check Pump Rotation

4.4 CHECK INPUT/OUTPUT INDICATORS

Crawler function will be checked by observing the various input and output functions from the crawler control processor. Figure 4.6 shows the input and output (I/O) modules of the SLC-500 controller located on the crawler bed. In the sections that follow, match the various functions with the LEDs on the I/O modules.

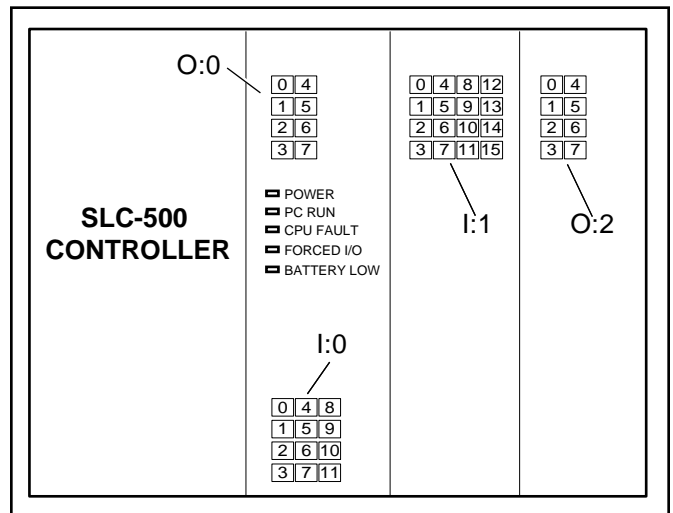


Figure 4.6 Crawler Input/Output Modules

4.5 CHECK OPERATION OF SAFETY BARS

The safety bars stop crawler operation whenever they hit an obstacle. The safety bars are essential components for protection of plant personnel. At all times, ensure that they are in proper working order. To check safety bars:

1. Lift up each safety bar to simulate a safety stop.
2. Verify function of limit switches LS-1 and LS-2.
3. Verify that horn signal blasts.
4. Verify that pump stops running.

4.6 CHECK CRAWLER MOVEMENT

This step verifies proper crawler movement on and off the transfer car and also checks for proper operation of car proximity sensor PRS-6. This sensor signals the LSC-40C operating system that the crawler is in position on top of the car. To check crawler movement:

1. From the car control panel, extend car rail locks.
2. Using the crawler pendant control, move the crawler on and off the car.
3. From the car control panel, verify proper function of PRS-6.

4.7 CHECK ELEVATOR OPERATION

From the crawler control station, move elevator up and down. On the SLC-500 controller verify:

- for elevator up, a signal on crawler I:0, terminal 4
- for elevator down, a signal on crawler I:0, terminal 3

4.8 CHECK CRAWLER PROXIMITY SENSORS

The LSC-40C control system coordinates the signals from eight “look-up” proximity sensors to monitor crawler location in relation to a rack.

Figure 4.7 shows the sensor locations and Figure 4.8 illustrates a typical pair of sensors attached to a mounting bracket. Each pair of sensors must be positioned to within 1/4 inch [6 mm] of the bottom of the first rack shelf. To check sensor function:

1. Using manual controls, move crawler off car and proceed under a rack.
2. Observe the gap between the bottom rack shelf and the faces of each pair of sensors.
3. If necessary, adjust sensor to achieve a 1/4 inch [6 mm] gap. Loosen the nut on the sensor to raise or lower sensor to the correct height. Move the sensor along the slot to the correct position.
4. Verify sensor function from the SLC-500 controller. All signals appear on crawler I:1 and match the terminals as shown in Table 4.1.

PRS	Terminal
15	4
16	5
18	6
19	7
20	8
21	9
22	10
23	11

Table 4.1 PRS and Terminal Connections

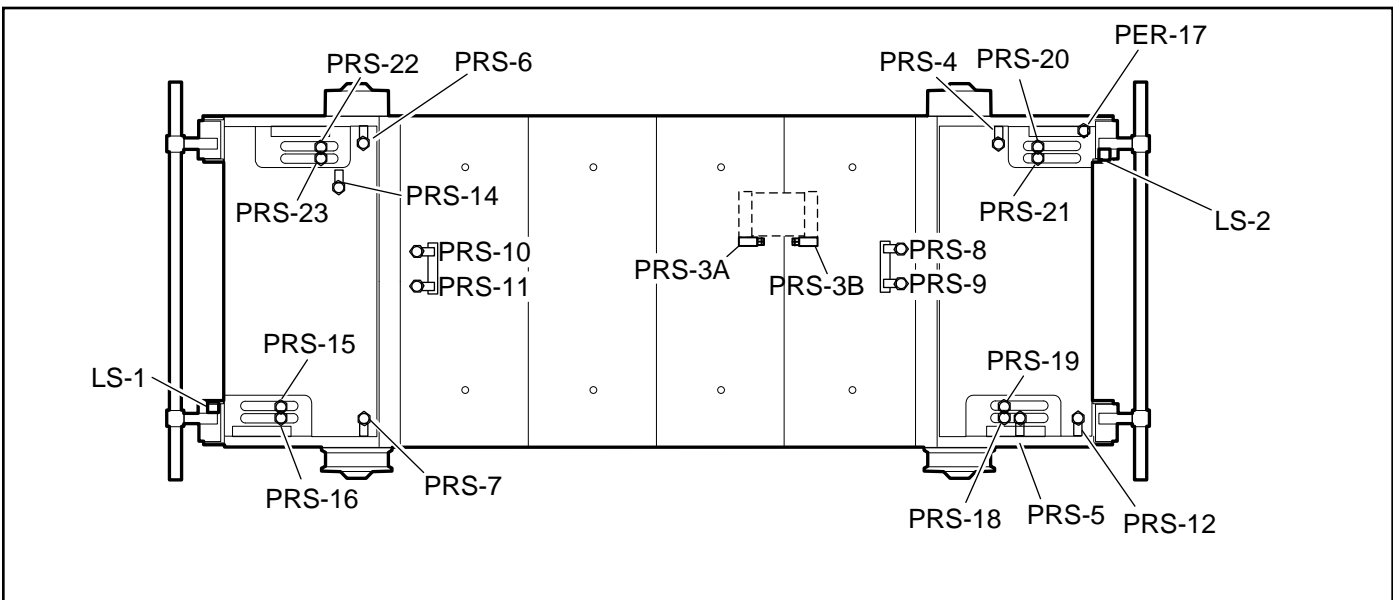


Figure 4.7 Crawler Sensor Locations

4.9 CHECK END-OF-KILN SAFETY STOPS

Using manual controls, move the crawler to the back of each kiln. Verify that each end-of-kiln safety stop activates the crawler safety bar. The crawler should stop moving and the horn signal should blast.

4.10 CHECK END-OF-KILN ACTUATORS

Using manual controls, move the crawler to the back of each kiln. Verify that the “look-up” sensors are actuated by the probe. The distance between the probe and the “look-up” sensors must be 1/4 inch [6 mm] maximum. See Figure 4.9.

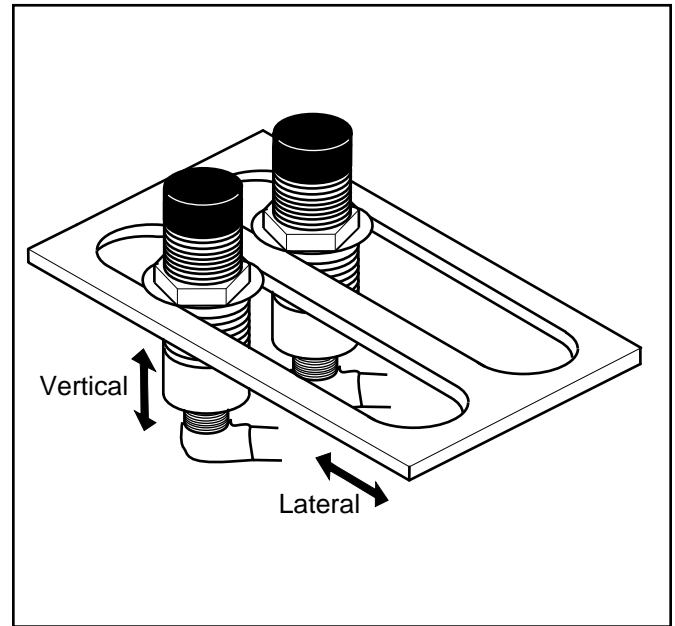


Figure 4.8 Crawler Sensor Adjustments

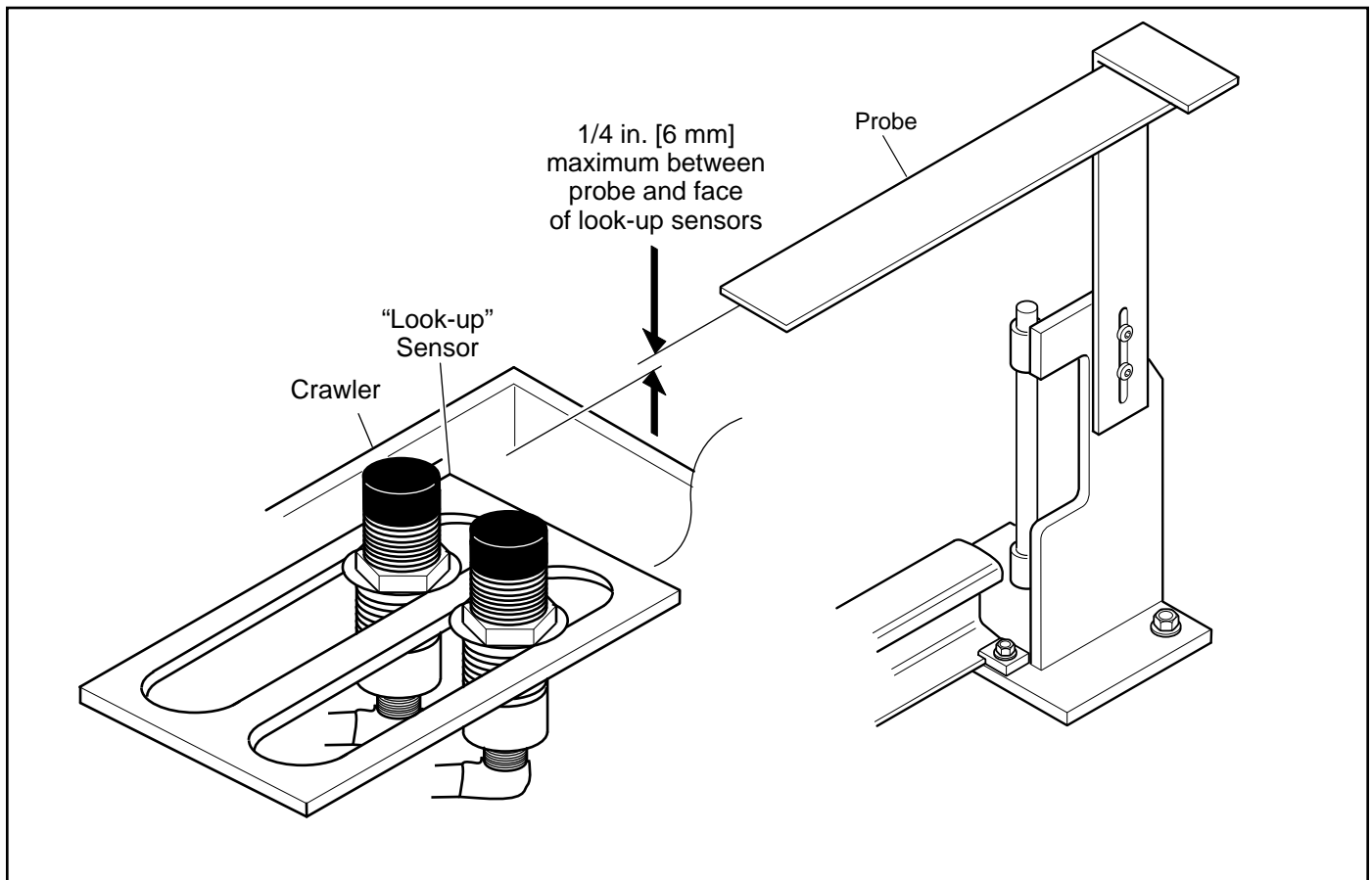


Figure 4.9 “Look-Up” Sensors

4.11 CALIBRATE CRAWLER SPEED

The crawler operates at three speeds:

- Slow: 15 feet [4572 mm] per minute
- Medium: 30 feet [9144 mm] per minute
- Fast: 45 feet [13716 mm] per minute

Figure 4.10 shows the six knobs used to adjust crawler speed. To calibrate crawler speed:

1. Mark a 10 foot [3048 mm] interval on crawler path.
2. Using manual control, run crawler both forward and reverse.
3. Rated travel time at slow speed is 20 seconds
4. If actual speeds differ from rated speeds, adjust speed control knobs.

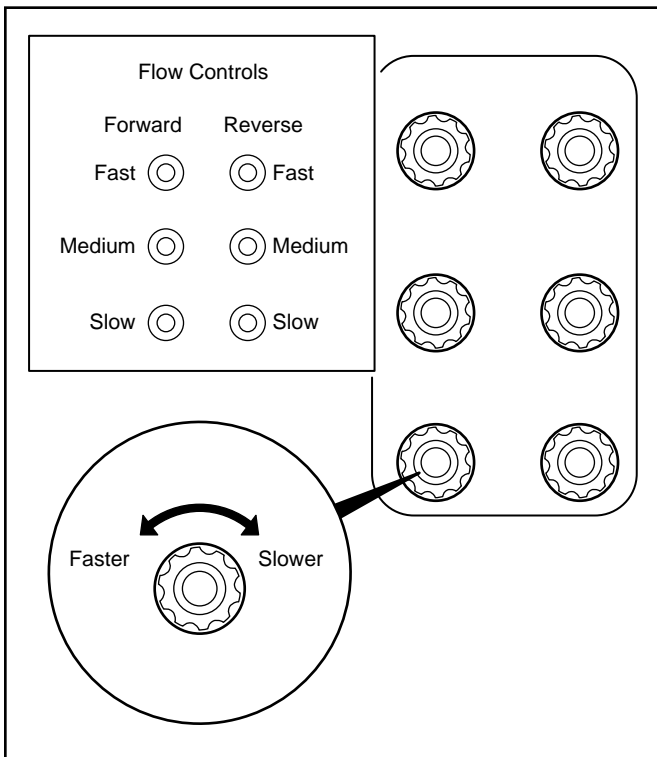


Figure 4.10 Speed Adjustments

4.12 APPLY SAFETY DECALS

Safety decals highlight areas of potential danger. Place the decals in the areas shown in Figure 4.11. See the Safety Section at the front of this manual for decal part numbers.

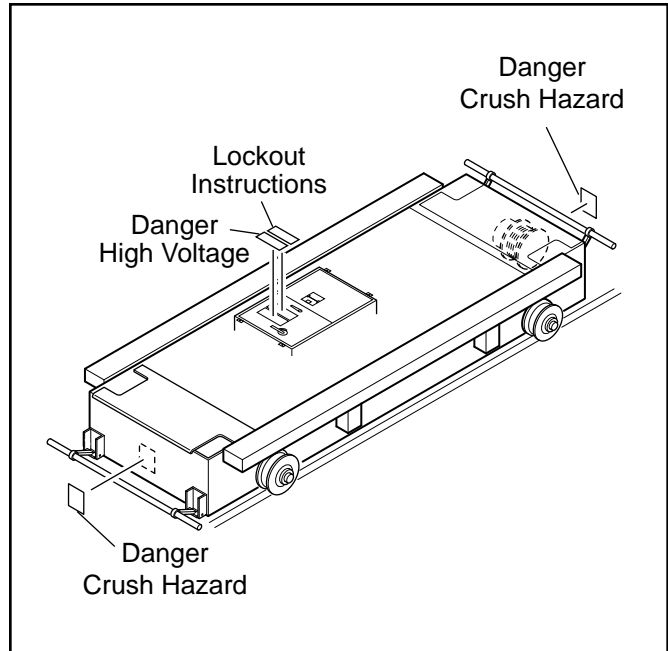
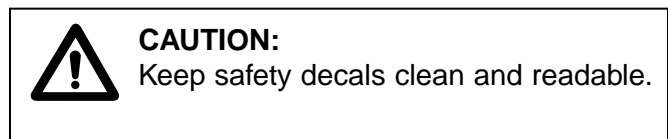


Figure 4.11 Crawler Safety Decals



SECTION 5

TRIAL RUNS

Before placing the final layer of concrete, the operator must observe and approve all details of equipment movement and make corrections as necessary. Section 5.2 provides a checklist for an approved installation.

5.1 SERIES OF RUNS

Besser suggests that the operator make a series of trial runs of increasing complexity:

- Manual operation without racks
- Manual operation with unloaded racks
- Automatic operation with unloaded racks
- Manual operation with loaded racks
- Automatic operation with loaded racks

Manual and unloaded trial runs need not complete the entire cycle of kiln loading and unloading. The main purpose of these early stages is to check out the equipment and rail system before adding racks and loads of product. If early trial runs indicate the need for changes to the site or equipment, these changes will be easier to accomplish without having to contend with loaded racks.

5.1.1 Runs Without Racks

Before racks are moved into the LSC-40C system, trial runs are needed to check the function of end-of-kiln safety stops and observe crawler travel independent of rack loading and unloading.

5.1.2 Manual Operation

Manual operation allows close observation and control of equipment. Before moving to automatic cycles, manual operation will ensure that the car and crawler are working properly independent of the automatic control system.

5.1.3 Unloaded Racks

Trial runs with unloaded racks allow checkout of all crawler operations independent of loads.

5.1.4 Automatic Operation

For instructions on starting and running the system on automatic control, see Section 1.3 of the Operation/Maintenance Manual.

5.2 INSTALLATION CHECKLIST

During the trial runs, use the checklist shown in Table 5.1 as a guide to areas of observation and testing. After successful completion of a loaded trial run, ensure that all elements have been checked and approved.

LSC-40C Installation Checklist	
<p>Important Dimensions</p> <p>Check all important dimensions to ensure they meet specifications.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Top of car rails elevation <input type="checkbox"/> Top of actuators elevation <input type="checkbox"/> Car rail gauge <input type="checkbox"/> Top of crawler rails elevation <input type="checkbox"/> Crawler rail gauge <input type="checkbox"/> Curb heights <input type="checkbox"/> Top of stabilizers elevation <p>System Operation</p> <p>Inspect for proper operation.</p> <ul style="list-style-type: none"> <input type="checkbox"/> No leaking hydraulic fluid <input type="checkbox"/> Car and crawler oil heaters are working <input type="checkbox"/> Car and crawler hydraulic systems are filled <input type="checkbox"/> Proper tension and cable retrieval <input type="checkbox"/> Smooth trolley movement on festoon <input type="checkbox"/> Kiln door interface (if used) 	<p>Proper Equipment Movement</p> <p>Observe and verify smooth, unobstructed equipment movement.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Car: full length of car rails <input type="checkbox"/> Crawler: off and on car <input type="checkbox"/> Crawler: full depth of all kilns <input type="checkbox"/> Crawler: on auxiliary rails (if used) <input type="checkbox"/> Crawler: on side shifter rails <input type="checkbox"/> Car and Crawler: over rail splices <input type="checkbox"/> Crawler/rack: into and out of kilns <input type="checkbox"/> Crawler/rack: onto rack conveyor <p>Safety Provisions</p> <p>Test and verify that all safety equipment is in place and operating properly.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Car rail end safety stops <input type="checkbox"/> Crawler end-of-kiln safety stops <input type="checkbox"/> Car safety bars <input type="checkbox"/> Crawler safety bars <input type="checkbox"/> Car E-Stop (no horn will sound) <input type="checkbox"/> Crawler E-Stop (no horn will sound) <p>Verify that all safety stops exhibit these results:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Equipment movement stops <input type="checkbox"/> Signal horn sounds fast pattern <input type="checkbox"/> Hydraulic pump stops

Table 5.1 Installation Checklist

SECTION 6

INSTALL FINAL CONCRETE LAYER

The final installation stage is to fill in the car path up to the plant floor level of 100 feet [30480 mm]. Figure 6.1 is a side view of a car rail following placement of the final concrete layer.

Note the following:

- There are 2 inch [51 mm] wide by 1 inch [25 mm] deep grooves along all car and crawler rails. See Installation Drawings for proper groove locations and specifications for single groove or double groove.
- Car rails and actuator tops extend 1/4 inch [6 mm] above grade.
- Stabilizer tops extend 1/2 inch [13 mm] above grade.

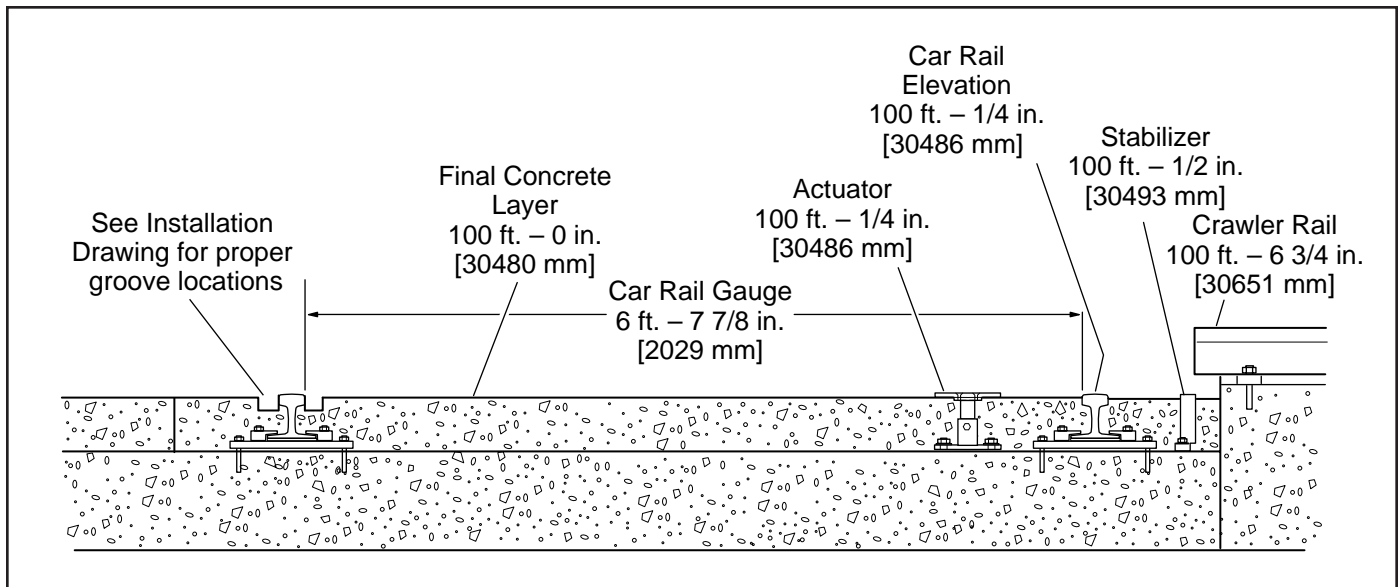


Figure 6.1 Final Concrete Layer

