



VERTICAL EXPRESS

AMEE

Twin Post Two Stage Telescopic and Single Stage Jacks



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Safety Precautions


Read this page before any work is performed on Elevator Equipment.

Important!

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 done 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** statements identify conditions that could result in damage to the equipment or other property if improper procedures are followed.

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

General Safety

 **Before applying power to the controller, check that all Factory 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 they apply and do not appear in this summary.

Refer to the *Accident Prevention Program Manual* and the *Elevator Industry Field Employees' Safety Handbook* for mechanical 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 as specified in the parts list for the product.

Electrical Hazards

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

When printed circuit cards are involved, do not remove connections or cards from the equipment while power is applied. This can damage equipment.

Always store and ship printed circuit cards in separate static bags.

Mainline Disconnect

Unless otherwise suggested, always Turn OFF, Lock, and Tag out the mainline disconnect to remove power from elevator equipment. Refer to the *Accident Prevention Program Manual* for the required procedure.

Test Equipment Safety

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

Meggering 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

Dangerous voltages exist at several points in some products. To avoid personal injury, do not touch exposed electrical connections or components while power is ON.

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

Static Protection Guidelines

IMPORTANT! Read this page before performing work with electronic cards.

Modern elevator control systems use a number of electronic cards to control various functions of the elevator. These cards have components that are sensitive to static electricity. Damage to some electronic components will result from a rather small discharge of static.

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

Handling:

- Cards shipped from the factory in separate static bags must remain in the bags until time for installation.
- Wear an anti-static wrist strap with ground wire. Acceptable straps may be purchased from the 3M™ Company or RadioShack Corporation.
- Cards must not be placed on any surface without adequate static protection.

- Handle cards only by their edges after discharging your body to ground. Components, traces or connectors must not be touched.
- Extra care should be used when handling individual, discrete components such as EPROMS which do not have circuit card traces and components for suppression.

Shipping:

- Any card returned to the factory must be packaged in a static bag designed for the card.
- Any card returned to the factory must be packaged in a shipping carton designed for the card.
- “Peanuts” and styrofoam are unacceptable packing materials.

NOTE: Refer to the *Replacement Parts Catalog* to order extra static bags and shipping cartons for each card.

Failure to adhere to these guidelines will VOID card warranty!

Arrival of the Equipment

Receiving

Upon arrival of the telescoping jack, 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 jacks from dust, dirt, moisture, and temperature extremes.

Jacks should be stored on a flat surface.

Installation

Power Unit

1. Place the Power Unit in the Machine Room. See Figure 1.
2. Position the Power Unit according to the layout and Figure 1, then anchor it to the machine room floor with four $\frac{1}{2}$ " anchors.

Mainline Disconnect

1. Mount the mainline disconnect.
2. Run power to the power unit.

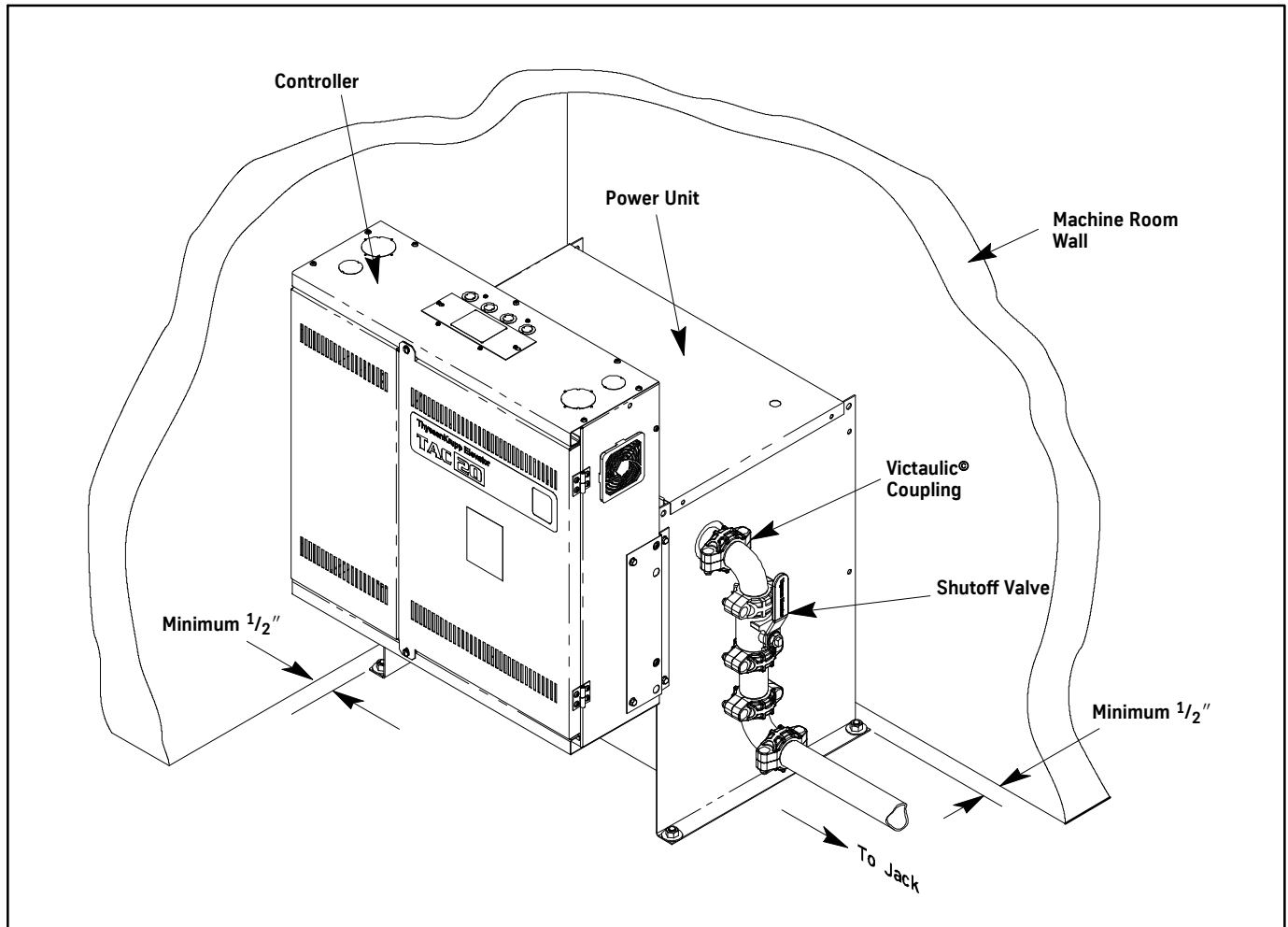


Figure 1 - Power Unit Placement And Piping

Pit Template and Laser

NOTE: If a discrepancy is found with the hoistway in steps 1 through 6, notify the general contractor and your supervisor.

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

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

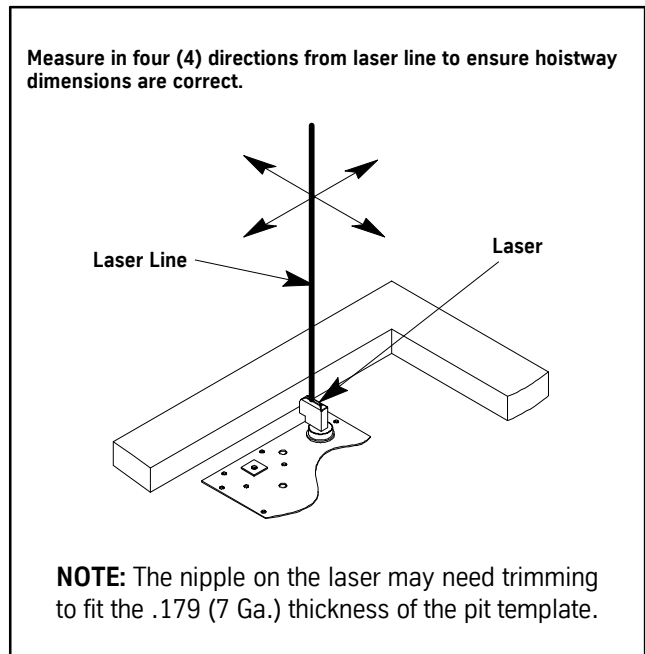


Figure 2 - Hoistway Laser Survey

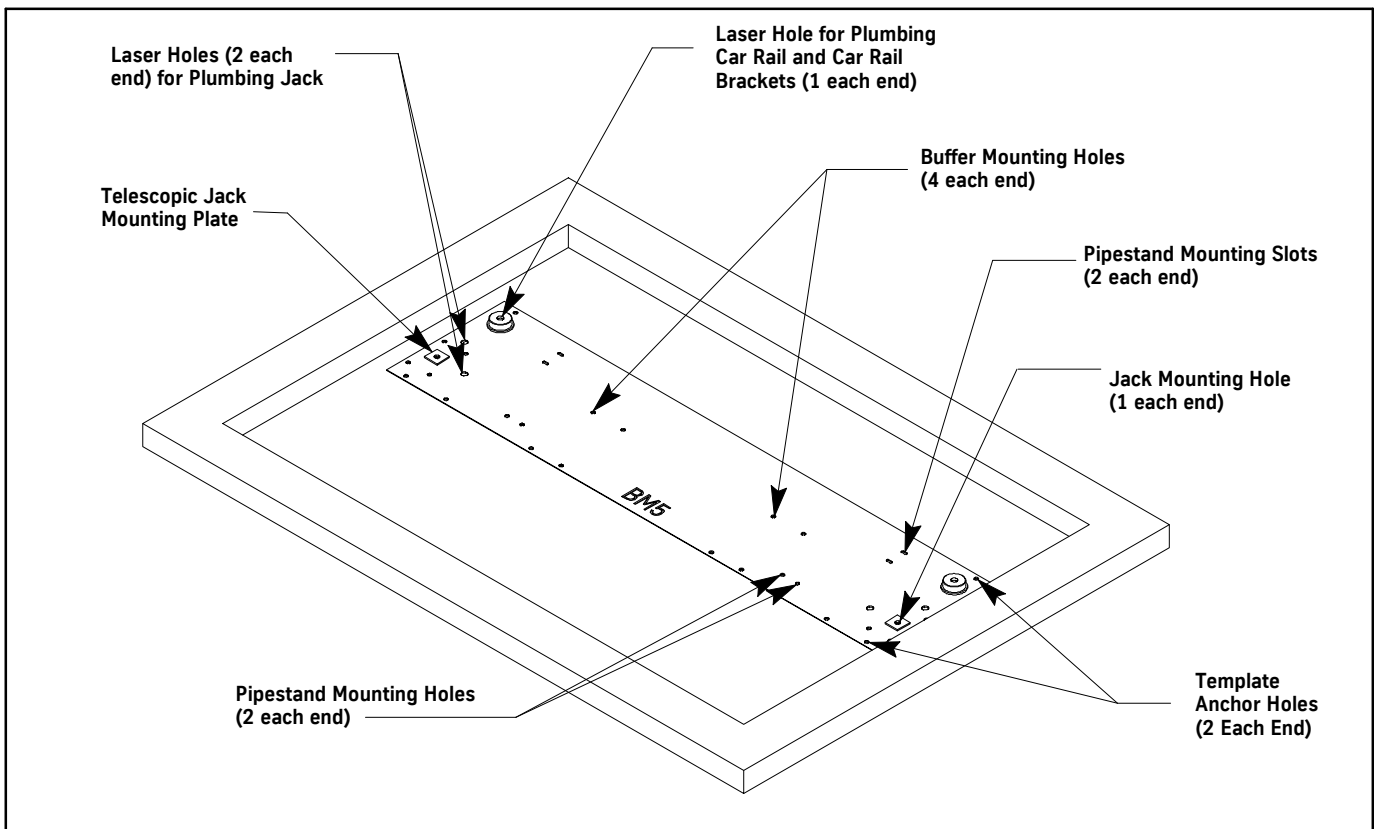


Figure 3 - Pit Template Legend (AMEE 25, 30, and 35 Shown. AMEE 21, 40, 45, and 50 Similar)

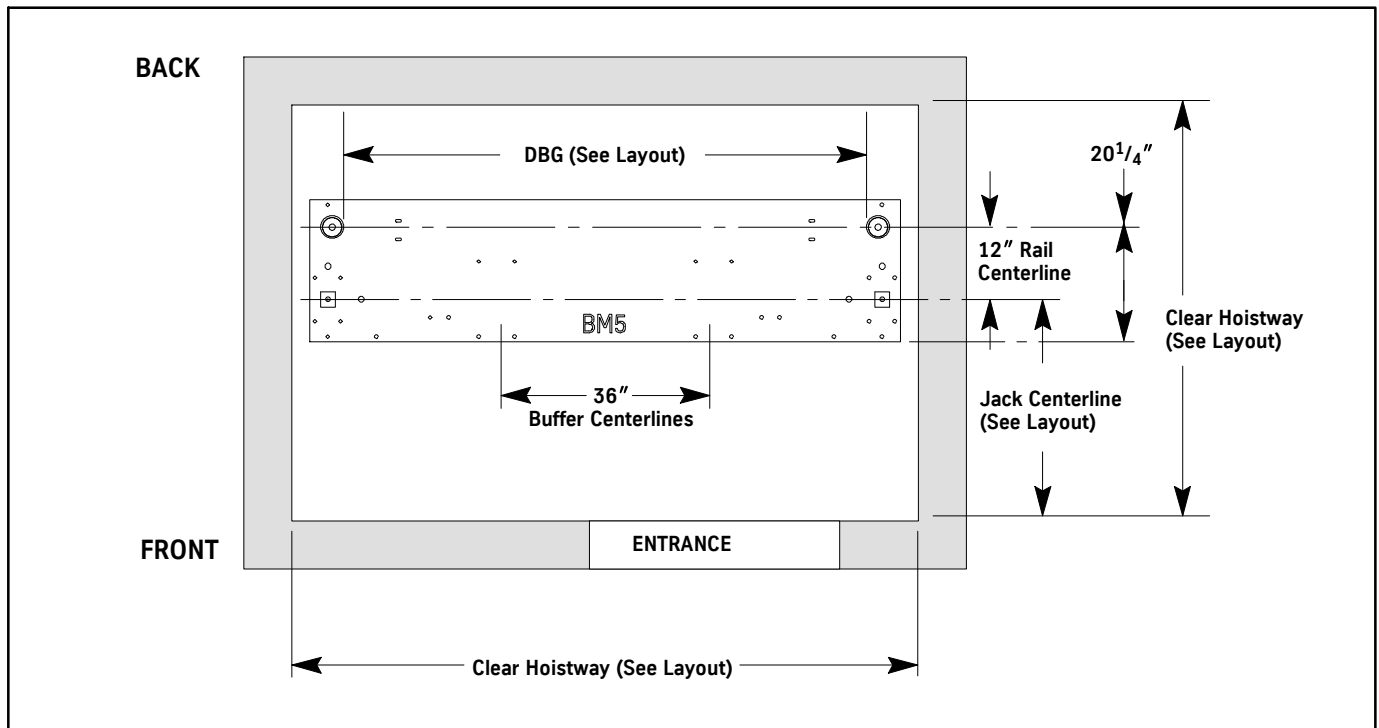


Figure 4 - Three-Stage Jack Layout (AMEE 25, 30, and 35 Shown. AMEE 21, 40, 45, and 50 Similar)

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 5.
2. Install a bottom rail bracket as follows. See Figure 5:
 - 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. Anchor the rail bracket completely.
3. Repeat step 2 for the opposite side bottom rail bracket.
4. Measure the distance between the two rail brackets at both ends of the brackets to ensure that they are square (faced) to one another. See Figure 5.
5. Remove the targets from the first set of rail brackets.
6. Install a second rail bracket as follows. See Figure 5:
 - 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. Anchor the rail bracket completely.
7. Repeat step 6 for the opposite side second rail bracket.
8. Measure the distance between the two rail brackets at both ends of the brackets to ensure that they are square (faced) to one another. See Figure 5.

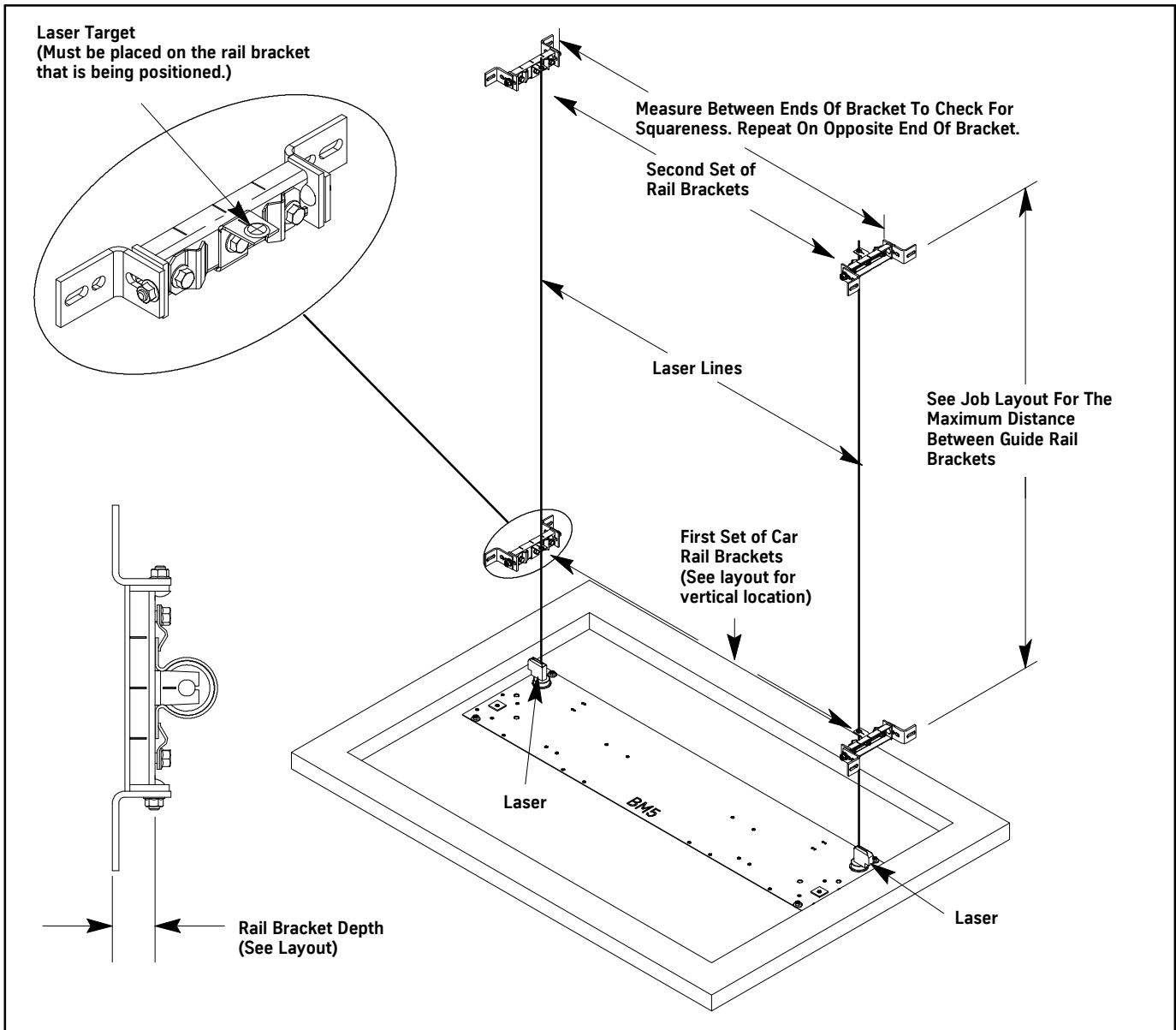


Figure 5 - Car Rail Bracket Installation

Car Rails

NOTES:

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

2. Press the rail onto the tapered keyhole brackets. See Figure 6.
3. Attach the rail to the bracket using the slip clips provided. See Figure 6.
4. Tighten the clips with the heel of the clip butted against the rail. See Figure 6.
5. Repeat steps 1 through 4 for the opposite side.

1. Place the first rail on the template and against the rail bracket(s).

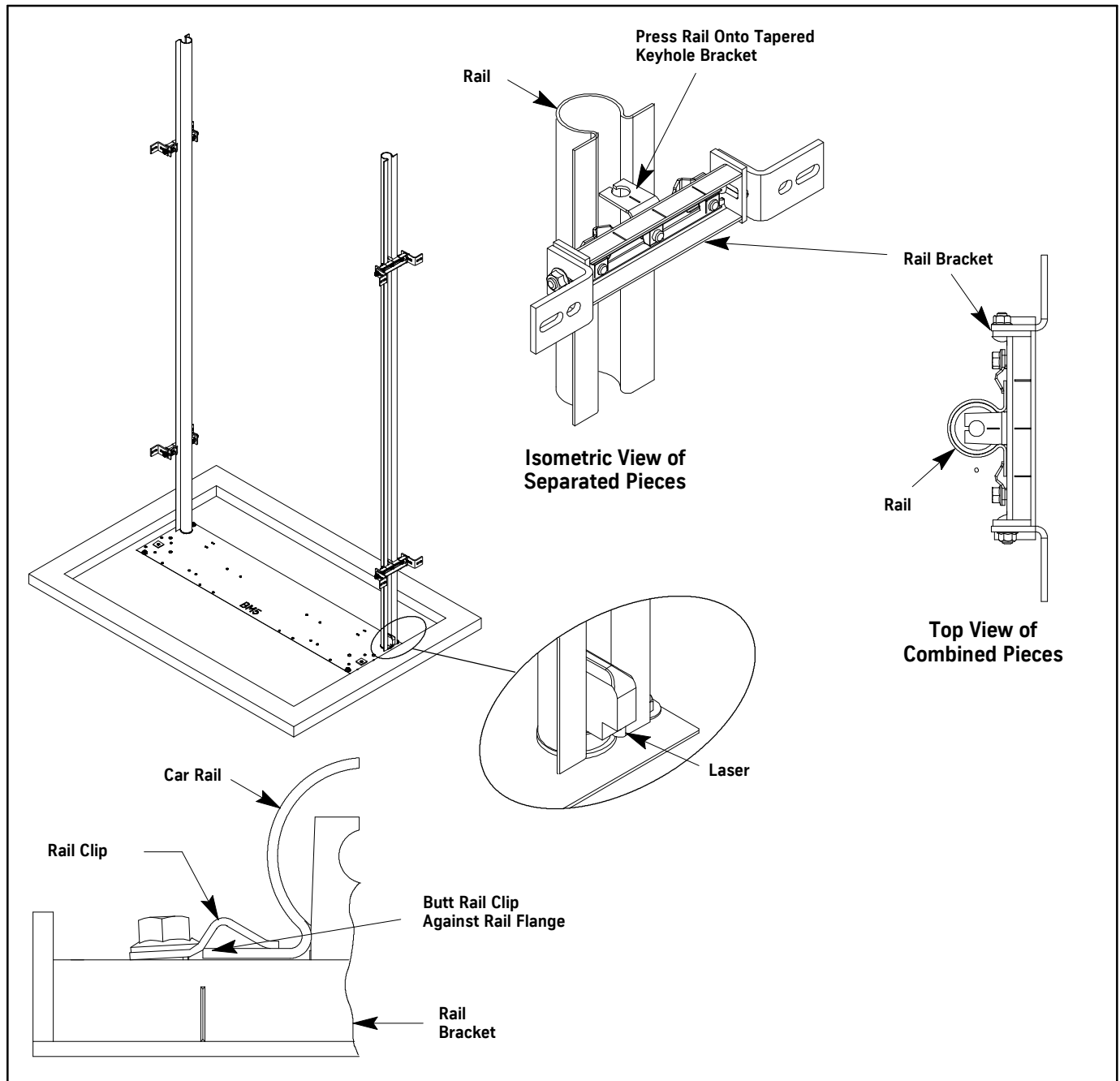


Figure 6 - Car Rail Installation

Jacks

1. Attach the Jack Support Bracket to the car guide rail just below the top of the jack casing. See Figure 8.

NOTE: 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 sonotubing EXCEPT the part below the lower plunger. See Figure 7.
3. Hoist the jack into the hoistway and into its hole on the pit template. See Figure 3 and Figure 8, Jack Detail.

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 rail and adjust the jack to the dimension shown in Figure 8.
5. Install the 90° barbed “drain tube” elbow. See Figure 7.
6. Place a laser(s) in pre-punched hole(s) of the pit template in locations as shown in Figure 9.

7. Turn the jack so that the oil inlet is pointing toward the other jack. See Figure 9.
8. Use the laser(s) to plumb the jack, making sure that dimensions A and B are 2” at each end. See Figure 9.
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.

10. Repeat steps 1 through 6 for the other jack.

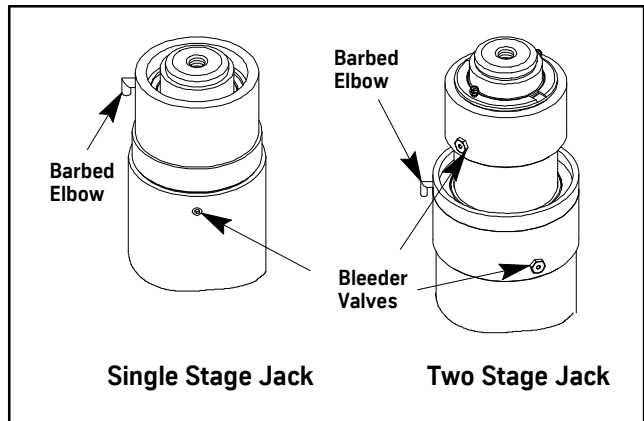


Figure 7

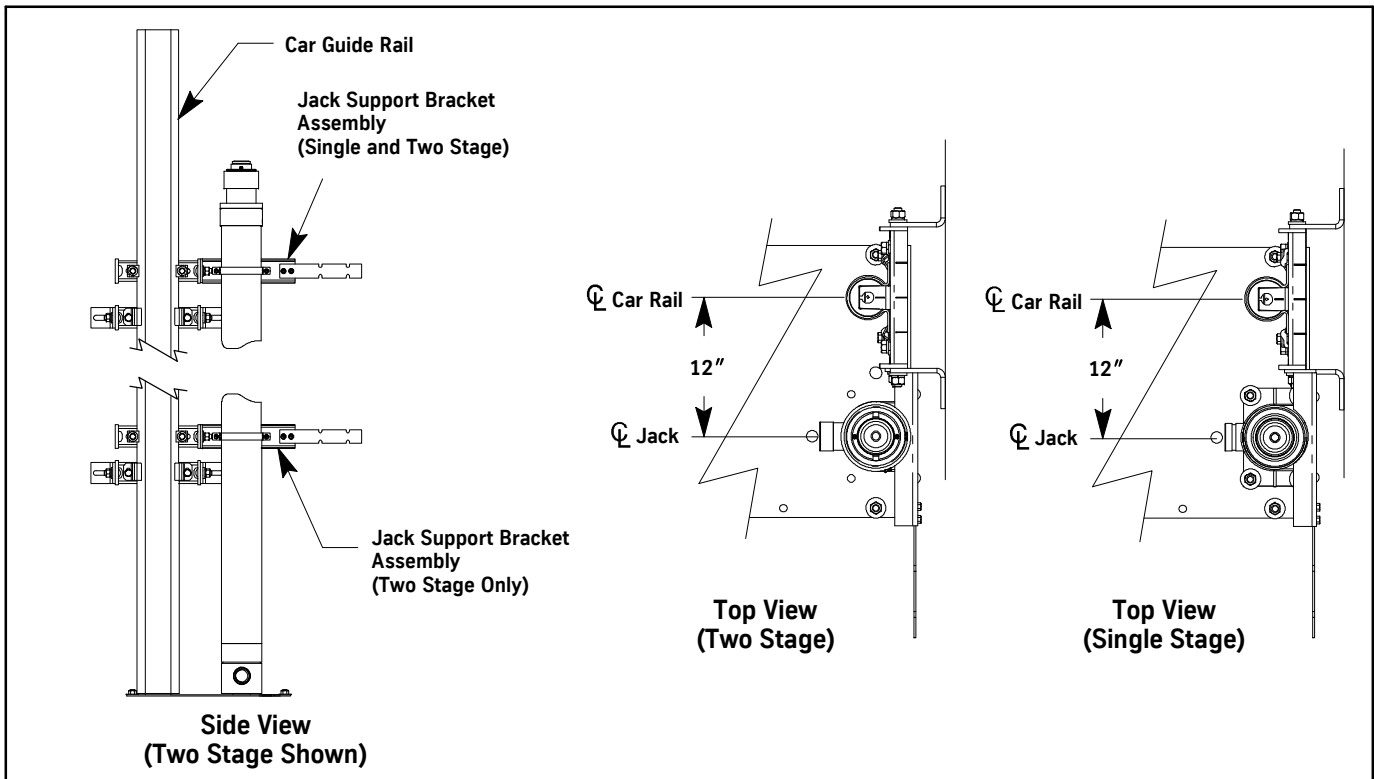


Figure 8

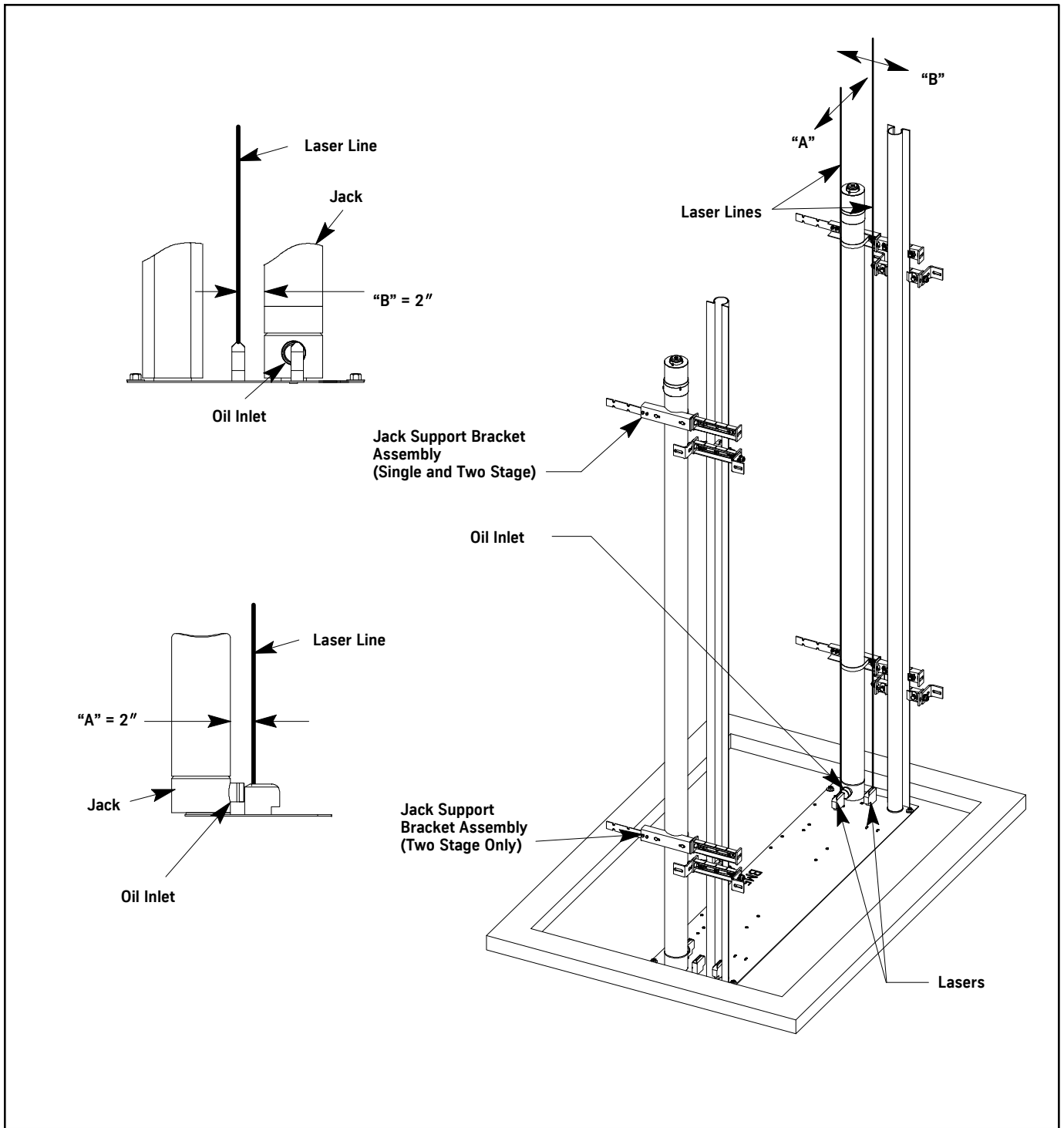


Figure 9 - Jack Installation (Two Stage Shown)

Piping

1. Place a shallow pan under the oil inlet to catch residual oil, then remove the Victaulic® coupling and cap from the oil inlet of each jack.

NOTE: Residual oil may amount to as much as a quart.

2. Install the Victaulic® “tee” on the jack that is nearest where the oil line enters the hoistway. See Figure 11.

WARNING! By code, the pipe between the two jacks must be seamless while all other pipes may be seamed.

NOTE: Run a rag tied to a wire through the inside of all pipes to ensure that all debris is removed.

3. Install Victaulic couplings and connect the seamless pipe (provided) from the “tee” to the opposite jack inlet. See Figure 11.
4. Install the overspeed valve to the “tee”. Connect the end labeled “JACK” directly to the “tee”. See Figure 11.
5. Refer to the Job layout, and construct the oil line from the overspeed valve to the power unit using the shortest

route available avoiding building obstructions. Install the shutoff valve as close to the power unit as possible. See Figure 10.

WARNING! Do Not weld to a ductile iron fitting.

NOTES:

- 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, have the contractor sign the form in the *Project Management Book* confirming the finished ceiling height. (The oil line must have a label every ten feet identifying “high-pressure oil line”.)
6. Level and secure the pipe using the supplied pipe stands. See Figure 3 and Figure 12.

WARNING! Turning the adjustment screw out (counterclockwise) ensures that the overspeed valve will not set during elevator construction or adjustment of the control valve.

7. Turn the adjusting screw out on the overspeed valve to prevent premature setting.

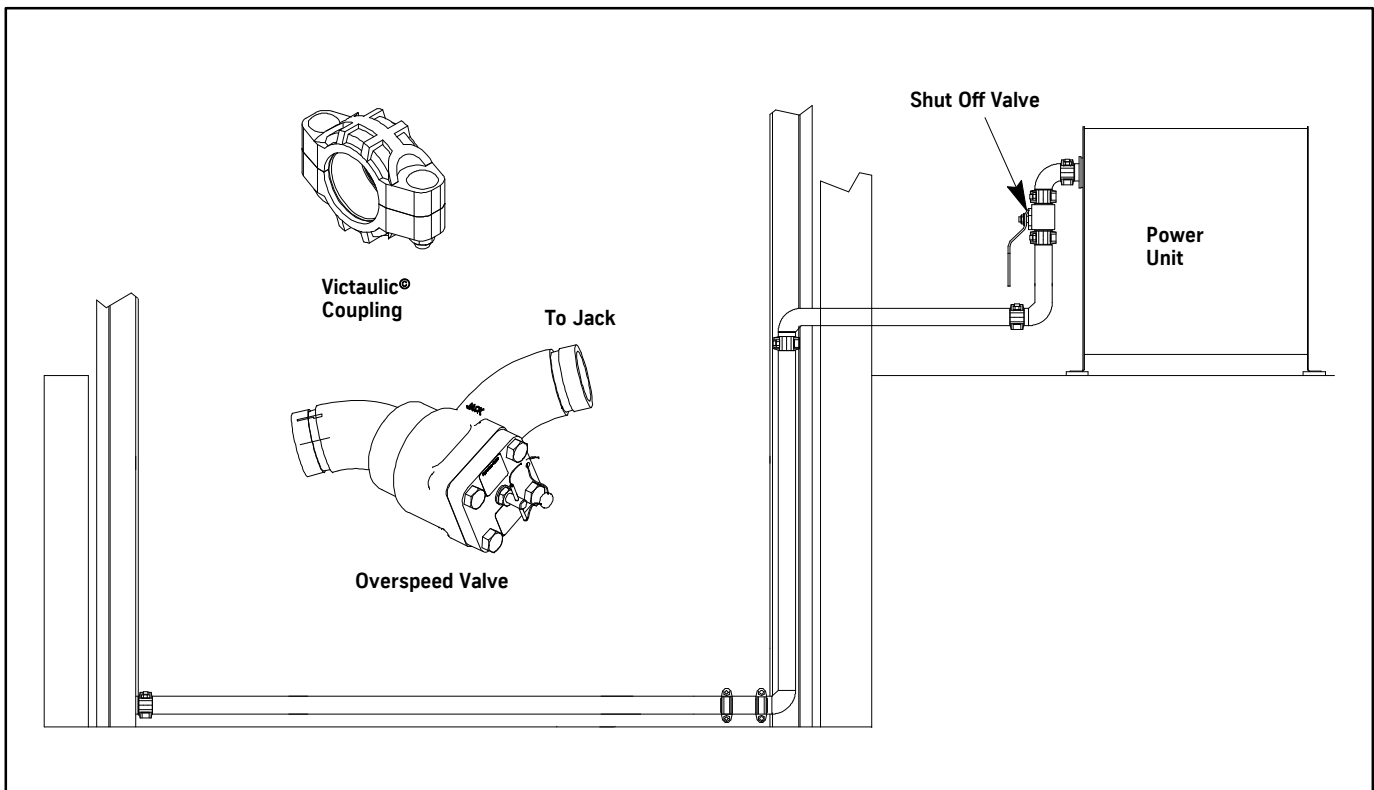


Figure 10 - Piping Installation From Jack To Power Unit

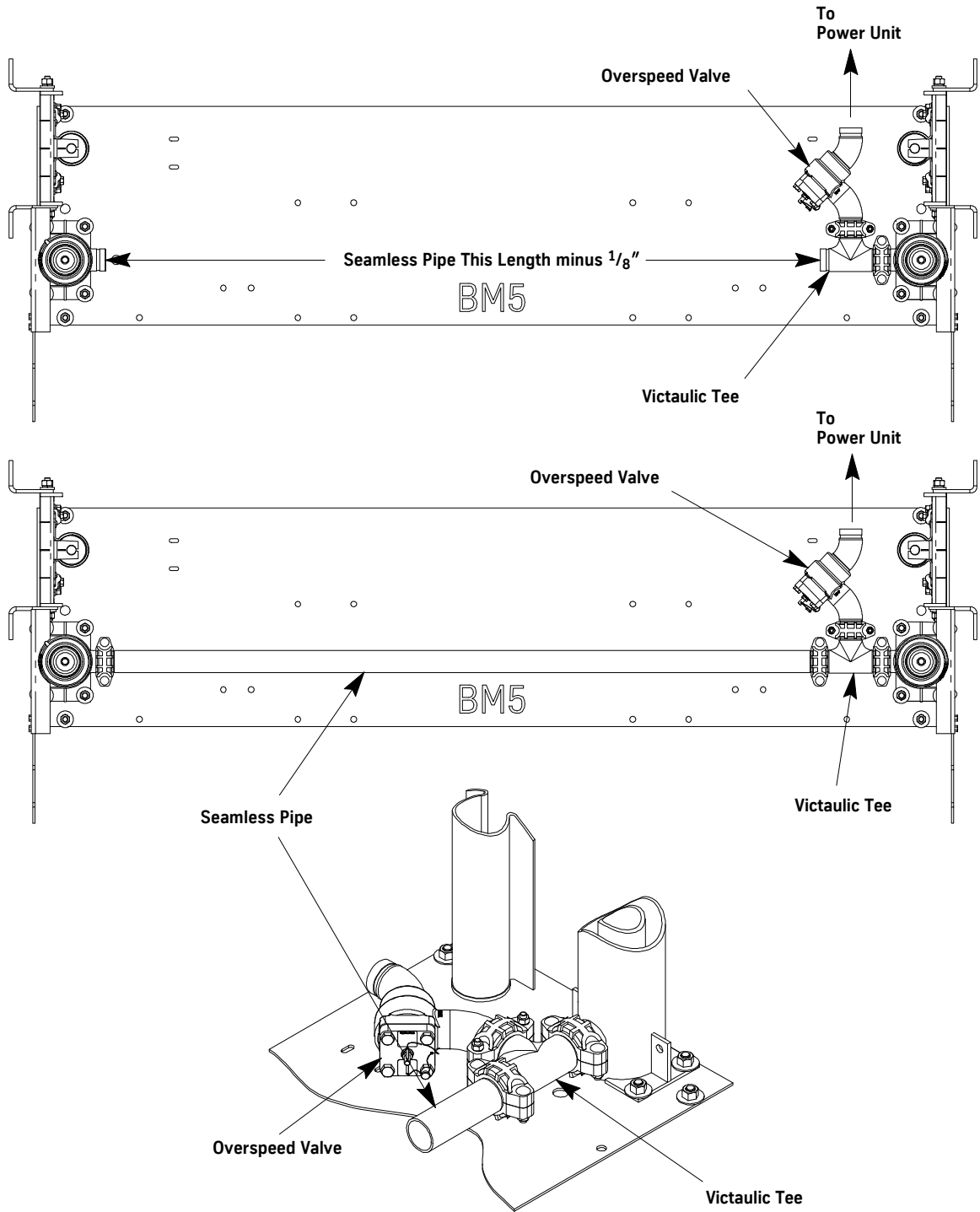


Figure 11 - Piping Between Jacks (Single Stage Shown)

Buffer Stands

1. Install the buffer stands on the pit template. See Figure 12.
2. Shim between the template and the buffer stands as needed to level and plumb the stands.
3. Match drill 4 holes for $\frac{1}{2}$ " concrete anchors at each buffer stand. Holes must be a minimum $2\frac{3}{4}$ " deep to obtain a minimum $2\frac{1}{4}$ " penetration.

4. Anchor the buffer stands with $\frac{1}{2}$ " anchors. Be careful not to drive them too deep (see note below). See Figure 12.

NOTE: Leave room for 1" of shimming between buffer and pit template. If shimming is not needed during installation, the anchors can be driven and tightened later.

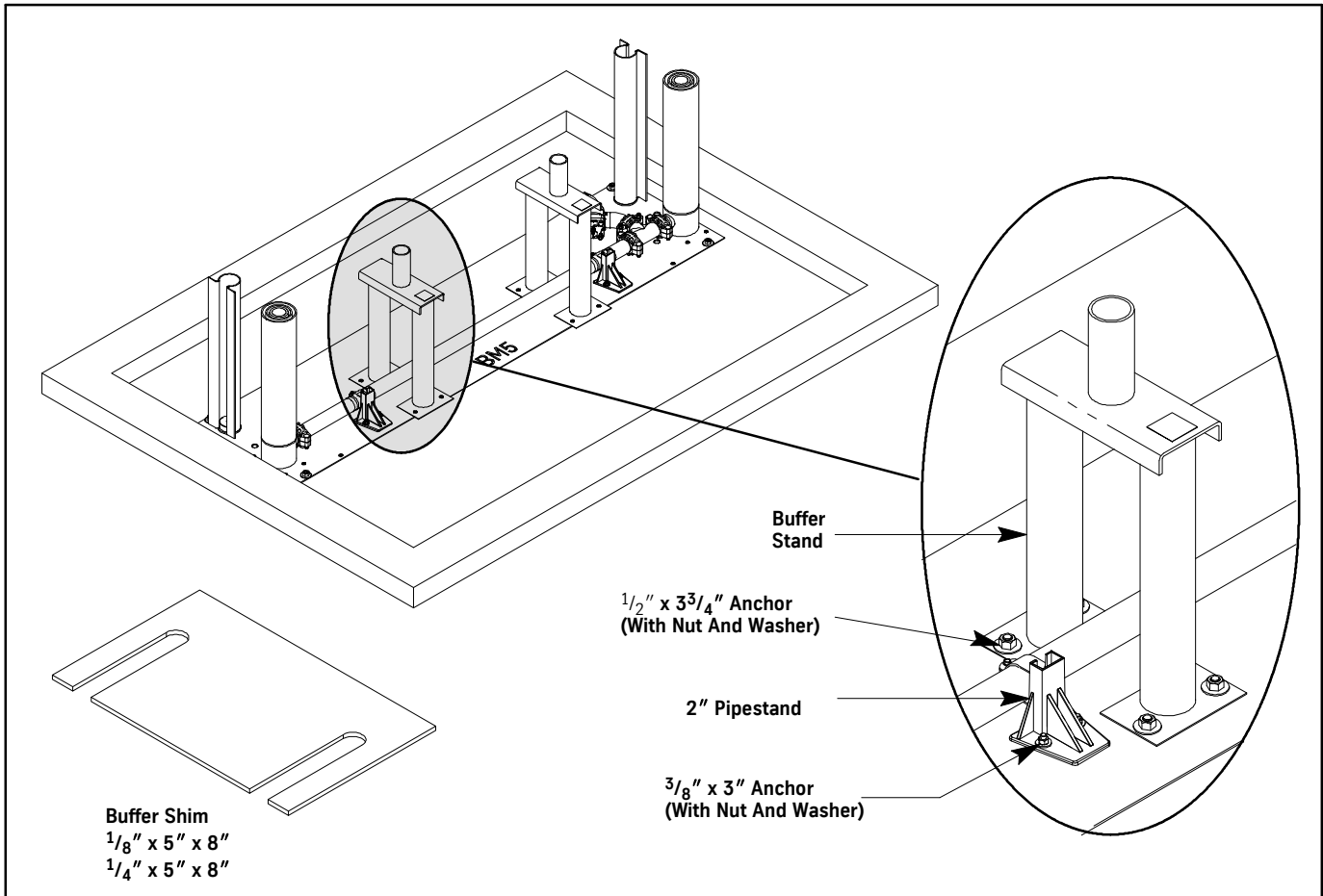


Figure 12 - Buffer and Pipestand Installation

Car Frame

1. Turn the plunger head of each jack until the bleeder valves are pointing to the rear of the hoistway.
2. Fully compress the jacks.
3. Check that the tops of the upper plungers are level with each other.

If not, place supplied shims as necessary between the upper plunger and the Lift Bracket.

Stiles

1. Bolt the lift bracket/platens to the stiles using four Hex Head Cap Screws. See Figure 14.
2. Hoist the first stile and lift bracket/platen assembly up and “hook” it onto the top of the plunger. See Figure 14.
3. Install the jump bolt through the lift bracket/platen assembly and into the plunger. See Figure 14.
4. Tighten the jump bolt.

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

5. Repeat steps 2 through 4 for the other side.

Bolster

1. Place the bolster assembly directly on the buffer stands. See Figure 13.

2. Check the bolster assembly for level. If it is not, shim the buffer stand(s). See Figure 12.
3. Install the bottom guide shoes on the shoe mount weldment. See Figure 15.
4. Run both of the tension adjustment screws in equally until the slide guides are touching each rail.
5. Measure the amount of thread protruding past each locknut and adjust until both sides are equal to ensure equal spacing and tension. See Figure 15.
6. Tighten both locknuts on the tension adjustment screws.
7. Snugly (not tight) fasten the bolster assembly to the stiles.
8. Level and square the bolster channel assembly, then tighten the bolts holding it to the stiles.

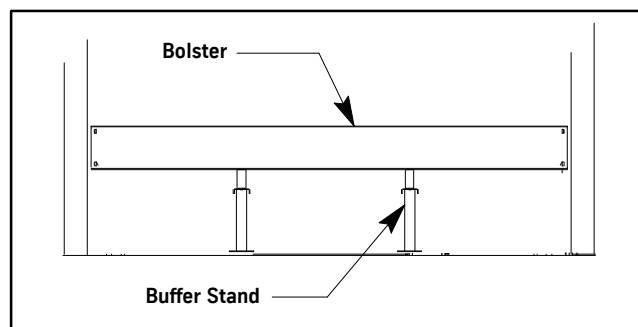


Figure 13

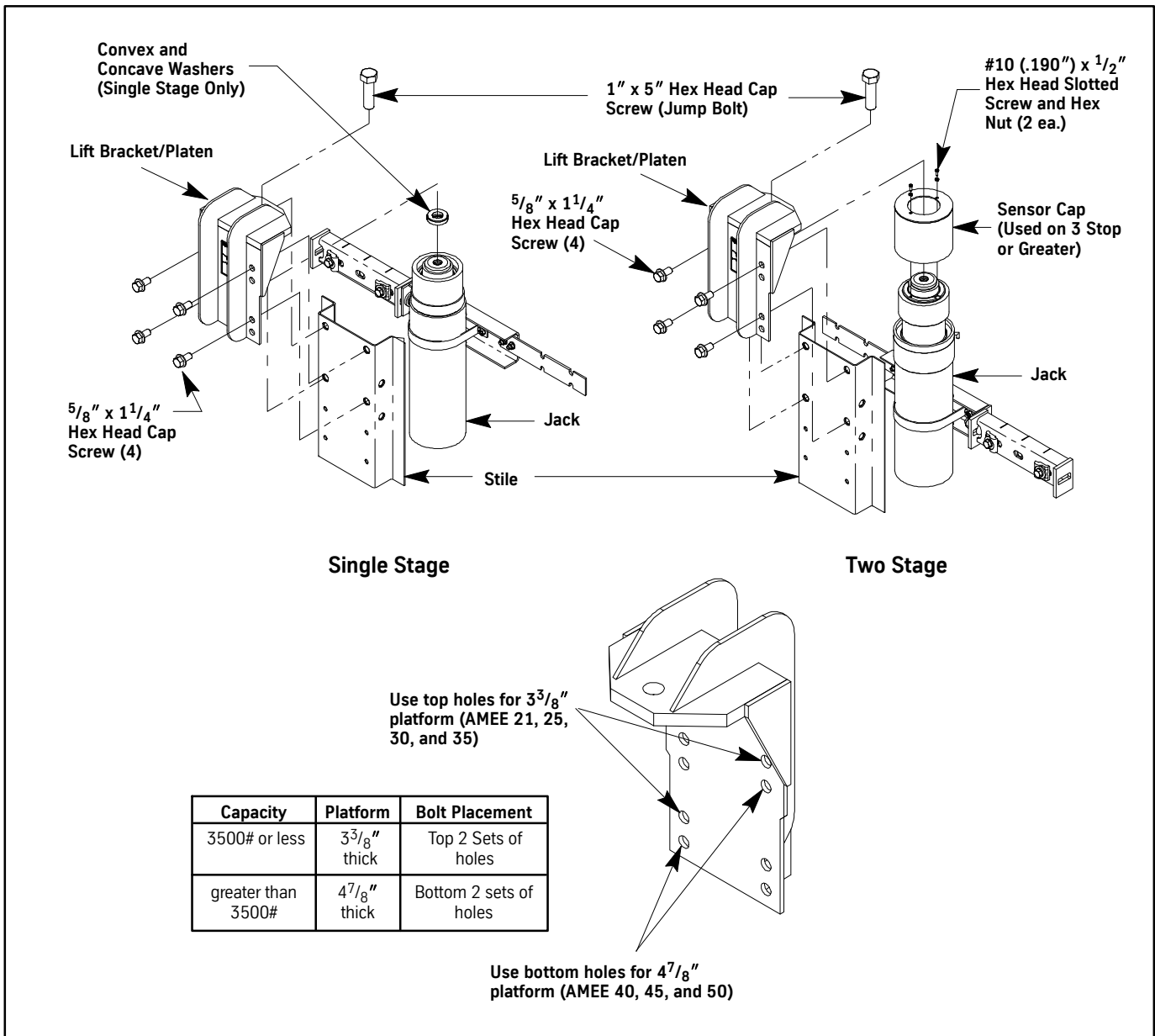


Figure 14 - Lift Bracket/Platen Installation on Stile and Jack

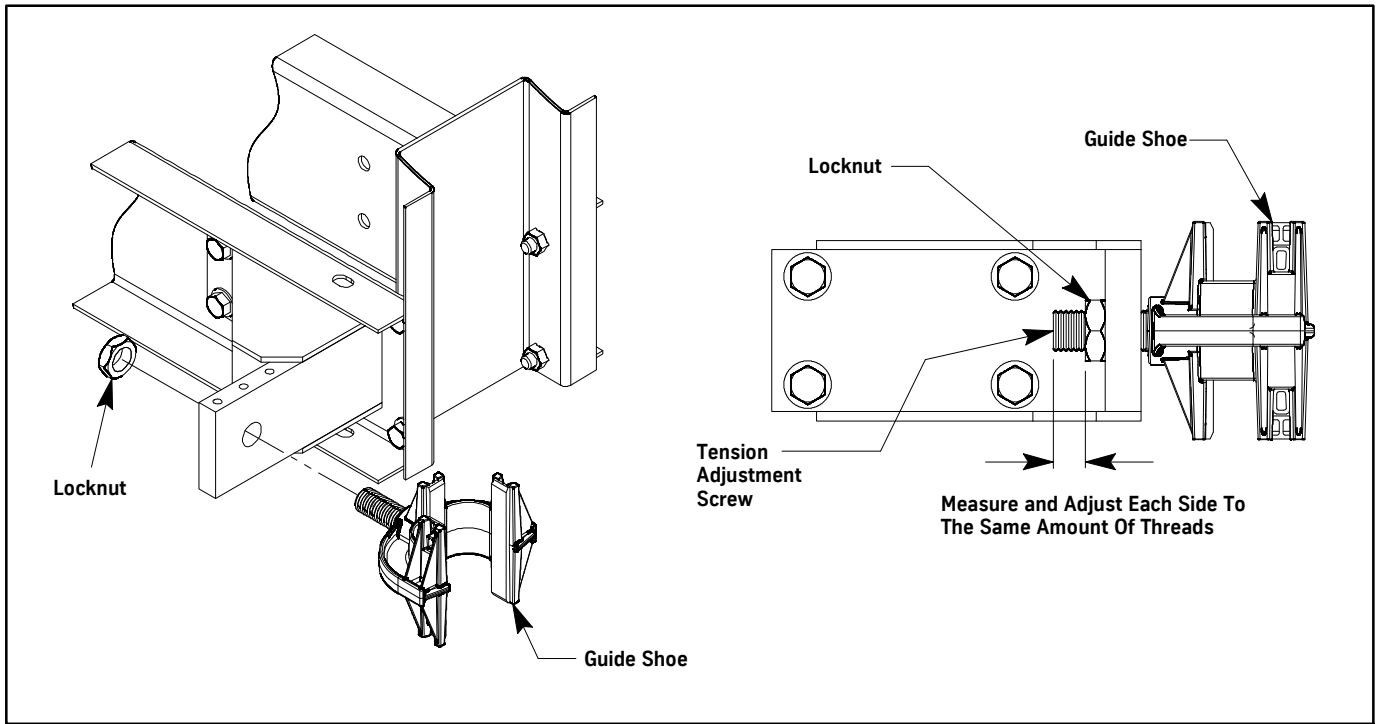


Figure 15 - Bottom Guide Shoe Installation

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 16.
2. Adjust the platform to the rails according to the job layout dimensions and 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 $\frac{5}{8}$ " holes in the stiles. See Figure 17.

4. Level the platform front to back by adjusting the brace rods. See Figure 17.

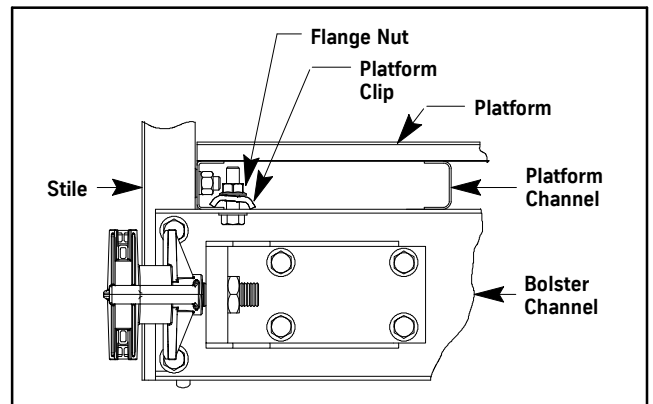


Figure 16 - Platform Installation

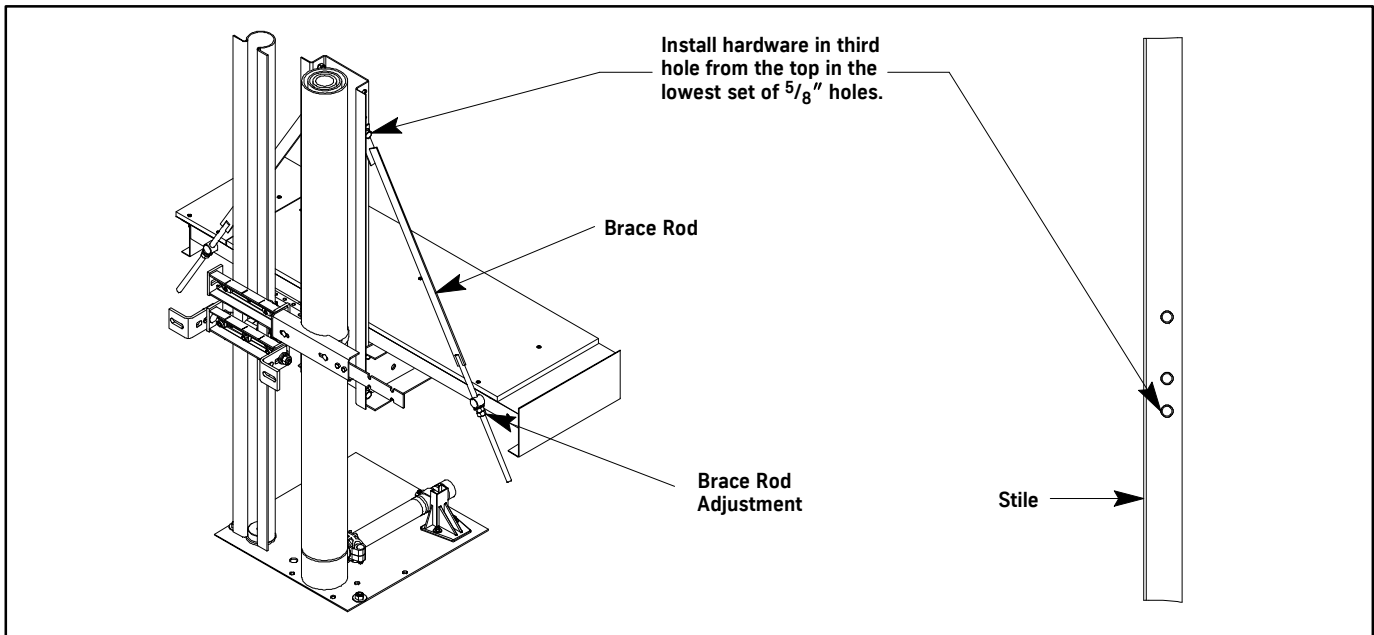


Figure 17 - Brace Rod Installation

Crosshead

1. Fasten the two upper guide shoes to the shoe mount weldment on the crosshead channel. See Figure 18.
2. Plumb the stiles to the rails and tighten the bolts.
3. Place the rear crosshead channel between the two stiles in the lowest location directly above the two rear brace rods about three feet above the platform. See Figure 19.
4. Install the hardware and attach the rear crosshead channel to the stiles, but do not tighten the bolts at this time.
5. Turn both tension adjustment screws in equally until the guide shoes are touching each rail.
6. Measure the amount of thread protruding past each locknut and adjust until both sides are equal to ensure equal spacing and tension. See Figure 18.
7. Tighten both lock nuts on the guide shoe tension adjusting screws.
8. Install the front crosshead channel in its permanent location near the platen assembly at the top of the stiles with the hardware provided, but do not tighten the bolts at this time.
9. Verify that the crossheads are square and plumb with the stiles, and then tighten all the hardware in both crosshead channels.

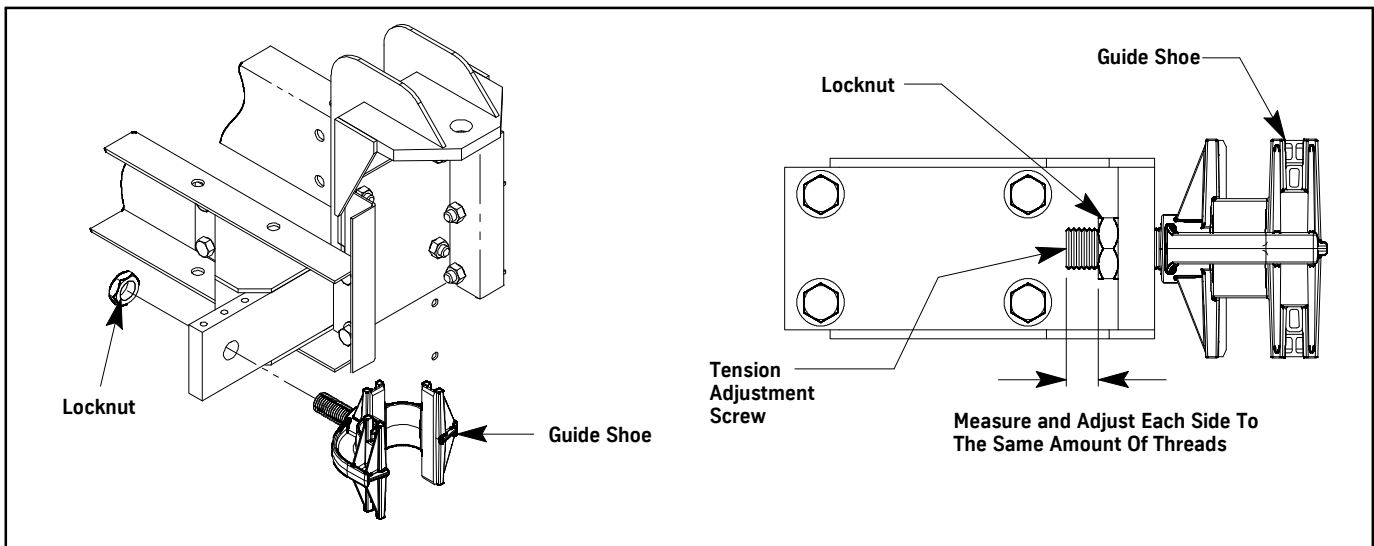


Figure 18 - Upper Guide Shoe Installation

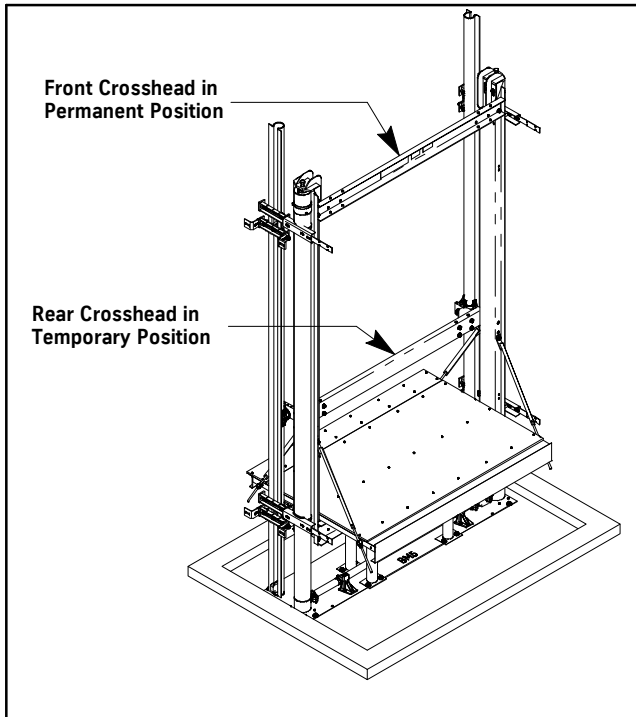


Figure 19 - Crosshead Installation

Drip Tube

1. Install the drip tube down from the barbed elbow on the packing head to a drip pan in the pit. See Figure 20.
2. Tie-wrap the plastic line to the jack to keep the line clear of the car frame.

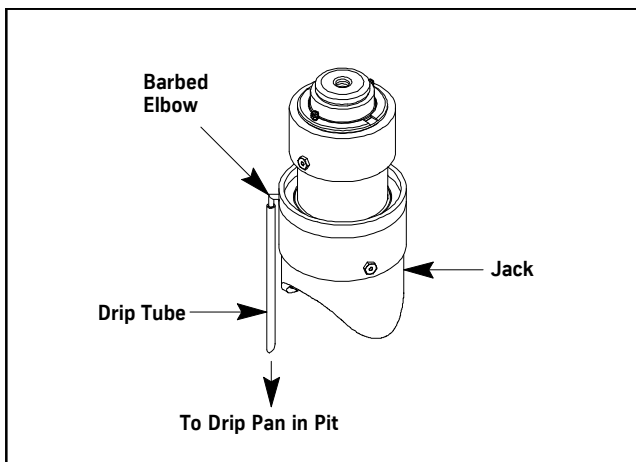


Figure 20 - Drip Tube Installation (Two Stage Shown)

Temporary Operation

1. Fill the power unit with oil.
2. Fill the empty supply lines with oil by energizing the power unit until the jacks begin to move.
3. Remove the sonotube from below the lower plunger.
4. Turn OFF, lock and tag out the mainline disconnect.
5. Follow directions on the start-up placard inside the controller.

NOTE: Obtain a Product or Component Manual for the Controller type used on the job.

6. Turn ON the mainline disconnect and verify operation.

WARNING! DO NOT attempt to change the phasing between the starter/contacter and the pump motor - swap the phases at the incoming source.

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

Bleeding The Jacks

Two Stage Telescoping

1. Insert one end of the $\frac{3}{16}$ " x 24" nylon evacuation tubing from the Jack Accessory Kit into one of the bottom bleeder valves and the other end into an empty container. See Figure 21.
2. With an $\frac{9}{16}$ " Wrench, slightly open the bottom bleeder valve on each jack. See Figure 21.

NOTE: The two stage telescoping jack has three bleeder valves. There are two in the jack casing. One is opposite the bottom one shown in Figure 21. Of these two, use the one that is the most accessible.

3. Energize the pump motor a couple of seconds at a time until oil is visible at the bleeder valves.

CAUTION! Do NOT overtighten the bleeder valves. Very little torque is required to open or close.

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

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

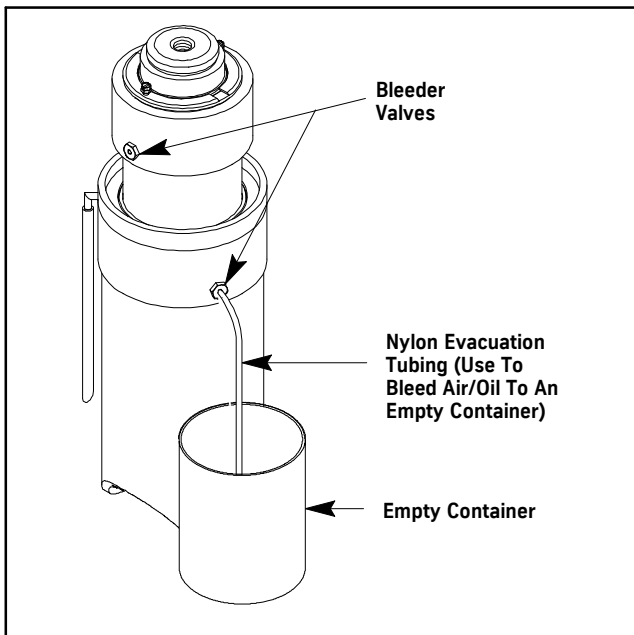


Figure 21 - Bleeding the Jack (Two Stage Only)

- Progressing upward, Repeat steps 1 through 3 for the other bleeder valve pairs.

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

- Remove the Sono Tubing from the bottom plunger.

Single Stage

- Open both bleeder ports (at the top of each jack) about one-third the way out.
- Momentarily energize the pump motor a couple of seconds at a time until oil is visible at the bleeder valve.

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

- When oil appears at bleeder valve tighten valve.

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

Car Guide Rail Completion

- Place the car frame as close as possible to the top of the rails.

WARNING! Always be aware of where the top slide guides are in relation to the the top of the rail. **DO NOT** run the car frame off of the rails! **DO NOT** run the top shoe more than 48" above the top installed rail bracket.

- Install the lasers on the pit template underneath the rails.

TIP: If laser accuracy is a problem, place the laser on every other guide rail bracket as the rails are stacked.

- Install the next set of rail brackets. See job layout for maximum distance between brackets. See Figure 22.
- Adjust both brackets using the laser lines and the laser target.
- Install a splice tube in the existing rail with two splice clamps and tighten the splice. Use measurements and torque specification shown in Figure 22.
- Hoist the new rail up and slide it down over the splice tube.
- Install the remaining two splice clamps and tighten the splice. Use measurements and torque specification shown in Figure 22.

- Repeat steps 3 through 7 for the opposite side.

CAUTION! Rail splices must be tightened completely before running the car above the splice.

- Run the car frame up, and attach the rails to the rail brackets using the supplied clips and hardware.
- Tighten the rail clips completely.
- Repeat steps 2 through 10 for any remaining rail brackets and rails.
- Clean and file all rail joints.

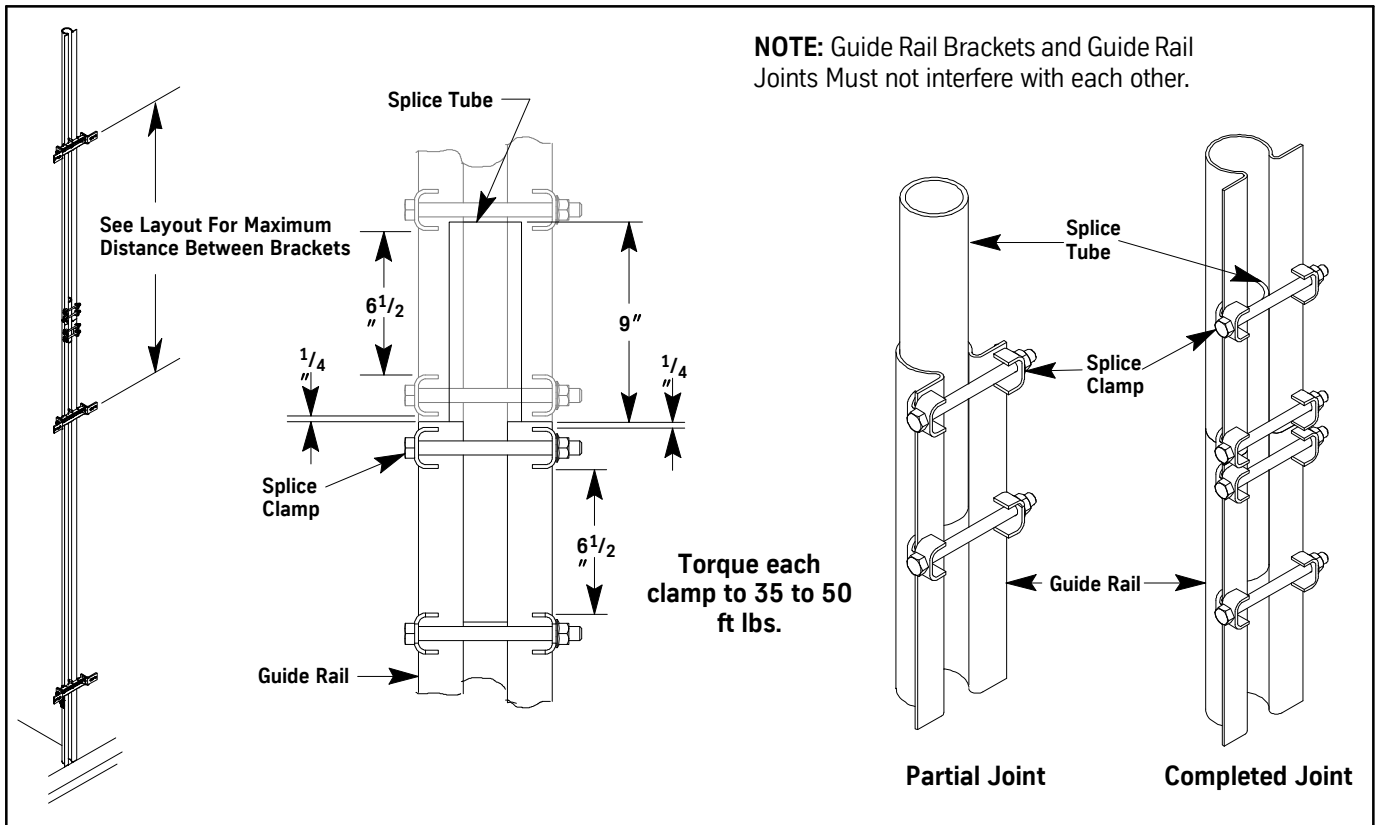


Figure 22 - Rail Splice and Final Rail Installation

Car Frame Completion

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 23.

CAUTION! DO NOT remove or loosen the slide guides. The adjusted guide shoes will help hold the crosshead in place until the bolts are in place.

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

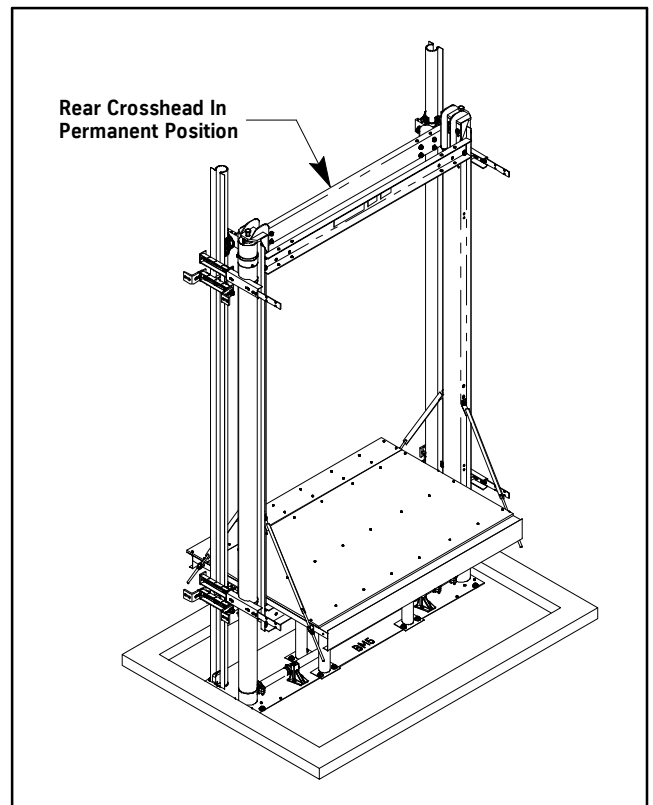


Figure 23

Sensor Installation

There are two types of sensors, **Static** and **Dynamic**. The same Jack Sensor Assembly with optical sensors is used for both.

Static sensors are activated when the car is stopped level with a landing (used only on jobs of 4 landings or more).

Dynamic sensors are activated when the car is moving into the top landing (used only on jobs of 3 landings or more).

NOTE: See *Technical Information* section for more information.

Sensor Requirements (See Figure 25)

2 Landings: No Sensors

3 Landings: (2) Dynamic Sensors For the Top Landing

4 Landings or More: (2) Static Sensors For Each Landing and (2) Dynamic Sensors For the Top Landing

NOTE: Requirements for 2 and 3 Landings apply to both Single and Two Stage Jacks.

Three Landings

1. Place the platform level with the bottom landing.
2. Mount one dynamic sensor on each side of the hoistway at the top landing as follows. See Figure 24 and Figure 25:
 - a. Determine the selector up slowdown distance and add 12" to the value.
 - b. Mark the car rail at the point determined in step 2a.
 - c. Mount a Jack Sensor Assembly on the car rail so that the sensors are aligned vertically with the mark on the rail.
 - d. Adjust the sensors horizontally so that they overlap the sensor plunger cap by $\frac{3}{8}$ ". Ensure that the Sensors will not be activated by the bottom plunger. See Figure 24, Detail C.
 - e. Wire the sensors per job wiring diagrams.

NOTE: Each set of sensors must activate at the same time, $\pm\frac{1}{8}$ ".

3. Perform a resynch and check adjustment. Refer to *Adjustment* section.

Four Landings or More

1. Mount one static sensor on each side of the hoistway at each landing as follows. See Figure 24 and Figure 25:
 - a. Place the car level with the bottom landing.
 - b. Mount a Jack Sensor Assembly on the car rail so that the sensors are aligned vertically with the vertical center of the Sensor Plunger Cap. See Figure 24, Detail B.
 - c. Adjust the sensors horizontally so that they overlap the sensor plunger cap by $\frac{3}{8}$ ". Ensure that the Sensors will not be activated by the bottom plunger. See Figure 24, Detail C.
 - d. Place the car level with the second landing.
 - e. Repeat steps 1b and 1c for the second landing.
 - f. Repeat steps 1b through 1e for each subsequent landing.
 - g. Wire all sensors per job wiring diagrams.
2. Mount one dynamic sensor on each side of the hoistway at each landing as follows:
 - a. Determine the selector up slowdown distance and add 12" to the value.
 - b. Mark the car rail at the point determined in step 2a.
 - c. Mount a Jack Sensor Assembly on the car rail so that the sensors are aligned vertically with the mark on the rail.
 - d. Adjust the sensors horizontally so that they overlap the sensor plunger cap by $\frac{3}{8}$ ". Ensure that the Sensors will not be activated by the bottom plunger. See Figure 24, Detail C.
 - e. Wire all sensors per job wiring diagrams.

NOTE: Each set of sensors must activate at the same time, $\pm\frac{1}{8}$ ".

3. Perform a resynch and check adjustment. Refer to *Adjustment* section.

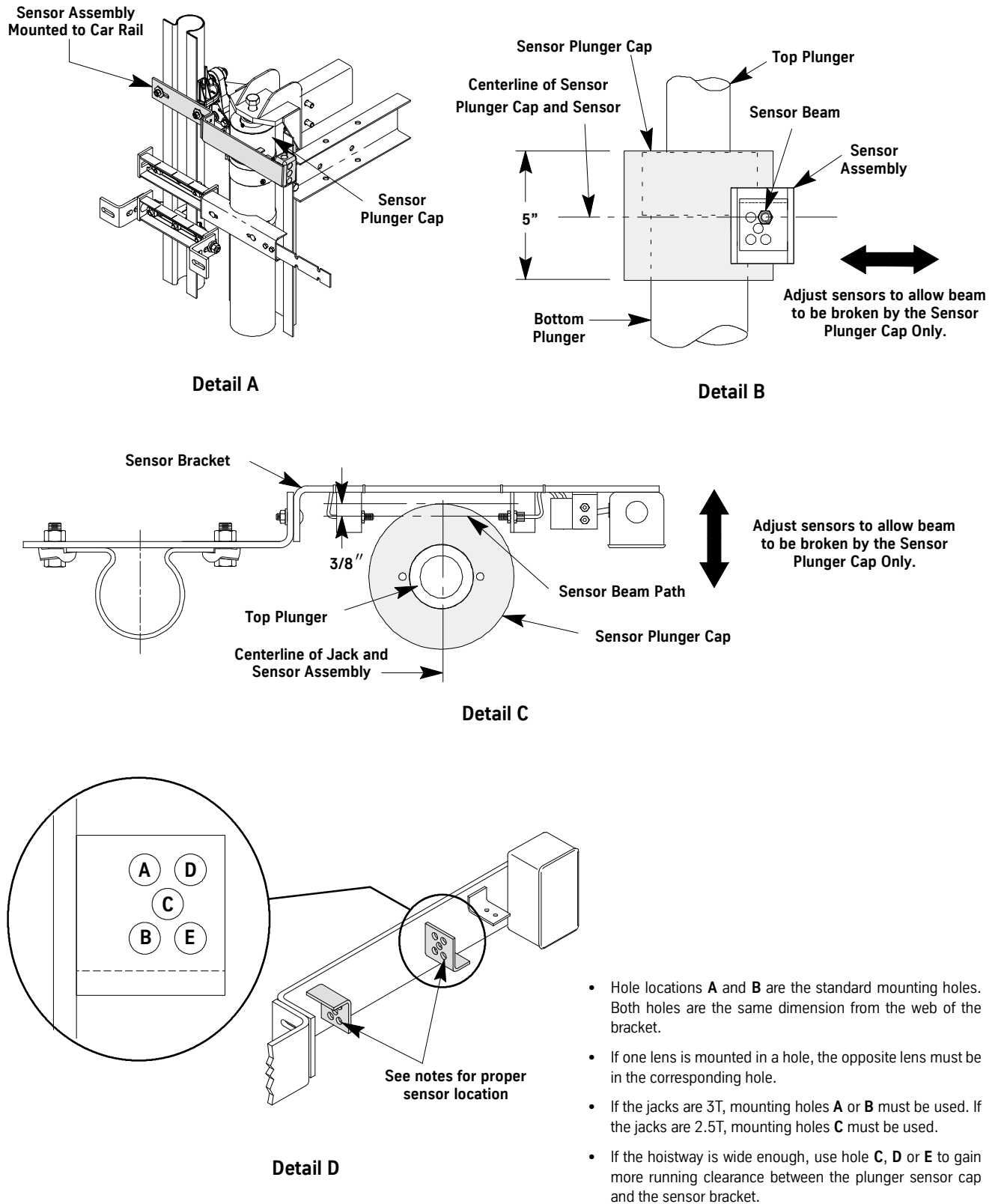
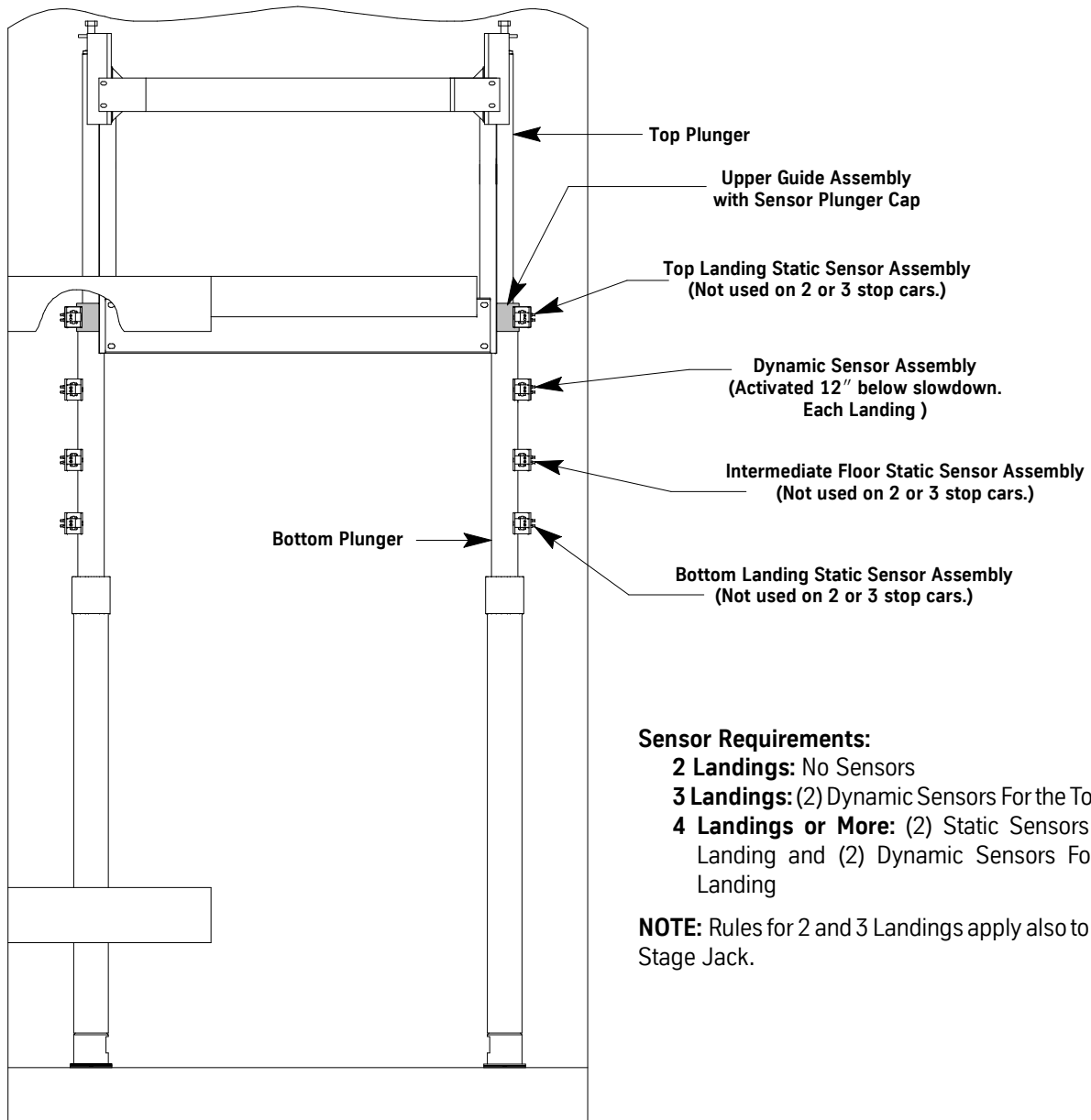


Figure 24 - Sensor Assembly Mounting



Sensor Requirements:

2 Landings: No Sensors

3 Landings: (2) Dynamic Sensors For the Top Landing

4 Landings or More: (2) Static Sensors For Each Landing and (2) Dynamic Sensors For the Top Landing

NOTE: Rules for 2 and 3 Landings apply also to the Single Stage Jack.

Figure 25 - Twin Post Telescopic and Single Stage Jack Hoistway Sensor Mounting

Adjustment

Twin Post Telescoping Jack Resynch Tests

NOTES:

- See the *Technical Information* section for a detailed description of the resynch function.
- To perform the following tests, the car must have been through all final adjustment procedures.

Static Sensors (Not used on 2 and 3 stop cars)

1. Turn OFF, Lock, and Tag Out the mainline disconnect.
2. Disconnect one of the first floor static sensors. See wiring diagrams for the specific controller.
3. Place car on Automatic.
4. Turn the mainline disconnect ON.
5. Car should perform a resynch and return to the first floor.
6. When the car returns to the 1st floor it will initiate another resynch (static sensor input still disconnected).
7. When there are four requests to resynch, the car will go into Twin Post Shutdown.
8. Turn OFF, Lock, and Tag Out the mainline disconnect.
9. Re-connect first floor static sensor.

10. Turn mainline disconnect ON.

11. Verify proper automatic operation.

Dynamic Sensors

1. Place the car at the bottom landing.
2. Turn OFF, Lock, and Tag Out the mainline disconnect.
3. Remove one sensor input wire.
4. Turn mainline disconnect ON.
5. Register a call to run the car to the top landing.
6. As the car nears the top floor, the car should stop, return to the bottom landing and shut down.
7. Turn OFF, Lock, and Tag Out the mainline disconnect.
8. Replace the sensor input wire and cycle the controller power to return the car to service.
9. Turn the mainline disconnect ON.
10. Verify proper automatic operation.

Technical Information

Jack Sensors

There are two types of sensors, **Static** and **Dynamic**. The same Jack Sensor Assembly with optical sensors is used for both.

Sensor Requirements per Jack

On two (2) landing jobs, there are no sensors required.

One job of three (3) landings or more, two (2) dynamic sensors are mounted at 12" below the point where the top landing slowdown is activated.

On jobs of four (4) landings or more, two (2) static sensors are mounted at each landing. The sensors are centered vertically on a plunger sensor cap mounted on the lower plunger to indicate when the car is level at a landing.

Resynch Causes

- 1) When the car is sitting level at a landing with no demand to run and a static sensor input (used only on 4 stops or more.) goes low.
- 2) When jacks are 2" to 3" out of synch when the dynamic sensors (used only on 3 stops or more) are activated.
- 3) Based on the setting of the Resynch Timer, two and three stop cars will resynch their jacks once every 24 hours. Also available is a motor start counter that can resynch the jacks when the counter reaches 1500 motor starts. Both of these are field adjustable. For 3 landing jobs only, the car is forced to make a trip to the bottom landing at least once every 6 hours.

System Operation

Optical sensors are used to determine when any of the stages of the jack become too far out of synch. The jack synchronization is checked by two static sensors (4 or more landings) when the car is stationary at a landing and by two dynamic sensors (3 landings or more) as the car is running

into the top landing just before reaching the top landing slowdown activation point. When the jacks are 2" to 3" out of synch, the controller will cause a resynching operation to occur the next time the doors close and no calls are present in the system.

When a need for resynch is indicated, the car will initiate a resynch operation. If the sensors call for a resynch four times in less than 10 minutes, the car will go on Twin Post Shutdown Operation (same as Low Oil Operation).

If the jacks are out of synch 6" or more at any checkpoint, the car will immediately stop and go into Twin Post Shutdown Operation (same as Low Oil Operation).

NOTE: Make sure the low oil timer is set equal to the time it takes for the longest floor to floor run plus about 10%.

Resynch Operation

When the controller determines a need to resynch the jack(s), it will remove the car from Group Operation. The controller will then monitor the car call inputs for a "window" to synch the jacks. If a car call is registered and the resynch command is not critical, the car will answer all registered car calls.

If the need to resynch has been present for 5 minutes with no opportunity to resynch, the controller will cancel all car calls and run the car to the bottom landing at high speed. The car will stop at the bottom landing and cycle the doors. It will then lower at slow speed, with leveling disabled, until the bottom directional limit is activated. The bottom directional limit must be activated within a nonadjustable period of time (about 2 seconds). The car will pause at the bottom directional limit, then continue lowering until the car comes to rest on the buffer stands.

A timer will start timing when the car starts moving down from the bottom direction limit. When the timer expires, the car will level back up to the bottom landing. If the sensor inputs indicate the jacks are in synch, the car will return to automatic service.

Maintenance

Single Stage Twin Post Jack

Each Visit Inspection

1. Take the car of service by:
 - a. Notifying the proper building personnel
 - b. Putting "Out of Service" tags at each landing (as required).
 - c. Taking the car out of service.
2. Check the controller resynch log and adjust parameters as required.
3. Visually inspect the casing head for leakage from seal or o-ring.
4. Inspect for blockage of discharge line to discharge container. Empty as necessary (follow EPA rules for disposal or consult your supervisor).

Replacing Seals 3.0" and 3.875" Diameter

NOTE: See Figure 28 for Single Stage Twin Post Jack Assembly parts locations.

Seal Removal (See Figure 26)

1. Place the car on inspection operation.
2. Lower the car down onto the buffer springs.
3. Turn **OFF**, Lock, and Tag Out 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.
7. Push the plunger down until it bottoms out in the casing.
8. Close the shut off valve.
9. Remove the retainer ring using two flat blade screw drivers.
10. Screw two #10-24 screws into the tapped holes in the seal retainer.
11. With pairs of pliers, grasp the screws and pull the seal retainer from the recess.
12. Screw packing removal tools or two drywall screws into the seal.
13. Pull the seal from the recess without scratching the plunger or seal recess in the guide.
14. Remove all oil from the seal recess with clean rags.

NOTE: A new seal will not properly seat in a recess containing oil.

15. Check the seal recess for scratches.
16. Polish out any scratches or replace the guide if there are any scratches which can cut the seal.

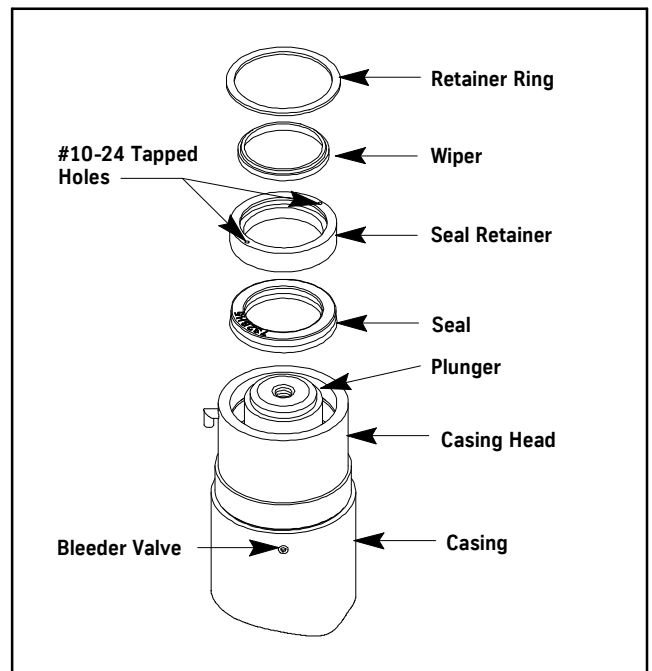


Figure 26 - Single Stage Seal Removal and Replacement

New Seal Installation (See Figure 26)

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. See Figure 27 for proper orientation.

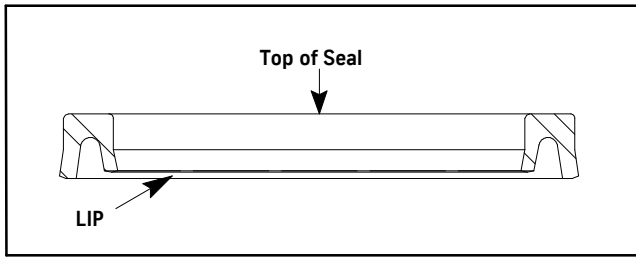


Figure 27 - Seal Orientation

4. Close the bleeder valve.
5. Place the seal retainer with the wiper over the plunger and down into the recess. Make certain that the top of the seal retainer is below the retainer ring groove.
6. Install the retainer ring.

7. Close the manual lowering valve.
8. Open the shut off valve.
9. Re-attach the Lift Bracket/Platen assembly to the stile.
10. Turn **ON** the mainline disconnect.
11. Install the two bevel washers between the jack and Lift Bracket/Platen.
12. Place the car on inspection operation and carefully run the jack up until it contacts the Lift Bracket/Platen.
13. Install the jump bolt.
14. Run the jack up 12" to 18" to restore system pressure.
15. Bleed the jacks of air.

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

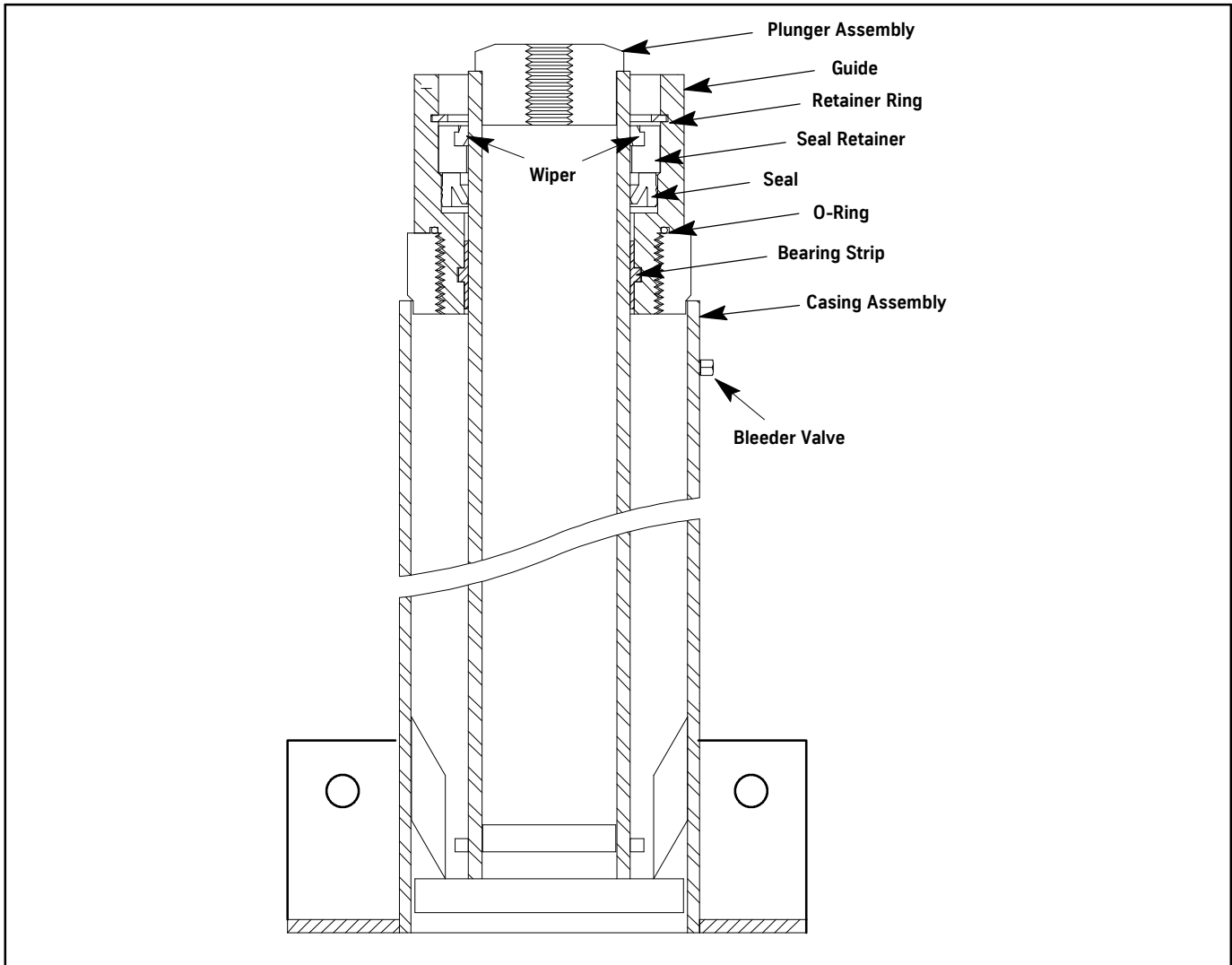


Figure 28 - Single Stage Twin Post Jack Assembly (3.0" Shown, 3.875" Similar)

Two Stage Twin Post Telescoping Jack

Each Visit Inspection

1. Take the car of service by:
 - a. Notifying the proper building personnel
 - b. Putting "Out of Service" tags at each landing (as required).
 - c. Taking the car out of service.
2. Check the controller resynch log and adjust parameters as required.
3. Visually inspect the casing head for leakage from seal or o-ring.
4. Inspect for blockage of drip tube to drip pan. Empty as necessary (follow EPA rules for disposal or consult your supervisor).

Seal / Check Valve Replacement

Recommended Tools:

- Jack straps
- Eye bolts
- Strap wrench
- Chain Hoist
- 5 gallon container
- Small electric pump
- 2 Stage seal tools (Required):
 - 2.5T
 - 9845604 (850RH1) Bullet Seal Tool
 - 9844211 (850RM1) Plunger Head Seal Loading Tool
 - 9844119 (850RR1) Plunger Head Seal Loading Tool
 - 3T
 - 9845630 (850RK1) Bullet Seal Tool
 - 9844200 (850RT1) Plunger Head Seal Loading Tool
 - 9844302 (850RV1) Plunger Head Seal Loading Tool


Recommended Parts:

200AHE12 Seal Kit 2.5T
 200AHE13 Seal Kit 3T
 (See *Replacement Parts* for lists)

Preparation

NOTE: See Figure 31 for Telescoping Jack assembly part locations.

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


 **CAUTION!** If step 2 is not done, the jack will fall over when disconnected from the Lift Bracket/platen.

2. If the job does not have a clamp holding the jack to the pit wall, use timbers to clamp the cylinder to the bottom rail bracket
3. Remove the jack jump bolts.
4. Collapse the plunger assemblies by closing the Down Stop adjustment fully (count and record the number of turns) and opening the manual lowering valve.
5. Remove the Lift Bracket/Platen from both stiles. See Figure 14.
6. Continue with *Removing the Plungers*.

Inspection and Repair of The Plunger Surface Finish

NOTE: If a plunger scratch or burr damaged the old seals or bearing strips, it will almost certainly damage the new ones.

1. Carefully inspect the plunger for surface damage when it is removed or installed.

 **CAUTION!** In steps 2 and 3, do not allow any sanding debris to contaminate the wipers and seals.

2. Carefully remove any deep scratches, dings, burrs, or high spots with 240-320 grit emery cloth.
3. Finish the repair by polishing that area with 600 grit emery cloth.

Removing the Plungers

1. Using a strap wrench, remove the upper plunger guide assembly. Leave the seal retainer in place.
2. 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.
3. Inspect and, if necessary, repair the surface finish of the upper plunger. Refer to *Inspection and Repair of The Plunger Surface Finish*.
4. Using a strap wrench, remove the lower plunger guide assembly. Leave the seal retainer in place.
5. Temporarily, re-assemble the upper plunger guide assembly to the lower plunger.
6. Insert the inlet hose from the small electric pump into the casing beside the lower plunger.
7. Place a strap choke under the upper plunger guide and lift the lower plunger out of the jack, pumping the oil into the 5 gallon container as the plunger is hoisted.

NOTE: The seal will hang on the casing threads when the lower plunger is lifted. Moving the lower plunger side to side will help get the seal past the threads.

8. Leave the lower plunger suspended.
9. Inspect and, if necessary, repair the surface finish of the middle plunger. Refer to *Inspection and Repair of The Plunger Surface Finish*.

Repairing and Reassembling the Jack

Lower Plunger

1. Replace the Seals and Check Valve O-Ring of the Lower Plunger as follows. See Figure 29:
 - a. With the lower plunger suspended, remove the seal retainer and bearing strip from the bottom of the lower plunger by removing the $\frac{1}{2}$ " x 1" Hex Head Cap Screws.
 - 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, then torque the bottom nut against the other one 12 - 13 ft lb.
 - f. Install a new O-Ring in the check valve bore, then install the check valve.
 - g. Install a new external oil seal on the lower plunger base.
 - h. Attach the seal retainer to the lower plunger base with the $\frac{1}{2}$ " x 1" Hex Head Cap Screws.
 - i. Tighten the Hex Head Cap Screws to 30 ft. lbs.
 - j. Install a new bearing strip on the seal retainer.
2. Place the external seal tool over the top of the casing. See Figure 29.
3. Inspect and, if necessary, repair the surface finish of the lower plunger. Refer to *Inspection and Repair of The Plunger Surface Finish*.
4. Lower the lower plunger into the jack casing.
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 discard the wiper, internal oil seal, and the O-Ring.
8. Clean the lower plunger guide parts.
9. Reassemble the lower plunger guide with a new wiper, internal oil seal, and O-Ring. Apply grease to the O-Ring to hold it in place. See Figure 29.
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. See Figure 30.
3. Inspect and, if necessary, repair the surface finish of the upper plunger. Refer to *Inspection and Repair of The Plunger Surface Finish*.
4. Lower the upper plunger into the lower plunger.
5. Disassemble the upper plunger guide and discard the wiper, internal oil seal, and the O-Ring. See Figure 30.
6. Clean the upper plunger guide parts.
7. Reassemble the upper plunger guide with a new wiper, internal oil seal, and O-Ring. Apply grease to the O-Ring to hold it in place. See Figure 30.
8. Install the upper plunger guide on the middle plunger.
9. Continue with *Return To Service*.

Return to Service

1. Close the manual lowering valve.
2. Remove the rubber hose from the quick connect of the silencer.
3. Open all of the bleeder valves until the air stops or oil begins.
4. Close the bleeder valves.
5. Install the Lift Bracket/Platens 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.

6. Jog the power unit to run the jacks up to the Lift Bracket/Platens.

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.

7. Continue running the pump until the plungers have reached their respective Lift Bracket/Platens.
8. Install the jack jump bolts.
9. If the jack has been clamped to the bottom rail bracket, remove the clamp.
10. With the weight of the car on the jacks, bleed all bleeders on each jack.
11. Resynch the jacks with the buffer springs removed.
12. Install buffer springs.
13. Verify proper operation, then return the car to service.

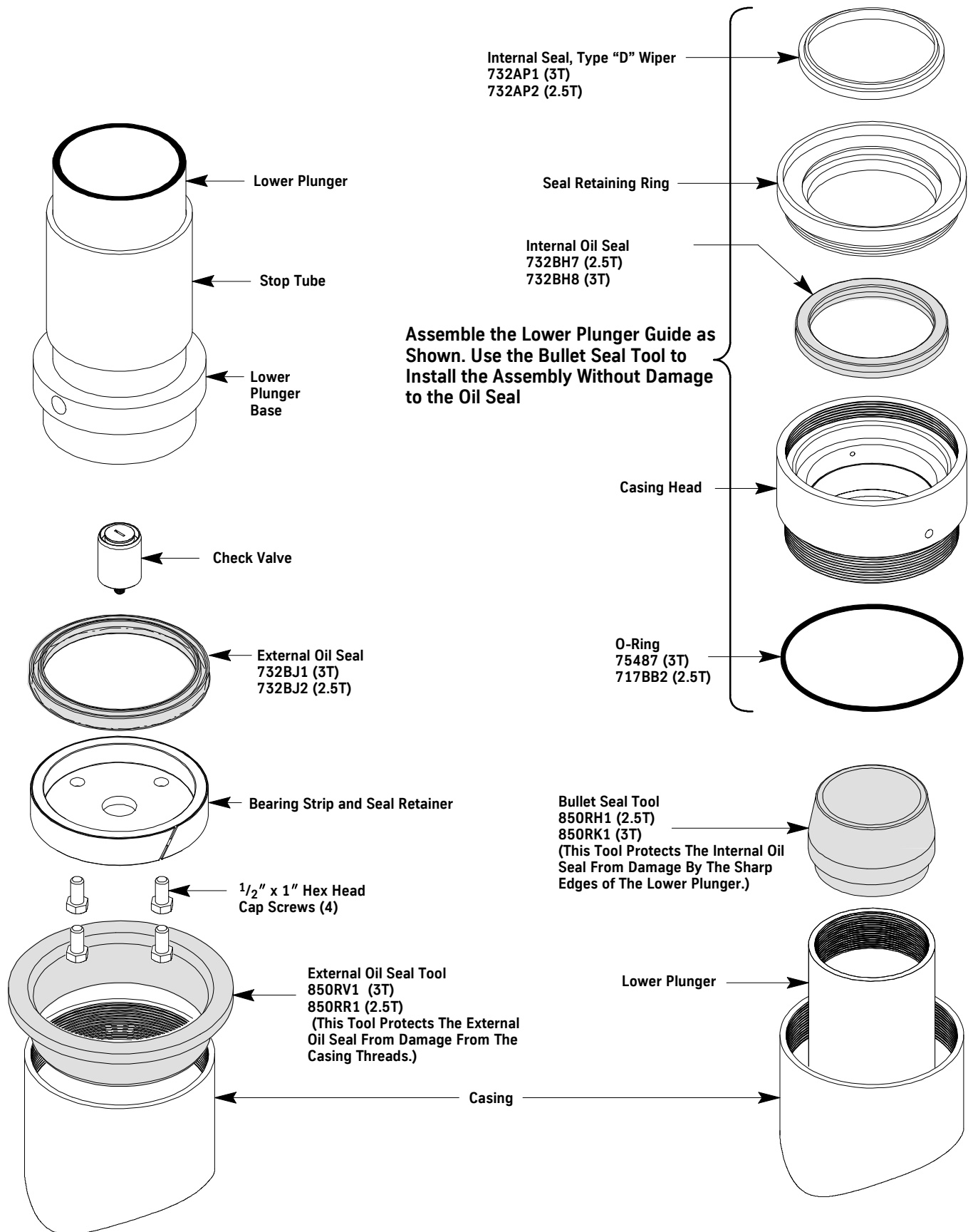


Figure 29 - Casing and Lower Plunger Internal and External Oil Seal Installation

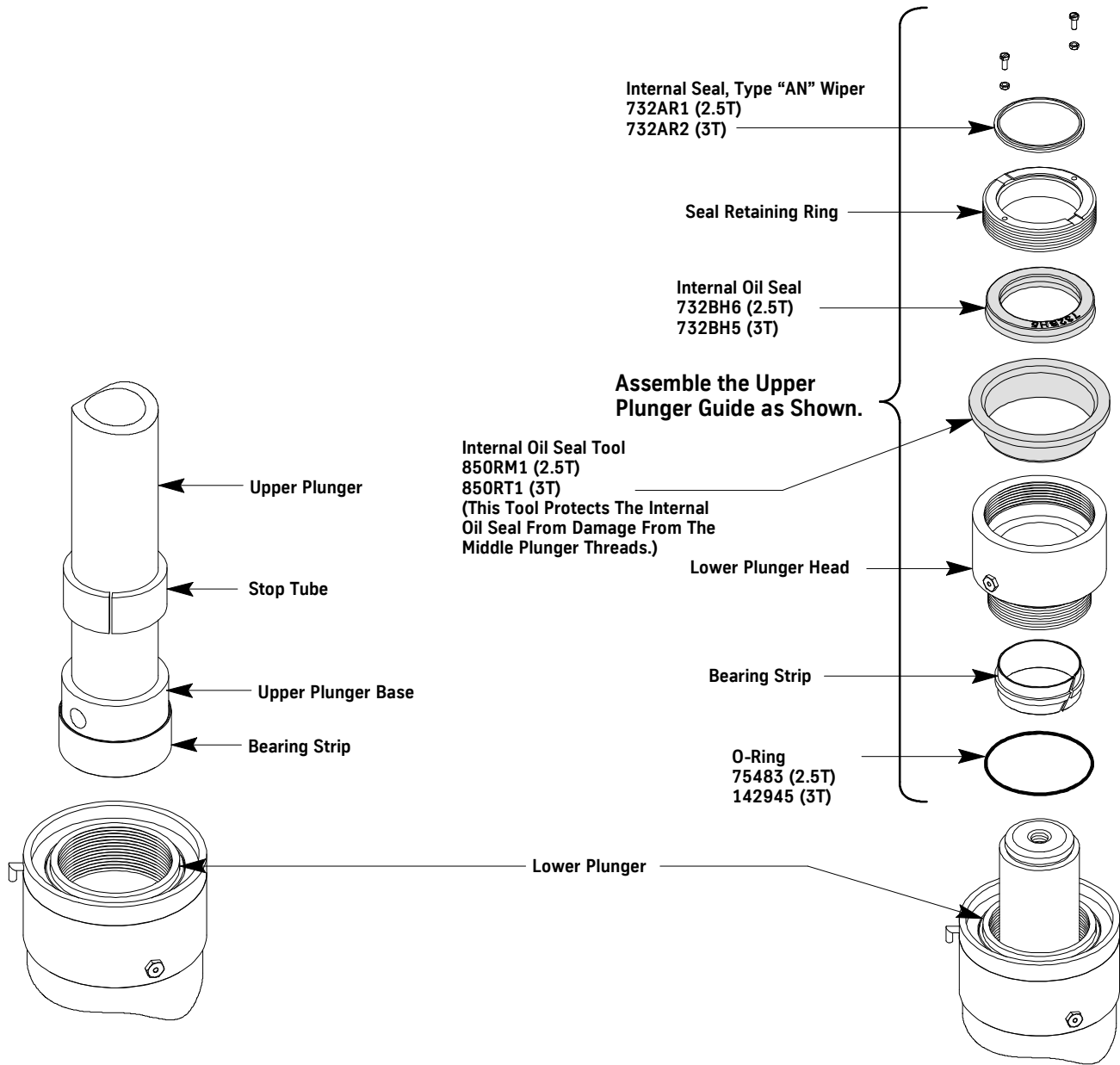


Figure 30 - Upper Plunger Internal Oil Seal Installation

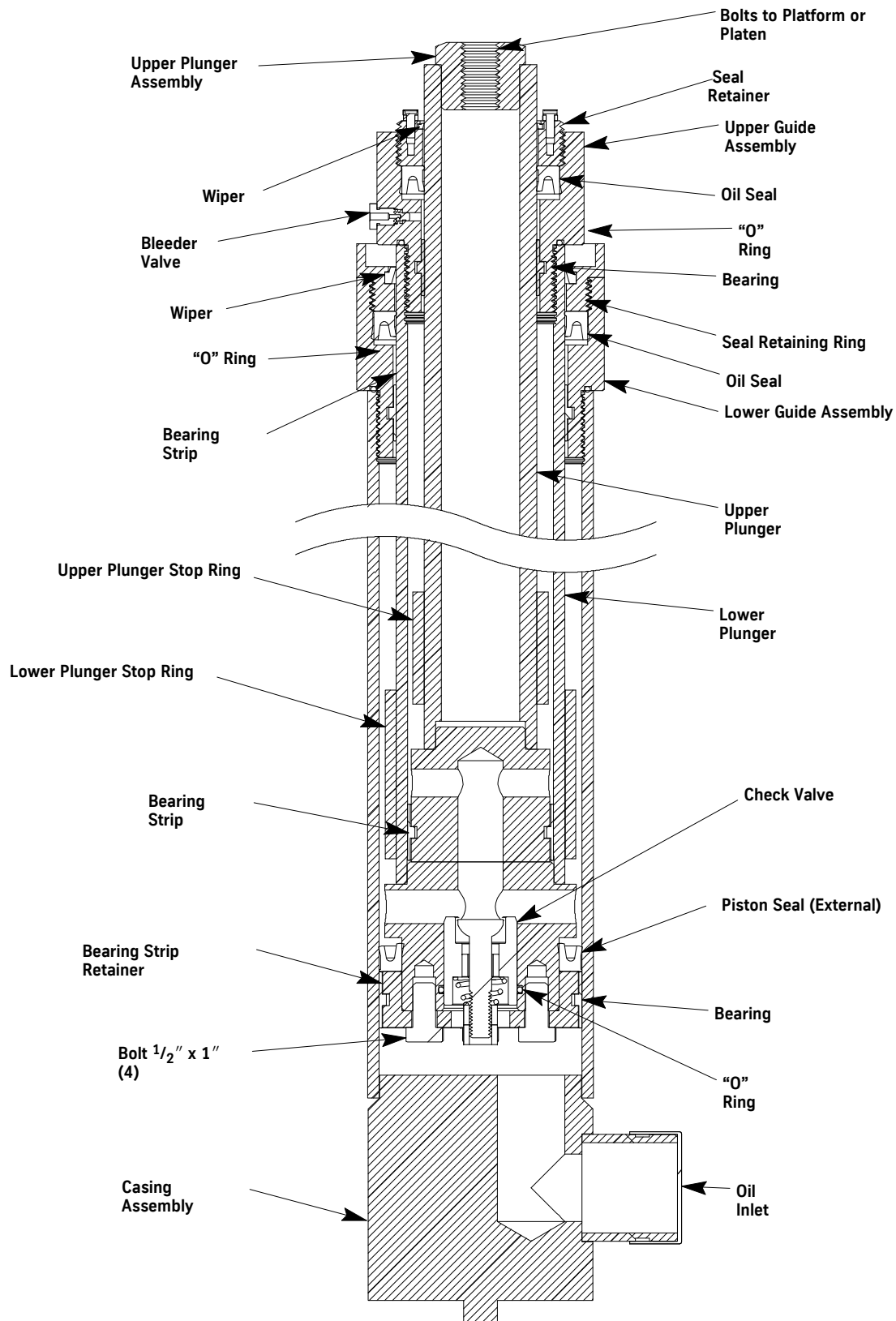


Figure 31 - Twin Post Telescopic Jack Assembly

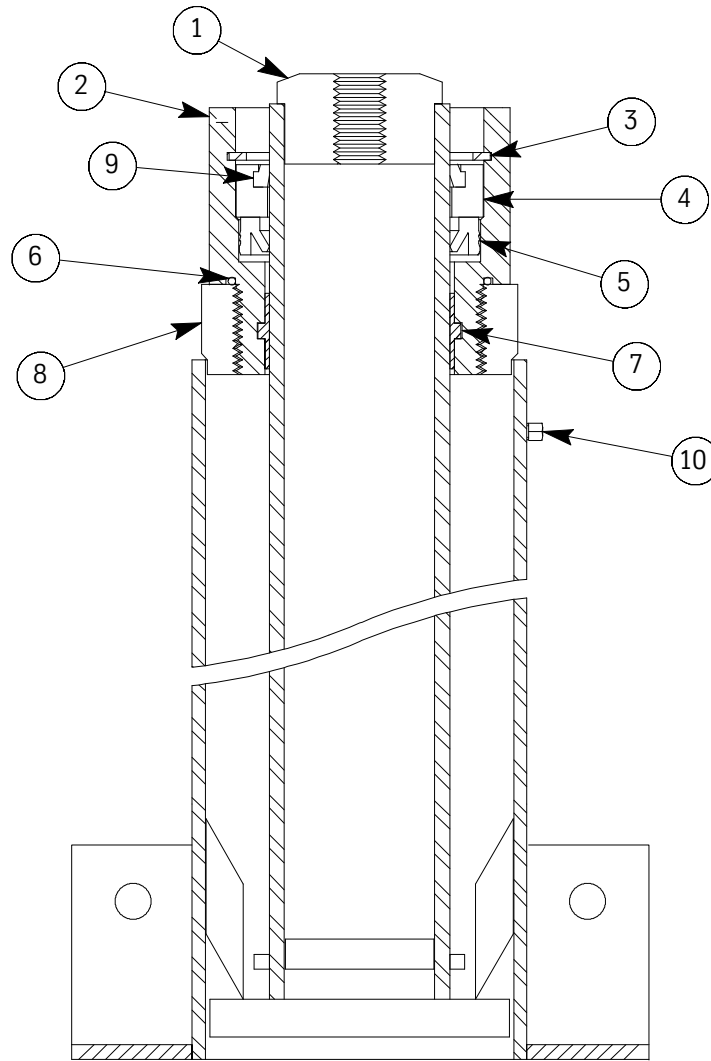
Troubleshooting

The following is a table of common problems and their possible causes and solutions:

Problem	Possible Cause	Solution
Upper stage of jack will not extend until bottom stage has reached it's stop ring.	All of the air has not been bled from the jack.	Extend jacks and bleed.
Upper stage of jack will not extend until bottom stage has reached it's stop ring.	Check valve or bottom piston seal leaking.	Replace seal and check valve.
Vibration in the jack. More noticeable in the up leveling, and the down start from the top landing.	Jack is not installed plumb. Check for metal in bearing strip.	Add 1 quart Caterpillar oil additive to the jack that is vibrating.
Frequent need to resynch because of an external oil leak from the upper seals.	Worn seals in guide assemblies.	Replace Seal. See seal replacement procedures.
Frequent need to resynch because of oil leakage from the upper stage to the lower stage. (Internal leak, upper plunger shrinking)	Worn bottom seal.	Replace bottom seal. See seal replacement procedures.
	Check Valve leaking.	Replace Check Valve.

Replacement Parts

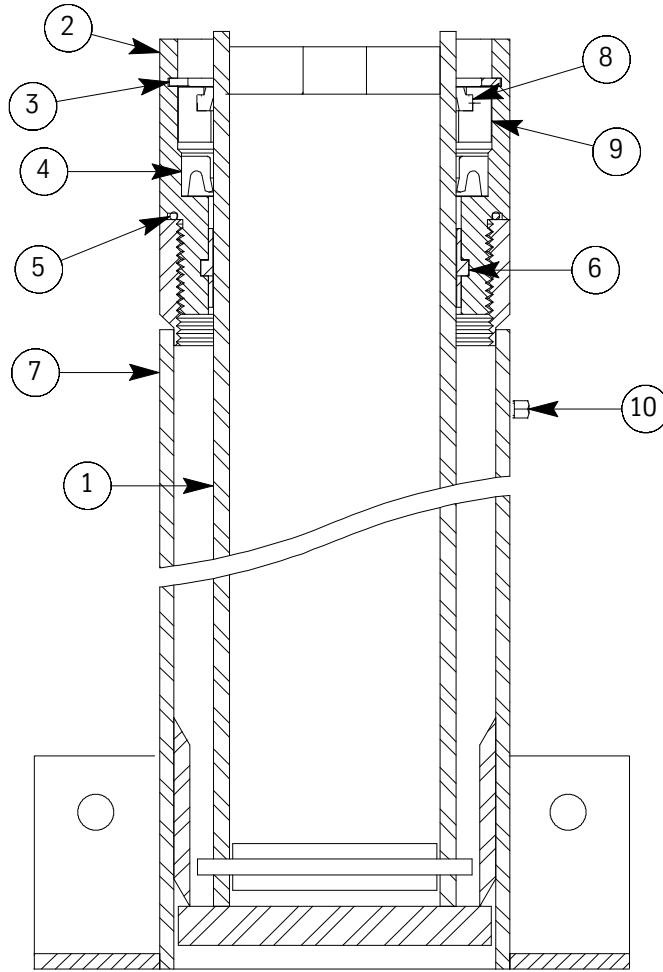
Single Stage Twin Post Jack, 3.0"



ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		6502AC3	Plunger Assembly, Twin Post 3.00 Jack
2		454AM2	Guide, Plunger, 3.00 Jack
3		717BE1	Ring, Retainer Offset, Internal
4		713AA2	Retainer, Seal, Oil, 3.00 ID
5	9846621	*732BH5	Seal Oil Internal 4.000 OD
6		717AB3	O-Ring 0.125 x 4.125 ID x 4.375 OD
7	9738903	*142AX1	Bearing Strip, 1.250 Wide 9.375 Flat Length
8		6503BN1	Casing Assembly Twin Post 3.00 Jack
9		*732AP1	Seal Internal Type "D" Wiper 3.50 OD
10	9723900	114811	Valve, Bleeder
11		232CD1	Cap, Protective 2.378" ID (Not Shown)
		107846	Plug, Pipe, NPT, 2.0" (Not Shown)
12		700863	Pipe Plug, .125" (Not Shown)

* Included in 2S Seal Kit, Print No. 200AHE1

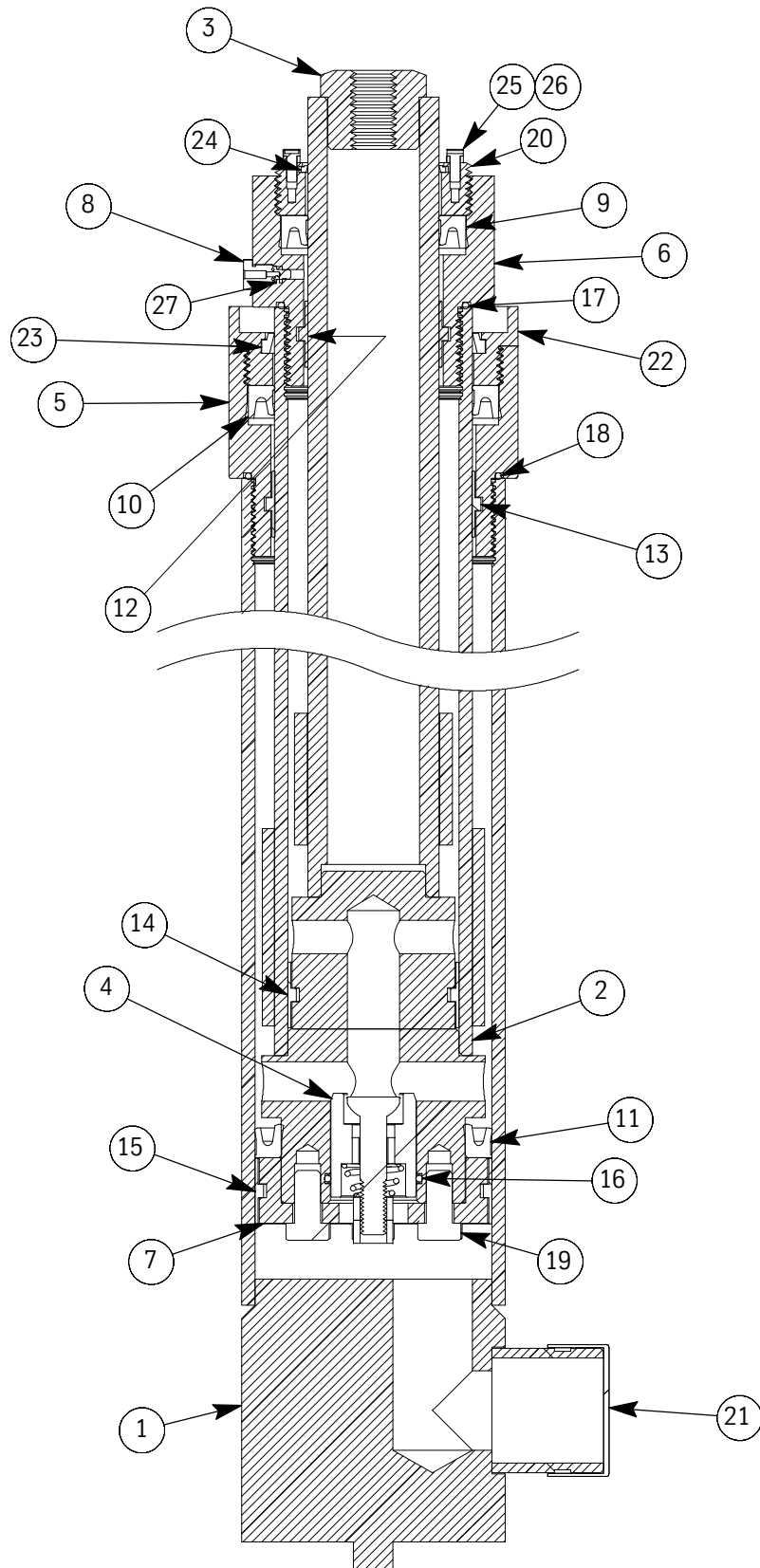
Single Stage Twin Post Jack, 3.875"



ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		6502AD2	Plunger Assembly
2		454AN1	Guide, Plunger
3	9739350	139357	Ring, Retainer
4	9725600	*732BH1	Seal Oil Internal
5		139358	O-Ring 0.125" x 5.00" x 5.25"
6	9811576	*137995	Bearing Material
7		6503BP1	Casing Assembly
8	9723821	*123833	Wiper
9		148113	Retainer, Seal
10	9723900	114811	Valve, Bleeder
11		232CD1	Cap, Protective 2.378" ID (Not Shown)
		107846	Plug, Pipe, NPT, 2.0" (Not Shown)
12		700863	Pipe Plug, .125" (Not Shown)

* Included in 3S Seal Kit, Print No. 200AHE2

Two Stage Twin Post Jack, 2.5T and 3T



Two Stage Twin Post Jack, 2.5T and 3T (continued)

2.5-T Two Stage Jack Assembly

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		6503BM4	Casing Assembly
2		6502AA4	Plunger Assembly, Lower
3		6502AB5	Plunger Assembly, Upper
4	9721824	886BF2	Valve Assembly, Check
5		454AJ4	Guide, Lower Plunger
6		454AK2	Guide, Upper Plunger
7		712AA4	Retainer, Bearing, 4.347" O.D.
8		886BN1	Valve, Bleeder
9	9846633	*732BH6	Seal, Oil , Internal, 2.500" I.D.
10	9846645	*732BH7	Seal, Oil , Internal, 3.750" I.D.
11	9846610	*732BJ2	Seal, Oil , External, 4.500" O.D.
12		*142CG4	Bearing, Upper Plunger
13	9739002	*142CG2	Bearing, Lower Plunger
14		*142CH4	Bearing, Upper Piston
15		*142CH2	Bearing, Lower Piston
16	9840450	*717BB1	"O" Ring, #223, .125" x 1.625" x 1.875"
17	9709885	*75483	"O" Ring, #237, .125" x 3.375" x 3.625"
18	9840461	*717BB2	"O" Ring, #247, .125" x 4.625" x 4.875"
19		396EH1	FS, Screw, Csh .500" x 1.0" Z
20		717BC4	Ring, Retaining, Seal
21		232CD1	Cap, Protective 2.378" ID
		107846	Plug, Pipe, NPT, 2.0"
22		717BP3	Ring, Retaining, Seal
23		*732AP2	Seal, Internal "D" Wiper
24		*732AR1	Seal, Internal "AN" Wiper
25		396PA1	FS, Screw, .190" (#10) x .50" Z
26	9702234	700571	FS, Nut, NH, .190" (#10) Z
27	9781365	*78136	O-Ring, #006, .125" X .250"
28	9810043	232AL5	Cap, Plunger, Sensor (Not Shown)

* Included in 2.5T Seal Kit, Print No. 200AHE12

3-T Two Stage Jack Assembly

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		6503BM3	Casing Assembly
2		6502AA3	Plunger Assembly, Lower
3		6502AB6	Plunger Assembly, Upper
4	9721824	886BF2	Valve Assembly, Check
5		454AJ3	Guide, Lower Plunger
6		454AK1	Guide, Upper Plunger
7		712AA3	Retainer, Bearing, 5.098" O.D.
8		886BN1	Valve, Bleeder
9	9846621	**732BH5	Seal, Oil , Internal, 3.0" I.D.
10	9846657	**732BH8	Seal, Oil , Internal, 4.250" I.D.
11	9846608	**732BJ1	Seal, Oil , External, 5.250" O.D.
12		**142CG3	Bearing, Upper Plunger
13		**142CG1	Bearing, Lower Plunger
14		**142CH3	Bearing, Upper Piston
15	9739210	**142CH1	Bearing, Lower Piston
16	9840450	**717BB1	O-Ring, #223, .125" x 1.625" x 1.875"
17	9742943	**142945	O-Ring, #241, .125" x 3.875" x 4.125"
18	9754878	**75487	O-Ring, #253, .125" x 5.375" x 5.625"
19		396EH1	FS, Screw, Csh .50" x 1.0 ZN
20		717BC3	Ring, Retaining, Seal, 3.077" I.D.
21		232CD1	Cap, Protective 2.378" I.D.
		107846	Plug, Pipe, NPT, 2.0"
22		717BP4	Ring, Retaining, Seal, 4.324" I.D.
23		**732AP3	Seal, Internal "D" Wiper, .375" x 4.25"
24		**732AR2	Seal, Internal "AN" Wiper, .188" x 3.0"
25		396PA1	FS, Screw, .190 (#10) x .50" Z
26	9702234	700571	FS, Nut, NH, .190 (#10) Z
27	9781365	**78136	O-Ring, #006, .125" X .250"
28	9810055	232AL6	Cap, Plunger, Sensor (Not Shown)

** Included in 3T Seal Kit, Print No. 200AHE13

Vertical Express

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