VERTICAL EXPRESS

Twin Post Jacks

Single-Stage Jacks

Two-Stage Telescoping Jacks

Three-Stage Telescoping Jacks

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Safety Precautions

IMPORTANT!

Read this page before any work is performed on elevator equipment. The procedures contained in this manual are intended for the use of qualified elevator personnel. In the interest of your personal safety and the safety of others, do not attempt any procedure that you are not qualified to perform.

All procedures must be accomplished in accordance with the applicable rules in the latest edition of the National Electrical Code, the latest edition of ASME A17.1, and any governing local codes.

Terms in This Manual

CAUTION

CAUTION statements identify conditions that may result in damage to the equipment or other property if improper procedures are followed.

WARNING

WARNING statements identify conditions that may result in personal injury if improper procedures are followed.

General Safety

CAUTION

Before applying power to the controller, check that all manufacturing wire connections are tight on relays, contactors, fuse blocks, resistors, and terminals on cards and DIN rail terminals. Connections loosened during shipment may cause damage or intermittent operation.

Other specific warnings and cautions are found where applicable and do not appear in this summary. See the *Elevator Employee Safety and Accident Prevention Program Manual* and the *Elevator Industry Field Employees' Safety Handbook* for electrical equipment safety information on installation and service.

Electrical Safety

All wiring must be in accordance with the National Electrical Code and be consistent with all state and local codes.

Use the Proper Fuse

To avoid fire hazards, use only a fuse of the correct type, voltage, and current rating. See the job specific drawings sheet (Power Supplies) for fusing information.

Electric shocks can cause personal injury or loss of life. Circuit breakers, switches, and fuses may not disconnect all power to the equipment. Always refer to the wiring diagrams. Whether the AC supply is grounded or not, high voltage will be present at many points.

Printed Circuit Cards

Printed circuit boards may be damaged if removed or installed in the circuit while applying power. Before installation and/or removing printed circuit boards, secure all power. Always store and ship printed circuit cards in separate static bags.

Mainline Disconnect

Unless otherwise directed, always Turn OFF, Lockout, and Tagout the mainline disconnect to remove power from elevator equipment. Before proceeding, confirm that the equipment is de-energized with a volt meter. Refer to the *Elevator Employees' Safety and Accident Prevention Program Manual* for the required procedure.

Electrical Safety
(continued)

Test Equipment Safety

Always refer to manufacturers' instruction book for proper test equipment operation and adjustments.

Megger or buzzer-type continuity testers can damage electronic components. Connection of devices such as voltmeters on certain low level analog circuits may degrade electronic system performance. Always use a voltmeter with a minimum impedance of 1M Ohm/Volt. A digital voltmeter is recommended.

When Power Is On

To avoid personal injury, do not touch exposed electrical connections or components while power is ON.

Mechanical Safety

See the *Elevator Employees' Safety and Accident Prevention Program Manual* and the *Elevator Industry Field Employees' Safety Handbook* for mechanical equipment safety information on installation and service.

Arrival of Equipment

Receiving

Upon arrival of the equipment, inspect it for damage. Promptly report all visible damage to the carrier. All shipping damage claims must be filed with the carrier.

Storing

During storage in a warehouse or on the elevator job site, precautions should be taken to protect the equipment from dust, dirt, moisture, and temperature extremes.

Asbestos Compliance

Vertical Express elevator personnel will no longer drill or modify any doors with asbestos containing materials (ACM) or possible asbestos containing materials (PACM). All elevator doors manufactured or installed 1980 and earlier will be treated as having ACM/PACM.

Doors with ACM/PACM should be replaced rather than modified. If replacement is not feasible, abatement modifications shall be done by a licensed asbestos abatement company. tkE mechanics will safely stage the equipment for the abatement team, or remove the doors and seal them with plastic for delivery or pick up by the asbestos abatement company.

Doors manufactured or installed 1980 and earlier may be modified by tkE employees if a test is conducted by a licensed asbestos company prior to work showing zero evidence of ACM/PACM.

All employees that risk exposure to asbestos will complete tkE safety department approved asbestos awareness training.

All employees will stop any work that could expose them to ACM/PACM, and immediately contact their supervisor and their safety manager. All exceptions must be approved by the Director of Health and Safety.

Static Protection Guidelines

IMPORTANT!

Read this page before working with electronic circuit boards.

Elevator control systems use a number of electronic cards to control various functions of the elevator. These cards have components that are extremely sensitive to static electricity and are susceptible to damage by static discharge.

Immediate and long-term operation of an electronic-based system depends upon the proper handling and shipping of its cards. For this reason, Manufacturing bases warranty decisions on the guidelines below.

Handling

- Cards shipped from Manufacturing in separate static bags must remain in the bags until time for installation.
- Anti-static protection devices, such as wrist straps with ground wire, are required when handling circuit boards.
- Cards must not be placed on any surface without adequate static protection.
- Only handle circuit cards by their edges, and only after discharging personal static electricity to a grounding source. Do NOT touch the components or traces on the circuit card.
- Extra care must be taken when handling individual, discrete components such as EPROMS (which do not have circuit card traces and components for suppression).

Shipping

- Complete the included board discrepancy sheet.
- Any card returned to Manufacturing must be packaged in a static bag designed for the card.
- Any card returned to Manufacturing must be packaged in a shipping carton designed for the card.
- “Peanuts” and Styrofoam are unacceptable packing materials.

Failure to adhere to the above guidelines will void the card warranty!

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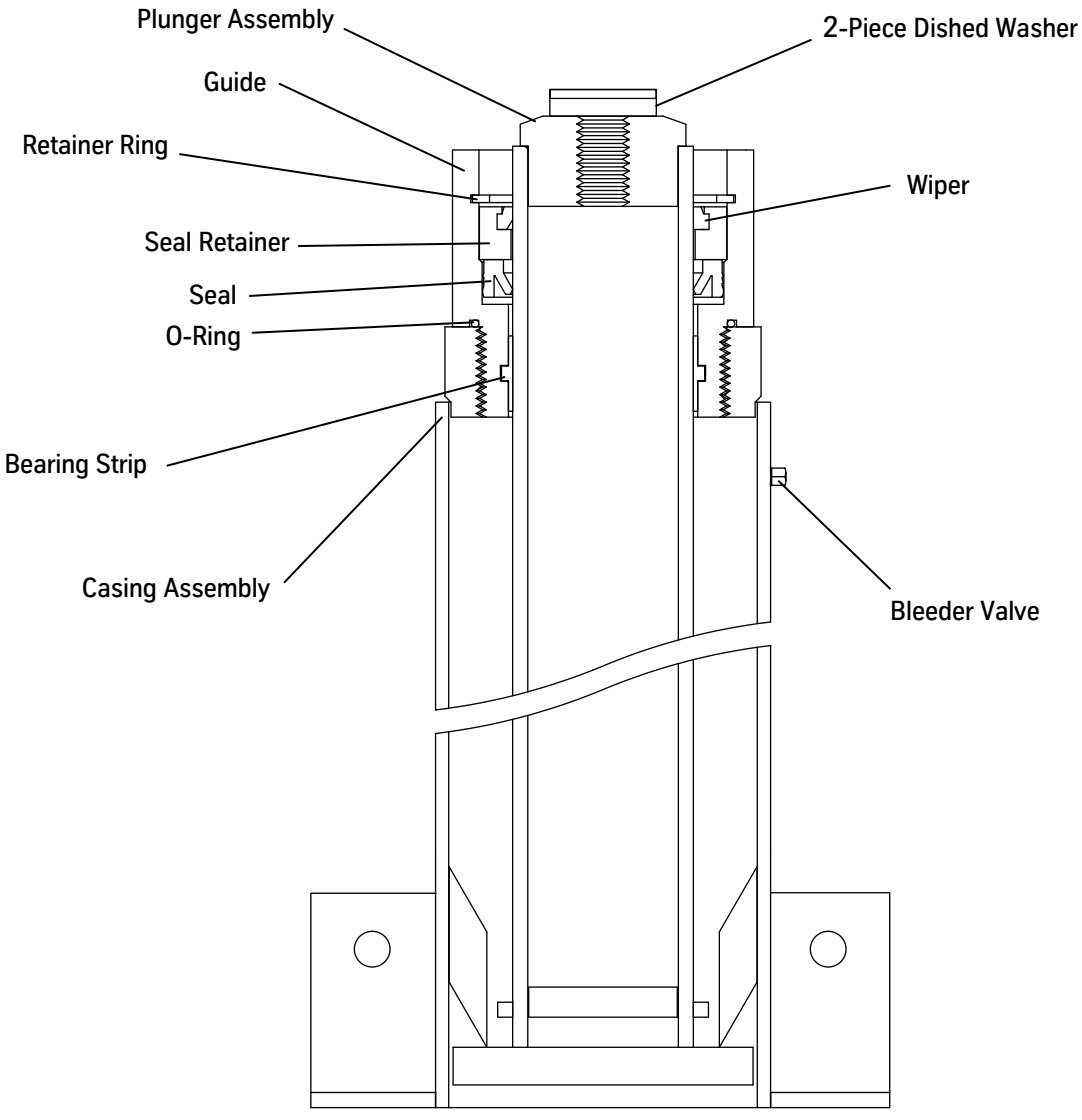
Single-Stage and Two-Stage Telescoping

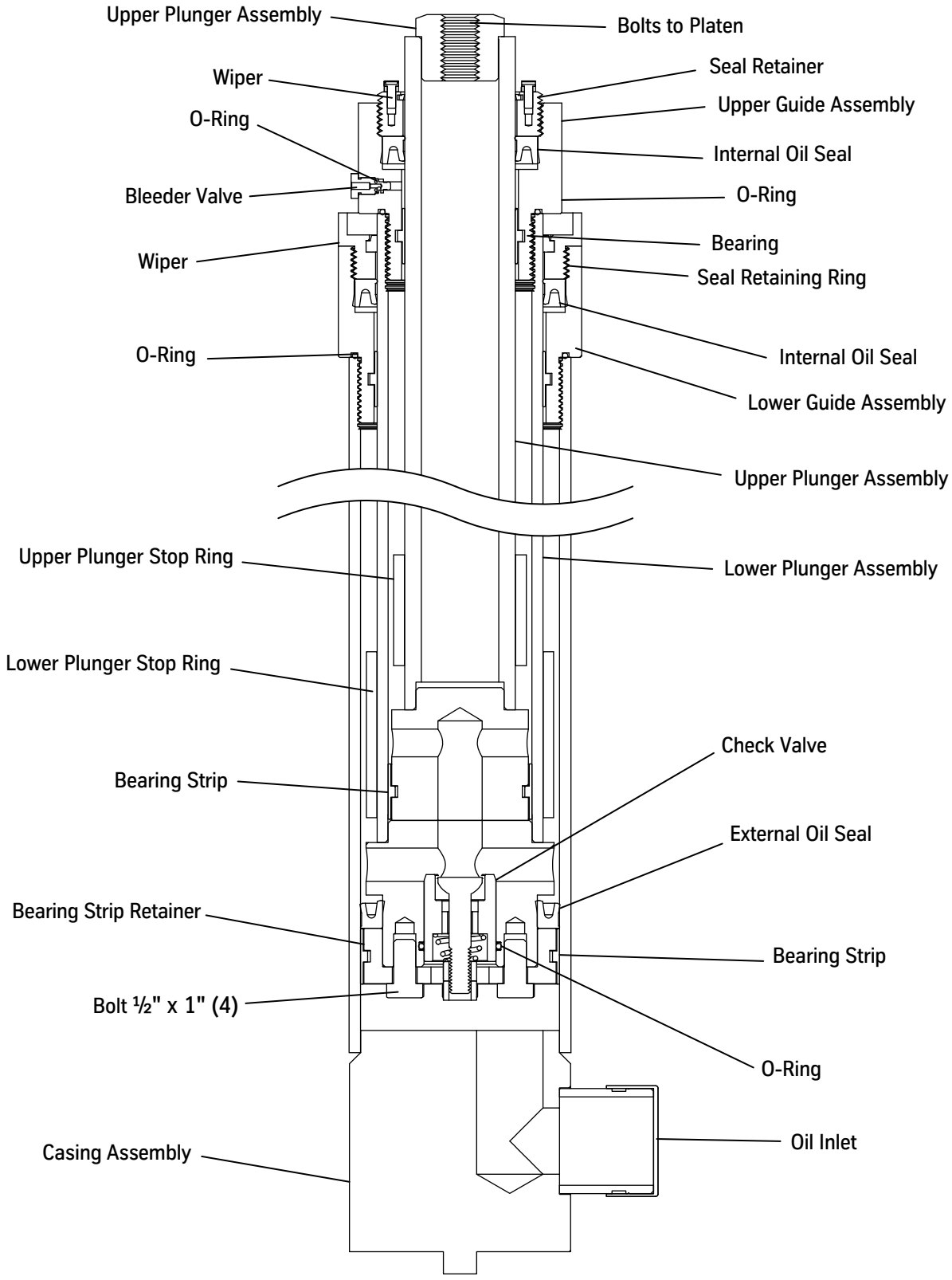
Overview

Single-Stage Jacks, 2-S & 3-S



Overview
(continued)

Two-Stage Telescoping Jacks, 2.5-T & 3-T



Installation

Pit Template

1. Verify that the hoistway position is correct with reference to the building grid or corridor lines (if supplied).
2. Verify that the pit's width and depth are correct per the layout; check the squareness.
3. Place the pit template on the pit floor, and position it per the layout. See Figure 1.
4. Place a laser on each end of the template, and survey the hoistway. See Figure 2 on page 10.
5. Adjust the pit template so that the centerlines of the rail and jack match the layout.
6. Measure from the laser line to the back of the hoistway to ensure that the car has adequate running clearance.
7. Verify that the pit template is level and square, and then use a $^{1}/_{2}$" concrete anchor in each corner to secure the template to the pit floor.

NOTE If the pit depth is correct and the template is within 1" of level side to side, the jacks and buffers can be shimmed when they are installed.

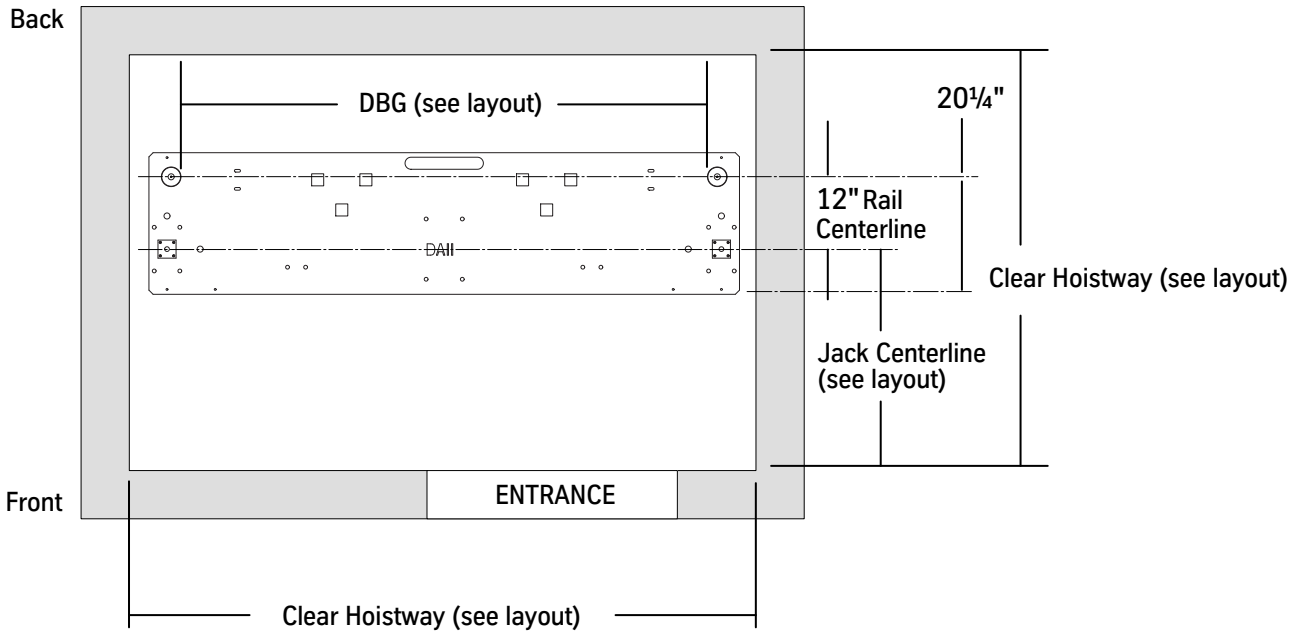


Figure 1 - Hoistway Layout

Pit Template

(continued)

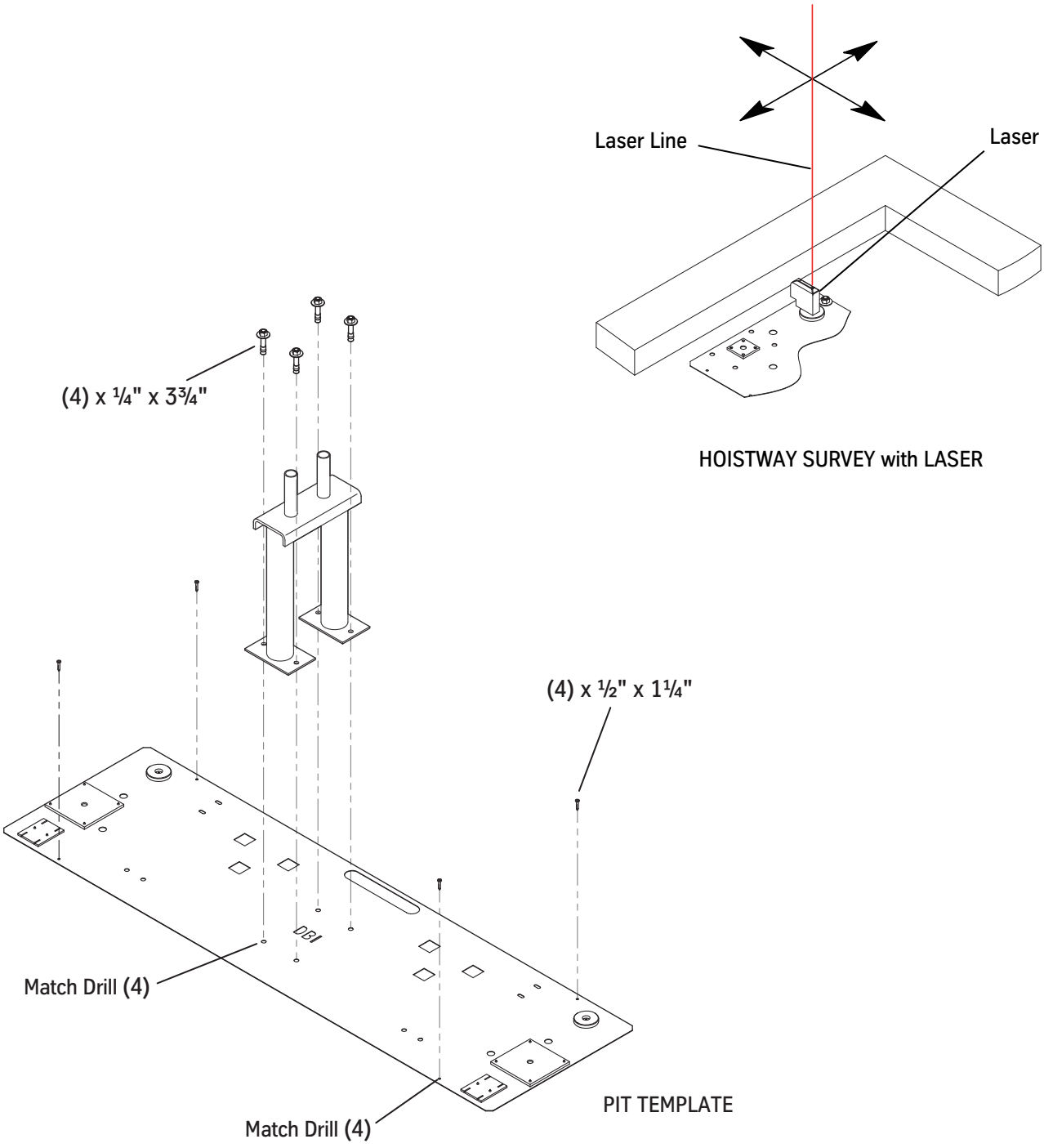


Figure 2 - Pit Template Layout

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 3 on page 12.
2. Install a bottom rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
3. Repeat step 2 for the opposite side bottom rail bracket.
4. Measure the distance between the two rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.
5. Remove the targets from the first set of rail brackets.
6. Install a second tier rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
7. Repeat step 6 for the opposite second tier rail bracket.
8. Measure the distance between the two second tier rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.

Car Rail Brackets
(continued)

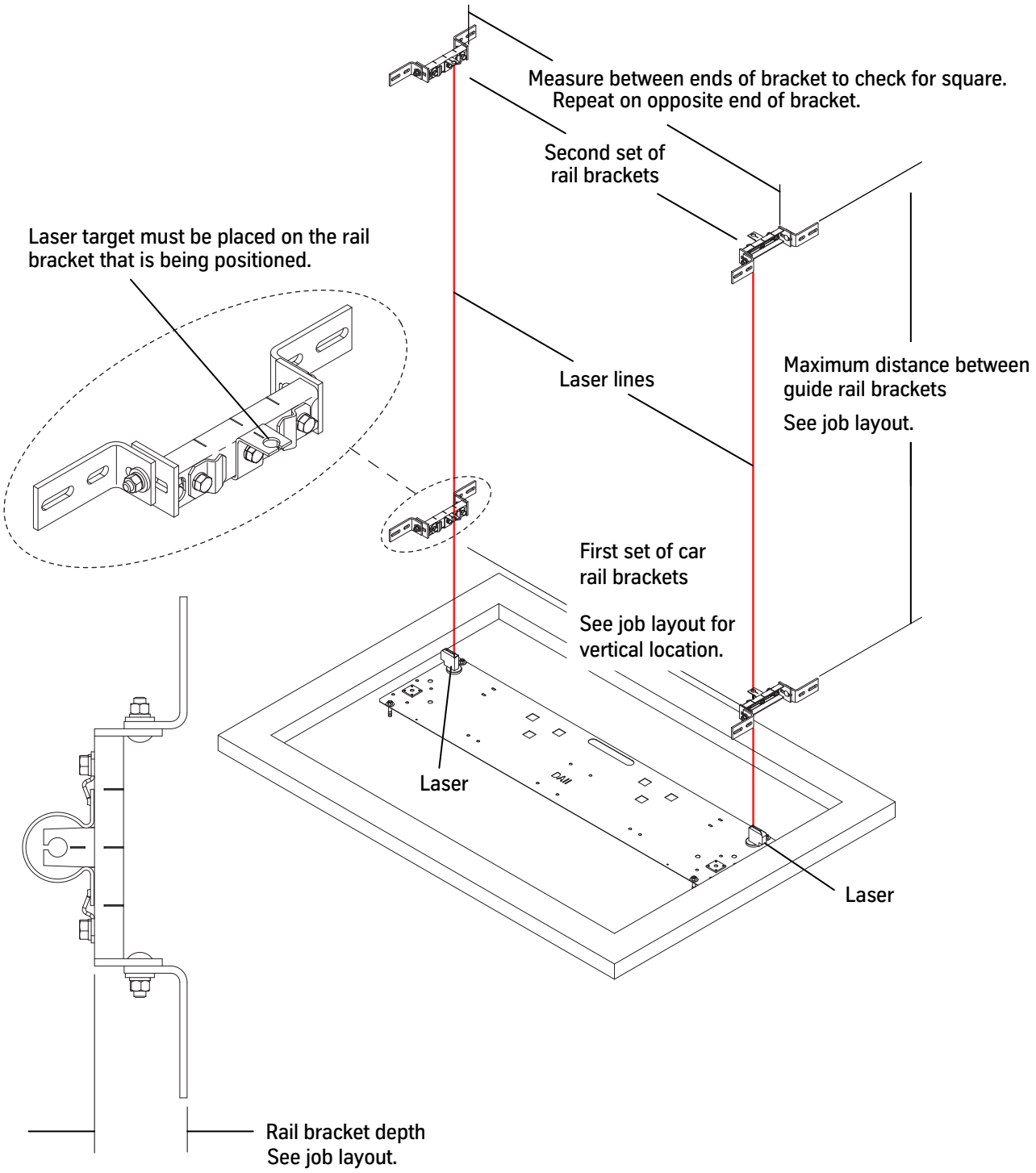


Figure 3 - Car Rail Bracket Installation

Car Rails

- The car starter rails may not be full rails, based on the distance to the second tier of brackets. If necessary, install the cut (top out) rails below the first full rails.
- Use the pit template to locate the bottom rails. Note location of the laser inside the rail.

1. Place the first rail on the template and against the rail bracket(s).
2. Press the rail onto the tapered keyhole brackets. See Figure 4.
3. Use the provided slip clips to attach the rail to the bracket.
4. Tighten the clips with the heel of the clip butted against the rail.
5. Repeat step 1 through step 4 for the opposite side.

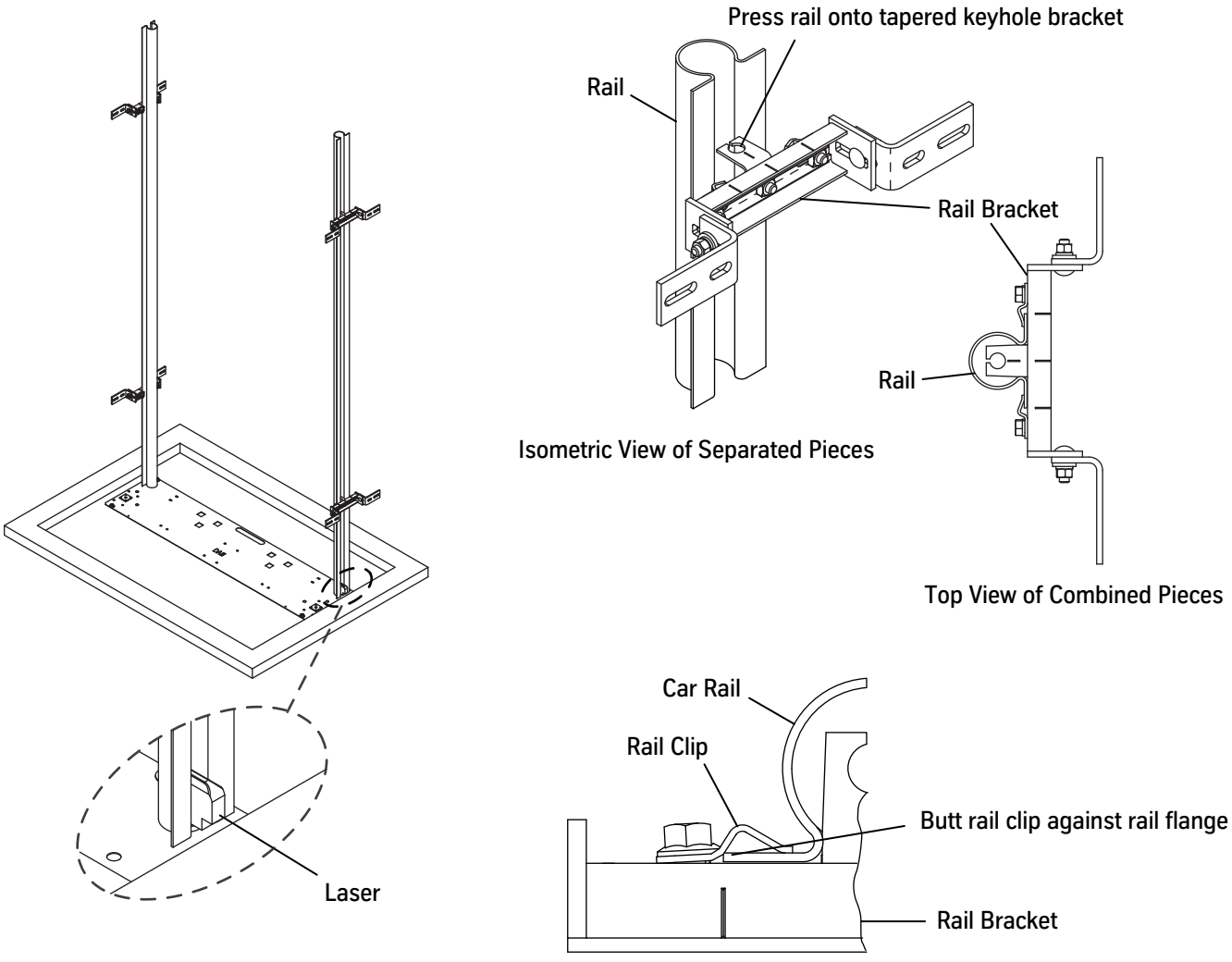


Figure 4 - Car Rail Installation

Jack Installation

See Figure 5 on page 15 for all steps in this procedure.

1. Attach the jack support bracket to the car guide rail just below the top of the jack casing. The jack support bracket does not make the casing rigid.

CAUTION

Do not remove the sonotube or banding from below the lower plunger until all piping is complete and the power unit tank is filled with oil.

2. Remove all sonotube EXCEPT the part below the lower plunger.

3. Hoist the jack into the hoistway and then into the jack hole on the pit template.

NOTE

The square plate welded to the pit template is sized to the diameter of the casing, which can serve as another guide to locate the jack.

4. Loosely attach the jack support bracket to the jack, and adjust the jack to the shown dimension.

5. Install the 90° barbed elbow.

6. Place a laser in the pre-punched holes of the pit template in the shown locations.

7. Turn the jack so that the oil inlet is pointing toward the other jack.

8. Use the laser to plumb the jack, and ensure that dimensions A and B are 2" at each end.

CAUTION

Do not overtighten the bolts of the jack support bracket. The bracket only holds the jack upright and in position while the car is installed or serviced.

9. Tighten all bolts on the jack support bracket.

10. Repeat this procedure for the other jack.

Jack Installation
(continued)

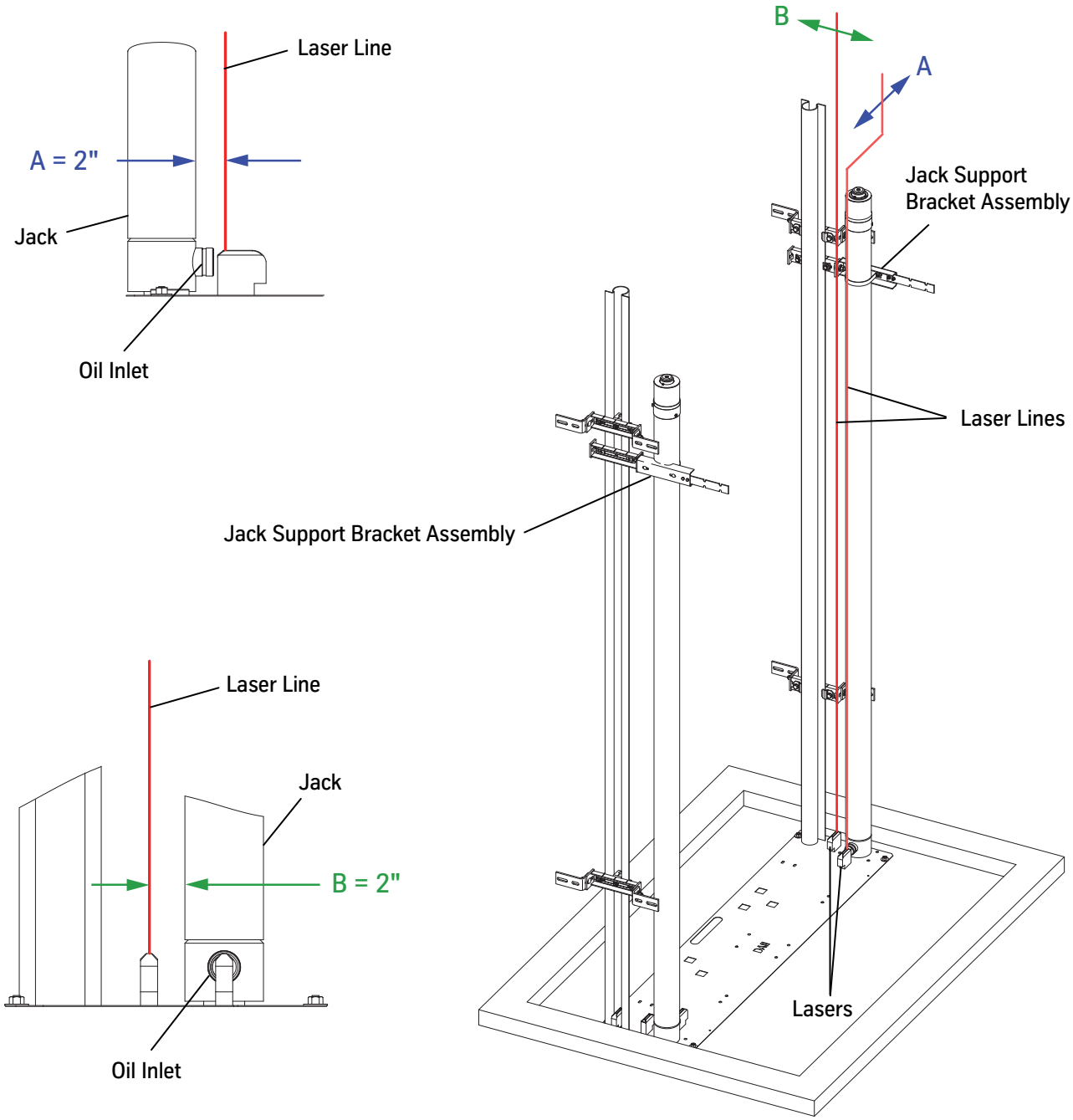


Figure 5 - Jack Installation (Two-Stage Shown)

Piping

1. Place a shallow pan under the oil inlet to catch any residual oil, and then remove the Victaulic coupling and cap from the oil inlet of each jack. Residual oil may amount to as much as a quart.
2. Start installation with the jack that is nearest to the oil line that enters the hoistway, and install the Victaulic tee on that jack. See Figure 6 below and Figure 7 on page 17.
3. Remove any debris from the inside of all pipes.
4. Install the Victaulic couplings, and connect the provided seamless pipe from the tee to the opposite jack inlet.
5. Install the overspeed valve to the tee.
6. Connect the end labeled "JACK" directly to the Victaulic tee.
7. Refer to the job layout, and use the shortest route available to construct the oil line from the overspeed valve to the power unit to avoid building obstructions. Install the shutoff valve as close to the power unit as possible.

WARNING **Do not weld to a ductile iron fitting.**

- Ensure that there is sufficient room to fully open and close the shutoff valve with its handle or lever.
- If the oil line is run in the ceiling:

  » Ensure that the contractor signs the *Remote Elevator Equipment Room Piping Verification* form located in the *Project Management Book*.

  » The oil line must have a label every 10' identifying it as a high-pressure oil line.

8. Use the supplied pipe stands to level and secure the pipe.
9. To ensure the overspeed valve will not set during elevator construction or adjustment of control valve, turn the overspeed valve adjustment screw out (counterclockwise).

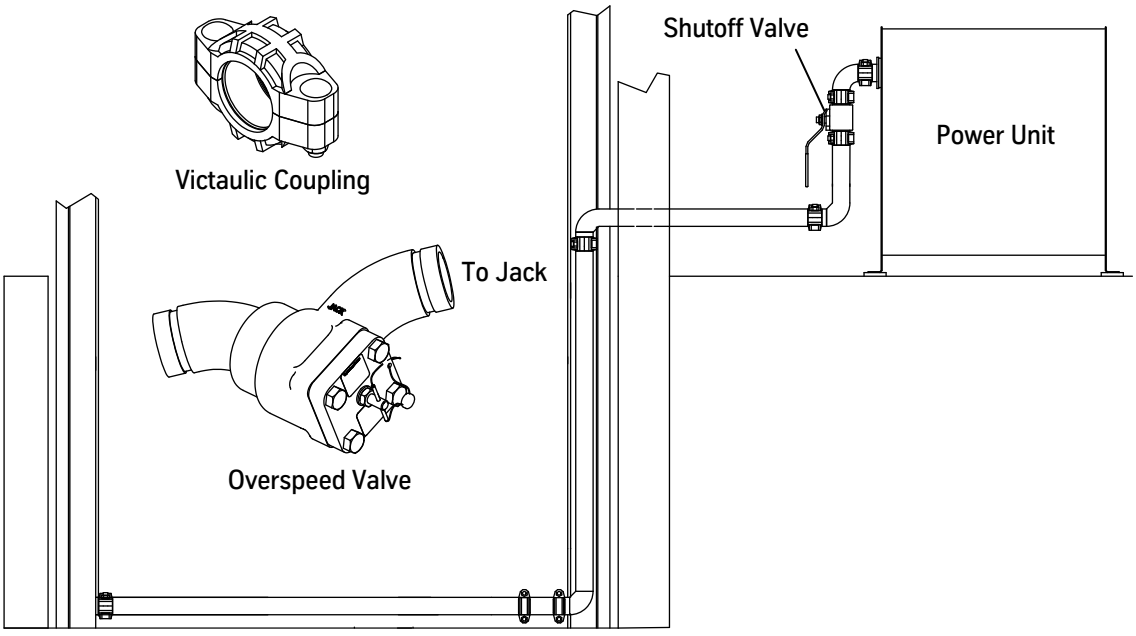


Figure 6 - Piping Installation from the Jack to the Power Unit

Piping
(continued)

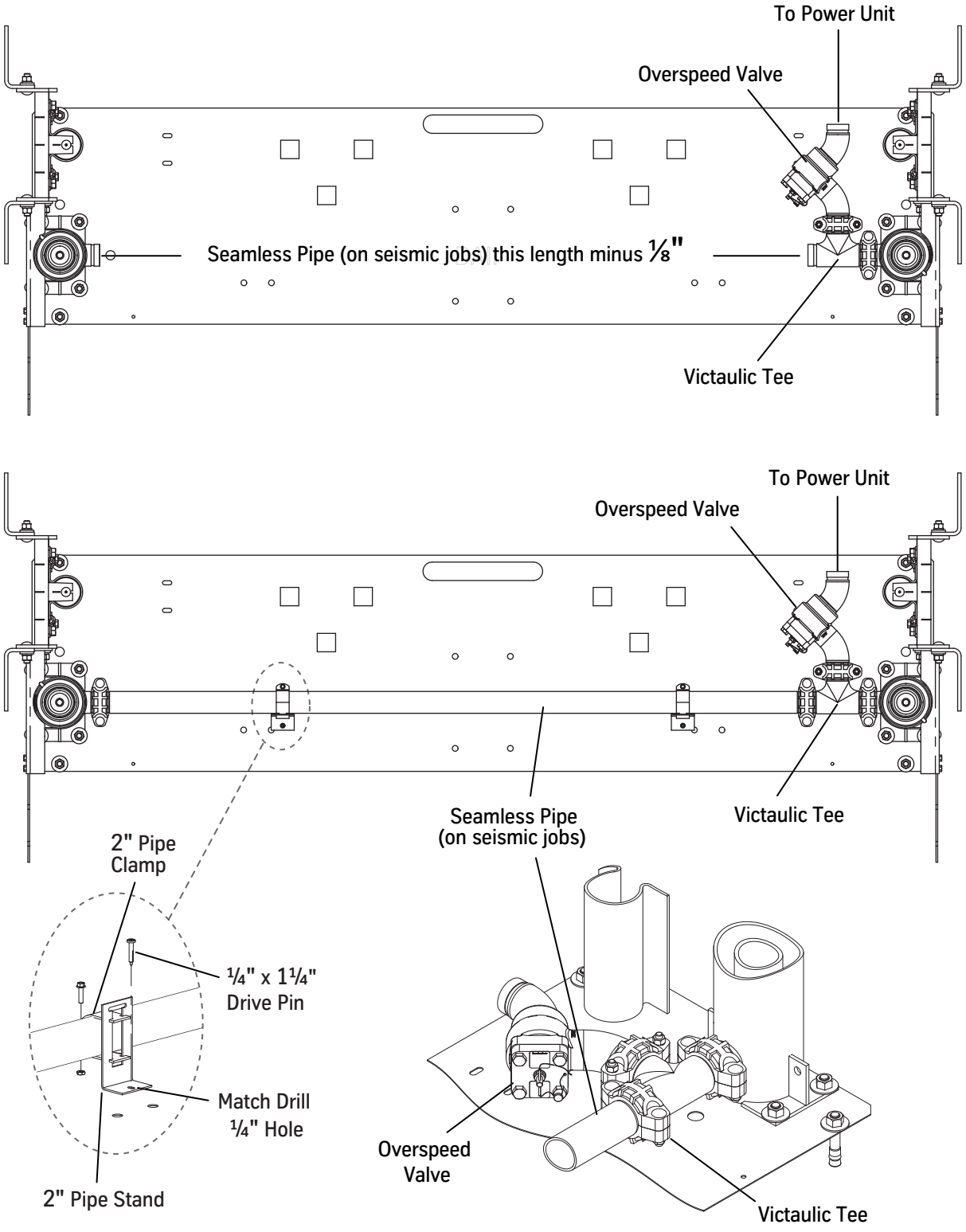


Figure 7 - Piping Between the Jacks

Buffer Stand

1. Place the buffer stand on the pit template. See Figure 8.
2. Shim between the template and the buffer stand to level and plumb the stand.
3. Match drill four holes for $^{1}/_{2}$" concrete anchors. Holes must be a minimum $2^{3}/_{4}$" deep to obtain a minimum $2^{1}/_{4}$" penetration.
4. Anchor the buffer stands with $^{1}/_{2}$" anchors. Leave room for 1" of shimming between the buffer and the pit template. If shimming is not needed during installation, anchors can be driven and tightened later.
5. Install the pit ladder per the layout.

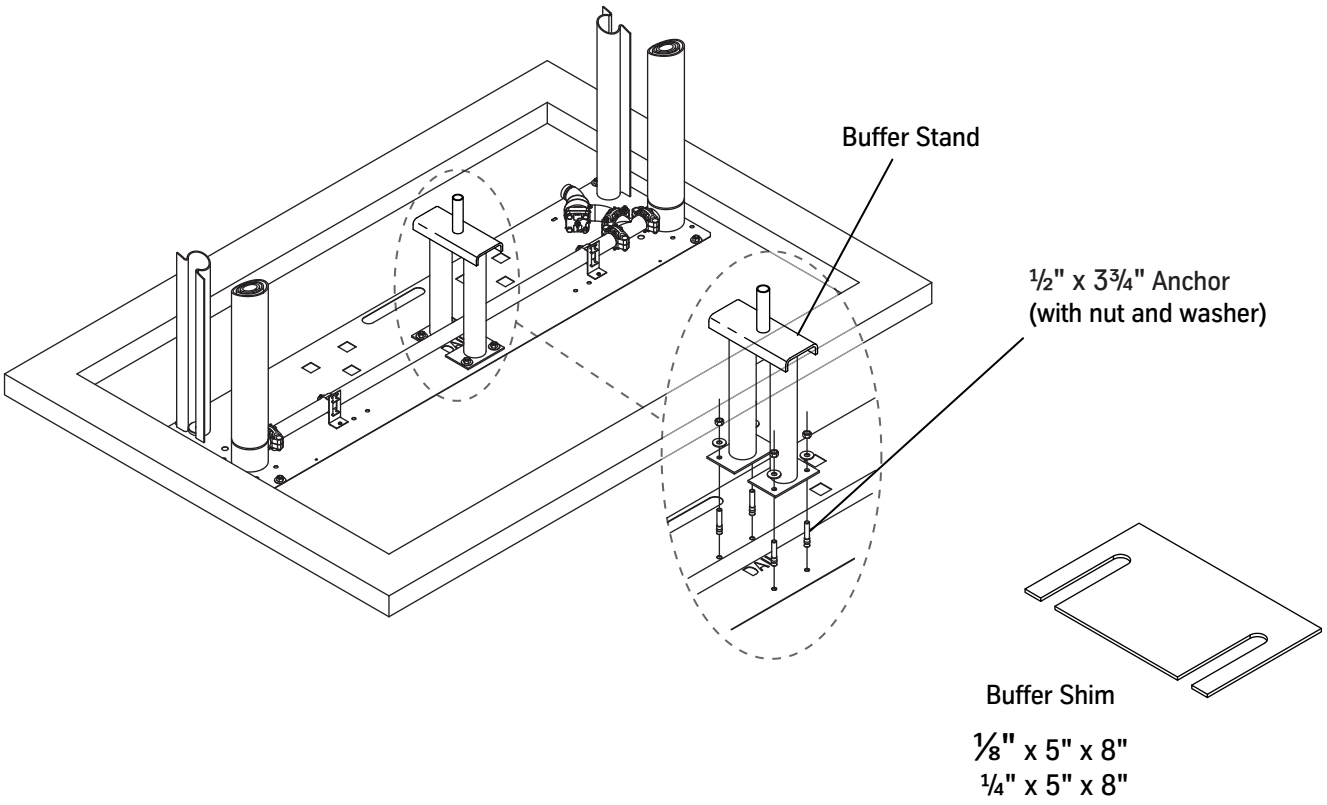


Figure 8 - Buffer Stand Installation

Car Frame

Stiles

1. Use four $^{5}/_{8}$" x $1^{1}/_{4}$" hex head cap screws to bolt a lift bracket/platen to each stile. See Figure 10 on page 20 for all steps in this procedure.
2. Turn the plunger head of each jack until the bleeder valves are pointing to the rear of the hoistway.
3. Fully compress the jacks.
4. Hoist the stile and lift bracket/platen assemblies, and hook them onto the respective plungers.
5. Verify that the tops of the upper plungers are level with each other. If not, place the supplied 1" flat washers between the upper plunger and the lift bracket/platen until level.
6. Install the jump bolt through the lift bracket/platen and into the plunger.
7. Tighten the jump bolt.

NOTE The long shoulder of the bolt does not allow contact between the bolt head and the top of the platen assembly.

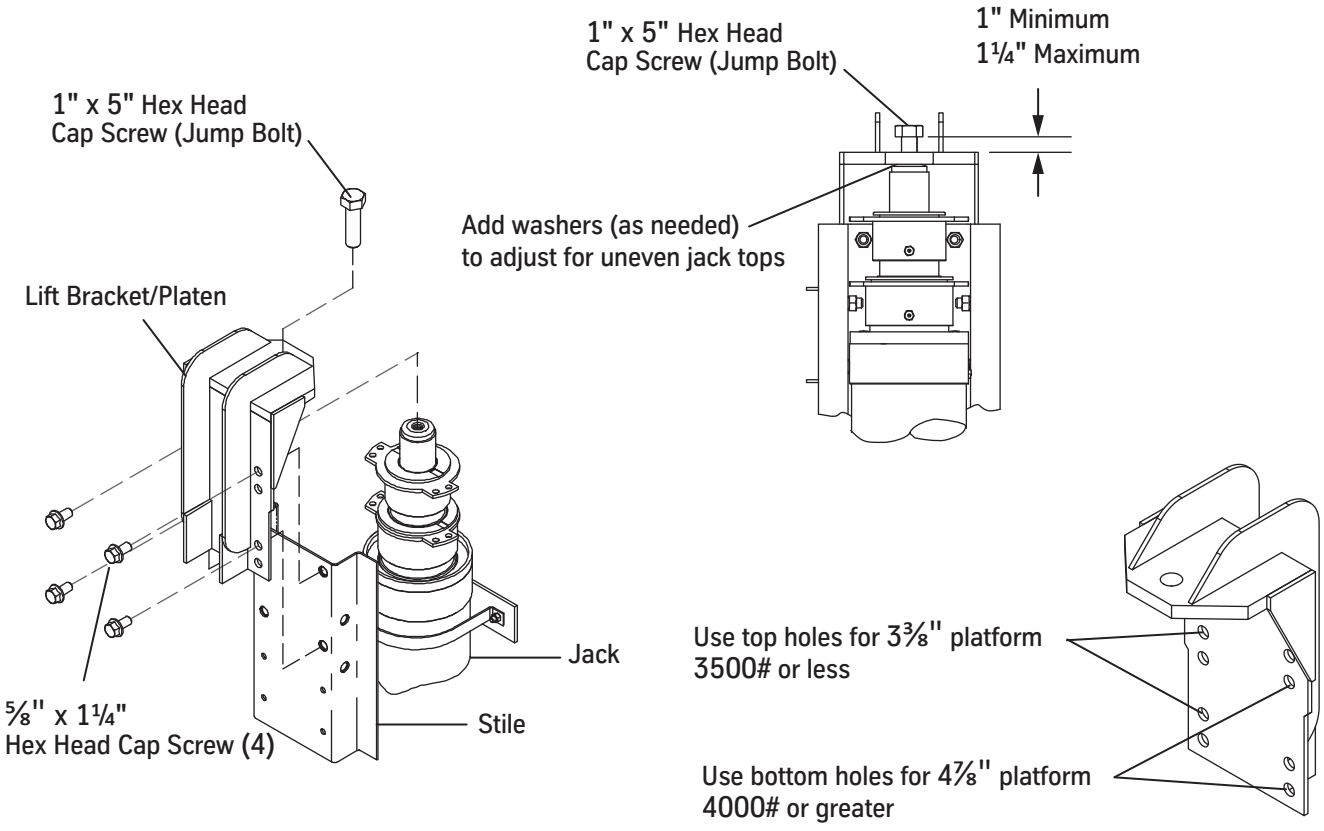


Figure 9 - Lift Bracket/Platen Assembly Mounting on Stile and Jack

Car Frame
(continued)

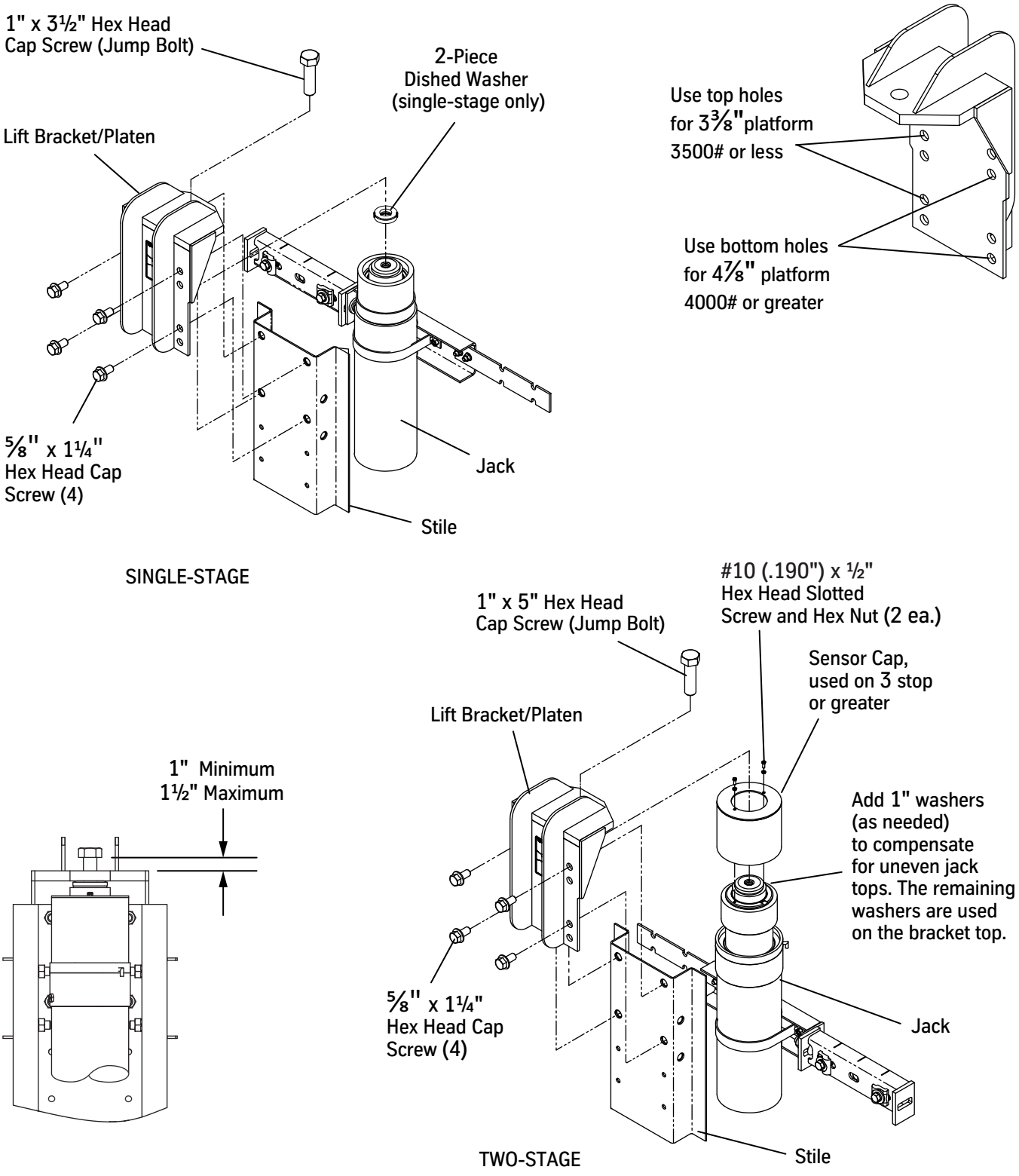


Figure 10 - Lift Bracket/Platen Assembly Installation on Stile and Jack

Car Frame
(continued)

Bolster

1. Snugly fasten the bolster assembly to the stiles. See Figure 11 for all steps in this procedure.
2. Install the bottom guide shoes on the shoe mount bracket.
3. Equally run both of the post-wise adjustment screws in (clockwise) until each slide guide is touching its corresponding rail.
4. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut, and adjust until both sides are equal.
5. Tighten both locknuts on the post-wise adjustment screws.
6. Level and square the bolster channel assembly with the stiles, and then tighten the bolts.

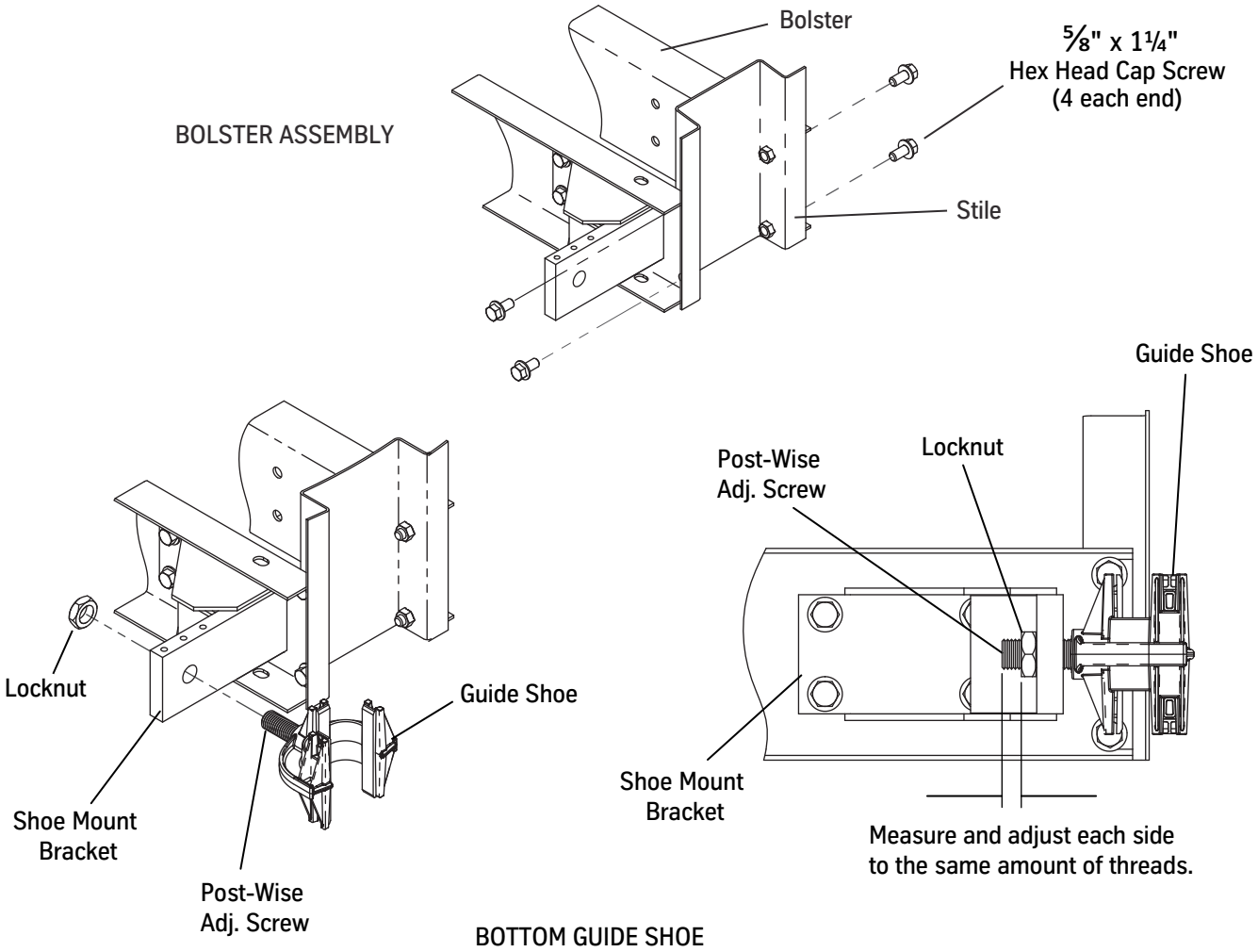


Figure 11 - Install Bolster Assembly and Bottom Guide Shoe

Car Frame
(continued)

Platform

1. Hoist the platform into place, and install the clips and bolts between the platform channels and the tops of the bolster channels. See Figure 12.

2. Adjust the platform to the rails per the job layout dimensions, and then tighten the bolts.

3. Install the four brace rods between the stiles and the four corners of the platform.

NOTE The brace rod goes in the lowest set of $^{5}/_{8}$" holes in the stiles.

4. Level the platform front to back by adjusting the brace rods.

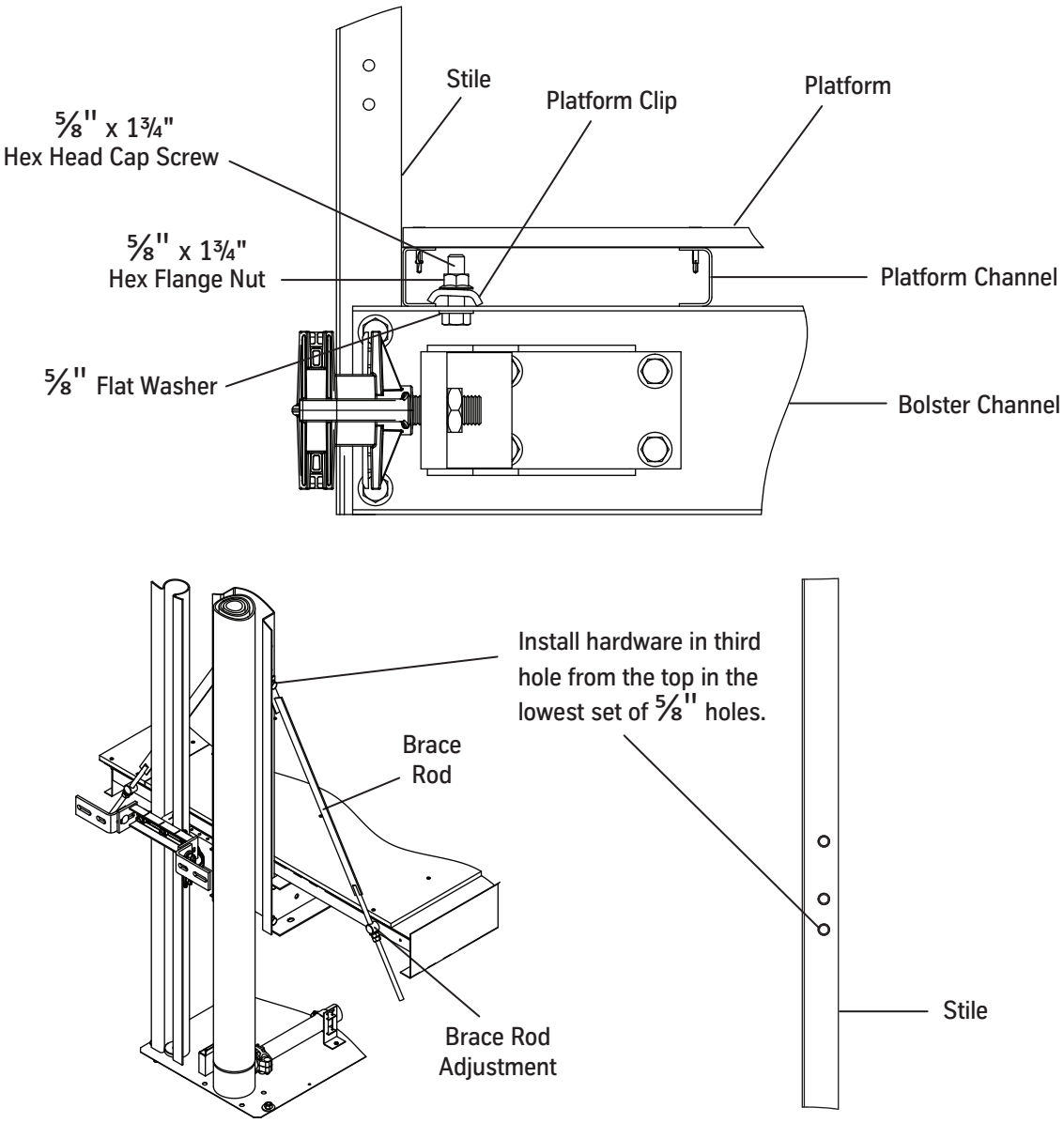


Figure 12 - Platform Installation

Car Frame
(continued)

Crosshead

1. Fasten the two upper guide shoes to the shoe mount bracket on the rear crosshead channel. See Figure 13 for all steps in this procedure.
2. Place the rear crosshead channel between the two stiles in the lowest location, directly above the two rear brace rods about 3' above the platform.
3. Install the hardware to attach the rear crosshead channel to the stiles; do not tighten the bolts at this time.
4. Equally turn both post-wise adjustment screws in until each guide shoe touches its corresponding rail. See also: Figure 11 on page 21.
5. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut, and adjust until both sides are equal.
6. Tighten the locknuts on the guide shoe post-wise adjustment screws.
7. Use the provided hardware to install the front crosshead channel in its permanent location at the top of the stiles; do not tighten the bolts at this time.
8. Verify that the crossheads are square and plumb with the stiles.
9. Tighten all of the hardware in both crosshead channels.

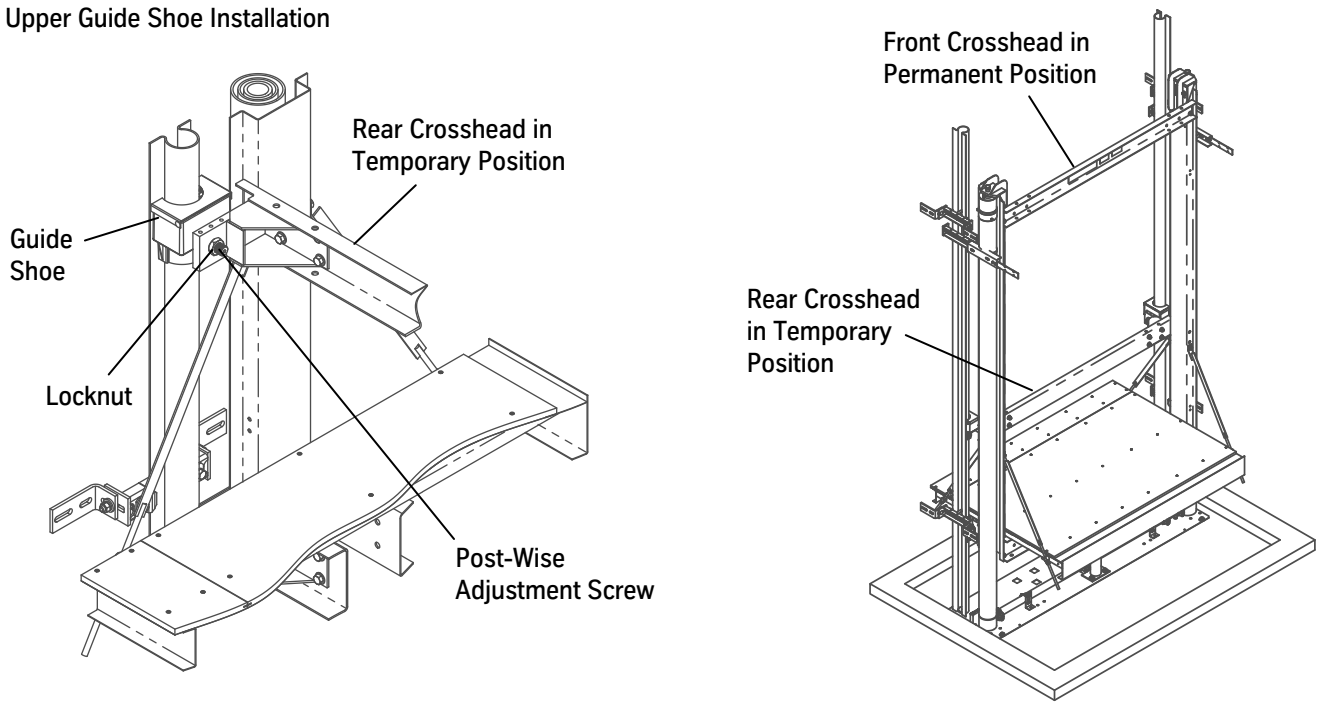


Figure 13 - Crosshead Installation

Car Frame
(continued)

Drip Tube

1. Install the drip tube on the barbed elbow (located on the packing head), and run the tube to a drip pan in the pit. See Figure 14.

2. Tie-wrap the drip tube to the jack to keep the line away from the car frame.

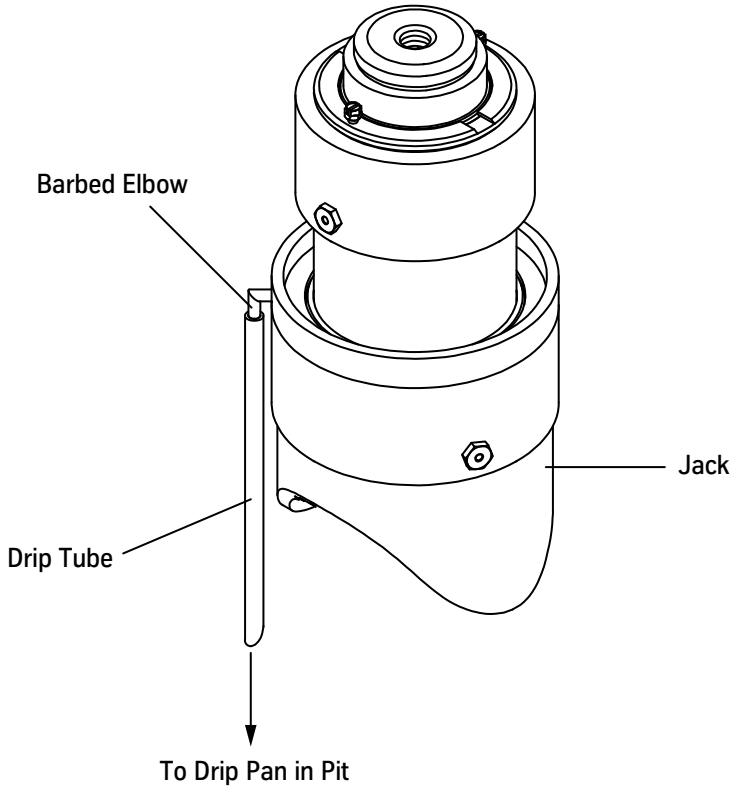


Figure 14 - Drip Tube Installation (Two-Stage Shown)

Temporary Operation

1. Fill the power unit with oil.
2. Energize the power unit until the jacks begin to move to fill empty supply lines with oil.
3. Remove the sonotube from below the lower plunger.
4. Turn OFF, Lockout, and Tagout the mainline disconnect.
5. Follow the directions on the startup card inside the controller.
6. Turn ON the mainline disconnect, and verify operation.

WARNING **Do not attempt to change the phasing between the starter/contactor and the pump motor; swap the phases at the incoming source.**

NOTE If the incoming power is out of phase or the motor runs backward, swap any two leads of the incoming power (starter or terminal block).

Bleed the Jacks

Single-Stage Jacks

1. Slightly open both bleeder ports (located at the top of each jack) to allow air to enter the valve. See Figure 15 on page 26.
2. Momentarily energize the pump motor until oil is visible at the bleeder valve.

CAUTION **One jack will probably purge air before the other, so completely tighten the bleeder valves one jack at a time. Do not overtighten the bleeder valves; very little torque is needed.**

3. When oil appears at the bleeder valve, tighten the valve.

NOTE This procedure may need repeating after the car frame is initially running.

Two-Stage Telescoping Jacks

1. Insert one end of the nylon evacuation tubing from the jack accessory kit into one of the bottom bleeder valves and the other end of the tube into an empty container.
2. Slightly open the bottom bleeder valve on each jack. See Figure 15 on page 26.

NOTE This jack has three bleeder valves. Two are located in the jack casing; use the one that is the most accessible.

Bleed the Jacks
(continued)

3. Momentarily energize the pump motor until oil is visible at the bleeder valves.

CAUTION

One jack will probably purge air before the other, so completely tighten the bleeder valves one jack at a time. Do not overtighten the bleeder valves; very little torque is needed.

4. When oil appears at the bleeder valves, tighten the valves.

5. Progress upward, and repeat this procedure for the other bleeder valve pairs.

NOTE This procedure may need repeating after the car frame is initially running.

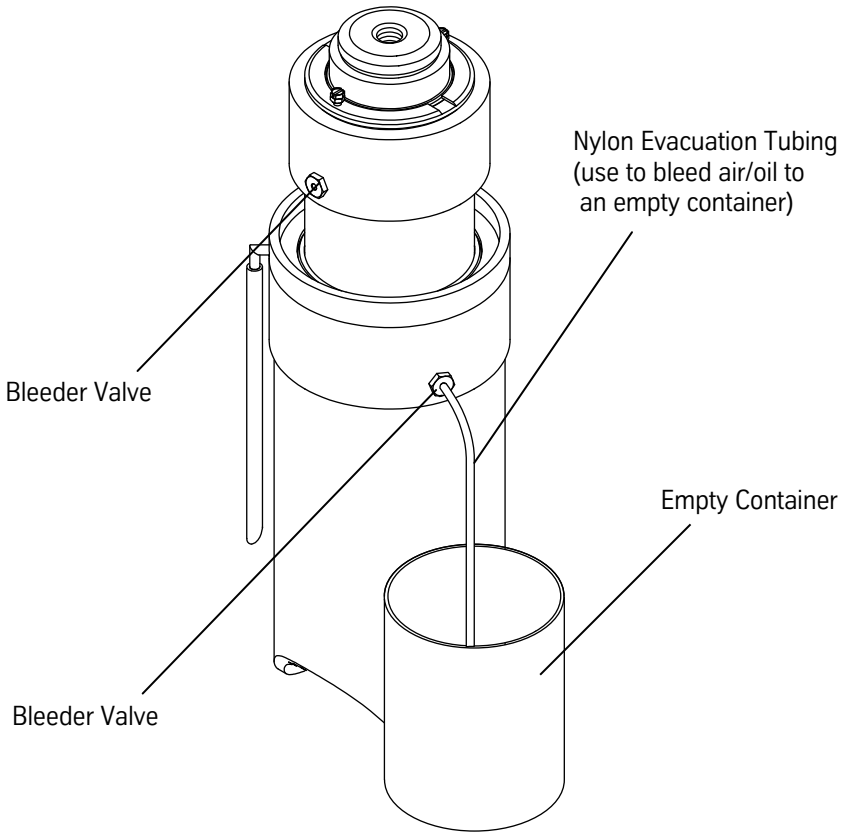


Figure 15 - Bleed the Jacks

Car Guide Rails

WARNING

Do not run the car frame off of the rails. Always be aware of where the top slide guides are in relation to the top of the rail. Do not run the top guide more than 48" above the top installed rail bracket.

1. Place the car frame as close as possible to the top of the rails.
2. Install the lasers on the pit template underneath the rails. See Figure 16 on page 28 for all steps in this procedure.
3. Install the next set of rail brackets. See the job layout for maximum distance between brackets.
4. Use the laser lines and the laser target to adjust both rail brackets.
5. Use a splice clamp to install a splice tube in the existing rail, and tighten the splice.
6. Hoist the new rail up, and slide it down over the splice tube.
7. Install the two remaining splice clamps, and tighten the splice.
8. Repeat step 3 through step 7 for the opposite side.

CAUTION

Before running the car above the splice, the rail splices must be completely tightened.

9. Run the car frame up, and use the supplied clips and hardware to attach the rails to the rail brackets.
10. Completely tighten the rail clips.
11. Repeat step 2 through step 10 for any remaining rail brackets and rails.
12. Clean and file all rail joints.

Car Guide Rails
(continued)

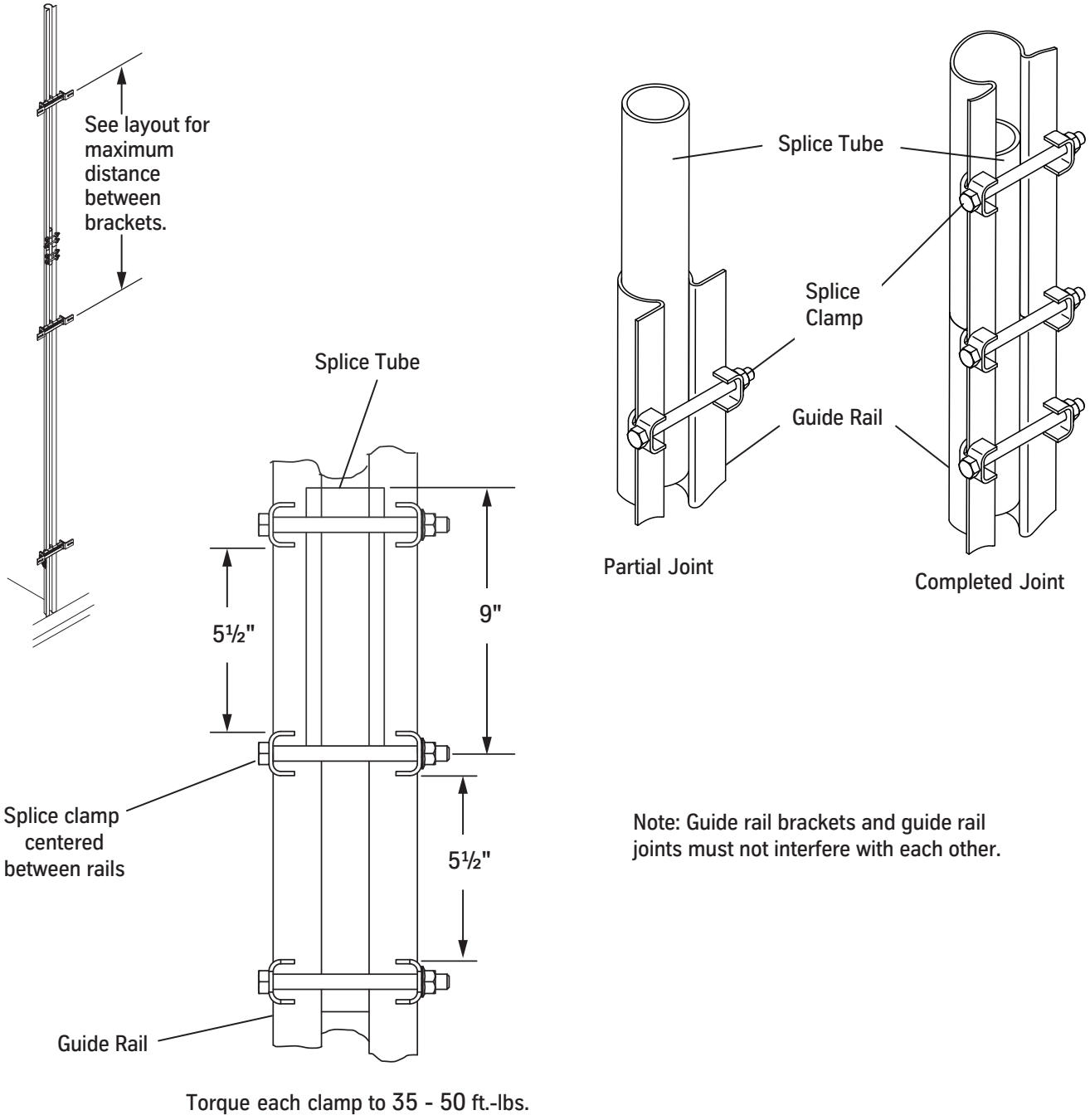


Figure 16 - Rail Splice and Final Rail Installation

Rear Crosshead Channel

1. With the car at the first landing, remove the rear crosshead channel from the stiles, and raise it up to its permanent location at the top of the stiles. See Figure 17.

CAUTION

Do not remove or loosen the slide guides. The adjusted guide shoes will help to hold the crosshead in position until the bolts are in place.

2. Install hardware between the channel and stiles, and completely tighten the hardware.

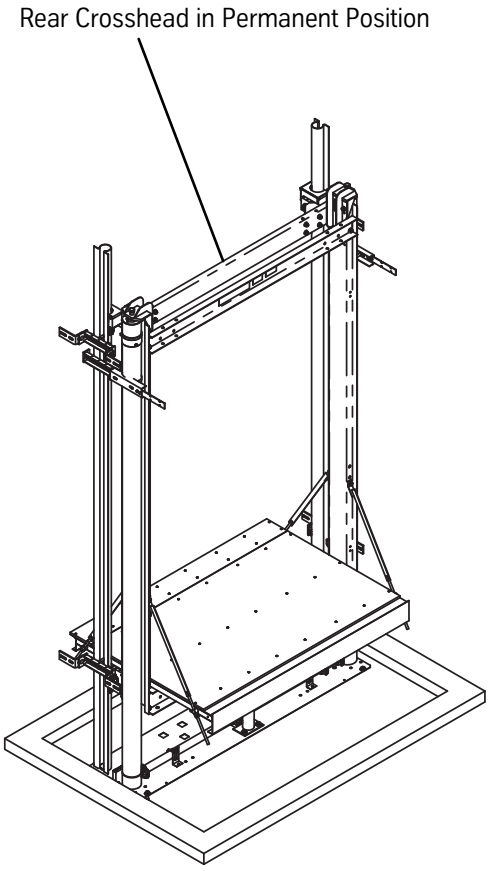


Figure 17 - Rear Crosshead Channel

Install Support Pipes

The support pipes can be stored on the rear wall of an Oildraulic® installation. Job conditions dictate whether the pipes can be stored there.

1. Locate and install the provided anchor bolts. See Figure 18 for dimensions.
2. Place each bracket over a bolt, and tighten the bolt.
3. Place the support pipes on the brackets.

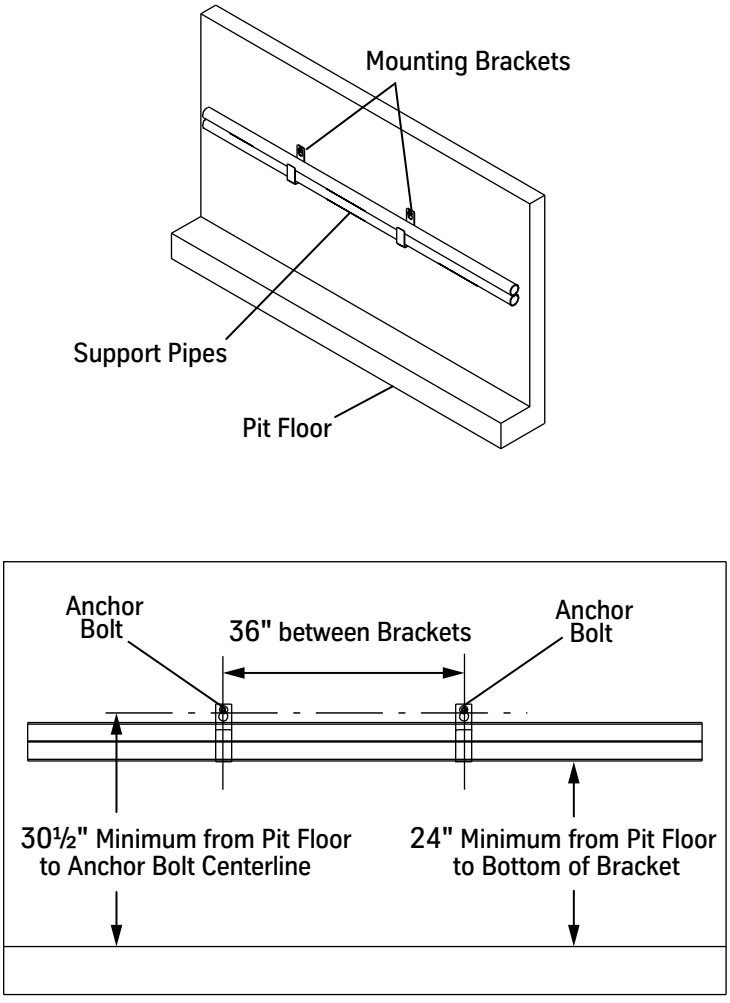


Figure 18 - Support Pipe Mounting Bracket Kit

Sensor Installation

See Figure 19 below and Figure 20 on page 34 for details.

Sensor Requirements

- 2 landing jobs = No sensors.
- 3 landing jobs = 2 dynamic sensors for the top landing.
- 4 or more landing jobs = 2 static sensors for each landing, and 2 dynamic sensors for the top landing.

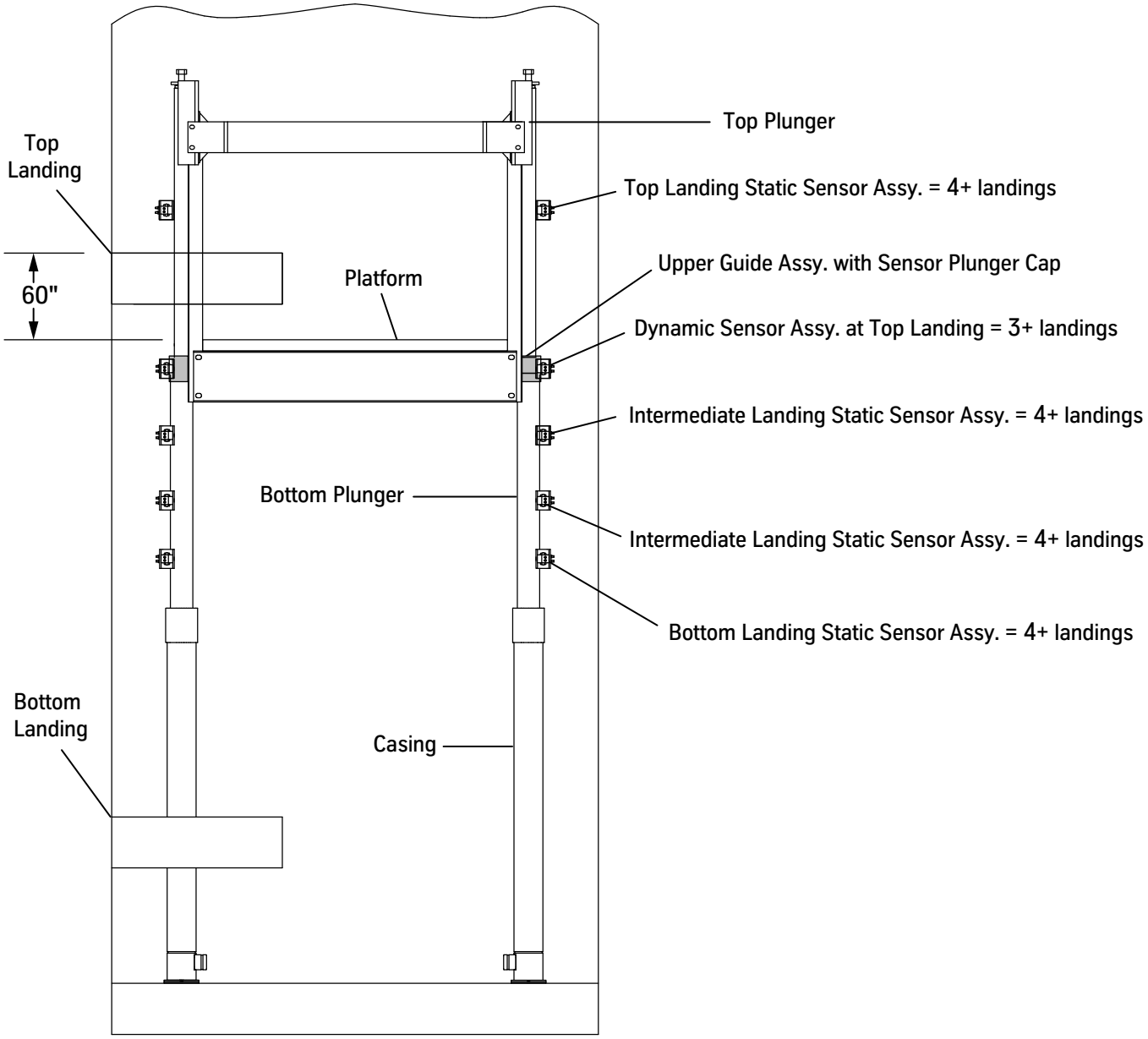


Figure 19 - Hoistway Sensor Installation

Sensor Installation
(continued)

Static Sensors

Activated when the car is stopped level with a landing; when used with 4 or more landing jobs, 2 static sensors are required for each landing.

1. Manually resync the jacks.
   a. Remove the buffer springs.
   b. Move the platform to the bottom landing.
   c. Place the platform on Inspection Operation.
   d. Open the manual lowering valve.
   e. Let the car lower until both jacks are fully collapsed.
   f. Let the platform sit for at least 10–15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.

NOTE Each plunger head must be level with its counterpart.

2. Mount one static sensor on each side of the hoistway at each landing. See Figure 20 on page 34.

IMPORTANT! **Ensure that each sensor pair is placed at exactly the same height in the hoistway because each sensor pair must activate at the same time, $\pm 1/8$".**

   a. If not already there, position the car level with the bottom landing.
   b. Mount a jack sensor assembly on the car rails so that the sensors are vertically aligned with the vertical center of the sensor plunger cap.
   c. Horizontally adjust the sensors so that they overlap the sensor plunger cap by $3/4$". Verify that the sensors will not be activated by the bottom plunger head.
   d. Position the car level with the second landing, and repeat step 2b and step 2c for the second landing.
   e. Repeat step 2b through step 2d for each next intermediate landing.

3. Wire all sensors per the job wiring diagrams.

4. Perform a jack resync, and check the adjustment.

Sensor Installation
(continued)

Dynamic Sensors

Activated when the car is moving into the top landing; when used with 3 or more landing jobs, 2 dynamic sensors are required for the top landing.

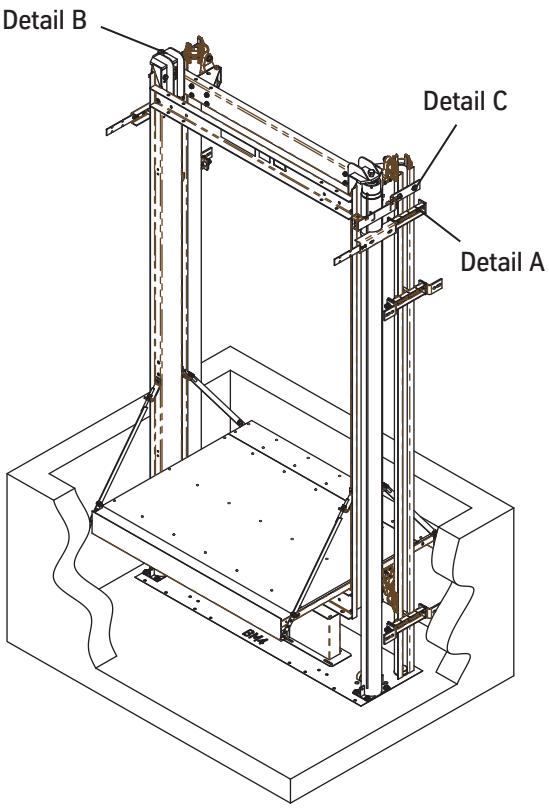
1. Manually resync the jacks.
   a. Remove the buffer springs.
   b. Move the platform to the bottom landing.
   c. Place the platform on Inspection Operation.
   d. Open the manual lowering valve.
   e. Let the car lower until both jacks are fully collapsed.
   f. Let the platform sit for at least 10–15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.
2. Position the platform level with the top landing.
3. Install the buffer springs (if they have been removed).
4. Lower the platform 60" from the top landing.
5. Locate the top of the upper guide sensor cap, and mark the guide rail at that point.
6. Mount a dynamic sensor assembly on guide rail with the top of the sensor assembly bracket roughly level with the top of the sensor plunger cap.
7. Level the sensor assembly front to back and side to side.
8. Repeat step 5 through step 7 for the other side.
9. Level the two sensors with each other. Do not use sensor plunger caps for reference.

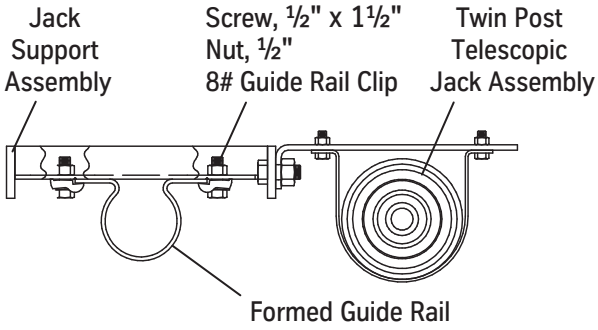
IMPORTANT!

Ensure that each sensor pair is placed at exactly the same height in the hoistway because each sensor pair must activate at the same time, $\pm 1/8$".

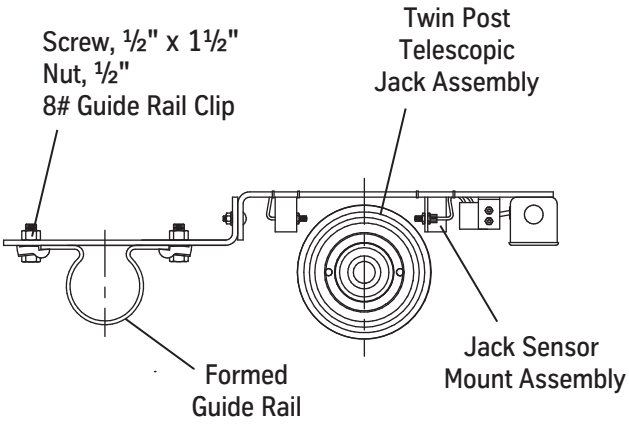
10. Horizontally adjust the sensors so that they overlap the sensor plunger cap by $3/4$". Verify that the sensors will not be activated by the bottom plunger head.
11. Wire the sensors per the job wiring diagrams.
12. Perform a jack resync.

Sensor Installation
(continued)

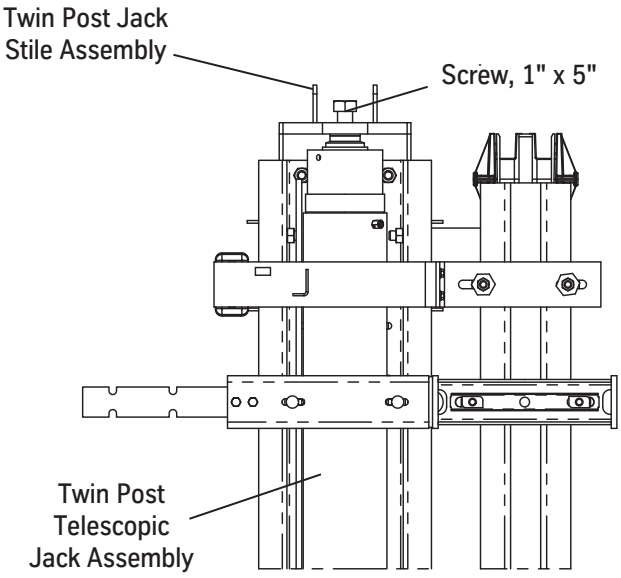




DETAIL A - JACK ASSEMBLY TO GUIDE RAIL



DETAIL C - SENSOR MOUNTING



DETAIL B - STILE ASSEMBLY

Figure 20 - Sensor Installation

Pit Depth Verification After Elevator Installation

1. Place the car at the bottom landing.
2. Turn OFF, Lockout, and Tagout the mainline disconnect.
3. Use the manual lowering valve to lower the car down onto the buffer springs.
4. Open the bottom landing hoistway doors.
5. Measure the distance from the hoistway sill to the car sill, and record this measurement as dimension A.
6. Close the manual lowering valve.
7. Turn ON the mainline disconnect.
8. Run the car up far enough to gain access into the pit.
9. Turn OFF, Lockout, and Tagout the mainline disconnect.
10. Remove the buffer springs.
11. While in the pit, verify that there is nothing to interfere with the car being lowered into the pit; e.g., sprinkler heads.
12. Turn ON the mainline disconnect.
13. Place the car at the bottom landing.
14. Turn OFF, Lockout, and Tagout the mainline disconnect.
15. With the manual lowering valve, lower the car until the jacks bottom out.
16. Check that both jacks are fully collapsed, and open the bottom landing hoistway doors.
17. Measure the distance from the hoistway sill to the car sill, record this measurement as dimension B, and then close the manual lowering valve.
18. Subtract dimension A from dimension B; B - A = C. The value of C should be $2^{1}/_{4}$" to $2^{1}/_{2}$". If not, make necessary corrections before attempting a resync.
19. Turn ON the mainline disconnect, and return the car to service.

Maintenance

Maintenance for Single-Stage Twin Post Jack

See also: Maintenance for Two-Stage Twin Post Telescoping Jack, 2.5-T & 3-T on page 39.

Refer to the *Maintenance Control Program* (MCP) binder for required inspections.

Replace Jack Seals (3" & $3^{7}/_{8}$" diameter)

Seal Removal

1. Place the car on Inspection Operation.
2. Lower the car down onto the buffer springs.
3. Turn OFF, Lockout, and Tagout the mainline disconnect.
4. Remove the jump bolt.
5. Open the manual lowering valve.
6. Remove the lift bracket/platen assembly from the stile. Retain the two beveled washers between the jack and lift bracket/platen assembly. See Figure 21 on page 37.
7. Push the plunger down until it bottoms out in the casing.
8. Close the shutoff valve.
9. Use two flat blade screwdrivers to remove the retainer ring.
10. Screw two #10-24 screws into the tapped holes in the seal retainer.
11. Use a pair of pliers to grasp the screws, and pull the seal retainer from the recess.
12. Screw packing removal tools or two drywall screws into the seal.
13. Without scratching the plunger or the seal recess in the guide, pull the seal from the recess.
14. Use clean rags to remove all oil from the seal recess. A new seal will not seat properly in a recess containing oil.
15. Polish out any scratches in the seal recess. If there are any scratches that can cut the seal, replace the guide.

Replace Jack Seals
(continued)

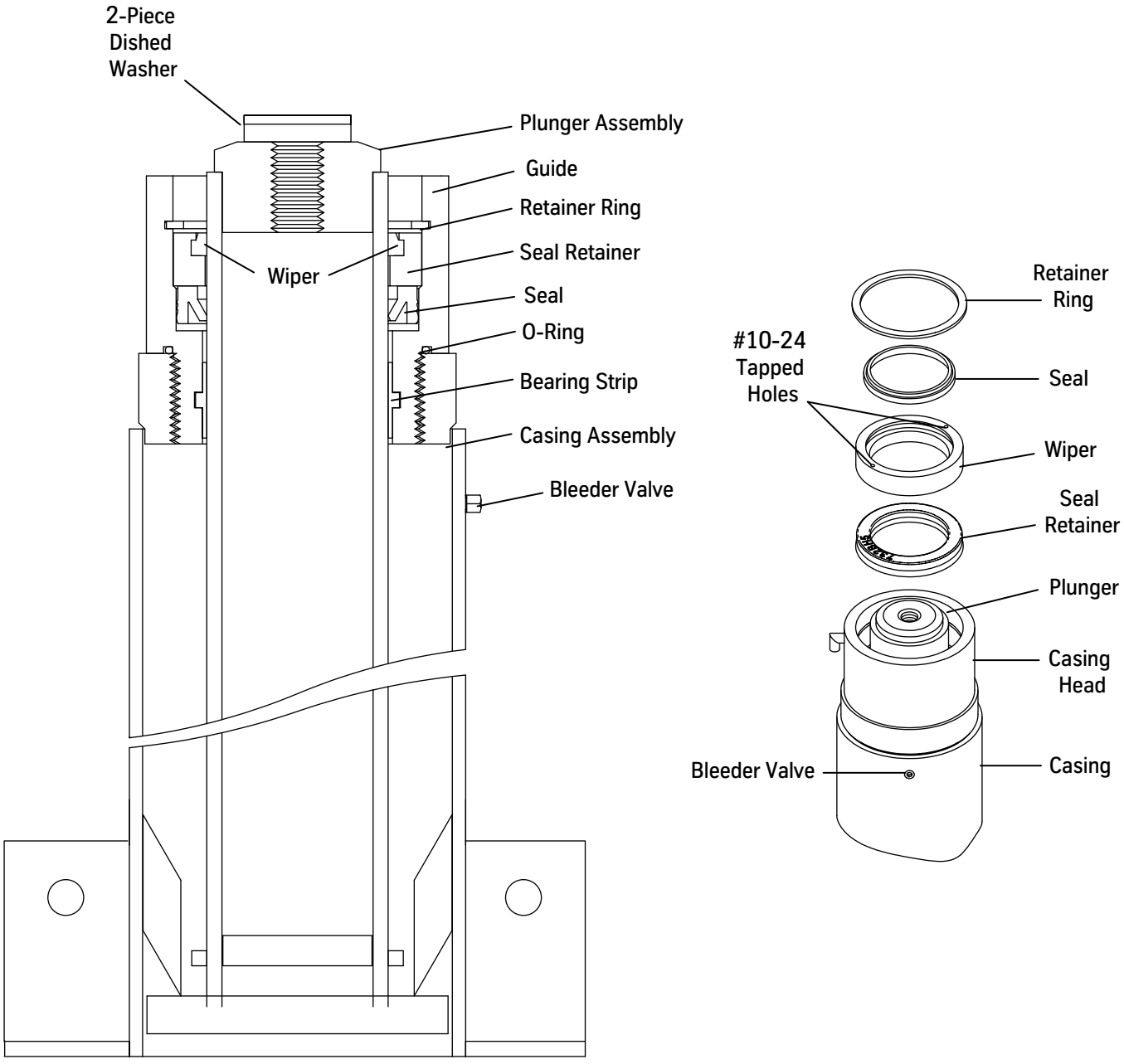


Figure 21 - Remove and Replace Jack Seals

Replace Jack Seals
(continued)

Install New Seal

1. Open the bleeder valve.
2. Lubricate both the outside and the inside of the new seal.

CAUTION **Do not drive the seal in.**

3. Push the seal over the plunger and down into the seal recess until it bottoms out.
4. Close the bleeder valve.
5. Place the seal retainer with the wiper over the plunger and down into the recess. Ensure that the top of the seal retainer is below the retainer ring groove.

CAUTION **The retainer ring must be fully seated in the groove.**

6. Install the retainer ring.
7. Close the manual lowering valve, and open the shutoff valve.
8. Re-attach the lift bracket/platen assembly to the stile.
9. Turn ON the mainline disconnect.
10. Install two bevel washers between the jack and lift bracket/platen assembly.
11. Place the car on Inspection Operation, and carefully run the jack up until it contacts the lift bracket/platen assembly.
12. Install the jump bolt.
13. Run the jack up 12" – 18" to restore system pressure.
14. Bleed the jacks of air.

Maintenance for Two-Stage Twin Post Telescoping Jack, 2.5-T & 3-T

Replace Jack Seals and Check Valves

Recommended Tools

- Chain hoist
- Jack straps
- Eye bolts
- 5-gallon container
- Small electric pump
- Strap wrench

Required Tools	Part No.	Print No.	Description	Use
2.5-T Jack	9845604	850RH2	Bullet Seal Tool	Install the pre-assembled casing head.
	—	850RP1	Seal Tool	Install the lower plunger assembly; gets the bottom seal across the casing threads.
	9844211	850RM1	Plunger Head Seal Loading Tool	Head pre-assembly; gets the head seal past the threads in the lower plunger head.
	9844119	850RR1		Head pre-assembly; gets the head seal past the threads in the casing head.
	—	200AHE12	Seal Valve Kit	Field replacements.
3-T Jack	9845630	850RK2	Bullet Seal Tool	Install the pre-assembled casing head.
	—	850RL1	Seal Tool	Install the lower plunger assembly; gets the bottom seal across the casing threads.
	9844200	850RT1	Plunger Head Seal Loading Tool	Head pre-assembly; gets the head seal past the threads in the lower plunger head.
	9844302	850RV1	Plunger Head Seal Loading Tool	Head pre-assembly; gets the head seal past the threads in the casing head.
	—	200AHE13	Seal Valve Kit	Field replacements.

1. Run the car to the top landing and secure it, but leave room to access the car top.

CAUTION

Verify that the jack support bracket assembly is properly installed.

2. Remove the jack jump bolts.
3. Collapse the plunger assemblies.
   a. Count and record the number of turns, and fully close the down stop adjustment.
   b. Count and record the number of turns, and open the manual lowering valve.
4. Remove the lift bracket/platen assembly from both stiles.
5. Use a strap wrench to remove the upper plunger guide assembly. Leave the seal retainer in place.
6. Screw the eye bolt into the upper plunger, and hoist it out of the jack. Stand the upper plunger in the pit beside the car.
7. Inspect and, if necessary, repair the surface finish of the upper plunger.

CAUTION

Do not allow any sanding debris to contaminate the wipers and seals.

   a. Use a 240–320-grit emery cloth to carefully remove deep scratches, burrs, etc.
   b. Polish the area with a 600-grit emery cloth.

Replace Jack Seals
(continued)

8. Use a strap wrench to remove the lower plunger guide assembly. Leave the seal retainer in place.
9. Temporarily reassemble the upper plunger guide assembly to the lower plunger.
10. Insert the inlet hose from the small electric pump into the casing beside the lower plunger.
11. Place a strap choke under the upper plunger guide, and lift the lower plunger out of the jack.
12. As the plunger is hoisted, pump the oil into the five-gallon container.

NOTE The seal will hang on the casing threads when the lower plunger is lifted. Move the lower plunger from side to side to get the seal past the threads.

13. Leave the lower plunger suspended.
14. Inspect and, if necessary, repair the surface finish of the lower plunger.

CAUTION **Do not allow any sanding debris to contaminate the wipers and seals.**

a. Use a 240–320-grit emery cloth to carefully remove deep scratches, burrs, etc.
b. Polish the area with a 600-grit emery cloth.

Repair the Jack

See Figure 22 on page 42 for all steps in this procedure.

Lower Plunger

1. Replace the seals and the check valve O-ring of the lower plunger.
   a. With the lower plunger suspended, remove the $^1/_2$"x 1" hex head cap screws, the seal retainer, and the bearing strip from the bottom of the lower plunger.
   b. Remove the external oil seal from the lower plunger base.
   c. Remove the check valve and O-ring from the check valve bore.
   d. Disassemble the check valve, and replace the O-ring on the check valve plunger.
   e. Reassemble the check valve, run the nuts together by hand, and then torque them 12–13 ft.-lbs.
   f. Install a new O-ring in the check valve bore, and then install the check valve.
   g. Install a new external oil seal on the lower plunger base.
   h. Use a $^1/_2$" x 1" hex head cap screw to attach the seal retainer to the lower plunger base, and then tighten to 30 ft.-lbs.
   i. Install a new bearing strip on the seal retainer.
2. Place the external seal tool over the top of the casing.
3. Inspect and, if necessary, repair the surface finish of the lower plunger.
4. Lower the lower plunger into the jack casing.

Repair the Jack
(continued)

5. Remove the upper plunger guide from the lower plunger.
6. Remove the external seal tool from the top of the casing.
7. Disassemble the lower plunger guide and then discard wiper, internal oil seal, and O-ring.
8. Clean the lower plunger guide parts.
9. Use a new wiper, a new internal oil seal, and a new O-ring to reassemble the lower plunger guide. Apply grease to the O-ring to hold it in place.
10. Place the bullet seal tool into the top of the lower plunger.
11. Install the lower guide on the casing.
12. Remove the bullet seal tool.

Upper Plunger

1. Suspend the upper plunger over the jack assembly.
2. Replace the bearing strip.
3. Inspect and, if necessary, repair the surface finish of the upper plunger.
4. Lower the upper plunger into the lower plunger.
5. Disassemble the upper plunger guide, and then discard the wiper, internal oil seal, and O-ring.
6. Clean the upper plunger guide parts.
7. Reassemble the upper plunger guide with a new wiper, a new internal oil seal, and a new O-ring. Apply grease to the O-ring to hold it in place.
8. Install the upper plunger guide on the lower plunger.
9. Close the manual lowering valve.
10. Remove the rubber hose from the quick connect of the silencer.
11. Open all of the bleeder valves until the air stops and oil begins.
12. Close the bleeder valves.
13. Install the lift bracket/platen assembly on each stile.

CAUTION

When extending the plungers, be careful not to hit the sensors or allow the car frame to scratch the plungers.

14. Jog the power unit to run the jacks up to the lift bracket/platen assembly.

NOTE

If the upper plungers do not extend, continue running the pump. When the lower plunger hits its stop ring, the increase in pressure will open the valve in the bottom of the lower plunger, forcing oil into it and the upper section. The increase in pump noise and jack vibration is normal.

Repair the Jack

(continued)

15. Continue running the pump until the plungers have reached their respective lift bracket/platen assembly.
16. Install the jack jump bolts.
17. If the jack has been clamped to the bottom rail bracket, remove the clamp.
18. With the weight of the car on the jacks, bleed all bleeders on each jack.
19. Remove the buffer springs, and resync the jacks.
20. Install the buffer springs, verify proper operation, and return the car to service.

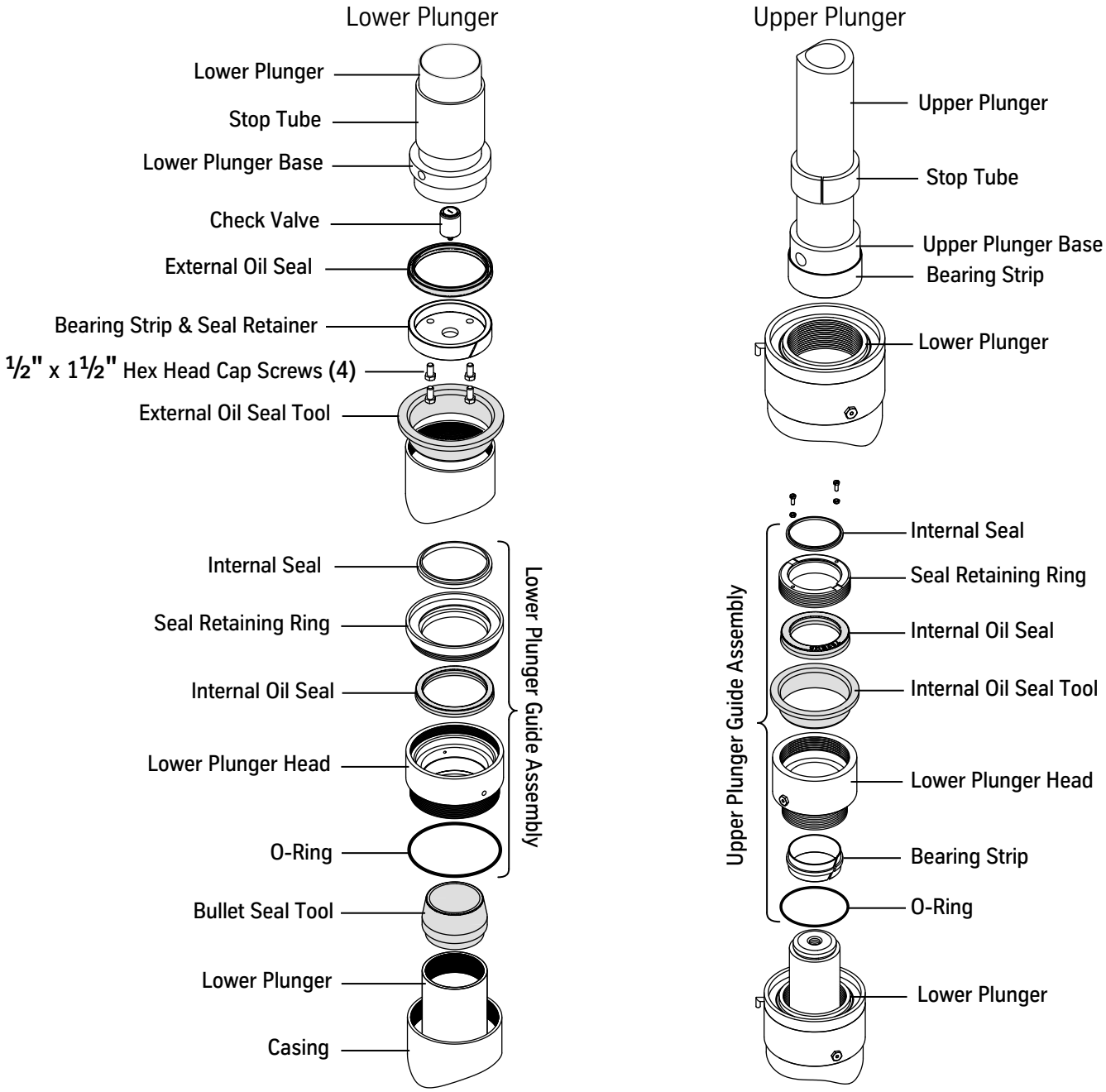
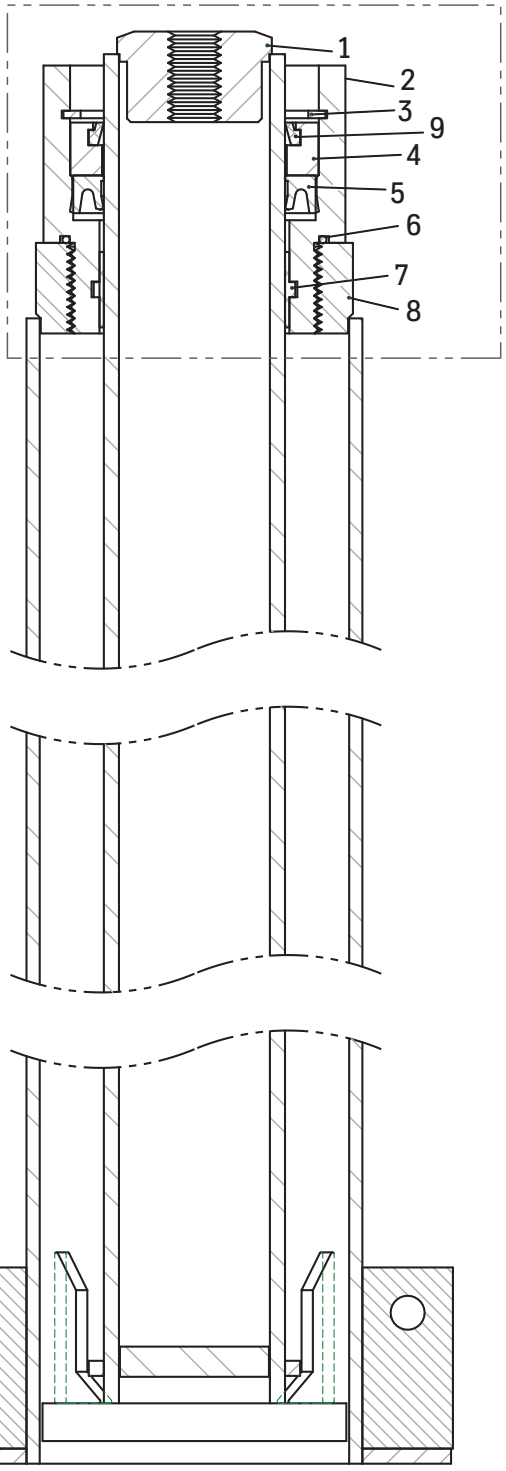
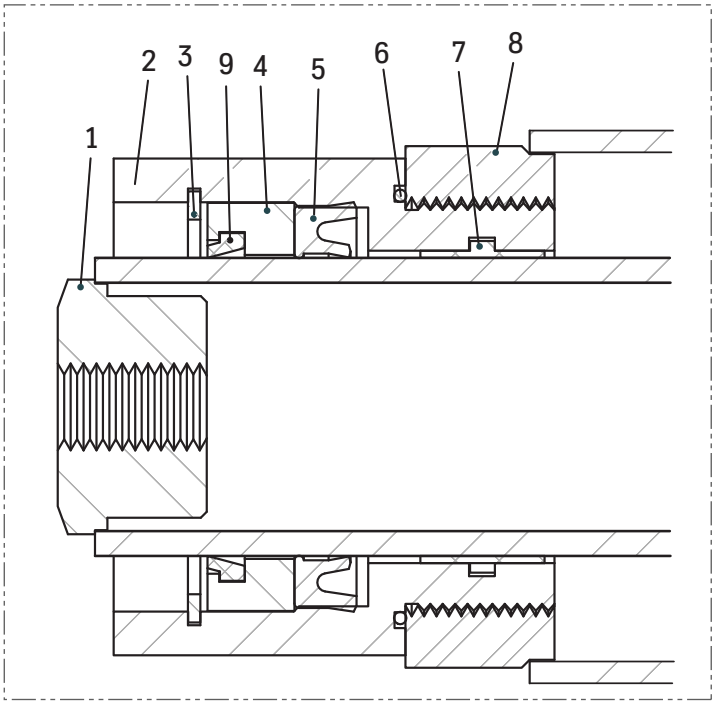


Figure 22 - Lower and Upper Plunger Internal and External Oil Seal Installation

Replacement Parts

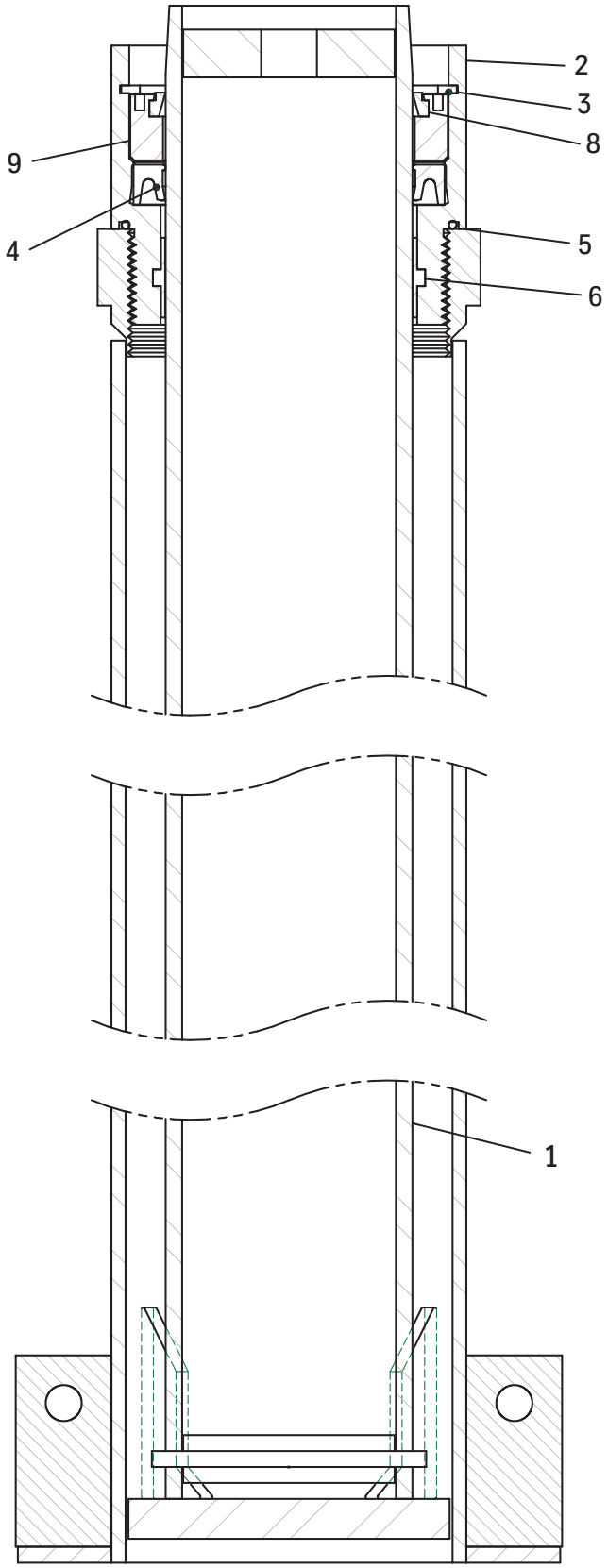
Single-Stage Twin Post Jack Assembly, 3" Diameter (6501CK)





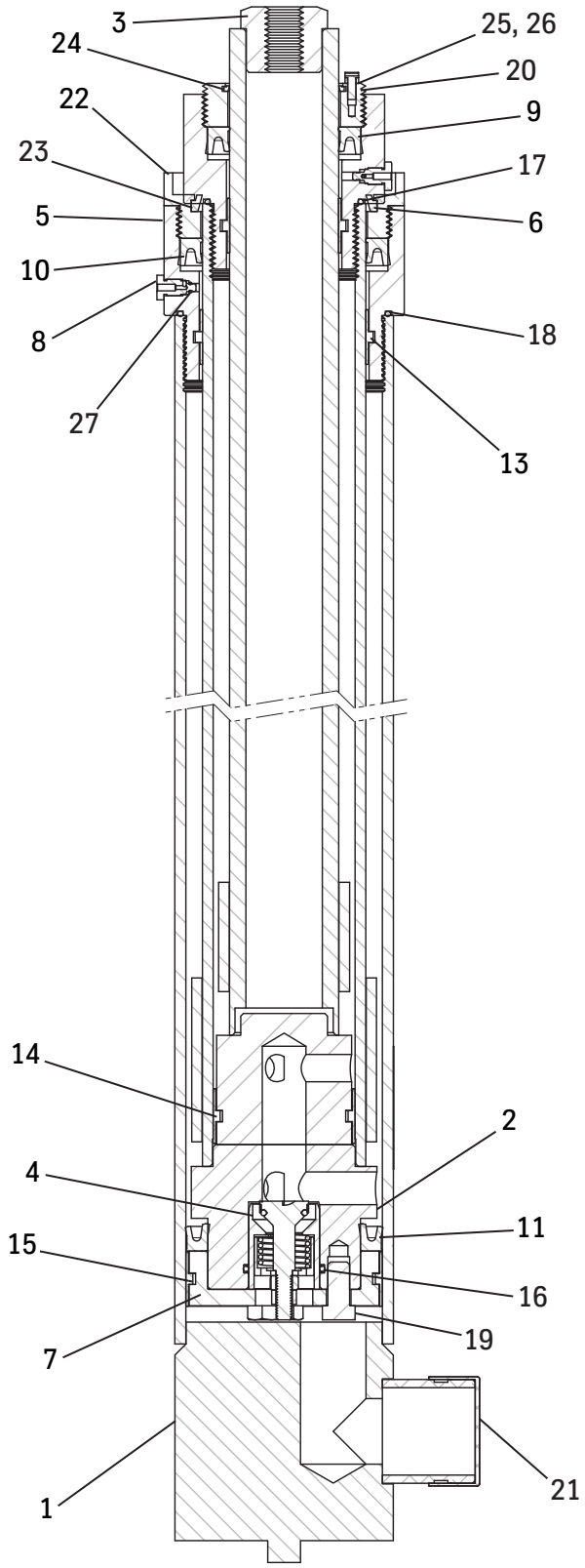
Item	Print No.	Description
1	6502AC3	Plunger Assembly
2	454AM2	Plunger Guide
3	717BE1	Internal Retainer Ring, Offset
4	713AA2	Oil Retainer Seal
5	732BH5	Internal Oil Seal
6	717AB3	O-Ring
7	142AX1	Bearing Strip
8	6503BN3	Casing Assembly
9	732AP1	Internal Seal, Type "D" Wiper
10*	107846	NPT Pipe Plug
11*	232CD1	Protective Cap for Victaulic
12*	700863	Pipe Plug
13*	802AN8	Bracket Assembly
14*	200BAD2	Additional Seal Kit
*not shown		

Single-Stage Twin Post Jack Assembly, $3^{7}/_{8}$" Diameter (6501CL)



Item	Print No.	Description
1	6502AD2	Plunger Assembly
2	454AN1	Plunger Guide
3	139357	Retainer Ring
4	732BH1	Internal Oil Seal
5	139358	O-Ring
6	137995	Bearing Strip
7	6503BP3	Casing Assembly
8	123833	Internal Seal, Type "D" Wiper
9	148113	Retainer Seal
10*	107846	NPT Pipe Plug
	232CD1	Protective Cap for Victaulic
11*	700863	Pipe Plug
12*	802AN8	Bracket Assembly
13*	200BAD3	Additional Seal Kit
* not shown		

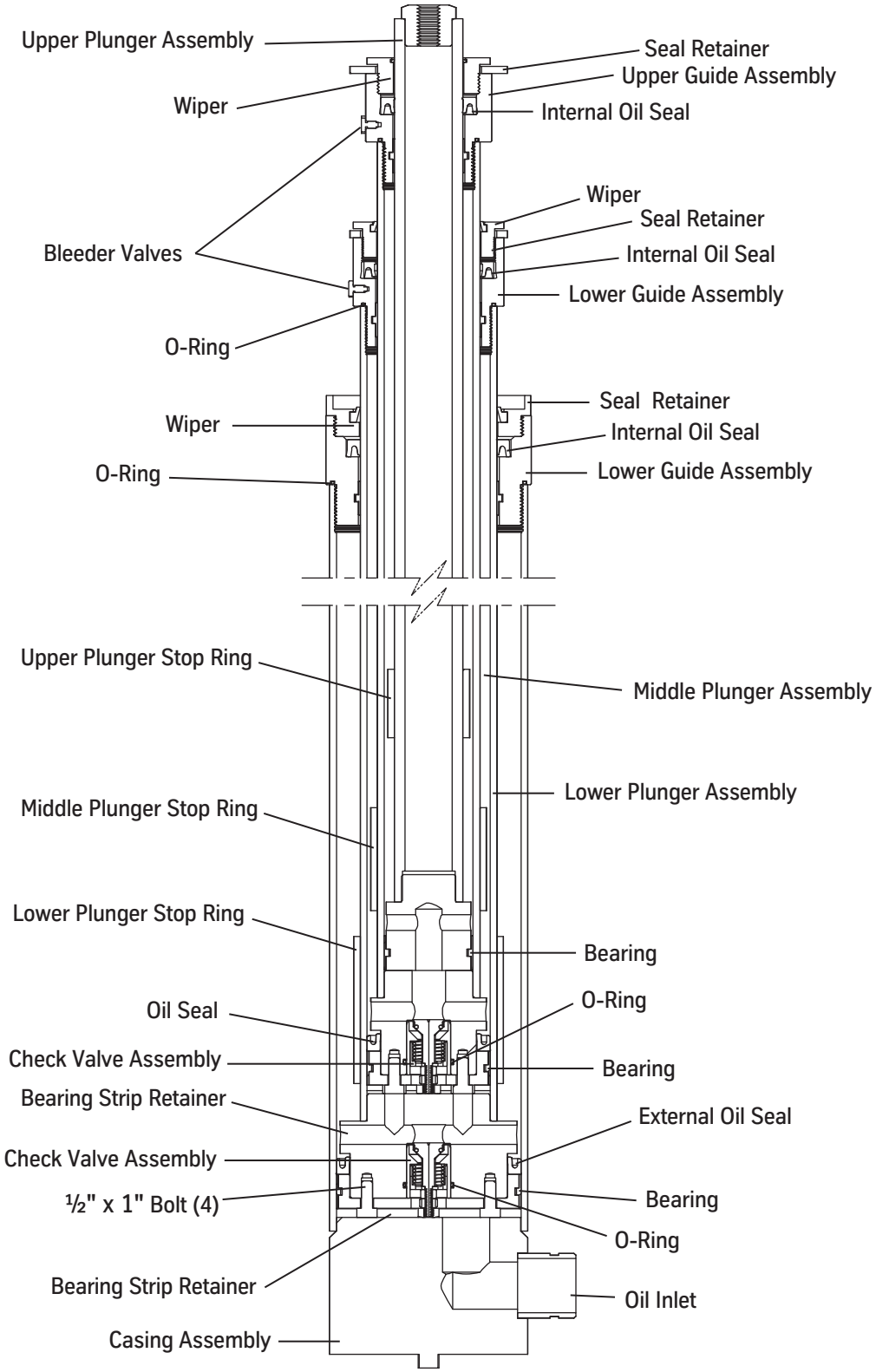
Two-Stage Twin Post Jack Assembly, 2.5-T and 3-T (6501CH)



Item	2.5-T Print No.	3-T Print No.	Description
1	6503BM4	6503BM3	Casing Assembly
2	6502AA4	6502AA3	Lower Plunger Assembly
3	6502AB5	6502AB6	Upper Plunger Assembly
4	886BX1	886BX1	Check Valve Assembly
5	454AJ4	454AJ3	Lower Plunger Guide
6	454AK2	454AK1	Upper Plunger Guide
7	712AA4	712AA3	Bearing Retainer
8	886BN1	886BN1	Bleeder Valve
9	732BH6	732BH5	Internal Oil Seal
10	732BH7	732BH8	Internal Oil Seal
11	732BJ2	732BJ1	External Oil Seal
12*	142CG4	142CG3	Upper Plunger Bearing
13	142CG2	142CG1	Lower Plunger Bearing
14	142CH4	142CH3	Upper Piston Bearing
15	142CH2	142CH1	Lower Piston Bearing
16	717BB1	717BB1	O-Ring, #223
17		142945	O-Ring, #241
	75483		O-Ring, #237
18		75487	O-Ring, #253
	717BB2		O-Ring, #247
19	396EH1	396EH1	Screw, ½" x 1"
20	717BC4	717BC3	Seal Retaining Ring
21	232CD1	232CD1	ID Protective Cap
	107846	107846	NPT Pipe Plug
22	717BP3	717BP4	Seal Retaining Ring
23	732AP2	732AP3	Internal "D" Wiper Seal
24	732AR1	732AR2	Internal "AN" Wiper Seal
25	396PA1	396PA1	Screw, #10 x ½"
26	700571	700571	Nut, #10
27	78136	78136	O-Ring, #006
28*	232AL5	232AL6	Sensor Plunger Cap
29*	802AN7	802AN8	Bracket Assembly
30*	200AEH12	200AEH13	Additional Seal Kit
31*	736AL3	736AL3	Dynamic Sensor Assembly
32*	735AL2	735AL2	Sensor Assembly
*not shown			

Three-Stage Telescoping

Overview



Installation

Pit Template

1. Verify that the hoistway position is correct with reference to the building grid or corridor lines (if supplied).
2. Verify that the pit's width and depth are correct per the layout; check the squareness.
3. Place the pit template on the pit floor, and position it per the layout. See Figure 23.
4. Place a laser on each end of the template, and survey the hoistway. See Figure 24 on page 48.
5. Adjust the pit template so that the centerlines of the rail and jack match the layout.
6. Measure from the laser line to the back of the hoistway to ensure that the car has adequate running clearance.
7. Verify that the pit template is level and square, and then use a $^{1}/_{2}$" concrete anchor in each corner to secure it to the pit floor.

NOTE If the pit depth is correct and the template is within 1" of level side to side, the jacks and buffers can be shimmed when they are installed.

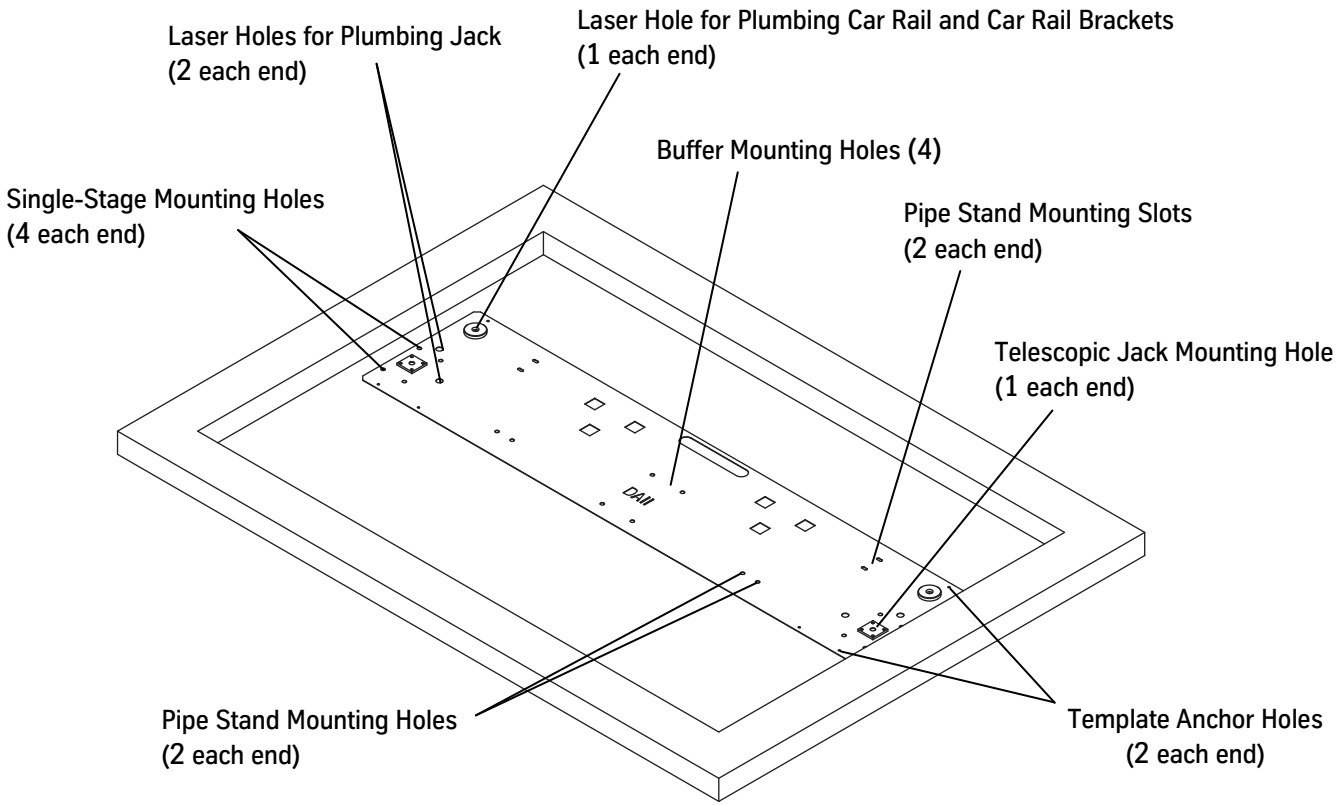


Figure 23 - Pit Template

Pit Template
(continued)

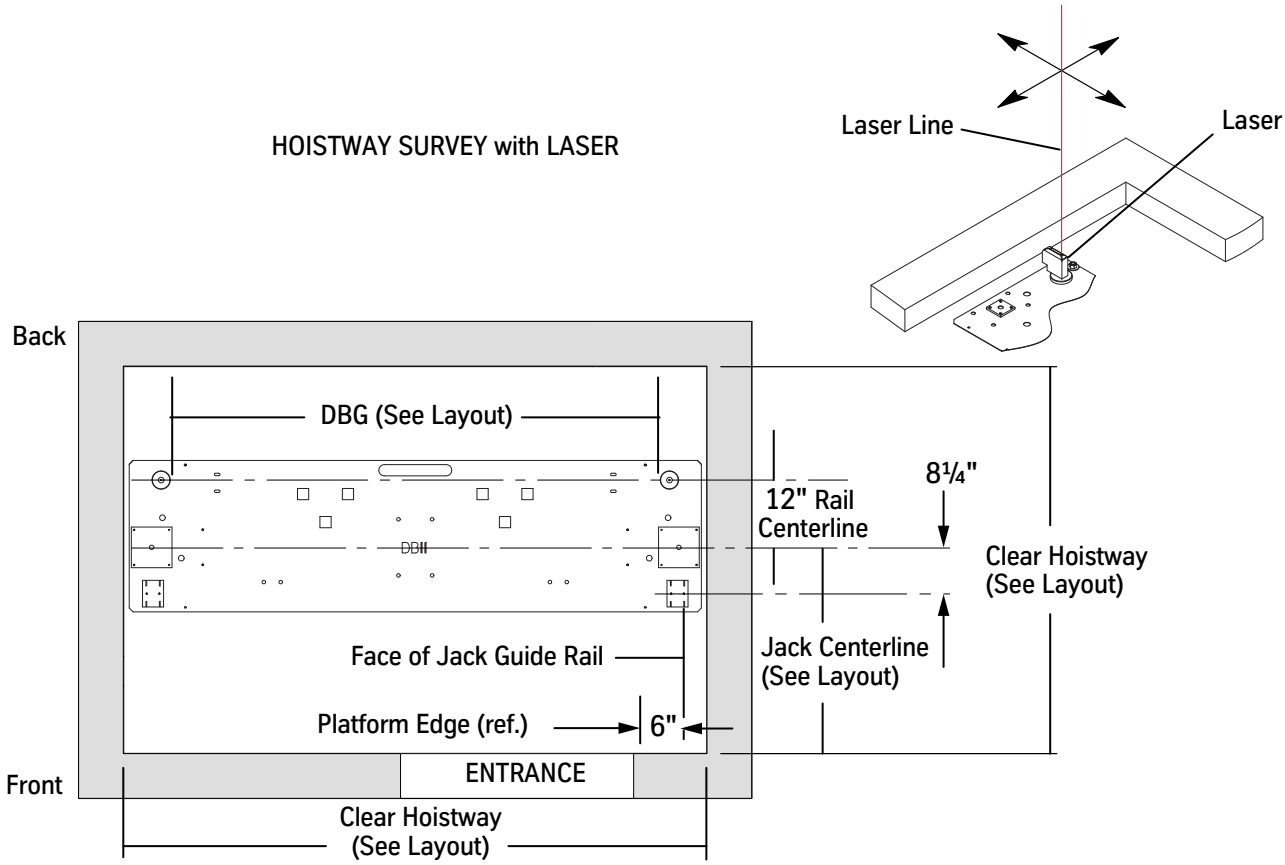


Figure 24 - Pit Template and Hoistway Laser Survey

Jack Guide Rails

1. Attach the 8'-long jack guide rail (with a manufacturing-attached splice jack guide rail) to the mounting brackets on the starter rail at the same elevation and corresponding mounting surface as the first car rail bracket. See Figure 25 on page 49.

NOTE Subsequent brackets for the jack guide rail will be located at the same intervals as the car rail brackets and on the corresponding mounting surfaces.

2. Adjust the placement per the job layout.
3. Hold the dimension from the centerline of the jack, and attach the guide rail mounting brackets to the hoistway wall.
4. Place a laser in the starter rail laser hole.
5. Plumb the starter rail with the laser, and then tighten the jack guide rail mounting brackets to the wall and to the starter rail.

NOTE The face of the starter rail and the horizontal center of the rail opening will align with the laser beam.

6. Repeat steps 1 through 5 for the other side.

Jack Guide Rails

(continued)

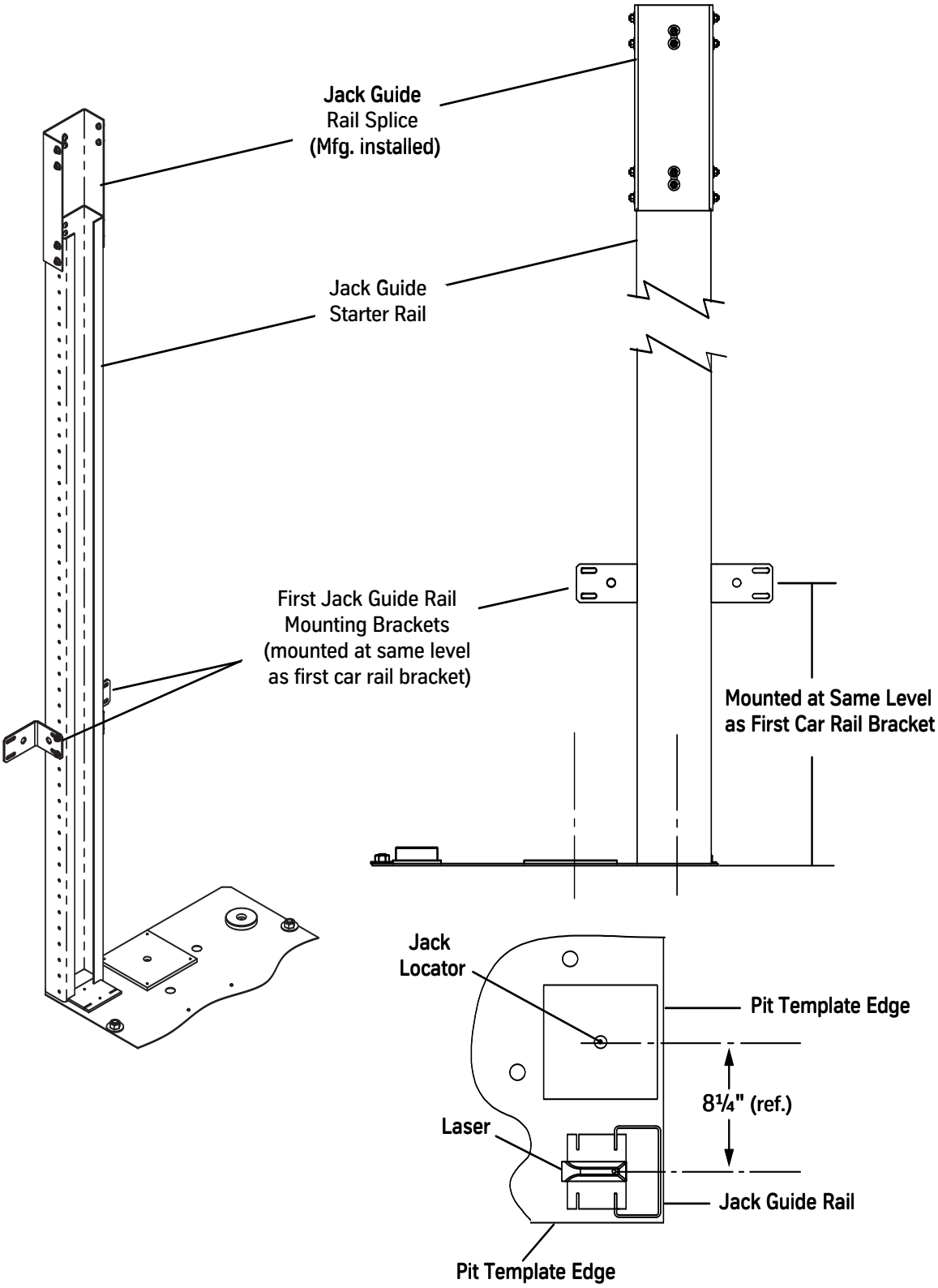


Figure 25 - Jack Guide Rail Installation

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 26 on page 51.
2. Install a bottom rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
3. Repeat step 2 for the opposite side bottom rail bracket.
4. Measure the distance between the two rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.
5. Remove the targets from the first set of rail brackets.
6. Install a second tier rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
7. Repeat step 6 for the opposite second tier rail bracket.
8. Measure the distance between the two second tier rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.

Car Rail Brackets
(continued)

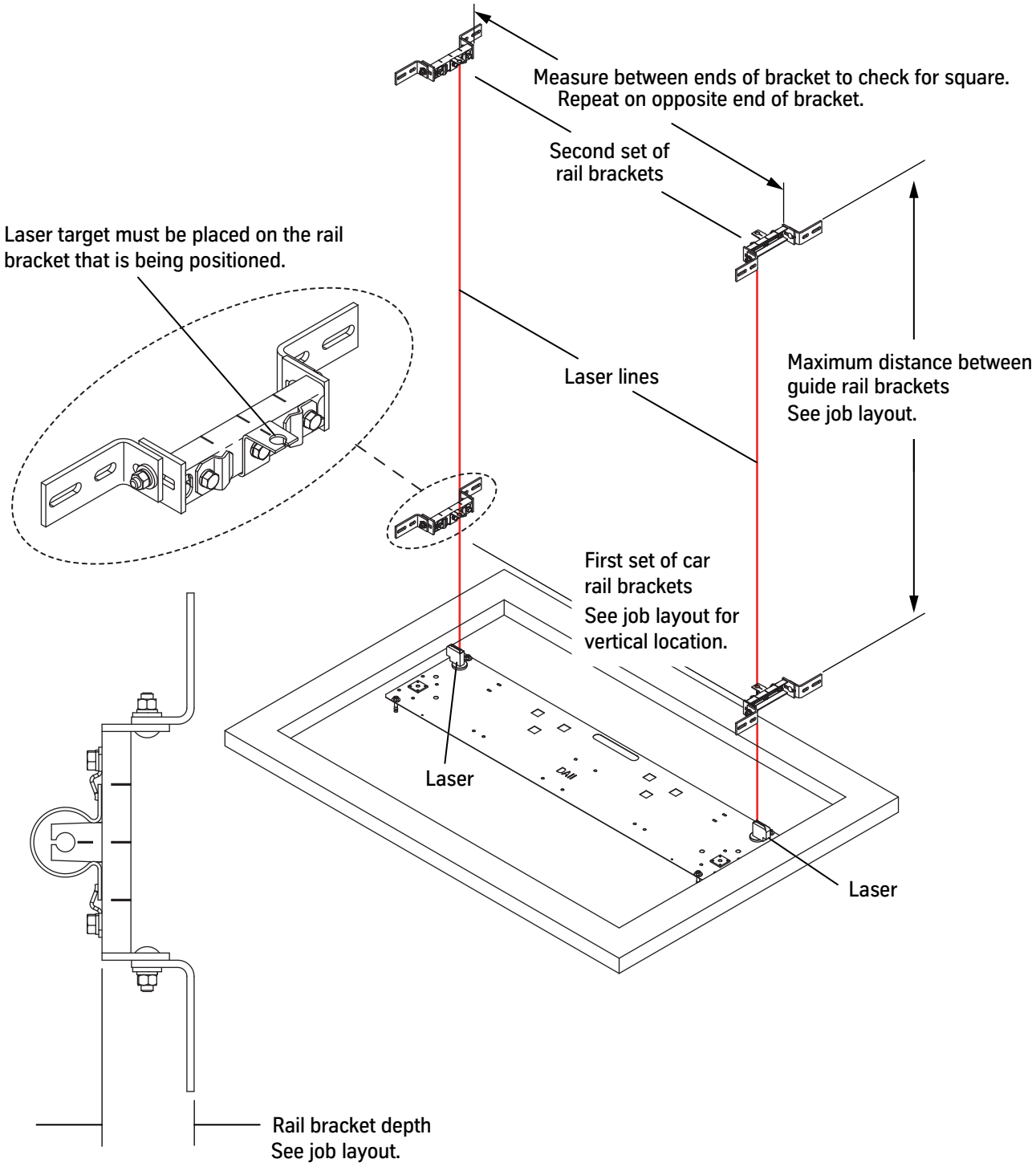


Figure 26 - Car Rail Bracket Installation

Car Rails

- The car starter rails may not be full rails, depending on the distance to the second tier of brackets. If necessary, install the cut (top out) rails below the first full rails.
- Use the pit template to locate the bottom rails. Note the location of the laser inside the rail.

1. Place the first rail on the template and against the rail bracket(s).
2. Press the rail onto the tapered keyhole brackets. See Figure 27.
3. Use the provided slip clips to attach the rail to the bracket.
4. Tighten the clips with the heel of the clip butted against the rail.
5. Repeat step 1 through step 4 for the opposite side.

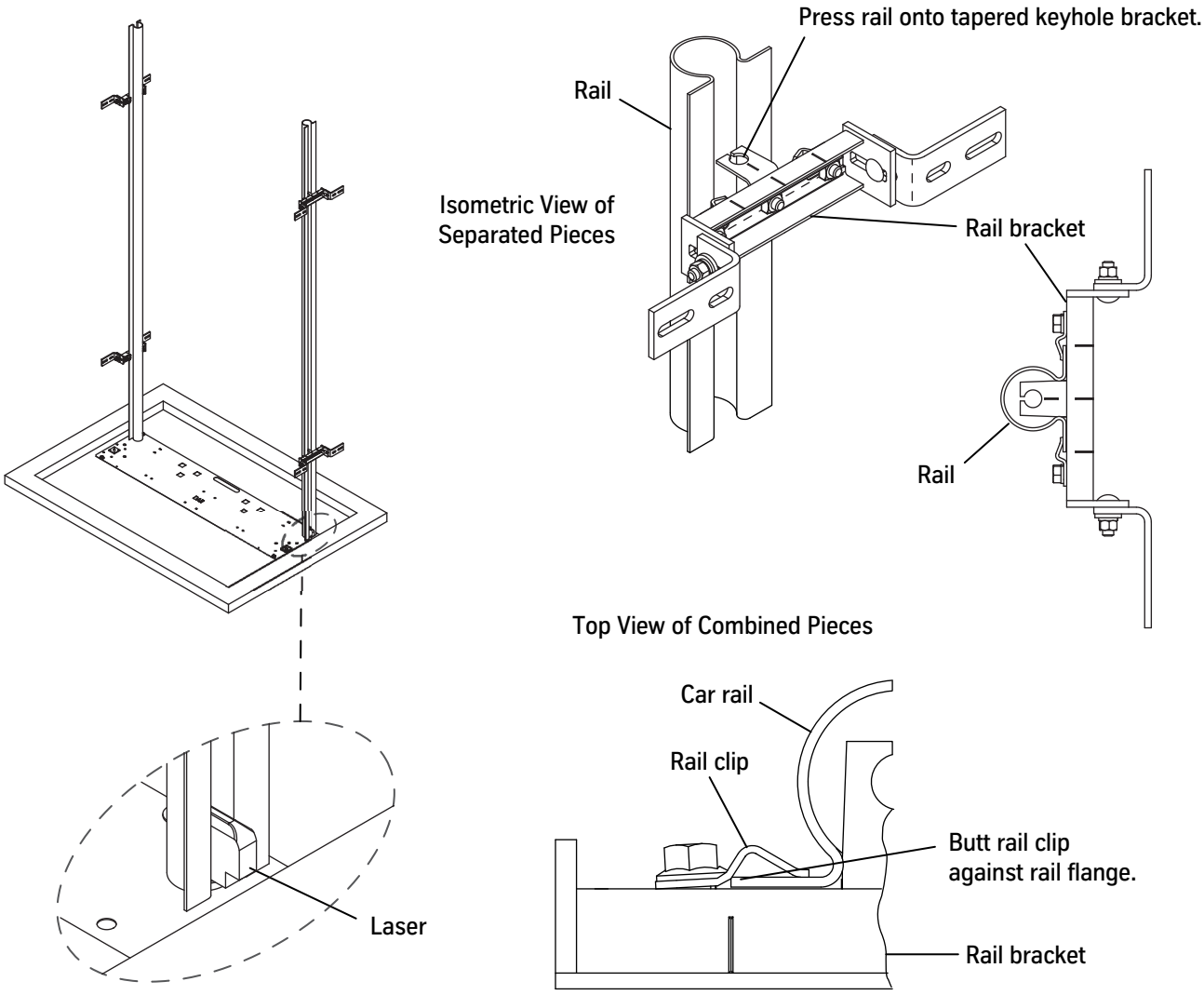


Figure 27 - Car Rail Installation

Jack Installation

1. Attach the jack support bracket to the car guide rail just below the top of the jack casing. The jack support bracket does not make the casing rigid. See Figure 28 below and Figure 29 on page 54 for all steps in this procedure.

CAUTION

Do not remove the sonotube or banding from below the lower plunger until all piping is complete and the power unit tank is filled with oil.

2. Remove all sonotube EXCEPT the part below the lower plunger.
3. Hoist the jack into the hoistway and into the jack hole on the pit template.

NOTE

The square plate welded to the pit template is sized to the diameter of the casing, which can serve as another guide to locate the jack.

4. Loosely attach the jack support bracket to the jack, and adjust the jack to the dimension shown.
5. Install the 90° barbed elbow.
6. Place a laser in the pre-punched holes of the pit template in the shown locations.
7. Turn the jack so that the oil inlet is pointing toward the other jack.
8. Use laser to plumb jack, and ensure that dimensions A and B are 2" at each end.
9. Tighten all bolts on the jack support bracket.

CAUTION

The jack support bracket only holds the jack upright and in position while the car is installed or serviced. Do not overtighten the bolts.

10. Repeat the above procedure for the other jack.

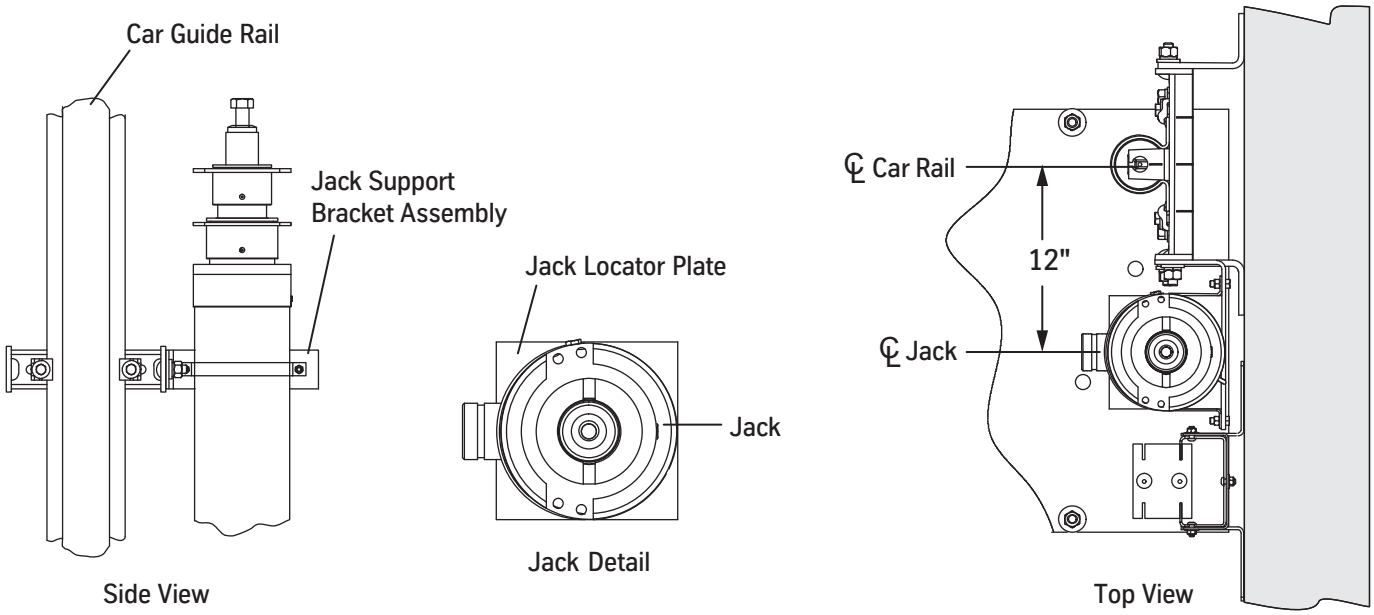


Figure 28 - Telescoping Jack Installation (1 of 2)

Jack Installation
(continued)

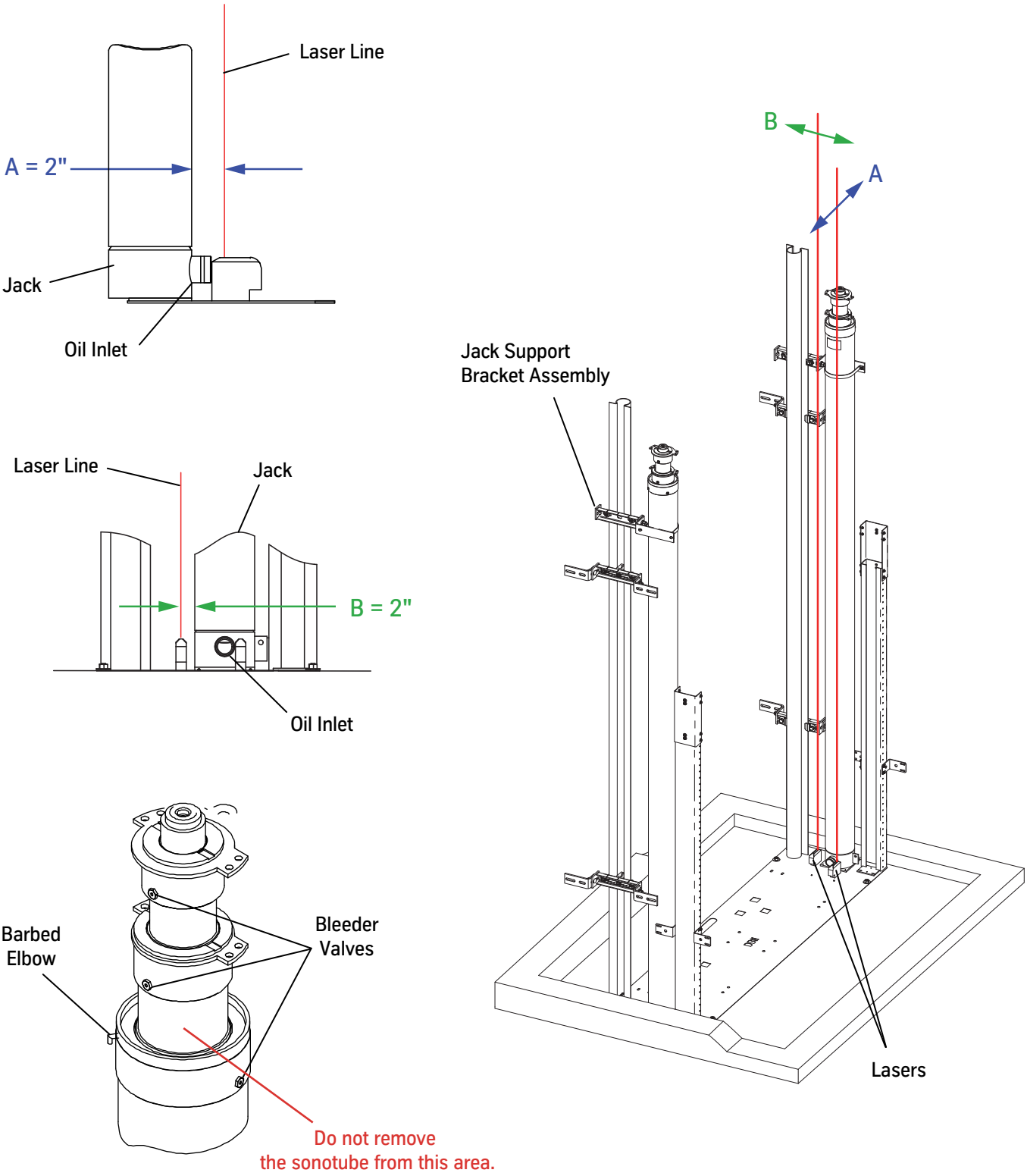


Figure 29 - Telescoping Jack Installation (2 of 2)

Piping

1. Place a shallow pan under the oil inlet to catch any residual oil, and then remove the Victaulic coupling and cap from the oil inlet of each jack. Residual oil may amount to as much as a quart.
2. Start installation with the jack that is nearest to the oil line that enters the hoistway, and install the Victaulic tee on that jack. See Figure 30 below and Figure 31 on page 56.
3. Remove any debris from the inside of all pipes.
4. Install the Victaulic couplings, and connect the provided seamless pipe from the tee to the opposite jack inlet.
5. Install the overspeed valve to the tee.
6. Connect the end labeled "JACK" directly to the Victaulic tee.
7. Refer to the job layout, and use the shortest route available to construct the oil line from the overspeed valve to the power unit to avoid building obstructions. Install the shutoff valve as close to the power unit as possible.

WARNING **Do not weld to a ductile iron fitting.**

- Ensure that there is sufficient room to fully open and close the shutoff valve with its handle or lever.
- If the oil line is run in the ceiling:

  » Ensure that the contractor signs the *Remote Elevator Equipment Room Piping Verification* form located in the *Project Management Book*.

  » The oil line must have a label every 10' identifying it as a high-pressure oil line.

8. Use the supplied pipe stands to level and secure the pipe.
9. To ensure the overspeed valve will not set during elevator construction or adjustment of control valve, turn the overspeed valve adjustment screw out (counterclockwise).

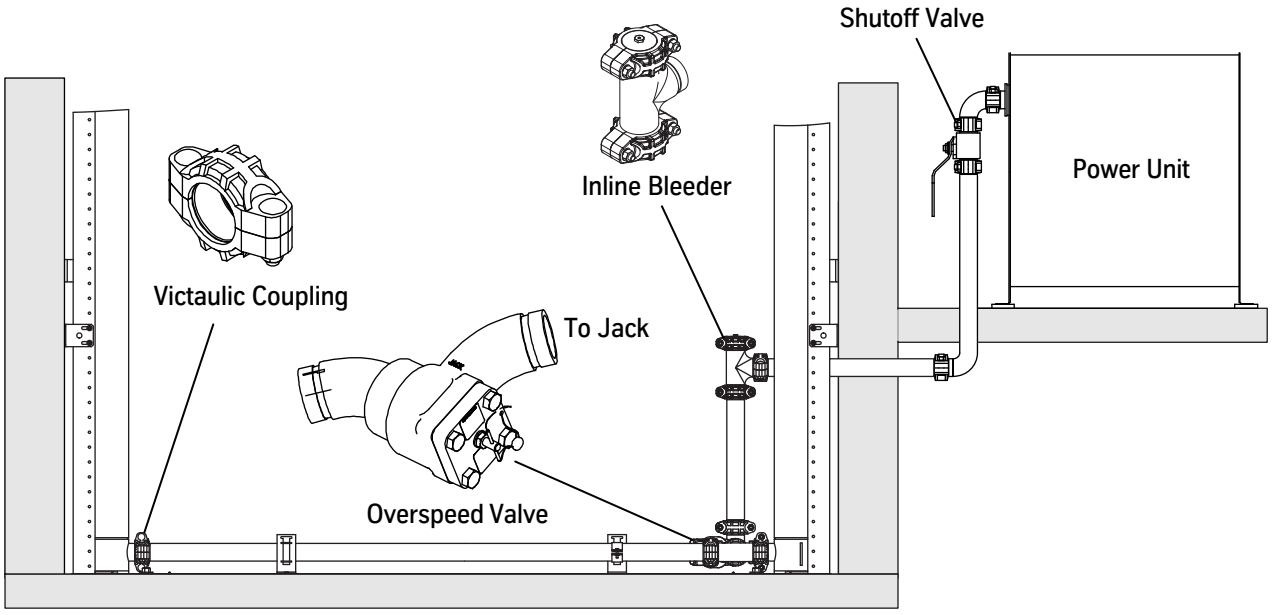


Figure 30 - Piping Installation from the Jack to the Power Unit

Piping
(continued)

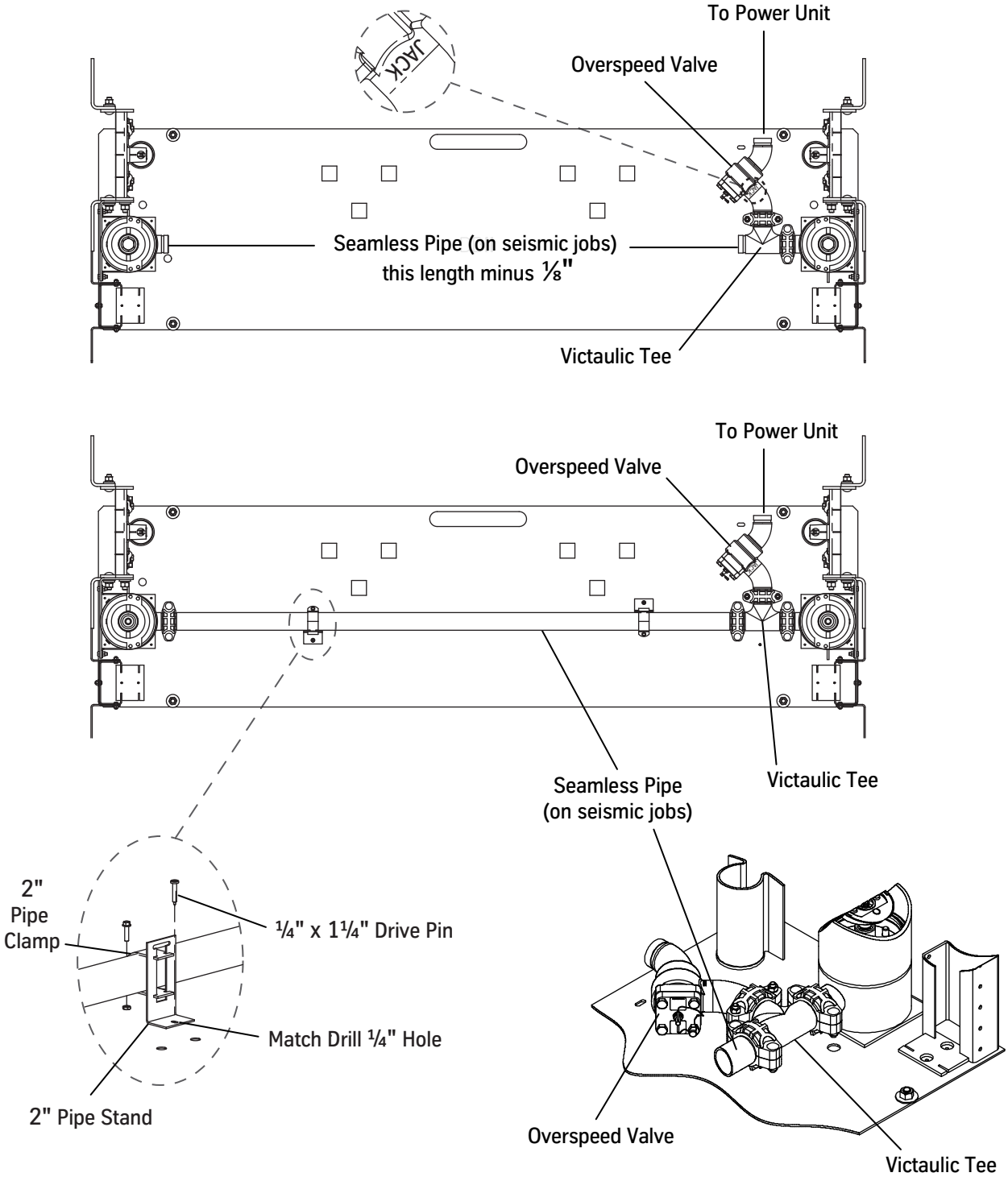


Figure 31 - Piping Between Jacks

Buffer Stand

1. Place the buffer stand on the pit template. See Figure 32.
2. Shim between the template and the buffer stand to level and plumb the stand.
3. Match drill four holes for $^{1}/_{2}$" concrete anchors. Holes must be a minimum $2^{3}/_{4}$" deep to obtain a minimum $2^{1}/_{4}$" penetration.
4. Anchor the buffer stands with $^{1}/_{2}$" anchors. Leave room for 1" of shimming between the buffer and the pit template. If shimming is not needed during installation, anchors can be driven and tightened later.
5. Install the pit ladder per the layout.

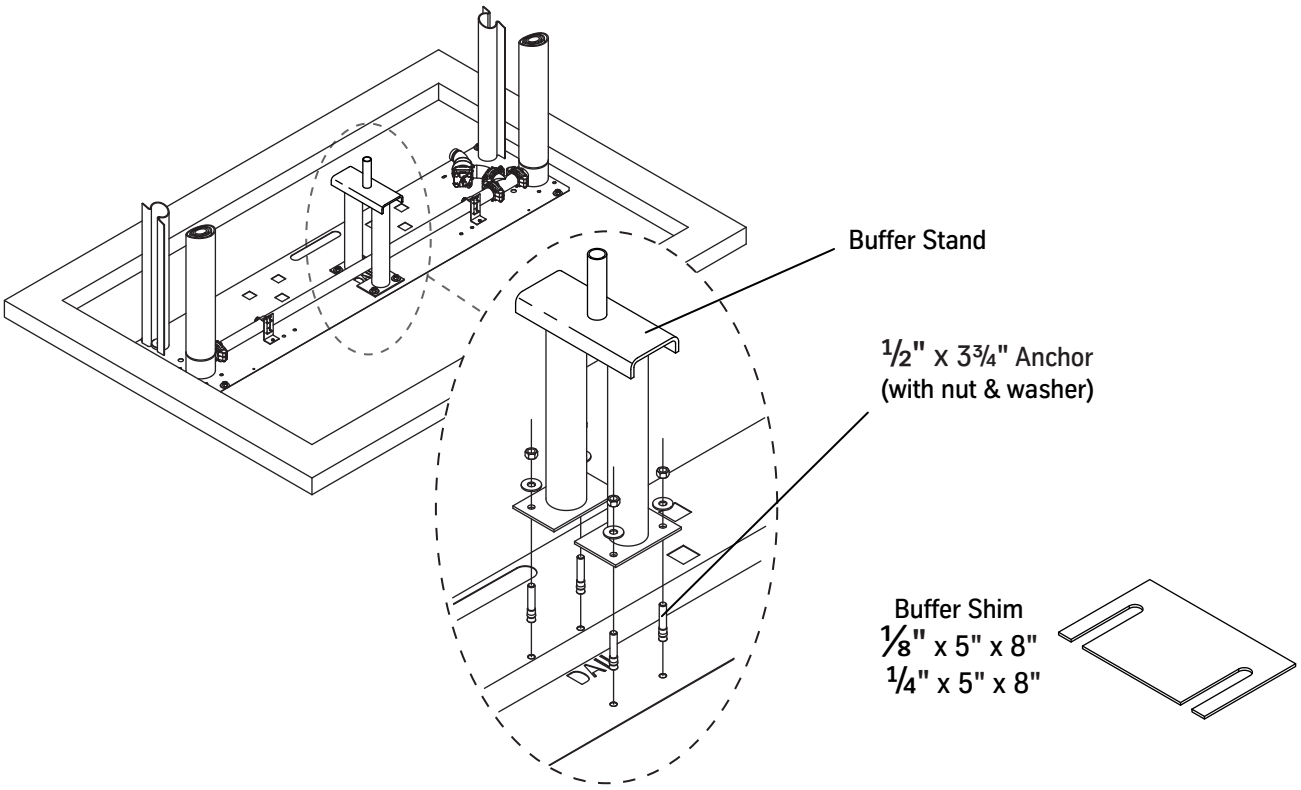


Figure 32 - Buffer Stand Installation

Car Frame

Stiles

1. Use four $^{5}/_{8}$" x $1^{1}/_{4}$" hex head cap screws to bolt a lift bracket/platen to each stile. See Figure 33 for all steps in this procedure.
2. Turn the plunger head of each jack until the bleeder valves are pointing to the rear of the hoistway.
3. Fully compress the jacks.
4. Hoist the stile and lift bracket/platen assemblies, and hook them onto the respective plungers.
5. Verify that the tops of the upper plungers are level with each other. If not, place the supplied 1" flat washers between the upper plunger and the lift bracket/platen assembly until level.
6. Install the jump bolt through the lift bracket/platen assembly and into the plunger.
7. Tighten the jump bolt.

NOTE The long shoulder of the bolt does not allow contact between the bolt head and the top of the lift bracket/platen assembly.

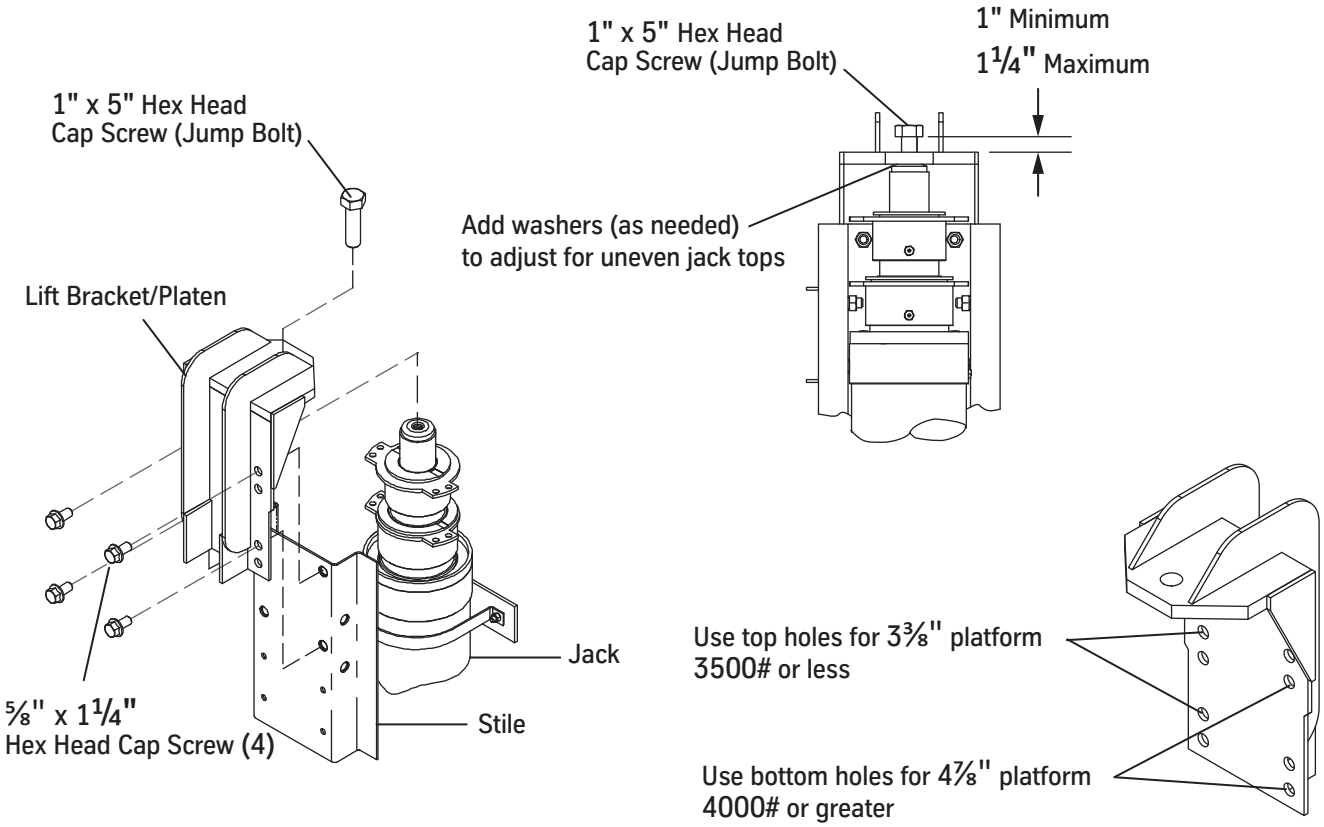


Figure 33 - Lift Bracket/Platen Assembly Mounting on Stile and Jack

Car Frame
(continued)

Bolster Assembly and Bottom Guide Shoes

1. Snugly fasten the bolster assembly to the stiles. See Figure 34 on page 60.
2. Install the bottom guide shoes on the shoe mount bracket.
3. Equally run both of the post-wise adjustment screws in (clockwise) until each slide guide is touching its corresponding rail.
4. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut, and adjust until both sides are equal.
5. Tighten both locknuts on the post-wise adjustment screws.
6. Level and square the bolster channel assembly with the stiles, and then tighten bolts.
7. Place the Follower Rail Template on top of the bolster. Ensure that the ends protrude into their respective jack starter rail. See Figure 35 on page 61.
8. Align the inside edge of the template notch with the edge of the bolster channel, and clamp it to the bolster.
9. On one end of the bolster, square the stile against the corresponding edges of the template, and tighten the fasteners holding the stile and bolster together.
10. On the other end of the bolster, square the stile against the corresponding edges of the template, and then tighten the fasteners on this side of the bolster.

Car Frame
(continued)

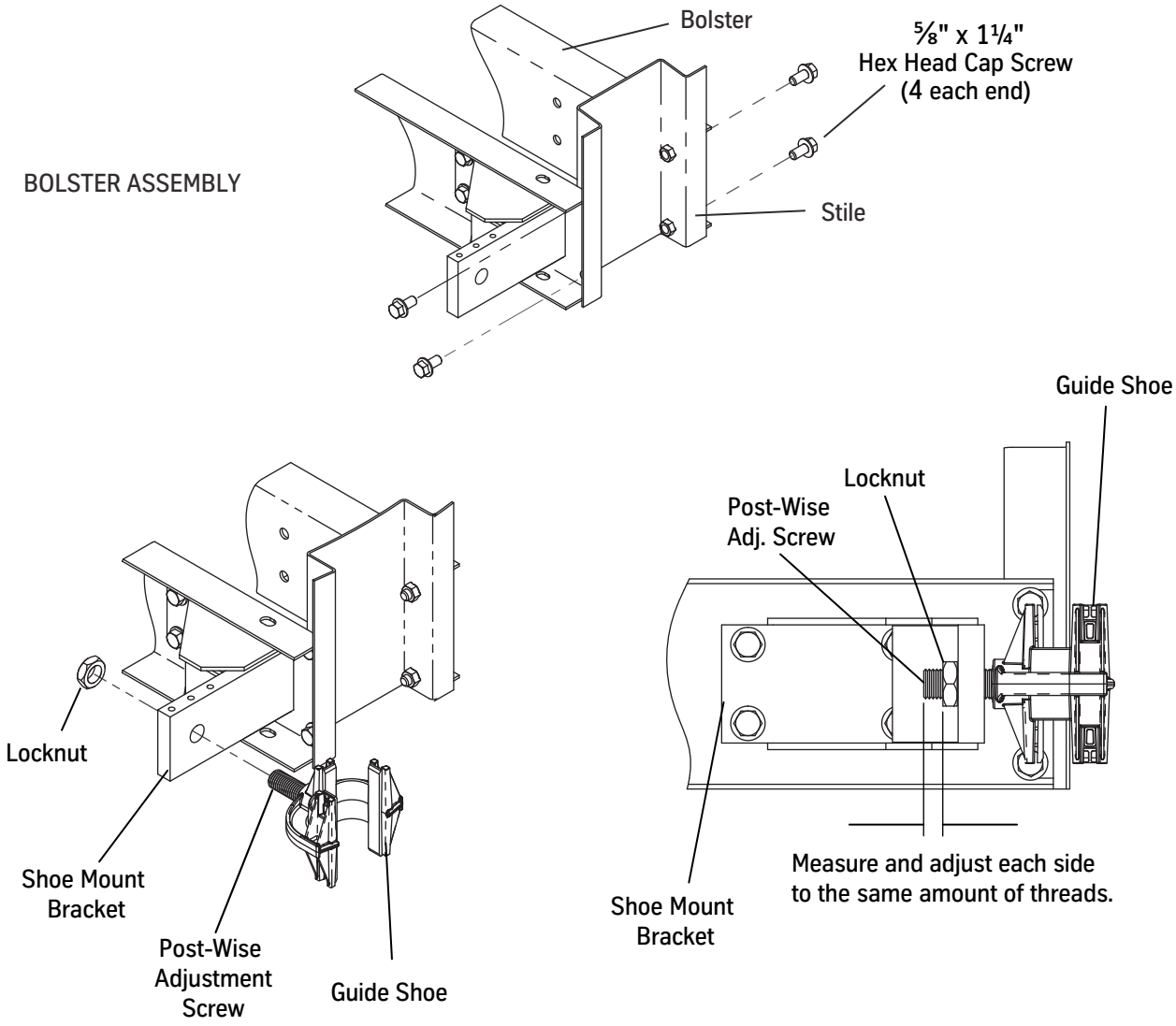


Figure 34 - Install Bolster Assembly and Bottom Guide Shoe

Car Frame
(continued)

Platform and Brace Rods

1. Hoist the platform into place, and install the clips and bolts between the platform channels and the tops of the bolster channels. See Figure 35.

2. Adjust the platform to the rails according to the job layout dimensions, and then tighten the bolts.

3. Install the four brace rods between the stiles and the four corners of the platform. The brace rod goes in the lowest set of $^{5}/_{8}$" holes in the stiles.

4. Level the platform front to back by adjusting the brace rods.

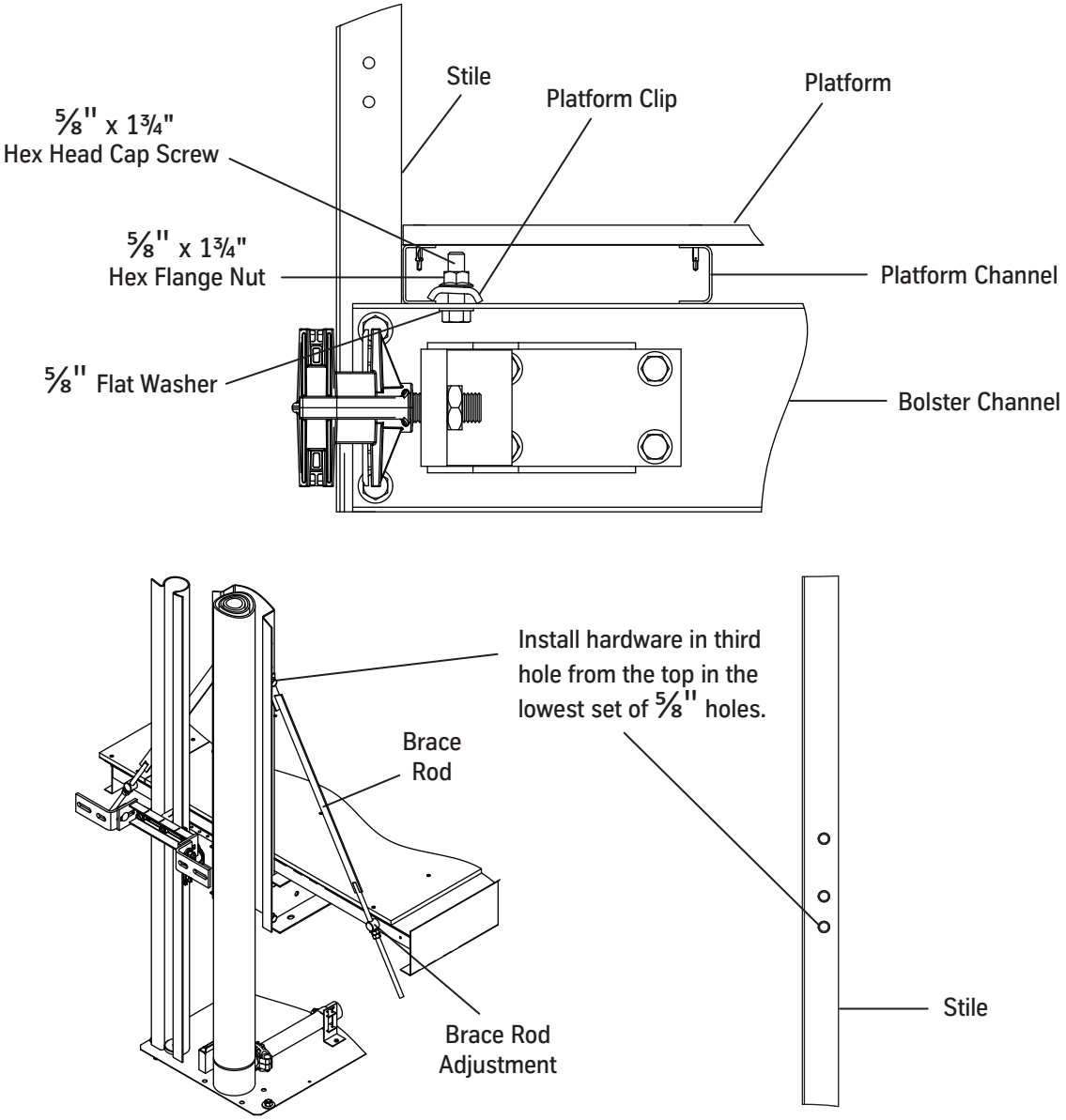


Figure 35 - Platform and Brace Rod Installation

Car Frame
(continued)

Crosshead and Upper Guide Shoes

1. Fasten the two upper guide shoes to the shoe mount bracket on the rear crosshead channel. See Figure 36 on page 63 for all steps in this procedure.
2. Place the rear crosshead channel between the two stiles in the lowest location, directly above the two rear brace rods about 3' above the platform.
3. Install the hardware to attach the rear crosshead channel to the stiles; do not tighten the bolts at this time.
4. Equally turn both post-wise adjustment screws in until each guide shoe is touching its corresponding rail.
5. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut and adjust until both sides are equal.
6. Tighten the locknuts on the guide shoe post-wise adjustment screws.
7. Use the provided hardware to install the front crosshead channel in its permanent location at the top of the stiles; do not tighten the bolts at this time.
8. Place the follower rail template on the bottom of the front crosshead.
9. Verify that the crossheads are square and plumb with the stiles.
10. Tighten all of the hardware in both crosshead channels.

Car Frame
(continued)

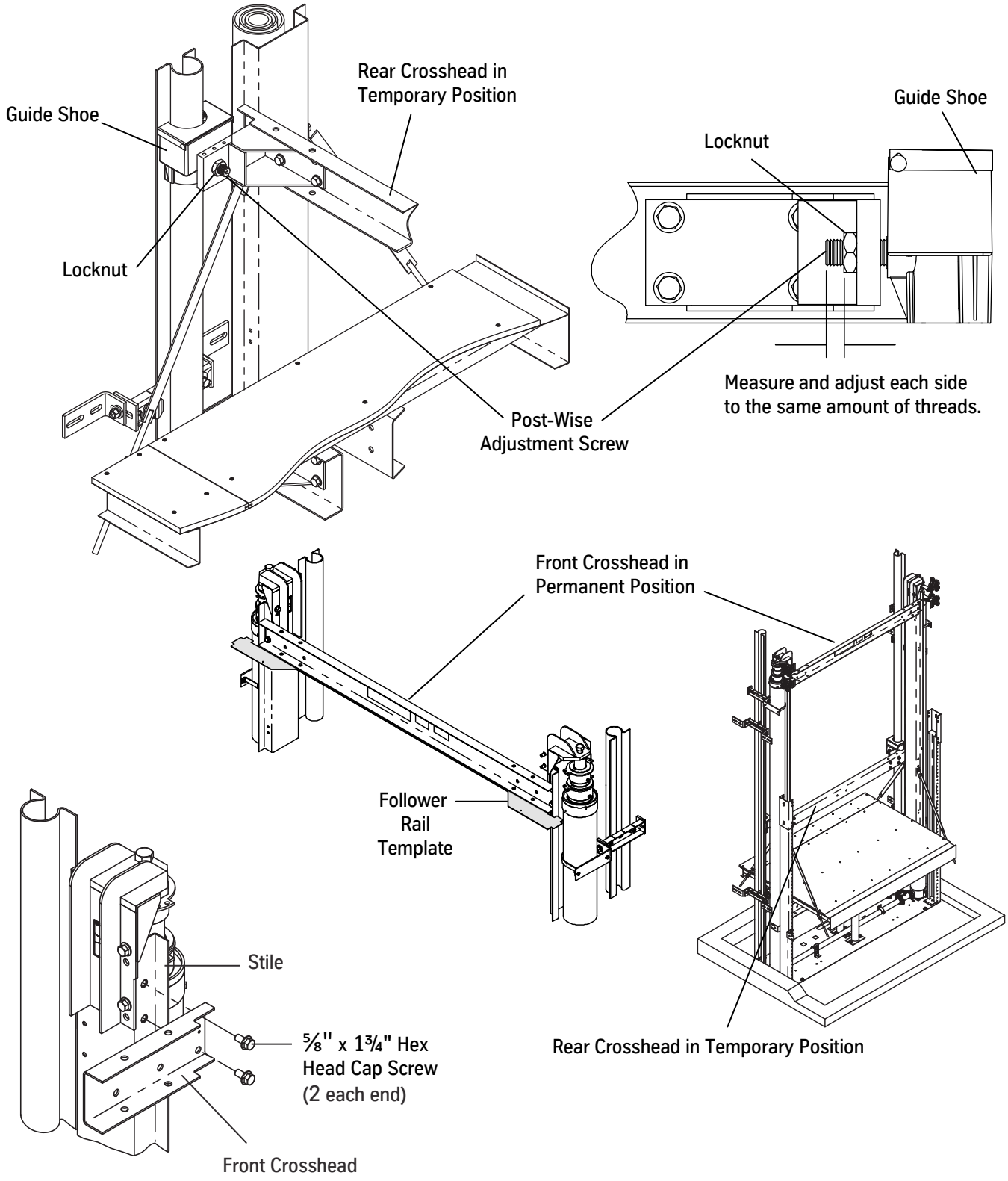


Figure 36 - Install Upper Guide Shoes and Crosshead

Drip Tube

1. Install the drip tube on the barbed elbow (located on the packing head), and run the tube to a drip pan in the pit. See Figure 37.
2. Tie-wrap the drip tube to the jack to keep the line away from the car frame.

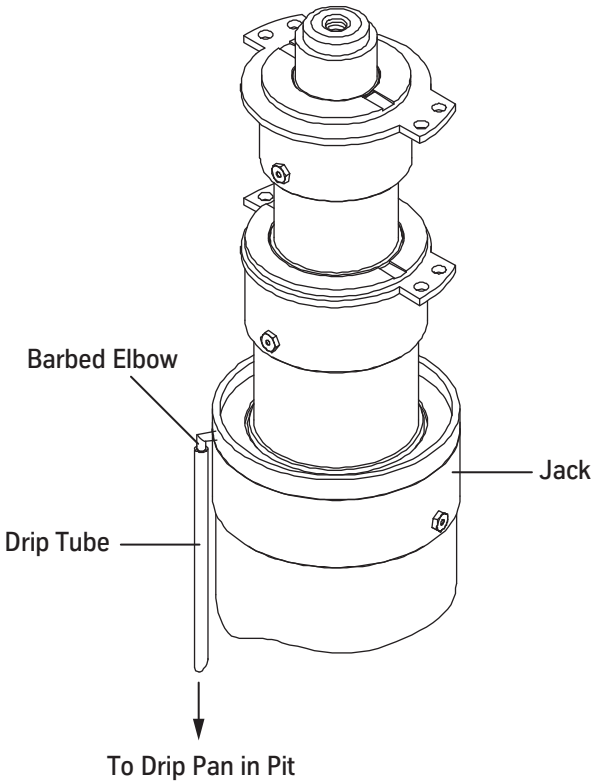


Figure 37 - Drip Tube Installation

Temporary Operation

1. Fill the power unit with oil.
2. Energize power unit until the jacks begin to move to fill empty supply lines with oil.
3. Remove the sonotube from below the lower plunger.
4. Turn OFF, Lockout, and Tagout the mainline disconnect.
5. Follow the directions on the startup card inside the controller.
6. Turn ON the mainline disconnect, and verify operation.

WARNING **Do not attempt to change the phasing between the starter/contactor and the pump motor; swap the phases at the incoming source.**

NOTE If the incoming power is out of phase or the motor runs backward, swap any two leads of the incoming power (starter or terminal block).

Temporary Operation
(continued)

Bleed the Jacks

1. Insert one end of nylon evacuation tubing from the jack accessory kit into one of the bottom bleeder valves and the other end of the tube into an empty container. See Figure 38.

2. Slightly open the bottom bleeder valve on each jack. This jack has four bleeder valves. Two are located in the jack casing; use the most accessible valve.

3. Momentarily energize the pump motor until oil is visible at the bleeder valves.

CAUTION **Do not overtighten the bleeder valves; very little torque is needed.**

4. When oil appears at the bleeder valves, tighten the valves.

CAUTION **One jack will probably purge air before the other, so completely tighten the bleeder valves one jack at a time.**

5. Progress upward, and repeat this procedure for the other bleeder valve pairs. This procedure may need repeating after the car frame is initially running.

6. Remove the sonotube from the lower plunger.

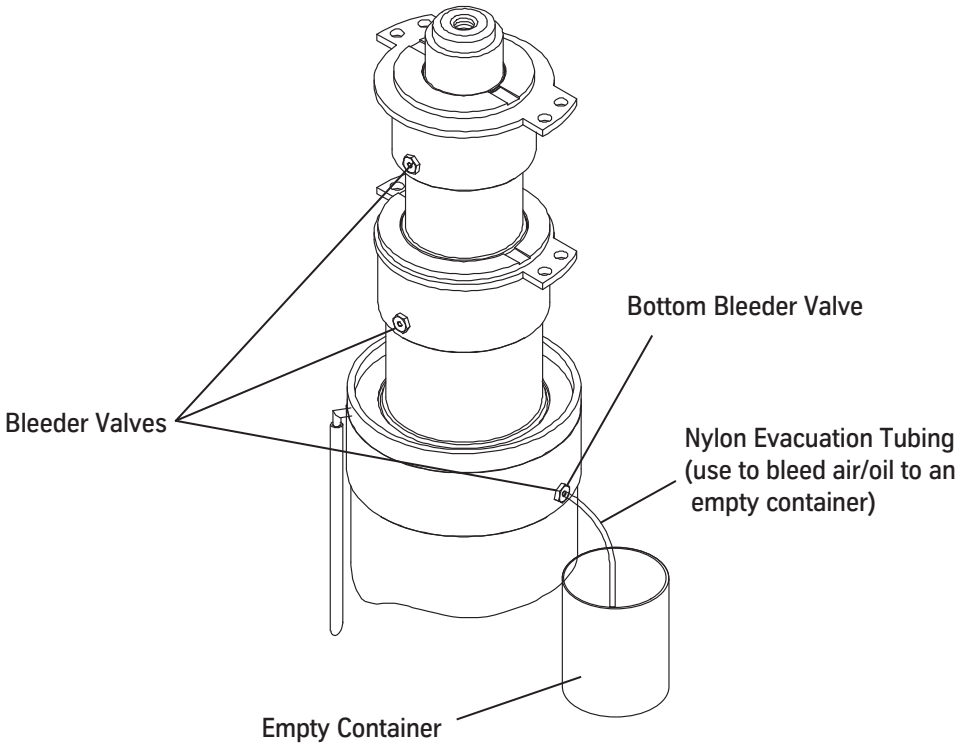


Figure 38 - Bleed the Jacks

Car Guide Rails

WARNING

Do not run the car frame off of the rails. Always be aware of where the top slide guides are in relation to the top of the rail. Do not run the top guide more than 48" above the top installed rail bracket.

1. Place the car frame as close as possible to the top of the rails.
2. Install the lasers on the pit template underneath the rails. See Figure 39 on page 67 for all steps in this procedure.
3. Install the next set of rail brackets. See job layout for maximum distance between brackets.
4. Use the laser lines and the laser target to adjust both rail brackets.
5. Use a splice clamp to install a splice tube in the existing rail, and tighten the splice.
6. Hoist the new rail up, and slide it down over the splice tube.
7. Install the remaining two splice clamps, and tighten the splice.
8. Repeat step 3 through step 7 for the opposite side.

CAUTION

Before running the car above the splice, completely tighten the rail splices.

9. Run the car frame up, and use the supplied clips and hardware to attach the rails to the rail brackets.
10. Completely tighten the rail clips.
11. Repeat step 2 through step 10 for any remaining rail brackets and rails.
12. Clean and file all rail joints.

Car Guide Rails

(continued)

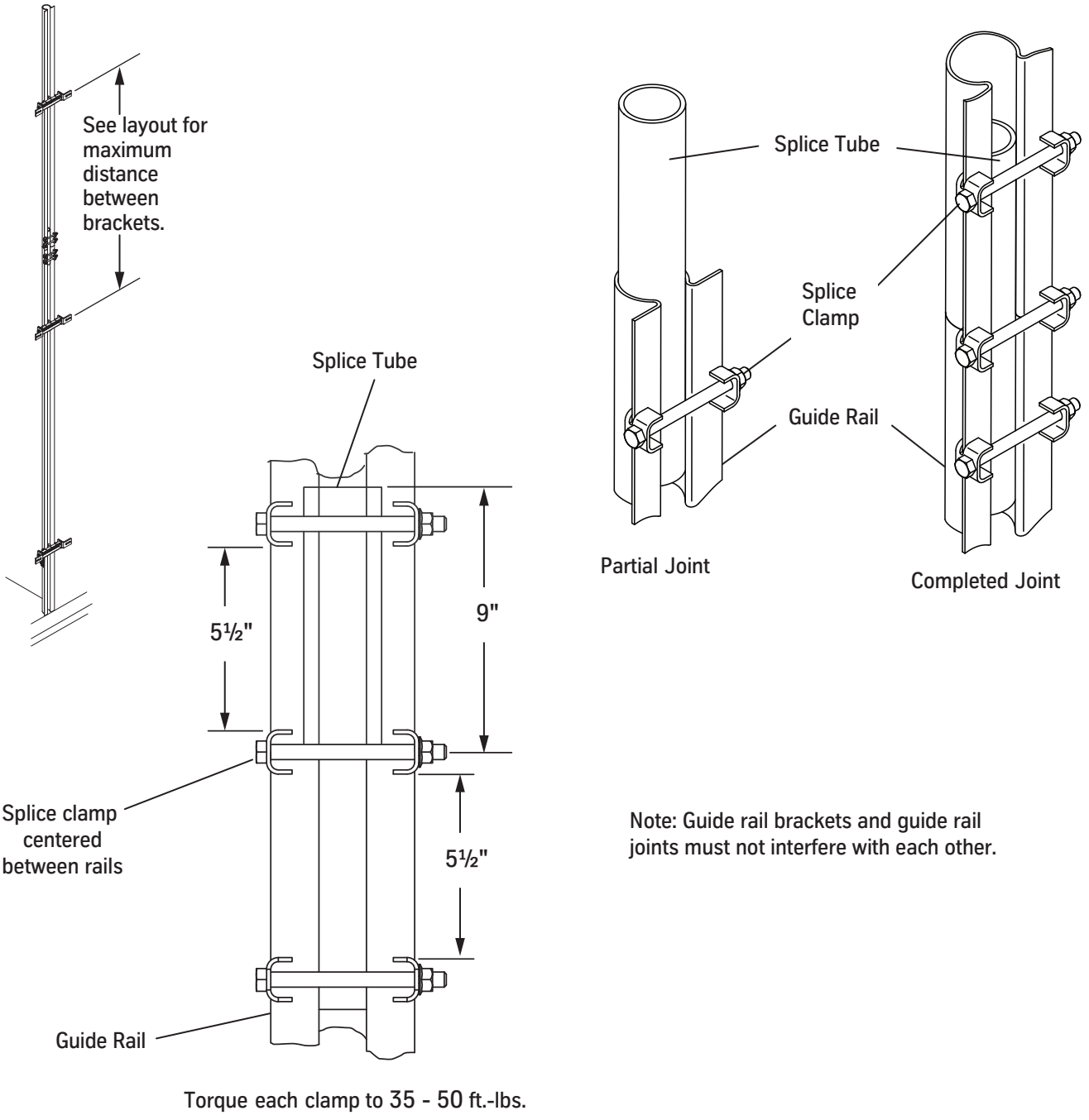


Figure 39 - Rail Splice and Final Rail Installation

Rear Crosshead Channel

1. With the car at the first landing, remove the rear crosshead channel from the stiles, and raise it up to its permanent location at the top of the stiles. See Figure 40.

CAUTION **Do not remove or loosen the slide guides. The adjusted guide shoes help hold the crosshead in position until the bolts are in place.**

2. Install hardware between the channel and stiles, and completely tighten the hardware.

3. Remove the template from the crosshead, and place it on the platform snugly against the stiles and each end in its respective starter rail.

4. Use wood screws to fasten the template to the platform. In this position, the template can be used to mount the remaining jack guide rails.

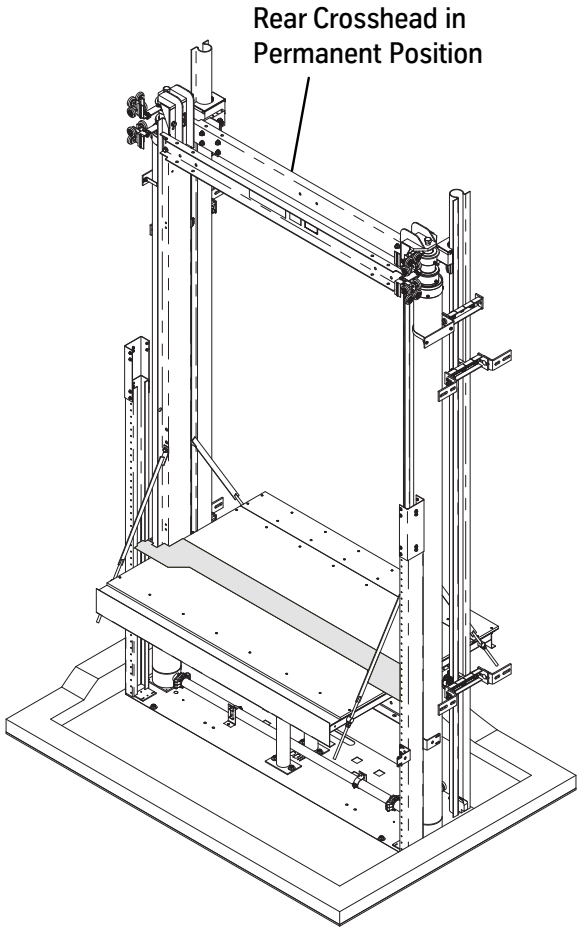


Figure 40 - Rear Crosshead Permanent Position

Install the Support Pipes

The support pipes can be stored on the rear wall of an Oildraulic® installation. Job conditions dictate whether the pipes can be stored there.

1. Remove the springs from the buffer stands.
2. Lower the car until it rests on the buffer stands.
3. Measure the distance between the platform and the rear wall.
4. Measure distance from the pit floor to the bottom of the platform nearest the wall.

NOTE If the measurement from step 3 is less than 3" and the measurement from step 4 is less than 24", the pipes cannot be stored on the rear wall because the arrangement would interfere with the platform.

5. If the clearances are satisfactory, locate and install the provided anchor bolts. See Figure 41 for dimensions.
6. Place each bracket over a bolt, and tighten the bolt.
7. Place the support pipes on the brackets.

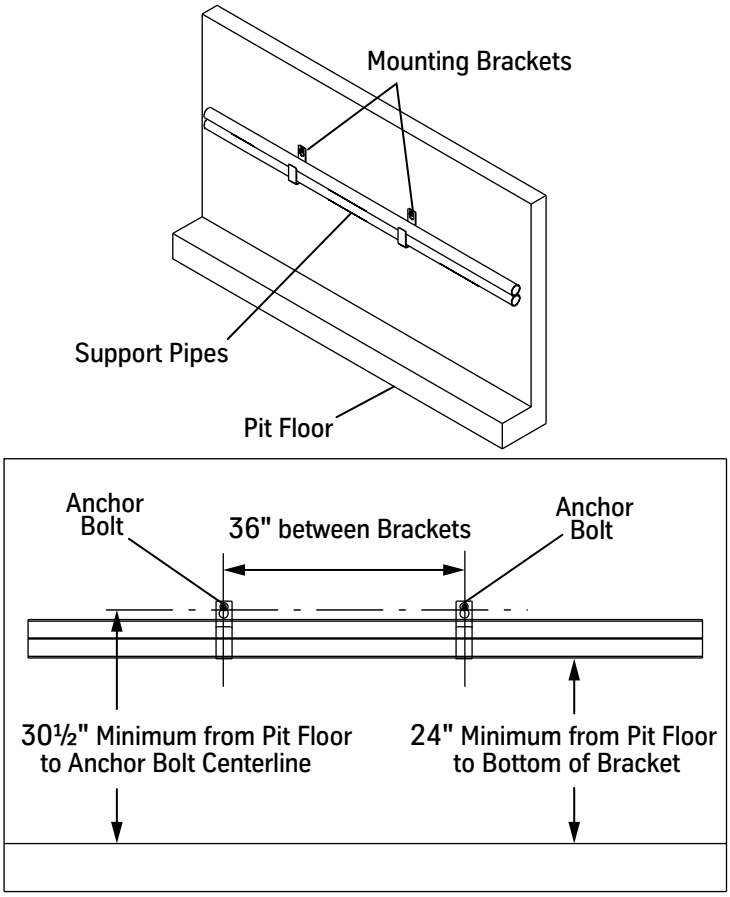


Figure 41 - Support Pipe Mounting Bracket Kit

Jack Guide Rail

1. Attach the jack guide rail brackets to the jack guide rail in a position corresponding to the nearest car rail bracket mounting surface. Brackets for the jack guide rail are located at the same intervals as the car rail brackets and on the corresponding mounting surfaces. See Figure 42.

WARNING

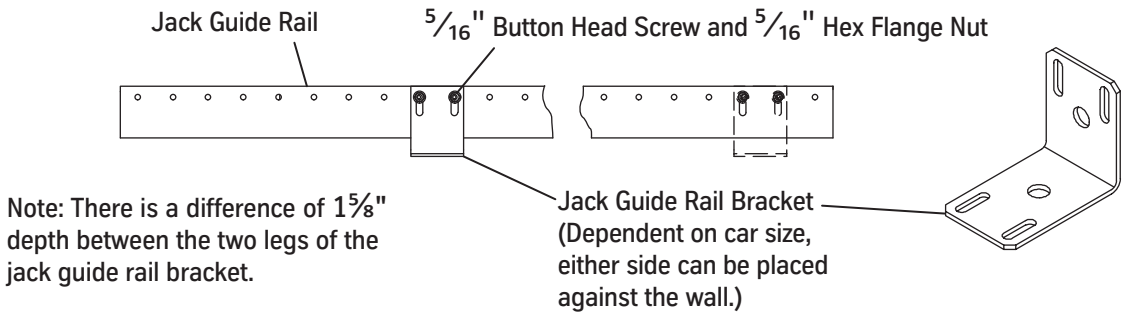
Button heads must be on the inside of the rail to avoid interference with roller guide.

2. Attach the assembly to the splice on the starter rail and the hoistway wall.

WARNING

The jack guide rail brackets must not interfere with the plunger guide mounting rings on the jack.

3. Install the splices. See Figure 43 on page 71.
4. Use either method below to estimate the length of the jack guide.
   - With the car at the bottom landing, the length of jack guide rail required above the middle plunger is two-thirds of the total travel plus 12".
   - Place the car in full overtravel. From the car top, estimate the highest point that could be reached by the top jack roller guide. The jack guide rail will extend just past this point.
5. Use a laser to plumb the guide rail. See the pit template for location.



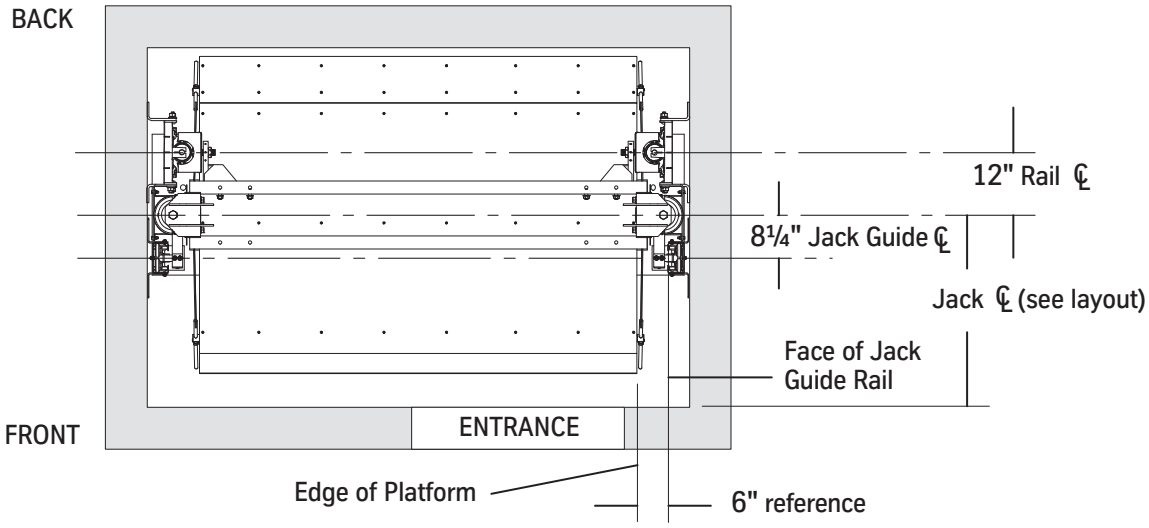


Figure 42 - Jack Guide Rail Mounting Brackets to Jack Guide Rail Assembly

Jack Guide Rail

(continued)

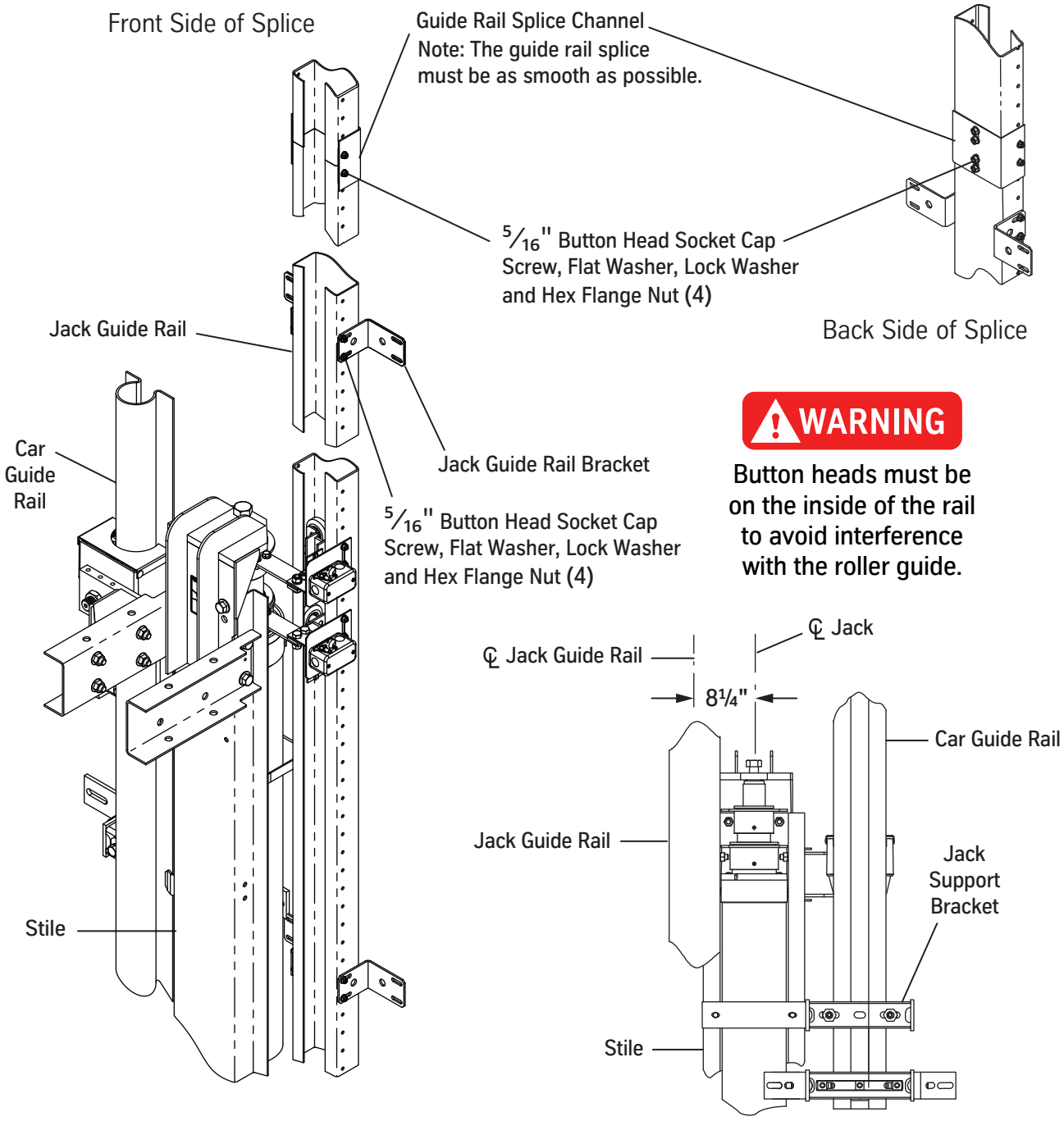


Figure 43 - Stack the Jack Guide Rail Channels

Jack Plunger Roller Guides

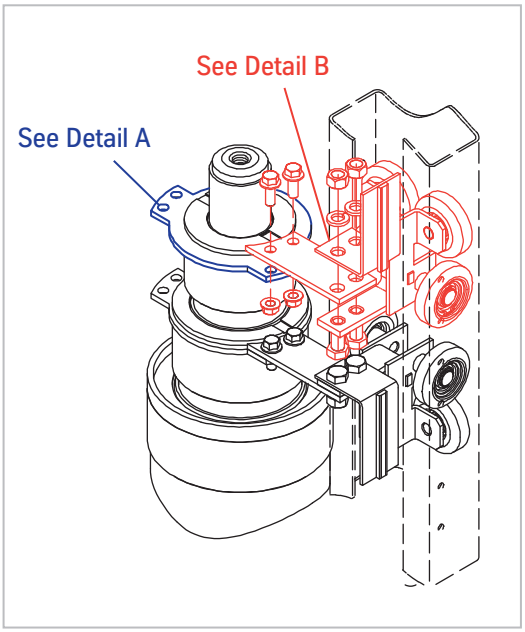
See Figure 44 Top Jack Plunger Guide Installation and Figure 45 Bottom Jack Plunger Guide Installation for the following procedure.

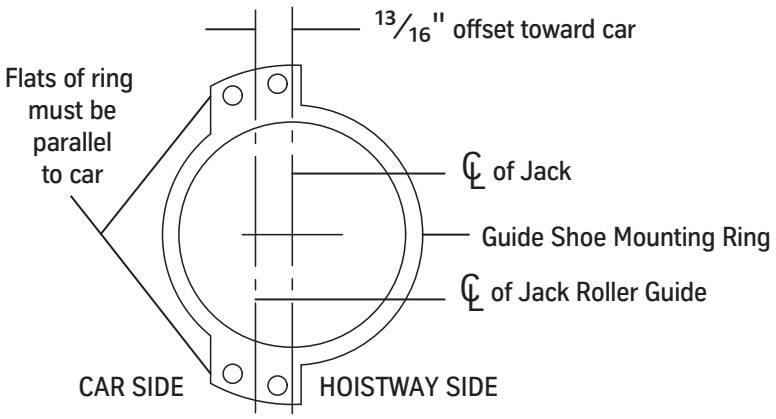
CAUTION

The top plunger roller guide must be pointed up, and the bottom plunger roller guide must be pointed down. Failure to do so will result in the two roller guides crashing into one another during a resync operation. See the labels on the roller guides for the correct orientation.

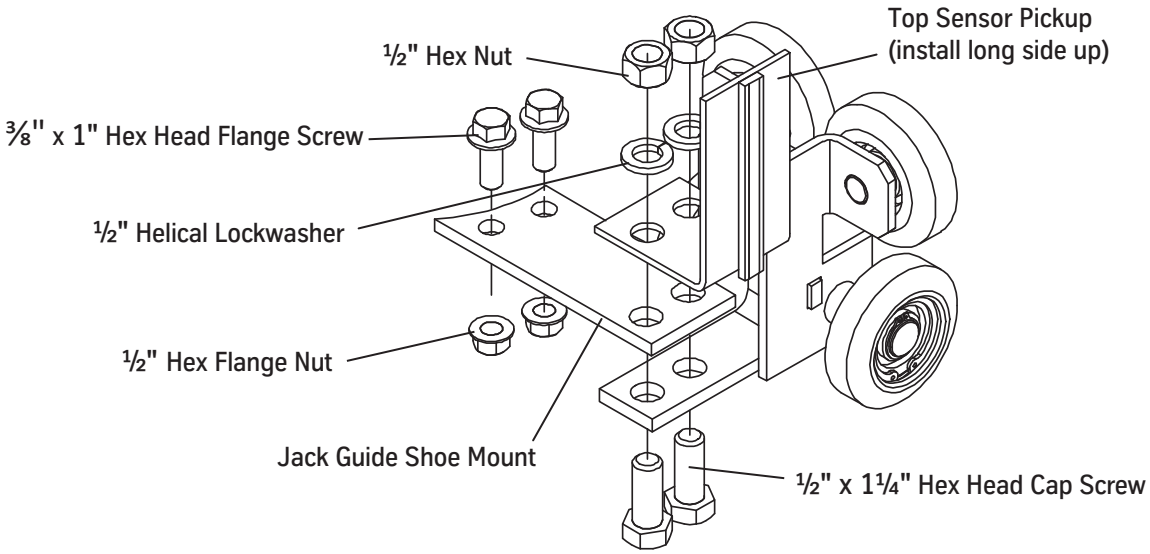
1. With the long side up and from the open splice at the top of the starter rail, slide the top plunger roller guide into the guide rail.
2. Raise the plunger roller guide to a point above the jack, and suspend it with an object such as a long screwdriver.
3. With the long side down and from the open splice, slide the bottom plunger roller guide into the guide rail and suspend it.
4. Match the offset of the guide shoe mounting ring from the centerline of the jack. The guide shoe mounting rings are free to turn on the jack plunger guides.
5. Use two $^{3}/_{8}$" hex head flange screws and flange nuts to install a guide shoe mount on the lower guide shoe mounting ring on the jack and tighten.
6. With the long sides pointed down, use two $^{1}/_{2}$" x $1^{1}/_{4}$" hex head cap screws to install the plunger roller guide and the sensor pickup assembly.
7. Install a $^{1}/_{2}$" lockwasher and hex nut on each cap screw and tighten.
8. Use two $^{3}/_{8}$" hex head flange screws and flange nuts to install a guide shoe mount on the upper guide shoe mounting ring and tighten.
9. Retrieve the top plunger roller guide.
10. With the long sides pointed up, use two $^{1}/_{2}$" x $1^{1}/_{4}$" hex head cap screws to install the plunger roller guide and the sensor pickup assembly.
11. Install a $^{1}/_{2}$" lockwasher and hex nut on each cap screw and tighten.
12. Repeat this procedure for the other side.

Plunger Roller Guides
(continued)





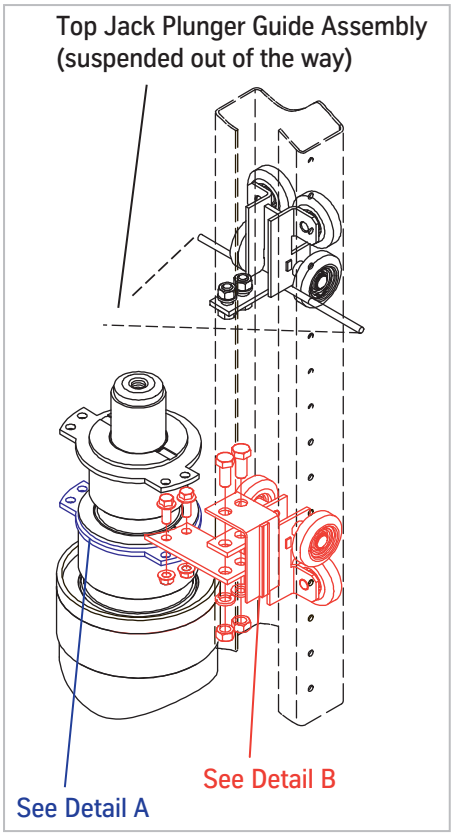
Detail A - Upper Jack Guide Shoe Mounting Ring

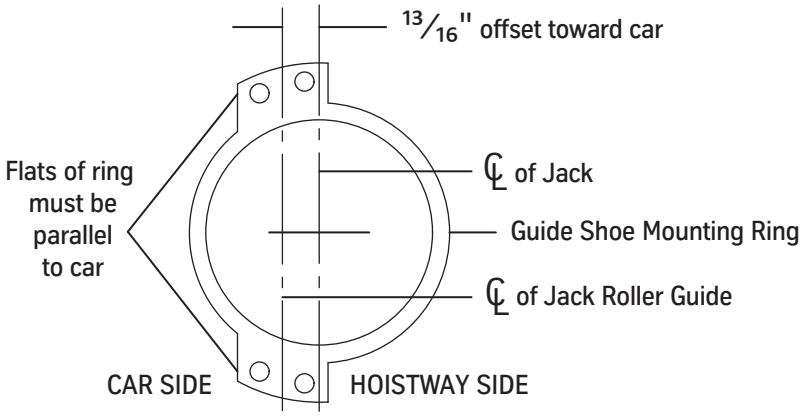


Detail B - Top Jack Plunger Guide Assembly

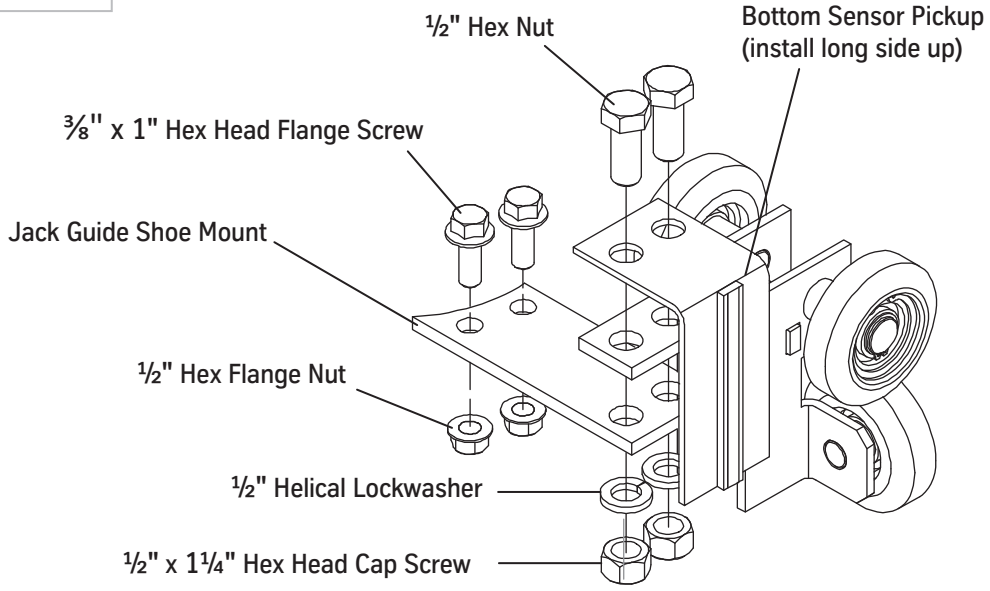
Figure 44 - Top Jack Plunger Guide Installation

Plunger Roller Guides
(continued)





Detail A - Lower Jack Guide Shoe Mounting Ring



Detail B - Bottom Jack Plunger Guide Assembly

Figure 45 - Bottom Jack Plunger Guide Installation

Sensors

Three sensor assemblies are required on each side of the hoistway.

Static Sensors at the Bottom Landing

1. Manually resync the jacks. See Figure 46 on page 77.
   a. Remove the buffer springs.
   b. Move the platform to the bottom landing.
   c. Place the platform on Inspection Operation.
   d. Open the manual lowering valve.
   e. Let the car lower until both jacks are fully collapsed.
   f. Let the platform sit for at least 10–15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.

Each plunger head should be level with its counterpart on the other side.

2. Use two button head screws, two lock washers, and two hex flange nuts to install a sensor assembly on the jack guide rail for each of the pickup assemblies.
3. Vertically center the sensors on their respective pickup sensor magnets, and tighten the button head screws.
4. Repeat step 2 and step 3 for the other side.
5. Install the buffer springs.

Sensors
(continued)

Dynamic Sensors at the Top Landing

1. Manually resync the jacks. See Figure 47 on page 78.
   a. Remove the buffer springs.
   b. Move the platform to the bottom landing.
   c. Place the platform on Inspection Operation.
   d. Open the manual lowering valve.
   e. Let the car lower until both jacks are fully collapsed.
   f. Let the platform sit for at least 10–15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.

Each plunger head should be level with its counterpart on the other side.

2. Position the platform level with the top landing.
3. Install the buffer springs (if they have been removed).
4. Lower the platform 60" from the top landing.
5. Locate the center of one of the upper guide sensor pickup magnets, and mark the jack guide rail at that point.
6. Use two button head screws, two flat washers, two lock washers, and two hex nuts to install a sensor assembly at the mark on the jack guide rail.
7. Vertically center the sensor on the mark, and tighten the button head screws.
8. Repeat step 5 through step 7 for the other side.
9. Ensure that each sensor pair is placed at exactly the same height in the hoistway because each sensor pair must activate at the same time, ± $^{1}/_{8}$".

Sensors
(continued)

Note: When the car is at the bottom landing, the bottom sensors must be vertically centered on the magnet of their respective sensor pickup assemblies.

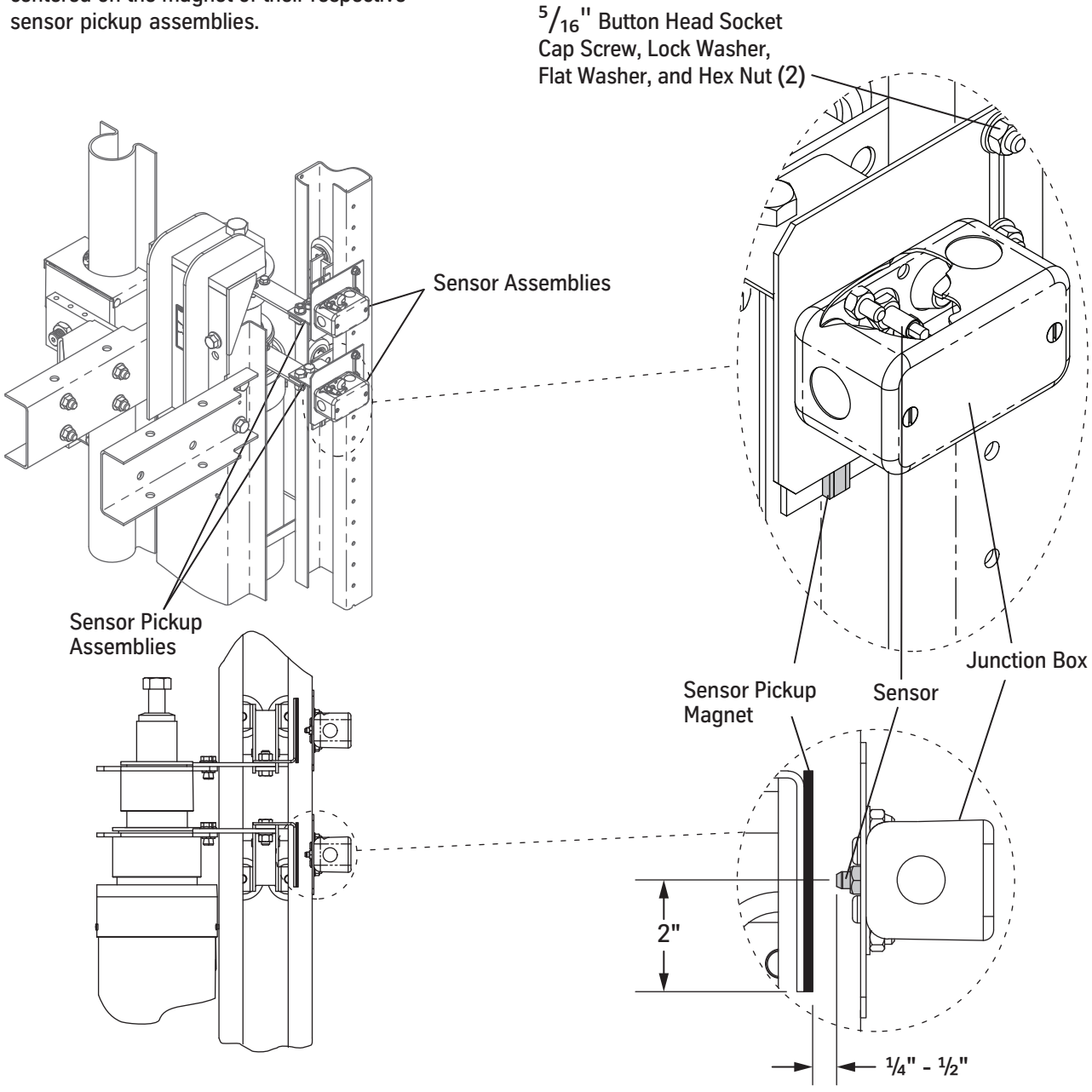


Figure 46 - Static Sensor Installation

Sensors
(continued)

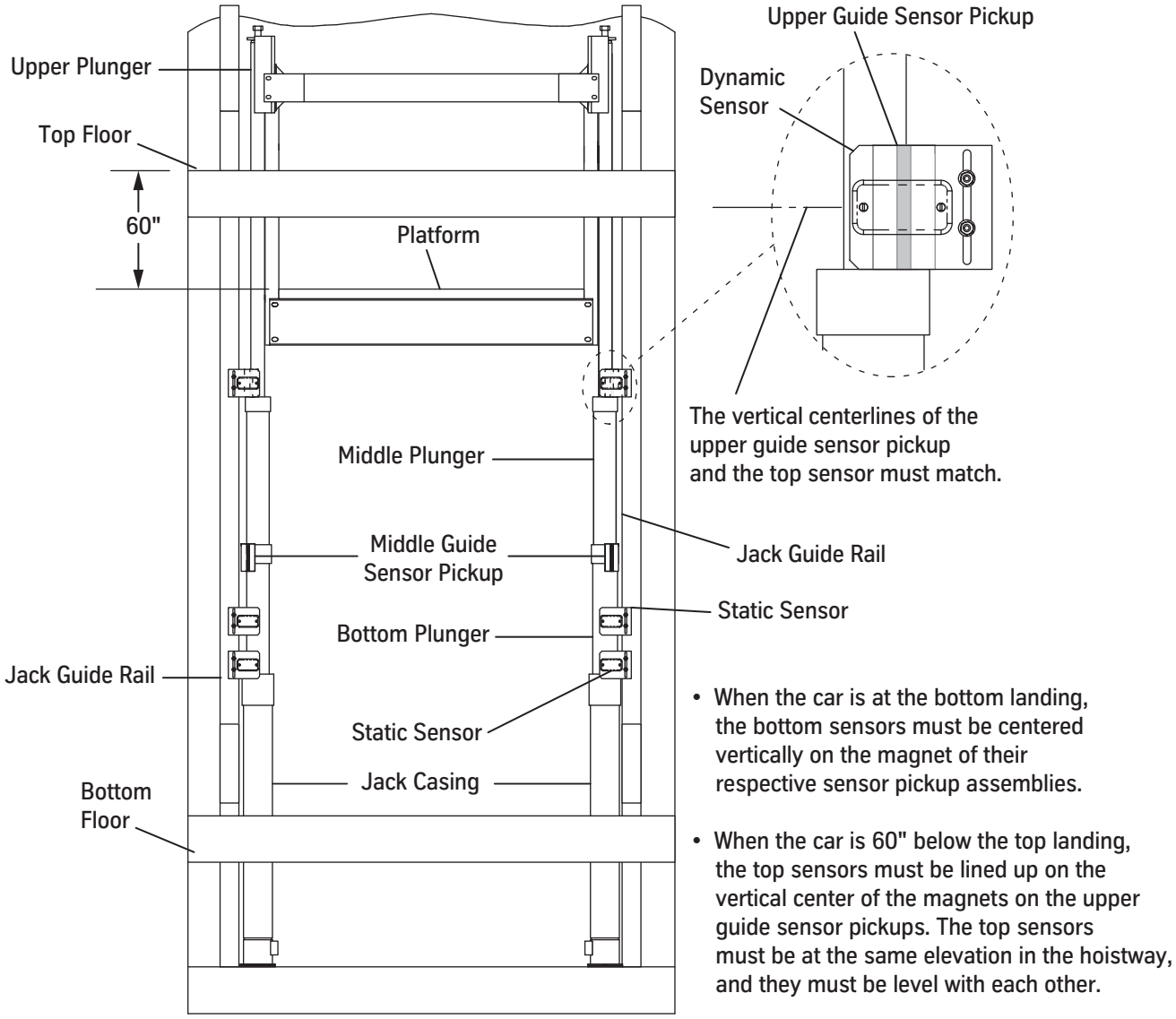


Figure 47 - Dynamic Sensor Installation

Top and Bottom Overtravel Check

NOTE Top overtravel must be $^{1}/_{2}$" more than bottom overtravel.

WARNING **Do not perform an overtravel check before the jacks are resynced.**

1. Remove the buffer springs (if installed).
2. Lower the car until both jacks bottom out, and then check for $8^{1}/_{2}$" of bottom overtravel.
3. Run the jacks onto the stop rings, and then check for 9" of top overtravel.

Maintenance

For required inspections, see the *Maintenance Control Program* (MCP) binder.

Replace Jack Seals and Check Valves

Recommended Tools

- Chain hoist
- Jack straps
- Eye bolts
- 5-gallon container
- Small electric pump
- Strap wrench

Required Tools	Part No.	Print No.	Description	Use
Three-Stage Telescoping	9845604	850RJ2	Bullet Seal Tool	Install the pre-assembled casing head.
	—	850RH2		Install the pre-assembled lower plunger head.
	—	850RN1	Lower Plunger Seal Tool	Install the lower plunger assembly; gets the bottom seal across the casing threads.
	—	850RP1	Seal Tool	Install the middle plunger assembly; gets the bottom seal across the lower plunger threads.
	9844211	850RM1	Plunger Head Seal Loading Tool	Head pre-assembly; gets the head seal past the threads in the lower plunger head.
	9844119	850RR1		Head pre-assembly; gets the head seal past the threads in the casing head.
	9862741	200AHE14	Seal Valve Kit	Field replacements.
	9723215	886BX1	Check Valve Assembly	

1. Unbolt the jack guide roller assemblies, and secure them in the jack guide rail.
2. Run the car to the top landing and secure it, but leave room to access the car top.

CAUTION **Verify that the jack support bracket assembly is properly installed.**

3. Remove the jack jump bolts.
4. Collapse the plunger assemblies.
   a. Count and record the number of turns, and fully close the down stop adjustment.
   b. Count and record the number of turns, and open the manual lowering valve.
5. Remove the lift bracket/platen assembly from both stiles.
6. Use a strap wrench to remove the upper plunger guide assembly. Leave the seal retainer in place.
7. Screw the eye bolt into the upper plunger, and hoist it out of the jack. Stand the upper plunger in the pit beside the car.

Replace Jack Seals and Check Valves

(continued)

8. Inspect and, if necessary, repair the surface finish of the upper plunger.

CAUTION **Do not allow any sanding debris to contaminate the wipers and seals.**

a. Use a 240–320-grit emery cloth to carefully remove deep scratches, burrs, etc.

b. Polish the area with a 600-grit emery cloth.

9. Use a strap wrench to remove the middle plunger guide assembly. Leave the seal retainer in place.

10. Temporarily reassemble the upper plunger guide assembly to the middle plunger.

11. Insert the inlet hose from the small electric pump into the casing beside the lower plunger.

12. Place a strap choke under the upper plunger guide, and lift the middle plunger out of the jack.

13. As the plunger is hoisted, pump the oil into the five-gallon container.

NOTE The seal will hang on the casing threads when the middle plunger is lifted. Move the middle plunger from side to side to get the seal past the threads.

14. Stand the middle plunger in the pit beside the car.

15. Inspect and, if necessary, repair the surface finish of the middle plunger.

CAUTION **Do not allow any sanding debris to contaminate the wipers and seals.**

a. Use a 240–320-grit emery cloth to carefully remove deep scratches, burrs, etc.

b. Polish the area with a 600-grit emery cloth.

16. Use a strap wrench to remove the lower plunger guide assembly. Leave the seal retainer in place.

17. Temporarily reassemble the middle plunger guide assembly to the lower plunger.

18. Insert the inlet hose from the small electric pump into the casing beside the lower plunger.

19. Place a strap choke under the middle plunger guide, and lift the lower plunger out of the jack.

20. As the plunger is hoisted, pump the oil into the five-gallon container.

21. Leave the lower plunger suspended.

22. Inspect and, if necessary, repair the surface finish of the lower plunger.

Repair the Jack

Lower Plunger

See Figure 48 on page 84.

1. Replace the seals and the check valve O-ring of the lower plunger.
   a. With the lower plunger suspended, remove the $^1/_2$" x 1" hex head cap screws, the seal retainer, and the bearing strip from the bottom of the lower plunger.
   b. Remove the external oil seal from the lower plunger base.
   c. Remove the check valve and O-ring from the check valve bore.
   d. Disassemble the check valve, and replace the O-ring on the check valve plunger.
   e. Reassemble the check valve, run the nuts together by hand, and then torque them 12–13 ft.-lbs.
   f. Install a new O-ring in the check valve bore, and then install the check valve.
   g. Install a new external oil seal on the lower plunger base.
   h. Use a $^1/_2$" x 1" hex head cap screw to attach the seal retainer to the lower plunger base, and then tighten to 30 ft.-lbs.
   i. Install a new bearing strip on the seal retainer.
2. Place the external seal tool over the top of the casing.
3. Inspect and, if necessary, repair the surface finish of the lower plunger.
4. Lower the lower plunger into the jack casing.
5. Remove the middle plunger guide from the lower plunger.
6. Remove the external seal tool from the top of the casing.
7. Disassemble the lower plunger guide, and discard the wiper, the internal oil seal, and the O-ring.
8. Clean the lower plunger guide parts.
9. Use a new wiper, a new internal oil seal, and a new O-ring to reassemble the lower plunger guide. Apply grease to the O-ring to hold it in place.
10. Place the bullet seal tool into the top of the lower plunger.
11. Install the lower guide on the casing.
12. Remove the bullet seal tool.

Repair the Jack
(continued)

Middle Plunger

See Figure 48 on page 84.

1. Cover the jack assembly so that nothing can fall into it during the rebuilding process.
2. Suspend the middle plunger over the jack assembly.
3. Replace the seals and the check valve O-ring of the middle plunger.
   a. With the middle plunger suspended, remove the $^{1}/_{2}$" x 1" hex head cap screws, the seal retainer, and the bearing strip from the bottom of the lower plunger.
   b. Remove the external oil seal from the middle plunger base.
   c. Remove the check valve and O-ring from the check valve bore.
   d. Disassemble the check valve, and replace the O-ring on the check valve plunger.
   e. Reassemble the check valve, run the nuts together by hand, and then torque them 12–13 ft.-lbs.
   f. Install a new O-ring in the check valve bore, and then install the check valve.
   g. Install a new external oil seal on the middle plunger base.
   h. Use a $^{1}/_{2}$" x 1" hex head cap screw to attach the seal retainer to the middle plunger base, and then tighten to 30 ft.-lbs.
   i. Install a new bearing strip on the seal retainer.
4. Place the external seal tool over the top of the lower plunger.
5. Inspect and, if necessary, repair the surface finish of the middle plunger.
6. Lower the middle plunger into the lower plunger.
7. Remove the upper plunger guide from the middle plunger.
8. Remove the external seal tool from the top of the lower plunger.
9. Disassemble the middle plunger guide, and discard the wiper, the internal oil seal, and the O-ring.
10. Clean the middle plunger guide parts.
11. Use a new wiper, a new internal oil seal, and a new O-ring to reassemble the middle plunger guide. Apply grease to the O-ring to hold it in place.
12. Place the bullet seal tool into the top of the middle plunger.
13. Install the middle plunger guide on the lower plunger.
14. Remove the bullet seal tool.

Repair the Jack
(continued)

Upper Plunger

See Figure 48 on page 84.

1. Suspend the upper plunger over the jack assembly.
2. Replace the bearing strip.
3. Inspect and, if necessary, repair the surface finish of the upper plunger.
4. Lower the upper plunger into the middle plunger.
5. Disassemble the upper plunger guide, and discard the wiper, the internal oil seal, and the O-ring.
6. Clean the upper plunger guide parts.
7. Reassemble the upper plunger guide with a new wiper, a new internal oil seal, and a new O-ring. Apply grease to the O-ring to hold it in place.
8. Install the upper plunger guide on the middle plunger.
9. Close the manual lowering valve.
10. Remove the rubber hose from the quick connect of the silencer.
11. Open all of the bleeder valves until the air stops and oil begins.
12. Close the bleeder valves.
13. Install the lift bracket/platen assembly on each stile.

CAUTION

When extending the plungers, be careful not to hit the sensors or allow the plungers to be scratched by the car frame.

14. Jog the power unit to run the jacks up to the lift bracket/platen assembly.

NOTE

If the upper plungers do not extend, continue running the pump. When the lower plunger hits its stop ring, the increase in pressure will open the valve in the bottom of the lower plunger forcing oil into it and the upper section. The increase in pump noise and jack vibration is normal.

15. Continue running the pump until the plungers have reached their respective lift bracket/platen assembly.
16. Install the jack jump bolts, and then install the jack plunger roller guides.
17. If the jack has been clamped to the bottom rail bracket, remove the clamp.
18. With the weight of the car on the jacks, bleed all bleeders on each jack.
19. Remove the buffer springs, and resync the jacks.
20. Install the buffer springs, verify proper operation, and return the car to service.

Repair the Jack

(continued)

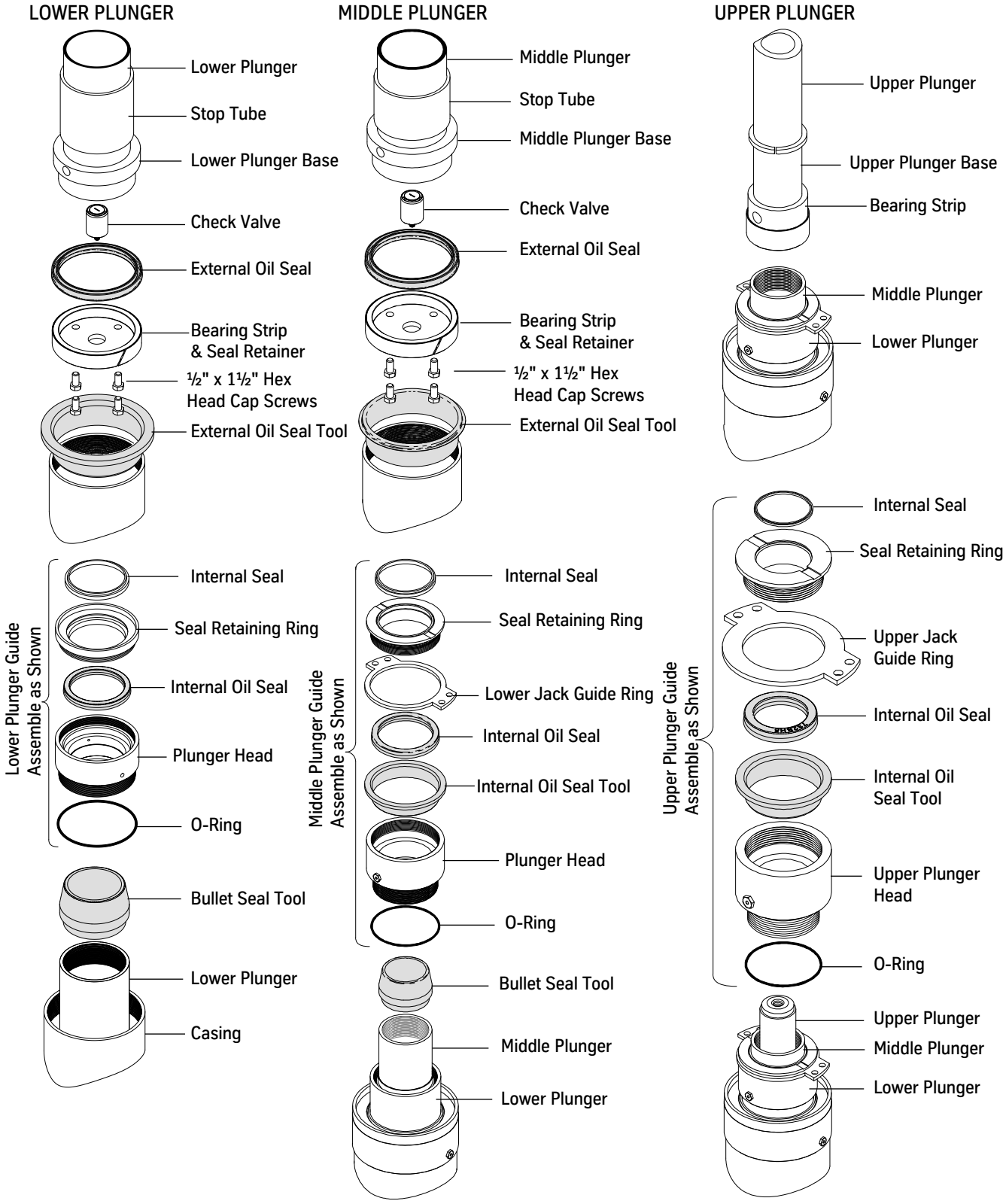


Figure 48 - Jack Plungers Internal and External Oil Seal Installation

Jack Resync Tests

Static Sensor Test (Four Landings or More)

1. Verify that the elevator control system has been through all final adjustment procedures.
2. Turn OFF, Lockout, and Tagout the mainline disconnect.
3. Disconnect one of the first landing static sensors. See the job wiring diagrams for the specific controller.
4. Place the car on Automatic Operation.
5. Turn ON the mainline disconnect.

- The car should perform a resync and return to the first landing.
- When the car returns to the first landing, it will initiate another resync.
- When there are four landings to resync, the car will go into Twin Post Shutdown (same as Low Oil Operation). Verify that the low oil timer is set equal to the time it takes for the longest landing-to-landing run plus about 10%.

6. Turn OFF, Lockout, and Tagout the mainline disconnect.
7. Reconnect the first landing static sensor.
8. Turn ON the mainline disconnect.
9. Verify that the car runs on Automatic Operation.

Dynamic Sensor Test (Three Landings or More)

1. Place the car at the bottom landing.
2. Turn OFF, Lockout, and Tagout the mainline disconnect.
3. Remove one sensor input wire.
4. Turn ON the mainline disconnect.
5. Enter a car call to the top landing. As the car nears the top landing, the car should stop, return to the bottom landing, and shut down.
6. Turn OFF, Lockout, and Tagout the mainline disconnect.
7. Replace the sensor input wire.
8. Turn ON the mainline disconnect.
9. Verify that the car runs on Automatic Operation.

Static Leak Test (Identify the Cause of a Shutdown)

To ensure accurate results, this test must be done when the oil is cool.

1. Verify that there are no external leaks.
2. Remove the buffer springs.
3. Move the car to the bottom landing.
4. Place the car on Inspection Operation.
5. Open the manual lowering valve.
6. Let the car lower until both jacks are fully collapsed.
7. Let the car sit for at least 10–15 seconds.
8. Close the manual lowering valve, and ensure that each plunger head is level with its counterpart.
9. Park the car about 12" above the bottom landing to ensure that the plungers are extended several inches but not enough to prevent measuring their positions from the car top.
10. Close the shutoff valve in the machine room.
11. Measure from the lifting bracket/platen down to the sensor cap on each jack, and record the distances and the time.
12. Let the car sit for about 30 minutes.
13. Measure from the lifting bracket/platen to the sensor cap on each jack again, and record the distances and the time.
14. Compare the before and after measurements. A difference of $^{1}/_{4}$" to $^{1}/_{2}$" is acceptable; more could indicate an internal leak, which requires the jack to be rebuilt.

Cycle Test (Identify the Cause of a Shutdown)

1. Verify that there are no external leaks.
2. Remove the buffer springs.
3. Move the car to the bottom landing.
4. Place the car on Inspection Operation.
5. Open the manual lowering valve.
6. Let the car lower until both jacks are fully collapsed.
7. Let the car sit for at least 10–15 seconds.
8. Close the manual lowering valve, and ensure that each plunger head is level with its counterpart.
9. Use IMS or the UIT to activate the car door disconnect (D26=1).
10. Use IMS or the UIT to set cycle adjustments O12 and O13 to the desired landings.
11. Cycle the car for about 30 minutes.
12. Stop cycle mode, and place the car on Inspection Operation.
13. Park the car about 12" above the bottom landing.
14. From the car top, measure from the lifting bracket (platen) to the sensor cap on each jack, and compare the measurements.

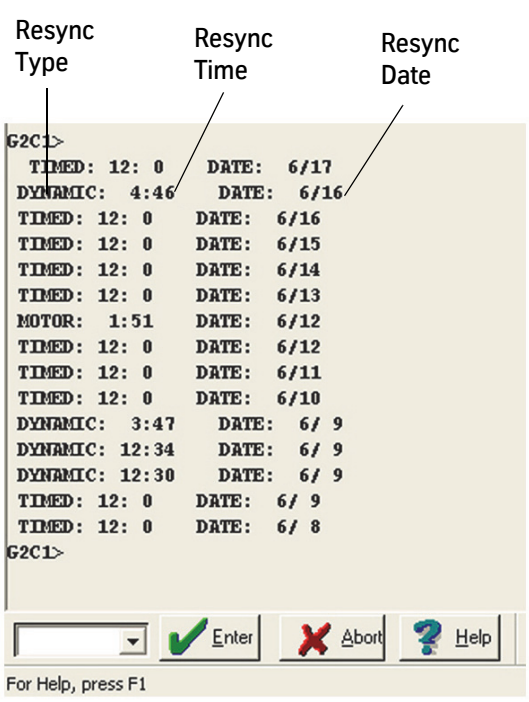
- If the jacks are out of sync and there is no obvious internal or external leak, use the following list to check for and correct any alignment problems:
  a. The DBG is correct over the entire travel.
  b. The car rails are plumb.
  c. The tip of each jack base is down into its respective hole in the pit template.
  d. The car frame is square.
  e. The centerlines of guide shoes are 12" from centerline of jump bolt and jack.
  f. The buffer stands are level.
- Before rebuilding a telescopic jack, verify the following items:
  a. The lifting brackets are in the correct holes. See the label on the bracket or Figure 31 on page 56.
  b. The top and bottom overtravel is correct.
  c. The net travel is correct.
  d. The pit depth and level is correct.
  e. The rail bracket quantity and spacing is correct.

IMS Jack Resync

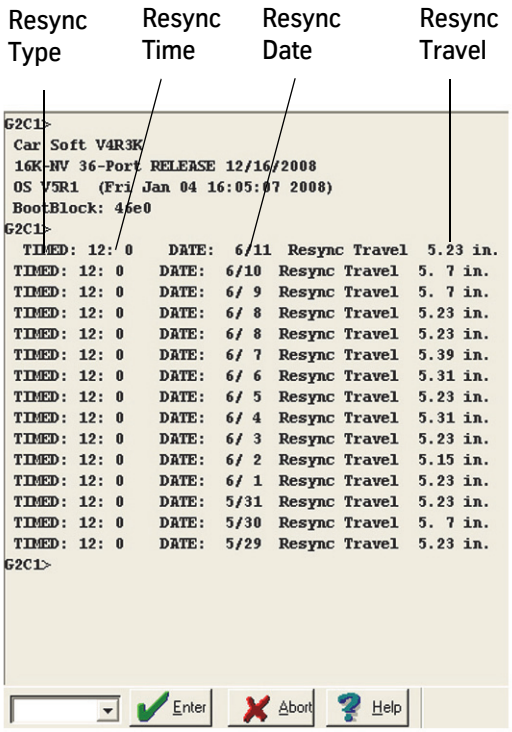
1. Connect an IMS laptop to the controller.
2. Start IMS, and open the Remote FAST window.
3. Enter the current data in the TIM (Time) and DAT (Date) Adjustments and, when correct, save these values with the WRT Command.

NOTE If TIM is 12 hours off, it could force the jacks into a resync operation during a peak demand period.

4. Enter a WJR Command to display the jack resync history data. See Figure 49.



Pre V4R3K WJR Command Screen



V4R3K (& higher) WJR Command Screen

- Resync Type
  - **Dynamic** sensors in the hatch at the top floor are detecting the jacks to be 4"– 6" out of sync (6" and above forces a car shutdown).
  - **Static** sensors are not being seen with the car at rest at a floor that has static sensors.
  - **Timed** resync is the time of day as known in the CPU and its O30 and JRT parameters.
  - **Motor** starts that have occurred, as set by the O44 parameter.
- **Resync Time** - The time of day the resync occurred.
- **Resync Date** - The month and day the resync occurred.
- **Resync Travel** -The number of inches the car moved, from the limit to the resync position on the buffers.

Figure 49 - WJR Command Screen

IMS Jack Resync
(continued)

WJR Command Results

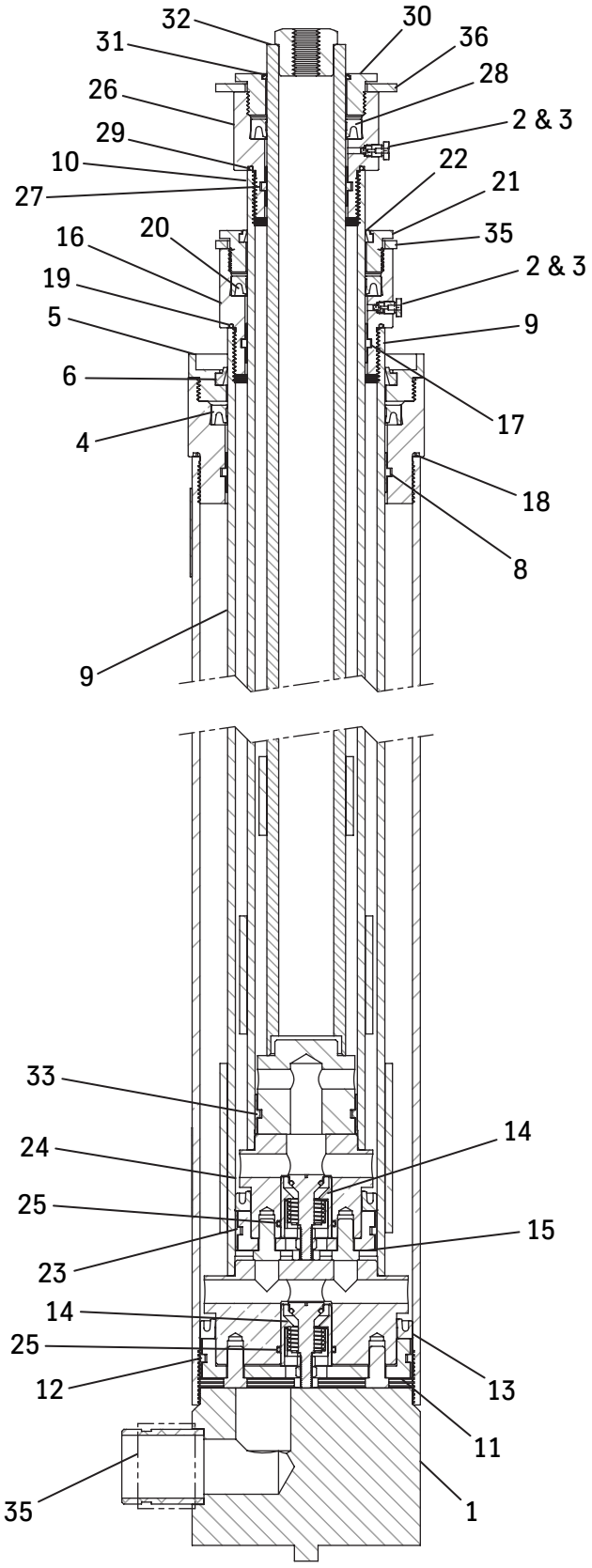
1. Static or Dynamic Resyncs
   - The timed and motor resyncs are not working properly.
   - The jacks are unable to resync properly.
   - Elevators with high traffic.

2. Motor Resyncs
   - Check O44 Adjustment, and set to the default value of 1500 (range 100–2500).
   - Adjust the default setting of the O29 Adjustment to match the job conditions; there has to be ample time for the car to lower past the bottom floor level and sit on the buffer springs for 6–10 seconds to synchronize the fluid levels in the jack sections.

Troubleshooting Guide

Problem	Possible Causes	Possible Solutions
Upper stage of jack will not extend until the bottom stage has reached its stop ring.	All of the air not bled from jack.	Extend jacks and bleed.
	Valve or bottom piston seal leaking.	Replace seal and check valve.
Vibration in jack; evident in Up Leveling, and Down Start from top landing.	Jack is not installed plumb. Metal in bearing strip.	Add 1 qt. Caterpillar Oil Additive (1U-9891) to vibrating jack.
Frequent need to resync due to an external oil leak from the upper seals.	Worn seals in the guide assemblies.	Replace the seal. See Jack Seal Replacement on page 79.
Frequent need to resync due to: • oil leak from upper to lower stage. • internal leak. • upper plunger shrinking.	Worn bottom seal.	Replace bottom seal.
	A leaking check valve.	Replace the check valve.
Failure to resync properly.	Perform the Replacement Parts (6501DG) on page 91.	

Replacement Parts (6501DG)



Item	Print No.	Description
1	6503CA1	Casing Assembly
2	886BN1	Bleeder Valve
3	78136	O-Ring
4	732BH9	Internal Oil Seal
5	732BT1	Seal Retaining Ring
6	732AP4	Internal "D" Wiper Seal
7	454EG1	Lower Plunger Guide
8	142CG5	Lower Piston Bearing
9	6502AV1	Lower Plunger Assembly
10	6502AT2	Middle Plunger Assembly
11	712AT1	Bearing Retainer Strip
12	142CH5	Lower Piston Bearing
13	732BJ3	External Oil Seal
14	886BX1	Check Valve Assembly
15	712AA4	Bearing Retainer Strip
16	454AJ4	Lower Plunger Guide
17	142CG2	Lower Plunger Bearing
18	717BB3	O-Ring
19	717BB2	O-Ring
20	732BH7	Internal Oil Seal
21	732BV2	Seal Retaining Ring
22	732AP2	Internal "D" Wiper Seal
23	142CH2	Lower Piston Bearing
24	732BJ2	External Oil Seal
25	717BB1	O-Ring
26	454AK2	Upper Plunger Guide
27	142CG4	Plunger Bearing
28	732BH6	Internal Oil Seal
29	75483	O-Ring
30	732BV1	Seal Retaining Ring
31	732AR1	Internal "AN" Wiper Seal
32	6502AW3	Upper Plunger Assembly
33	142CH4	Upper Piston Bearing
34*	642AT4	Grooved Pipe Coupling
35	596DT1	Lower Jack Guide Shoe Mount
36	596DT2	Upper Jack Guide Shoe Mount
37*	200AHE14	Seal Kit - Field Replacements
38*	802HR2	Support Bracket
*not shown		

Twin Post Jack Resync Failure Troubleshooting Procedure

1. Perform leak down tests to exclude problems with the packing, the check valves, or the power unit.

2. Verify that the controller is performing the proper resync.

3. Verify that all adjustments and I/Os are correct.

4. Confirm that the job number stamped on the jacks matches the current job.

5. Pull the springs, and fully collapse the jacks (in rare cases, it may be necessary to remove the buffer stands to fully collapse the jacks).

   If the bolster/strike plate touches the buffer stand/spring locator with fully collapsed jacks and,

   - If this is a code requirement: verify that there is at least $^{1}/_{4}$" of jack travel before the jacks are fully collapsed.
   - If this is not a code requirement: ensure that the bolster/strike plate does not touch the buffer stand/spring locator with fully collapsed jacks.

6. Verify that the springs are pulled and that the jacks are fully collapsed.

7. Verify that the tops of the fully collapsed jacks are level with each other. If not, add shims beneath the lower jack case until the tops are level.

8. Record the following plunger assembly measurements, and give these figures to ITS Field Engineering. See Figure 50 on page 93.

   a. Measure as closely as possible the fully collapsed jacks from the lifting bracket/ platen down to each of the plunger guide assemblies, and record this number in column a.

   b. Place the car at floor level of the bottom landing. Repeat the above measurements and record this number in column b.

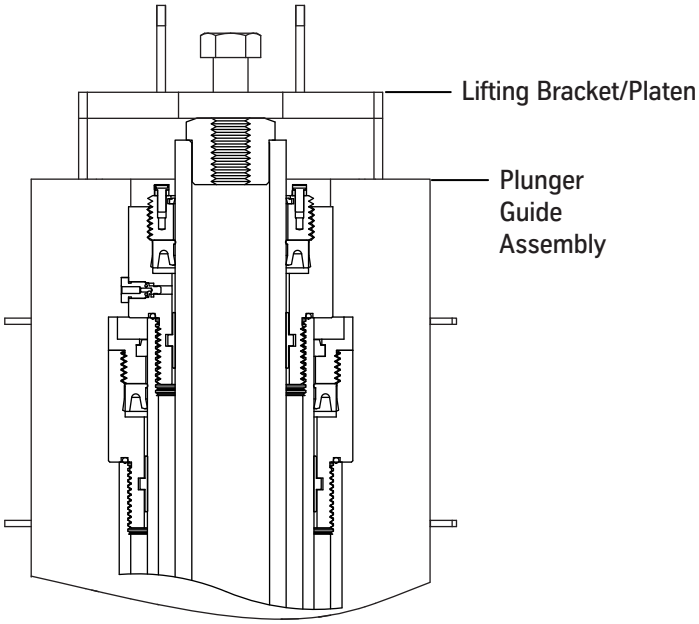
   c. Run the car to the top landing, and return the car to the bottom landing. Repeat the above measurements and record this number in column c.

   d. If the difference in the measurements is no more than $^{1}/_{4}$", correctly install the springs and manually lower the jacks to fully collapsed.

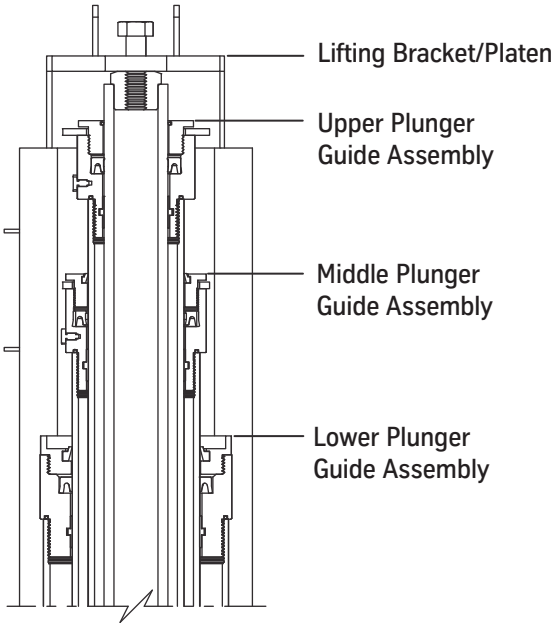
9. Verify that the jump bolts do not contact the tops of the lifting brackets/platens. There should be a gap between the hex head and the lifting bracket/platen.

10. If travel problems are occurring (top, bottom, run-by, etc.), proceed to the Travel Problems Chart on page 94 and fill in Table 1.

Troubleshooting Procedure
(continued)



TWO-STAGE JACK



THREE-STAGE JACK

Jack Assembly	Lower Plunger			Middle Plunger			Upper Plunger (Three-Stage Only)		
Column	a	b	c	a	b	c	a	b	c
Measurements	Fully Collapsed Jack	Car at Floor Level	Car to Top Landing	Fully Collapsed Jack	Car at Floor Level	Car to Top Landing	Fully Collapsed Jack	Car at Floor Level	Car to Top Landing
Right Jack									
Left Jack									
Difference									

- The right hand jack is on the right if standing in the car facing the door.
- The difference between the jacks should be $^{1}/_{4}$" or less.

Example: Right Jack = 22 $^{1}/_{4}$"
Left Jack = 22 $^{1}/_{2}$"
Difference = $^{1}/_{4}$"

Figure 50 - Plunger Assemblies and Measurements

Travel Problems Chart

Before filling out this table, the Twin Post Jack Resync Failure Troubleshooting Procedure must be completed.

If travel problems are occurring, complete this table and give the dimensions to ITS Field Engineering.

Measure the following:	From	To	Dimension
Distance	Pit depth	Bottom of hoistway sill	
Vertical distance	Bottom of hoistway sill	Top of hoistway sill	
Fully compressed jack length Note: The bolster cannot contact the buffer stand/spring locator. If needed, temporarily remove the buffer stands.	Top of plunger, under lifting brackets	Pit floor with buffer springs removed	
Fully extended jack length on stop rings	Top of plunger, under lifting brackets	Pit floor	
Distance	Beneath the lifting brackets	Finished car floor	
Car sitting on fully compressed springs	Car sill	Bottom landing hatch sill	
Jacks bottomed out with buffer springs removed	Car sill	Bottom landing hatch sill	
Height	Lifting brackets back plate (see print)		
Distance	Bolster	Top of right lifting bracket	
Distance	Bolster	Top of left lifting bracket	
Distance when on stop ring	Above or below car sill	Top of hoistway sill	
Right jack, when on stop ring	Bottom plunger extends out		
	Middle plunger extends out		
	Top plunger extends out		
Left jack, when on stop ring	Bottom plunger extends out		
	Middle plunger extends out		
	Top plunger extends out		

Table 1 - Jack Travel Measurements

Adjustments, Commands, and Fault Codes

Adj. Command Fault	Definition and Notes
CJR	Erases the WJR history, and subsequent WJR Commands will show no results until another resync occurs.
DAT	Adjusts the date on the internal clock. Format: DAT= mm/dd/yy.
JRT	Sets the time of day that a jack resync will occur; all fields are required, including the colons (:) Format: JRT=[hh:mm:ss] [a/p] hh = hours; mm = minutes; ss = seconds; a = AM; p = PM. Note: Set for a time that will ensure that timed resyncs will not occur during peak-traffic periods.
WJR	Displays the Jack Resync history data.
O29	Sets the time allowed for a jack resync to be completed once the car reaches the bottom and begins the resync operation; Range: 5-30, Default: 20.
O30	Sets the number of days between automatic jack resync operations; Range: 1-3, Default: 1
O44	Sets the number of motor starts necessary before the launch of automatic jack resync operations. Range: 0-2000, Default: 1000.
TIM	Adjusts the internal clock time; all fields are required, including the colons (:) Format: TIM=[hh:mm:ss] hh = hours; mm = minutes; ss = seconds.
1068	Dual Post Jack Resync Error - Attempts to resync the dual-post jack have failed because the jack cylinders are too far out of synchronization to allow resync operation. This fault causes elevator shutdown. Possible Causes: • Defective hydraulic system components seeping oil and leading to jack misalignment. • Improper wiring. • Defective jack position sensors. • Defective CPU Card.
1120	Left Dynamic Sensor Failure Possible Causes: Improper installation or a defective sensor.
1121	Right Dynamic Sensor Failure Possible Causes: Improper installation or a defective sensor.
1122	The car was already in slowdown when the dynamic jack resync sensors were activated. Note: Dynamic sensors should activate 12" before the slowdown point. Possible Causes: • Improper dynamic sensor installation. • Defective dynamic sensors. • The slowdown distance is too long.

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