AMEE

Three Stage Twin Post Telescoping Jack
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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 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 could result in damage to the equipment or other property if improper procedures are followed.

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

General Safety

CAUTION! 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 ThyssenKrupp 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.

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 ThyssenKrupp Elevator Employees’ Safety and 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 ThyssenKrupp Elevator Employees’ Safety and 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 Parts Manual to order extra static bags and shipping cartons for each card.

Failure to adhere to these guidelines will VOID card warranty!

All Procedures in this manual must be done in accordance with the applicable rules of the latest edition of the National Electrical Code; the latest edition of ASME A17.1, Safety Code for Elevators; and any governing local codes.

Arrival of The Equipment

Receiving
Upon arrival of the telescoping jack, inspect it for damage and 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 ½” 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

Important!
This procedure is the basis of the construction of the hoistway. Be sure ALL measurements are correct before proceeding.

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 center-lines 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 \(\frac{1}{2}\)” 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.

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Figure 2 - Hoistway Laser Survey

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

NOTE: The jack guide starter rail is an 8 foot long jack guide rail with a Factory attached splice. See Figure 5.

1. Attach Jack Guide Rail Mounting Brackets on the starter rail at the same elevation and corresponding mounting surface as the first car rail bracket.

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 dimensions in Figure 5.

3. Holding the dimension from the centerline of the jack, attach the guide rail mounting brackets to the hoistway wall.

4. Place a laser in the starter rail laser hole. See Figure 3 and Figure 5.

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. (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.
Figure 5 - Jack Guide Starter Rail

First Jack Guide Rail Mounting Brackets (Mounted at the same level and on the same mounting surface as the first car guide rail bracket)

Jack Guide Rail Splice (Installed by Factory)

Jack Guide Rail

First Jack Guide Rail Mounting Brackets

8 1/4" from Pit Template Edge

Jack Locator

Pit Template Edge

Laser

Jack Guide Rail Splice (Installed by Factory)

Jack Guide Rail

First Jack Guide Rail Mounting Brackets

6"

Same level and same mounting surface as first car guide rail bracket

Jack Guide

8 1/4" from Pit Template Edge

Jack Guide Rail

Pit Template Edge
Installation

AMEE Three Stage Twin Post Telescoping Jack

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 6.

2. Install a bottom rail bracket as follows. See Figure 6:
   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 6.

5. Remove the targets from the first set of rail brackets.

6. Install a second rail bracket as follows. See Figure 6:
   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 6.

Figure 6 - 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.

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 7.

3. Attach the rail to the bracket using the slip clips provided. See Figure 7.

4. Tighten the clips with the heel of the clip butted against the rail. See Figure 7.

5. Repeat steps 1 through 4 for the opposite side.

Figure 7 - 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 9.

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 8.

3. Hoist the jack into the hoistway and into its hole on the pit template. See Figure 3 and Figure 9, 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 9.

5. Install the 90° barbed “drain tube” elbow. See Figure 8.

6. Place a laser(s) in pre-punched hole(s) of the pit template in locations as shown in Figure 10.

7. Turn the jack so that the oil inlet is pointing toward the other jack. See Figure 10.

8. Use the laser(s) to plumb the jack, making sure that dimensions A and B are 2” at each end. See Figure 10.

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.

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Figure 8

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Figure 9
Figure 10 - Telescoping Jack Installation
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 12.

   \[\text{WARNING!}\] On Seismic jobs, the pipe between the jacks MUST be seamless. On Non-Seismic jobs, the pipe may be seamed.

   NOTE: Run a lint-free cloth 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 12.

4. Install the overspeed valve to the “tee”. Connect the end labeled “JACK” directly to the “tee”. See Figure 12.

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 11.

   \[\text{WARNING!}\] 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 13.

   \[\text{WARNING!}\] 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.

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![Figure 11 - Piping Installation From Jack To Power Unit](image-url)
Figure 12 - Piping Between Jacks
Buffer Stands

1. Install the buffer stands on the pit template. See Figure 13.

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 13.

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 13 - 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.

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

Bolster

1. Place the bolster assembly directly on the buffer stands. See Figure 15.
2. Check the bolster assembly for level. If it is not, shim the buffer stand(s). See Figure 13.
3. Install the bottom guide shoes on the shoe mount weldment. See Figure 16.
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 16.
6. Tighten both locknuts on the tension adjustment screws.
7. Snugly (not tight) fasten the bolster assembly to the stiles.
8. Place the Follower Rail Template on top of the bolster as shown in Figure 18. Ensure that the ends protrude into their respective starter rail.

**NOTE:** See Figure 17 for a legend of the Follower Rail Template.

9. Align the inside edge of the template notch with the edge of the bolster channel and clamp it to the bolster. See Figure 17 and Figure 18.

10. On one end, square the stile against the corresponding edges of the template and tighten the fasteners holding the stile and bolster together. See Figure 17.

11. Repeat step 10 on the other end of the bolster and then tighten the fasteners on the opposite side of the bolster.

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**Figure 16 - Bottom Guide Shoe Installation**

**Figure 17 - Follower Rail Template Legend**
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 19.

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. See Figure 20.

   NOTE: The brace rod goes in the lowest set of $\frac{5}{8}$” holes in the stiles.

4. Level the platform front to back by adjusting the brace rods. See Figure 20.
Crosshead

1. Fasten the two upper guide shoes to the shoe mount weldment on the rear crosshead channel. See Figure 21.

2. 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 22.

3. Install the hardware and attach the rear crosshead channel to the stiles, but do not tighten the bolts at this time.

4. Turn both tension adjustment screws in equally until the guide shoes 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 21.

6. Tighten both lock nuts on the guide shoe tension adjusting screws.

7. 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. See Figure 22.

8. Place the Follower Rail Template on the bottom of the front crosshead as shown in Figure 22.

9. Align the inside edge of the template notch with the edge of the crosshead channel and clamp it in place. See Figure 22.

10. Ensure that the stiles are square with the template, and then tighten the fasteners of the front crosshead.

11. Tighten the fasteners of the rear crosshead.

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Figure 21 - Upper Guide Shoe Installation

Figure 22 - 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 23.

2. Tie-wrap the plastic line to the jack to keep the line clear of the car frame.

![Figure 23 - Drip Tube Installation](image)

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. Remove all fuses and unplug connectors following the placard instruction.

7. Check that all orange factory temporary run jumpers have been installed. The controllers are shipped to run on temporary operation.

8. Verify that the incoming power voltage is the same as the Controller nameplate voltage.

9. Plug in the temporary run station.

10. Turn ON the mainline disconnect and verify operation.

![Figure 24 - Bleeding the Jack](image)

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

11. 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**

1. Insert one end of the \( \frac{3}{16}^\prime\prime \times 24^\prime\prime \) 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 24.

2. With an \( \frac{9}{16}^\prime\prime \) Wrench, slightly open the bottom bleeder valve on each jack. See Figure 24.

NOTE: The three-stage telescoping jack has four bleeder valves. There are two in the jack casing. One is opposite the bottom one shown in Figure 24. 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.

4. When oil appears at the bleeder valves, hand tighten the valves then add \( \frac{1}{4} \) turn with a wrench.

**CAUTION!** One jack will probably purge air before the other, so tighten the bleeder valve completely one jack at a time.
5. 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.

6. Remove the Sono Tubing from the bottom plunger.

Car Guide Rail Completion

1. 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 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.

2. 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.

3. Install the next set of rail brackets. See job layout for maximum distance between brackets. See Figure 25.

4. Adjust both brackets using the laser lines and the laser target.

5. Install a splice tube in the existing rail with two splice clamps and tighten the splice. Use measurements and torque specification shown in Figure 25.

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. Use measurements and torque specification shown in Figure 25.

8. Repeat steps 3 through 7 for the opposite side.

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

9. Run the car frame up, and attach the rails to the rail brackets using the supplied clips and hardware.

10. Tighten the rail clips completely.

11. Repeat steps 2 through 10 for any remaining rail brackets and rails.

12. Clean and file all rail joints.

13. Verify that the rails are plumb ± 1/8” for the entire length of the rails.

NOTE: Guide Rail Brackets and Guide Rail Joints Must not interfere with each other.

Figure 25 - 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 26.

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.

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. See Figure 26.

4. Fasten the template to the platform with wood screws.

NOTE: In this position, the template can be used to mount the remaining jack guide rails.

Jack Guide Rail

1. Attach Jack Guide Rail Brackets to Jack Guide Rail as shown in Figure 27 in a position corresponding to the nearest car rail bracket mounting surface.

NOTE: Brackets for the jack guide rail are located at the same intervals as the car rail brackets and on the corresponding mounting surfaces.

WARNING! Button heads must be on the inside of the rail to avoid interference with the 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 Splices per Figure 29.

4. Estimate the length of the jack guide with one of the following methods:
   - With the car at the bottom landing, the length of jack guide rail required above the middle plunger is \( \frac{2}{3} \) of 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. Plumb the Guide Rail with a laser. See Figure 3 for location.

Figure 26 - Rear Crosshead Installation
Figure 27 - Assembly of Jack Guide Rail Mounting Brackets to Jack Guide Rail

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

NOTE: There is a difference of 15/8” depth between the two legs of the jack guide rail bracket.

Figure 28 - Top View of Platform Assembly (AMEE 25, 30, and 35 Shown. AMEE 21, 40, 45, and 50 Similar)
NOTE: The Guide Rail Splice must be smooth as possible.

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

Figure 29 - Stacking Jack Guide Rail Channel(s)
Jack Plunger Roller Guide

Refer to Figure 30 and Figure 31 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 resynch operation.

1. With the long side up, slide the top Plunger Roller Guide into the Guide Rail from the open splice at the top of the starter rail.

2. Raise the top 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, slide the bottom Plunger Roller Guide into the Guide Rail from the open splice and suspend it.

4. Dependant on which side of the jack the guide rail will be on, match the offset of the Guide Shoe Mounting Ring from the centerline of the jack. See Figure 30, Detail A.

NOTE: The Guide Shoe Mounting Rings are free to turn on the jack plunger guides.

5. Install a Guide Shoe Mount on the lower Guide Shoe Mounting Ring on the jack with two (2) 3/8” Hex Head Flange Screws and Flange Nuts and tighten.

6. With long sides pointed down, install the Plunger Roller Guide and the Sensor Pickup Assembly with two (2) 1 1/4” Hex Head Cap Screws as shown in Figure 30.

7. Install a 1/2” lockwasher and hex nut on each cap screw and tighten.

8. Install a Guide Shoe Mount on the upper Guide Shoe Mounting Ring with two (2) 3/8” Hex Head Flange Screws and Flange Nuts and tighten.

9. Retrieve the top Plunger Roller Guide.

10. With long sides pointed up, install the Plunger Roller Guide and the Sensor Pickup Assembly with two (2) 1 1/4” Hex Head Cap Screws as shown in Figure 30.

11. Install a 1/2” lockwasher and hex nut on each cap screw and tighten.

12. Repeat steps 1 through 11 for the other side.
1. Place the Top Jack Plunger Guide into The Open Splice And Move It Up To a Point That Is Above The Jack And Suspend It As Shown Above.
2. Place The Bottom Jack Plunger Guide Into The Open Splice And Assemble It To The Jack As Shown Above.

Figure 30 - Bottom Jack Plunger Guide Installation
Figure 31 - Top Jack Plunger Guide Installation
Sensors

Refer to Figure 32 and Figure 33 for the following procedure.

NOTE: Three Sensor assemblies are required on each side of the hoistway.

Static Sensors at Bottom Landing

1. Manually resynch 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 to 15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.

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

2. Mount a sensor assembly on the jack guide rail for each of the pick-up assemblies with two button head screws, flat washers, and hex nuts. See Figure 32.

3. Vertically center the Sensors on their respective pick-up sensor magnets and tighten the button head screws.

4. Repeat steps 2 through 3 for the other side.

5. Install the buffer springs.

Dynamic Sensors at Top Landing

If the jacks have been resynched recently, start with step 2. If not, start with step 1.

1. Manually resynch 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 to 15 seconds.
   g. Close the manual lowering valve.
   h. Level the platform with the bottom landing.

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

2. Place 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. See Figure 33.

5. Locate the center of one of the upper guide sensor pick-up magnets and mark the jack guide rail at that point.

6. Mount a sensor assembly on the jack guide rail at the mark made in step 5 with two button head screws, flat washers, and hex nuts. See Figure 32.

7. Vertically center the Sensor on the mark and tighten the button head screws.

8. Repeat steps 5 through 7 for the other side.

9. Make sure the two sensors are level with one another by referencing them from a common level object such as a sill, a crosshead, or bolster channel. See Figure 33.

NOTE: The two top sensors must be accurately placed at the same height in the hoistway.
**WARNING!** Button heads must be on the inside of the rail to avoid interference with the roller guide.

NOTE: When the car is at the bottom landing, the bottom sensors must be vertically centered on the magnet of their respective sensor pick-up assemblies.
Top and Bottom Overtravel Check

NOTE: There must be $\frac{1}{2}$” more of top overtravel than bottom overtravel.

Do NOT do an Overtravel Check before the jacks are resynched.

1. Resynch the jacks by removing the buffer springs (if installed) and lowering the car until both jacks bottom out.

2. Check for $8\frac{1}{2}$” of bottom overtravel.

3. Run the jacks onto the stop rings and check for $9$” top overtravel.
Adjustment

1. Connect an IMS laptop to the controller.

2. Start IMS.

3. Open the remote FAST window.

4. Enter the TIM (Time) and DAT (Date) adjustments and note the results. Change as necessary to match current time and date. See Table 1.

**NOTE:** If the Time adjustment is 12 hours off, it could force the jacks into a resynch operation during a peak demand period.

5. Enter the WJR command to display a historical record of resynchs up to 15 events. See Table 1 and Figure 34.

**NOTES:**
- The WJR command is only available in controller generic software V4R1 or later.
- The resynch history may be cleared at any time with the CJR command.

**NOTE:** It is normal for “Timed” and “Motor” resynchs to be reported together.

6. If there are Static or Dynamic resynchs listed, fix the problems accordingly. See Table 1.

7. If there are a number of motor resynchs, check the setting for O44. Reset the value to the default of 1500, if necessary. See Table 1.

8. Check adjustment O29 for a value that will allow the car to completely lower itself on the buffer springs. See Table 1.

**NOTE:** The default value of 6 allows only enough time for the car to lower onto the buffers for a partial resynch.

9. Check that the JRT adjustment is set for 12 a.m. midnight or a time that will ensure that timed resynchs will not occur during peak-traffic periods. See Table 1.

10. If the elevator is very busy, set O30 to 1. Less busy elevators may be set to 2 or 3. However, a setting of 1 will help the operation of the jack. See Table 1.

![Figure 34 - Example Response to WJR Command](image-url)
<table>
<thead>
<tr>
<th>ADJ.</th>
<th>UNIT</th>
<th>RANGE</th>
<th>DEFAULT</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>O29</td>
<td>sec</td>
<td>5−30</td>
<td>6</td>
<td><strong>Jack Resynch Lower Time</strong> - Sets the time allowed for a Jack resynch to be completed once the car reaches the bottom and begins the resynch operation.</td>
</tr>
<tr>
<td>O30</td>
<td>days</td>
<td>1−3</td>
<td>1</td>
<td><strong>Jack Resynch Interval</strong> - Sets the number of days between automatic Jack resynch operations.</td>
</tr>
<tr>
<td>O44</td>
<td># of starts</td>
<td>100−2500</td>
<td>1500</td>
<td><strong>Jack Resynch Interval</strong> - Sets the number of motor starts before automatic Jack resynch operation takes place.</td>
</tr>
<tr>
<td>DAT</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td><strong>Date</strong> - Used to adjust the Date on the internal clock.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Format:</strong> DAT=mm/dd/yy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>mm</strong> = Month</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>dd</strong> = day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>yy</strong> = year (yyyy is acceptable)</td>
</tr>
<tr>
<td>JRT</td>
<td>----</td>
<td>----</td>
<td>12:00 am</td>
<td><strong>Jack Resynch Time</strong> - Sets the time of day that a jack resynch will occur.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>(Midnight)</strong> All fields are required, including colons (:).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Format:</strong> JRT=[hh:mm:ss] [a/p]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>hh</strong> = Hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>mm</strong> = Minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>ss</strong> = Seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>a</strong> = am</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>p</strong> = pm</td>
</tr>
<tr>
<td>TIM</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td><strong>Time</strong> - Used to adjust the Time on the internal clock.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Format:</strong> TIM=hh:mm:ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>hh</strong> = Hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>mm</strong> = Minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>ss</strong> = Seconds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CJR</td>
<td>Clears jack-Resynch diagnostics history</td>
</tr>
<tr>
<td>WJR</td>
<td>Displays jack-Resynch diagnostics - There are four types of resynch displayed:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Dynamic</strong> - The dynamic sensors at the top floor detect the jacks to be 3” to 5” out of synch (5” and above forces a car to shut-down).</td>
</tr>
<tr>
<td></td>
<td>• <strong>Static</strong> - The controller cannot “see” at least one of the static sensors when the car is at rest at the first landing.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Timed</strong> - The jack has resynched based on the values of adjustments TIM, O30, and JRT.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Motor</strong> - The jacks have resynched based on the value of the O44 adjustment.</td>
</tr>
</tbody>
</table>

Table 1 - Jack resynch Adjustments and Commands
Maintenance

Jack Sensor Operation

Sensor Requirements per Jack

Two (2) static Magnetic sensors centered on the activating magnets of the heads of the two bottom jack sections when car is level at the bottom landing.

One (1) dynamic Magnetic sensor centered on the activating magnet of the top section head when the car is 12” below the point where the top landing slowdown is activated.

System Operation

Magnetic 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 when the car is stationary at the bottom landing and by one dynamic sensor as the car is running into the top landing just before reaching the top landing slowdown activation point. When a jack section is 3” out of synch as detected by the dynamic sensors, 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 into Twin Post Shutdown Operation (same as Low Oil Operation).

If any section is detected to be out of synch 5” or more at either checkpoint, the car will shut down with a 1068 Fault.

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 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.

Each Visit

NOTE: Before taking the car out of service, notify the proper building personnel, and put “Out of Service” tags at each landing (as required).

1. Visually inspect the cylinder heads for leakage from seals or O-Rings.

2. Inspect for blockage of the drip tube to the drip pan. Empty as necessary (follow EPA rules for disposal of hazardous waste, or consult your supervisor).

3. Check the resynch log with IMS.

Seal / Check Valve Replacement

Recommended Tools:
- Jack straps
- Eye bolts
- Strap wrench
- Chain Hoist
- 5 gallon container
- Small electric pump
- 3 Stage seal tools (Required):
  - 9839350 (850RJ1) Lower Plunger Bullet Seal Tool
  - 9845604 (850RH1) Bullet Seal Tool
  - 9849348 (850RN1) Lower Plunger Seal Tool
  - 9849336 (850RP1) Seal Tool
  - 9844211 (850RM1) Plunger Head Seal Loading Tool
  - 9844119 (850RR1) Plunger Head Seal Loading Tool

NOTE: A Three Stage Seal Tool Kit (Part No. 9773253, Print No. 1105AL3) is available that contains the six seal tools listed above.

Recommended Parts:
- (2) 200AHE14 Seal Kit (See Replacement Parts for a list)
- (4) 886BX1 Check Valve

Preparation

NOTE: See Figure 38 for Telescoping Jack assembly part locations.

1. Unbolt the jack guide roller assemblies and secure them in the jack guide rail as shown in Figure 30 and Figure 31.

2. Run the car to the top landing and secure it, but leave room to access the car top.
3. 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.

**CAUTION!** If this is not done, the jack will fall over when disconnected from the platen.

4. Remove the jack jump bolts.

5. Collapse the plunger assemblies by closing the Down Stop adjustment fully (count and record the number of turns) and opening the manual lowering valve.

6. Remove the Platen/Lifting Bracket from both stiles. See Figure 14.

7. 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 jack 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 middle jack guide assembly. Leave the seal retainer in place.

5. Temporarily, re-assemble the upper jack guide assembly to the middle plunger.

6. Insert the inlet hose from the small electric pump into the lower plunger beside the middle plunger.

7. Place a strap choke under the upper jack guide and lift the middle plunger out of the jack, pumping the oil into the 5 gallon container as the plunger is hoisted. Stand the middle plunger in the pit beside the car.

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

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

9. Using a strap wrench, remove the lower jack guide assembly. Leave the seal retainer in place.

10. Temporarily, re-assemble the middle jack 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 middle jack guide and lift the lower plunger out of the jack, pumping the oil into the 5 gallon container as the plunger is hoisted.

13. Leave the lower plunger suspended.

14. Inspect and, if necessary, repair the surface finish of the lower 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 of the Lower Plunger:
   a. With the lower plunger suspended, remove the seal retainer and bearing strip from the bottom of the lower plunger by removing the $1\frac{1}{2}$" x $1$" Hex Head Cap Screws. See Figure 35.
   b. Remove the external oil seal from the lower plunger base.
   c. Remove the check valve and O-Ring from the check valve bore. See Figure 35.
   d. Install a new O-Ring in the check valve bore, then install a new check valve. See Figure 35.
   e. Install a new external oil seal on the lower plunger base. See Figure 35.
   f. Attach the seal retainer to the lower plunger base with the $1\frac{1}{2}$" x $1$" Hex Head Cap Screws. See Figure 35.
   g. Tighten the Hex Head Cap Screws to 30 ft. lbs.
   h. Install a new bearing strip on the seal retainer. See Figure 35.
Maintenance

AMEE Three Stage Twin Post Telescoping Jack

2. Place the external seal tool over the top of the casing. See Figure 35.
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 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, 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 35.
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.

Middle Plunger

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 Check Valve of the Middle Plunger:
   a. Remove the seal retainer and bearing strip from the bottom of the middle plunger by removing the \( \frac{1}{2} \times 1 \)” Hex Head Cap Screws. See Figure 36.
   b. Remove the external oil seal from the middle plunger base. See Figure 36.
   c. Remove the check valve and O-Ring from the check valve bore. See Figure 36.
   d. Install a new O-Ring in the check valve bore, then install a new check valve. See Figure 36.
   e. Install a new external oil seal on the middle plunger base. See Figure 36.
   f. Attach the seal retainer to the middle plunger base with the \( \frac{1}{2} \times 1 \)” Hex Head Cap Screws. See Figure 36.
   g. Tighten the Hex Head Cap Screws to 30 ft. lbs.
   h. Install a new bearing strip on the seal retainer. See Figure 36.
4. Remove the cover from the jack and place the external seal tool over the top of the lower plunger. See Figure 36.
5. Inspect and, if necessary, repair the surface finish of the middle plunger. Refer to Inspection and Repair of The Plunger Surface Finish.
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, internal oil seal, and the O-Ring.
10. Clean the middle plunger guide parts.
11. Reassemble the middle 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 36.
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.

Upper Plunger

1. Suspend the upper plunger over the jack assembly.
2. Replace the bearing strip. See Figure 37.
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 middle plunger.
5. Disassemble the upper plunger guide and discard the wiper, internal oil seal, and the O-Ring. See Figure 37.
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 37.
8. Install the upper plunger guide on the middle plunger.
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 Platen/Lifting Brackets on each stile.

6. Jog the power unit to run the jacks up to the platen plates.

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

NOTE: If the upper plungers do not extend, continue running the pump. When the bottom plunger hits its stop ring, the increase in pressure will open the valve in the bottom of the middle 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 platens.

8. Install the jack jump bolts.

9. Install the jack guide roller guides. See Figure 30 and Figure 31.

10. If the jack has been clamped to the bottom rail bracket, remove the clamp.

11. With the weight of the car on the jacks, bleed all bleeders on each jack.

12. Resynch the jacks with the buffer springs removed.

13. Install buffer springs.

14. Verify proper operation, then return the car to service.
Assemble the Lower Plunger Guide as shown. Use the Bullet Seal Tool to install the assembly without damage to the oil seal.

- **Internal Seal, Type “D” Wiper**
- **Seal Retaining Ring**
- **Internal Oil Seal 732BH9**
- **Lower Plunger Head**
- **O-Ring 717BB3**
- **Bullet Seal Tool 850RJ1 (This Tool Protects the Internal Oil Seal from Damage by the Sharp Edges of the Lower Plunger)**
- **External Oil Seal Tool 850RN1 (This Tool Protects the External Oil Seal from Damage from the Casing Threads)**
- **Casing**
- **Lower Plunger Base**
- **Lower Plunger Head**
- **Bearing Strip and Seal Retainer**
- **$\frac{1}{2}$” x 1” Hex Head Cap Screws (4)**
- **External Oil Seal 732BJ2**
- **Check Valve**

**Figure 35 - Casing and Lower Plunger Internal and External Oil Seal Installation**
Assemble the Middle Plunger Guide as shown. Use the Bullet Seal Tool to install the assembly without damage to the oil seal.

Internal Oil Seal Tool 850RR1 (This Tool Protects The Internal Oil Seal From Damage From The Middle Plunger Threads.)

Middle Plunger Head

O-Ring 717BB2

Bullet Seal Tool 850RH1 (This Tool Protects The Internal Oil Seal From Damage From The Sharp Edges of The Middle Plunger.)

Middle Plunger

Lower Plunger

Figure 36 - Middle Plunger Internal and External Oil Seals Installation
Assemble the Upper Plunger Guide as shown.

Internal Oil Tool 850RM1 (This Tool Protects The Internal Oil Seal From Damage From The Middle Plunger Threads.)

Figure 37 - Upper Plunger Internal Oil Seal Installation
Troubleshooting

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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper stages of jack will not extend until bottom/middle stage has reached its stop ring.</td>
<td>All of the air has not been bled from the jack.</td>
<td>Extend jacks and bleed.</td>
</tr>
<tr>
<td>Upper stage of jack will not extend until bottom stage has reached its stop ring.</td>
<td>Check valve or lower piston seal leaking.</td>
<td>Replace seal and check valve.</td>
</tr>
<tr>
<td>Vibration in the jack. More noticeable in the up leveling, and the down start from the top landing.</td>
<td>Jack is not installed plumb. Check for metal in bearing strip.</td>
<td>Add 1 quart Caterpillar® Oil Additive (1U-9891) to the jack that is vibrating.</td>
</tr>
<tr>
<td>Frequent need to resynch because of an external oil leak from the upper seals.</td>
<td>Worn seals in guide assemblies.</td>
<td>Replace Seal. See Seal Replacement Procedures.</td>
</tr>
<tr>
<td>Frequent need to resynch because of oil leakage from the upper stage to lower stage. (Internal leak, upper plunger shrinking)</td>
<td>Worn bottom seal.</td>
<td>Replace seal. See Seal Replacement Procedures.</td>
</tr>
<tr>
<td></td>
<td>Check Valve leaking.</td>
<td>Replace Check Valve.</td>
</tr>
</tbody>
</table>

Table 2 - Common Problems and Solutions

IMS Fault Codes

<table>
<thead>
<tr>
<th>CODE</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1068</td>
<td>Dual Post Jack Resync Racking Error. Attempts to re-synchronize the dual-post jack have failed. The jack cylinders are too far out of synchronization to allow resync operation. The elevator shuts down when this fault occurs. • Defective hydraulic system components seeping oil and leading to jack misalignment • Improper wiring • Defective jack position sensors • Defective CPU card</td>
</tr>
<tr>
<td>1120</td>
<td>Left Dynamic Sensor Failure</td>
</tr>
<tr>
<td>1121</td>
<td>Right Dynamic Sensor Failure</td>
</tr>
<tr>
<td>1122</td>
<td>Slowdown occurred before dynamic sensor</td>
</tr>
</tbody>
</table>
Replacement Parts

6501DG_ 2.5 T-III Three Stage Jack
### 6501DG_ 2.5 T-III Three Stage Jack (continued)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART NO.</th>
<th>PRINT NO.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>596DT2</td>
<td></td>
<td>Ring, Guide Shoe, Jack, Upper</td>
</tr>
<tr>
<td>2</td>
<td>596DT1</td>
<td></td>
<td>Ring, Guide Shoe, Jack, Lower</td>
</tr>
<tr>
<td>3</td>
<td>*142CH4</td>
<td></td>
<td>Bearing, Upper Jack Piston</td>
</tr>
<tr>
<td>4</td>
<td>6502AW_</td>
<td></td>
<td>Plunger Assembly, Upper, Telescopic Jack</td>
</tr>
<tr>
<td>5</td>
<td>*732AR1</td>
<td></td>
<td>Wiper Type “AN” 2.5” ID x .125” Thick</td>
</tr>
<tr>
<td>6</td>
<td>732BV1</td>
<td></td>
<td>Ring, Retaining, Seal</td>
</tr>
<tr>
<td>7</td>
<td>9709885</td>
<td>*754H3</td>
<td>O-Ring .125” x 3.375” (ID) x 3.625” (OD)</td>
</tr>
<tr>
<td>8</td>
<td>9846633</td>
<td>*732BH6</td>
<td>Seal, Internal, Oil</td>
</tr>
<tr>
<td>9</td>
<td>142CG4</td>
<td></td>
<td>Bearing, Upper Jack Plunger</td>
</tr>
<tr>
<td>10</td>
<td>454AK2</td>
<td></td>
<td>Guide, Upper Plunger</td>
</tr>
<tr>
<td>11</td>
<td>984050</td>
<td>*717BB1</td>
<td>O-Ring, .125” x 1.625” (ID) x 1.875” (OD)</td>
</tr>
<tr>
<td>12</td>
<td>9846610</td>
<td>*732BJ2</td>
<td>Seal, Internal, Oil</td>
</tr>
<tr>
<td>13</td>
<td>*142CH2</td>
<td></td>
<td>Bearing, Lower Jack Piston</td>
</tr>
<tr>
<td>14</td>
<td>*732AP2</td>
<td></td>
<td>Wiper, Type “D”, 3.75” ID x .375” Thick</td>
</tr>
<tr>
<td>15</td>
<td>732BV2</td>
<td></td>
<td>Ring, Retaining, Seal</td>
</tr>
<tr>
<td>16</td>
<td>9846645</td>
<td>*732BH7</td>
<td>Seal, Internal, Oil</td>
</tr>
<tr>
<td>17</td>
<td>9840461</td>
<td>*717BB2</td>
<td>O-Ring, .125” x 4.625” (ID) x 4.875” (OD)</td>
</tr>
<tr>
<td>18</td>
<td>*717BB3</td>
<td></td>
<td>O-Ring, .125” x 6.75” (ID) x 7” (OD)</td>
</tr>
<tr>
<td>19</td>
<td>*142CG2</td>
<td></td>
<td>Bearing, Lower Jack Plunger</td>
</tr>
<tr>
<td>20</td>
<td>454AJ4</td>
<td></td>
<td>Guide, Middle Plunger</td>
</tr>
<tr>
<td>21</td>
<td>712AA4</td>
<td></td>
<td>Retainer, Bearing Strip</td>
</tr>
<tr>
<td>22</td>
<td>886BX1</td>
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<td>Valve, Check</td>
</tr>
<tr>
<td>23</td>
<td>*732BJ3</td>
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<td>Seal, External, Oil</td>
</tr>
<tr>
<td>24</td>
<td>*142CH5</td>
<td></td>
<td>Bearing, Lower, Piston</td>
</tr>
<tr>
<td>25</td>
<td>712AT1</td>
<td></td>
<td>Retainer, Bearing Strip</td>
</tr>
<tr>
<td>26</td>
<td>6502AT_</td>
<td></td>
<td>Plunger Assembly, Middle, Telescopic Jack</td>
</tr>
<tr>
<td>27</td>
<td>6502AV_</td>
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<td>Plunger Assembly, Lower, Telescopic Jack</td>
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<td>28</td>
<td>*142CG5</td>
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<td>Bearing, Lower Plunger</td>
</tr>
<tr>
<td>29</td>
<td>454EG1</td>
<td></td>
<td>Guide, Lower Plunger</td>
</tr>
<tr>
<td>30</td>
<td>*732AP4</td>
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<td>Wiper, Type “D”, 5.75” ID x .562” Thick</td>
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<tr>
<td>31</td>
<td>732BT1</td>
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<td>Ring, Retaining, Seal</td>
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<td>32</td>
<td>*732BH9</td>
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<td>33</td>
<td>9781365</td>
<td>780136</td>
<td>O-Ring, #006, .250” x .125”, Valve</td>
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<td>34</td>
<td>886BN1</td>
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<td>Valve, Bleeder</td>
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<td>35</td>
<td>6503CA1</td>
<td></td>
<td>Casing Assembly, 3 Stage Jack, Telescopic</td>
</tr>
</tbody>
</table>

* Included in Print No. 200AHE14, Field Replacement Seal Kit.
## Three Stage Jack Common Components

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART NO.</th>
<th>PRINT NO.</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>454EF1</td>
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<td>Guide Assembly, Roller</td>
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<td>2</td>
<td>9819745</td>
<td>454BT1</td>
<td>Roller, 2$5/8$”</td>
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<td>3</td>
<td>736BK1</td>
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<td>Sensor Assembly</td>
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<td>736BE1</td>
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<td>Sensor, Magnetic Proximity</td>
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<td>5</td>
<td>196ANT1</td>
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<td>Sensor Pickup Assembly</td>
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<tr>
<td>6</td>
<td>568AG3</td>
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<td>Magnet Strip, .234” x .438” x 4” (South face has a $1/4$” yellow stripe)</td>
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<tr>
<td>7</td>
<td>802HR2</td>
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<td>Bracket, Support, Jack</td>
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<td>8</td>
<td>196ARH2</td>
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<td>Bracket Assembly, Jack Guide Shoe Mount</td>
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<td>9</td>
<td>760BB1</td>
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<td>Shim, Jack (Not Shown) (Use when Pit Template is not used)</td>
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<td>10</td>
<td>174KG1</td>
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<td>Angle, Mounting, Guide Rail, Jack</td>
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<td>701362</td>
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<td>Washer, WB, 1” U (Not Shown)</td>
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<td>12</td>
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<td>Shim, Buffer, $1/4$” (Not Shown)</td>
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<td>13</td>
<td>760CG1</td>
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<td>Shim, Buffer, $1/8$” (Not Shown)</td>
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