VERTICAL EXPRESS

Installation Manual

Every attempt has been made to ensure that this documentation is as accurate and up-to-date as possible. However, Vertical Express assumes no liability for consequences, directly or indirectly, resulting from any error or omission. The material contained herein is subject to revision. Please report any problems with this manual to Vertical Express, P.O. Box 2019, Memphis, Tennessee 38101.

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SECTION INFORMATION

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Installation Manual

Warning

The following procedures are intended for the use of qualified and authorized personnel only. In the interest of your personal safety and the safety of others, do NOT attempt any procedure that you are not qualified and authorized to perform.

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

All drawings and information herein are the proprietary property of Vertical Express and are loaned subject to return on demand and must not be made public or copied, nor used, directly or indirectly, in any manner detrimental to the interest of Vertical Express.

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Safety Precautions

IMPORTANT!

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

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

Terms in This Manual

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

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

General Safety

CAUTION **Before applying power to the controller, check all relays, contactors, fuse blocks, resistors, terminals on cards, and DIN rail terminals to ensure that the wiring connections installed by manufacturing are tight, because connections loosened during shipment may cause damage or intermittent operation.**

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

Electrical Safety

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

Use the Proper Fuse

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

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

Printed Circuit Cards

Printed circuit boards may be damaged if removed or installed in the circuit while applying power. Before installation and/or removing printed circuit boards, secure all power.

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

Electrical Safety
(continued)

Mainline Disconnect

Unless otherwise directed, always Turn OFF, Lock, and Tag out the mainline disconnect to remove power from elevator equipment. Before proceeding, confirm that the equipment is de-energized with a volt meter.

Test Equipment Safety

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

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

When Power Is On

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

Mechanical Safety

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

Static Protection Guidelines

IMPORTANT!

Read this page before working with electronic circuit boards.

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

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

Handling

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

Static Protection Guidelines

(continued)

Shipping

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

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

Arrival of Equipment

Receiving

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

Storing

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

Section Information

Section numbers (1,2,3) are followed by a dash and a sequential page number. Example: 1-1.

Figures and Tables are identified in sequential order, Table 1, Table 2,...etc.

Before starting any procedure in this manual,

- read each procedure carefully and completely.
- give special attention to all Cautions and Warnings (see *Safety Precautions* for details).
- follow all procedures in the order written.
- make sure that all test equipment, supplies, and parts are on hand. Maintain these in or near the machine room for future use.

All standard safety precautions must be followed on the job site.

Access and Egress Procedures

The Access and Egress Procedures that are used entering the hoistway determine whether or not power is needed to perform the required task(s). If not, Turn OFF, Lock, and Tag out the mainline disconnect.

WARNING **DO NOT stand on the car top emergency access cover, it may not be able to hold total body weight.**

Car Top Safety

Safety precautions when accessing/egressing car tops:

- Prior to opening the hoistway door, ensure that the correct hoistway has been selected and that the car is at the proper floor (to avoid a fall hazard).

  Note: Access car tops from the top terminal landing whenever possible.
- Never access a hoistway, unless a reliable method of controlling the car has been determined.
- Locate the emergency stop switch.
- Before accessing the car top, place the stop switch in the STOP position, and confirm the proper operation.
- Locate a safe refuge area.
- Always maintain control of the hoistways doors during access/egress.
- Fall protection is to be used when a fall hazard exists. The only exception to this is when routine maintenance is being performed on top of complete, operational elevator cars, Do Not use fall protection where there is a greater risk of entanglement.
- When opening hoistway doors from the car top, do so slowly, so that no one steps in from the landing thinking a car has arrived.
- Observe overhead clearances.
- Use extra care when working on car tops that are curved, domed, or located in unenclosed hoistways.
- When egressing the hoistway/car top, ensure that the stop switch is in the STOP position, and that the inspection switch is on Inspection Operation.

WARNING **DO NOT turn these switches to Automatic Operation until the hoistway door interlock is open – and remains open – and the hoistway is empty.**

Access and Egress Procedures
(continued)

Pit Safety

Before entering a pit, ensure that every employee is aware of the hazards. Some common hazards are:

- Recognized refuge space
- Inadequate lighting
- Improper access
- Tripping hazards
- Improper use of pit ladders
- Moisture/water/fluid
- Moving equipment

Before entering a pit, take appropriate steps to minimize the following hazards and any others that are identified:

- Locate the position and counterweights of the car being accessed, as well as any other cars/counterweights in the vicinity.
- Obtain control of the car.
- Identify a refuge space.
- If movement of the elevator is not needed to complete the work being performed, Turn OFF, Lock, and Tag out procedures are required.
- If notified by the building owner or representative that the pit and/or hoistway has been classified as a Permit Required Confined Space (this notification could be verbal or the pit/hoistway may be labeled), contact the appropriate person for authorization. In either case, DO NOT enter the pit/hoistway until you receive authorization.

Safety Precautions when working in pits:

- Before entering the pit, test and verify the door lock circuit and stop switch circuit.
- Ensure that all portable lights and tools are connected through a ground fault (GFCI).
- Take care to protect all lighting from damage.
- DO NOT work in a pit with standing water.
- Before climbing, always examine shoes for fluid/grease.
- Use both hands when working with ladders and when accessing/egressing the pit.
- Be aware of moving equipment (e.g., pump, motors, belts, and sheaves), and ensure that clothing and hands can't get caught in them.
- Avoid smoking, or the use of open flames in the pit.

JACKS

JACKS

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TWIN POST JACKS

Three Stage Twin Post Telescoping Jacks, 2.5-T-III

Reference Information

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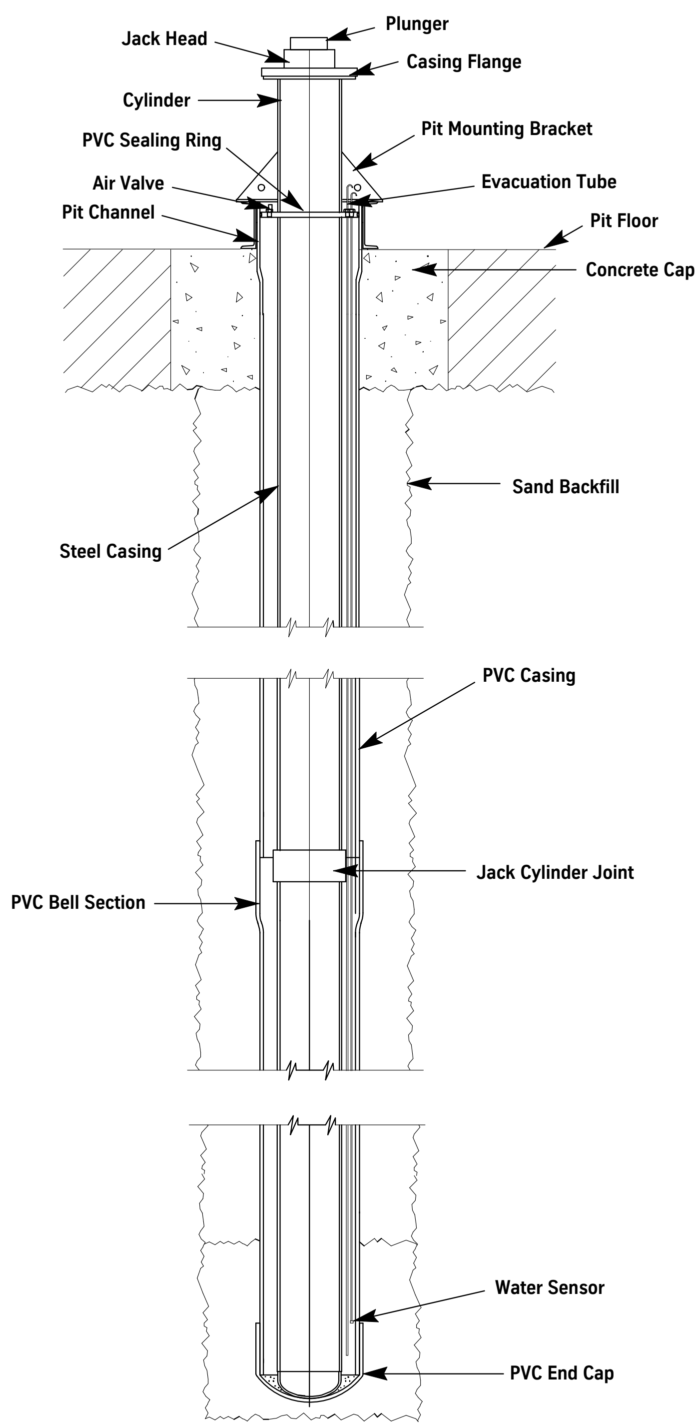
CONVENTIONAL JACKS

Multi-Section Jacks

Overview

Multi-Section Jack with Polyvinyl Chloride (PVC) Pipe

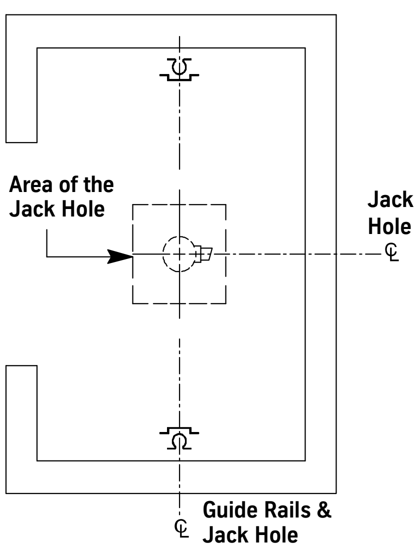


Jack Hole Measurement and Drilling

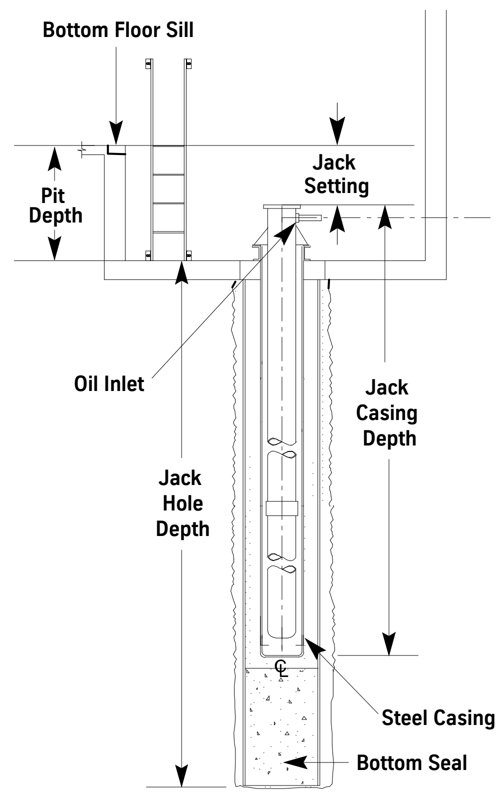
1. Use the job layouts that include a sectional view and a hoistway plan to determine the proper location for the jack assembly. For an example, see Figure 1.
2. Verify that the pit dimensions are correct per the job layout.
3. Measure and mark the exact location for the jack's center lines.
4. Mark the location of the jack hole.
5. Add the following measurements to determine the total minimum depth of the jack hole:
   The complete length of the jack casing + 3 inches + the length of the bottom seal.
6. Verify the jack casing size, including the protection system and coupling, to determine the proper drill size. See Conventional Jack Data, starting on page 1-126.
7. After verifying that the drill size allows ample space for plumbing, set up the drilling rig and begin drilling.

Notes:

- Check that the hole is plumb every ten feet. Make corrections as needed.
- To prevent the hole from caving in, place a steel casing in the hole.



Hoistway Plan Example



Jack Sectional View

Figure 1 - Hoistway Plan and Sectional View

Prepare the Hoistway

1. Compare the center line of the rails and the jack hole to hoistway layout. See Figure 2.

CAUTION **The rails and jack must maintain a common center line. If necessary, relocate (push or pull) the rails. This common center line may be violated only if the platform design has been checked by manufacturing for off-center loading. If there is side-to-side deviation of the placement of the jack between the rails, call manufacturing.**

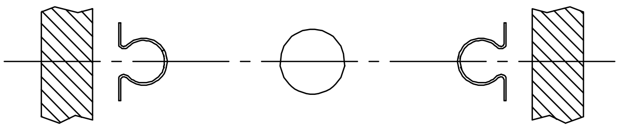


Figure 2 - Rail and Jack Centerline

2. From the top landing, check the travel and plumb of the front walls and floor landings. See Figure 3.

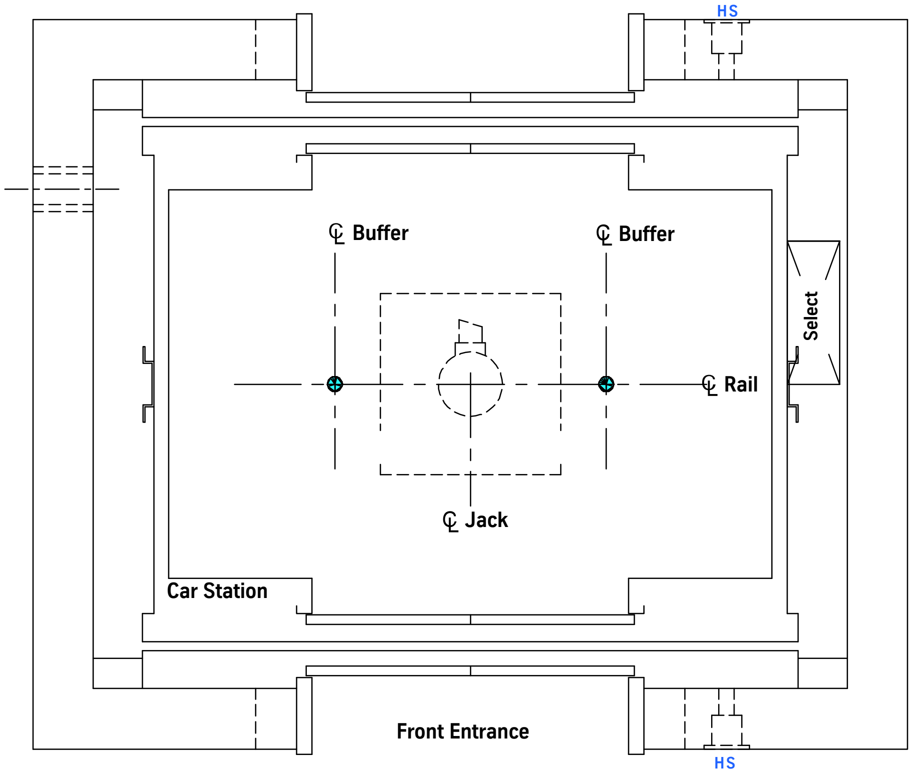


Figure 3 - Example Layout

Installation

Rails & Rail Brackets

1. Mark the center lines for the jack - across the pit floor, and the center line of the rails on the hoistway wall.

Notes:

- The center line is determined from the “corridor line” supplied by the contractor.
- The center line of each rail bracket and the two outer edges of the rail are marked by manufacturing for rail alignment.

2. Install a rail bracket on one wall in the pit.
   a. Mark the wall to show the location of the lowest rail bracket - at a solid anchor point 6” to 8” below the lowest floor on the pit side wall.
   b. Drill the holes for the anchor bolts, or weld the bracket to the beam. See Figure 4.
   c. Loosen the rail clips, and center and tighten the keyhole bracket (alignment tab).
   d. Center and tighten the mounting angles to the wall.
   e. Align and plumb the bracket to the mounting angles (per alignment marks), and lock the bracket to the mounting angles. See Figure 4.
   f. Repeat the above steps to install the second floor bracket.

3. Use a proper method for access, and install remaining rail brackets on current working side.

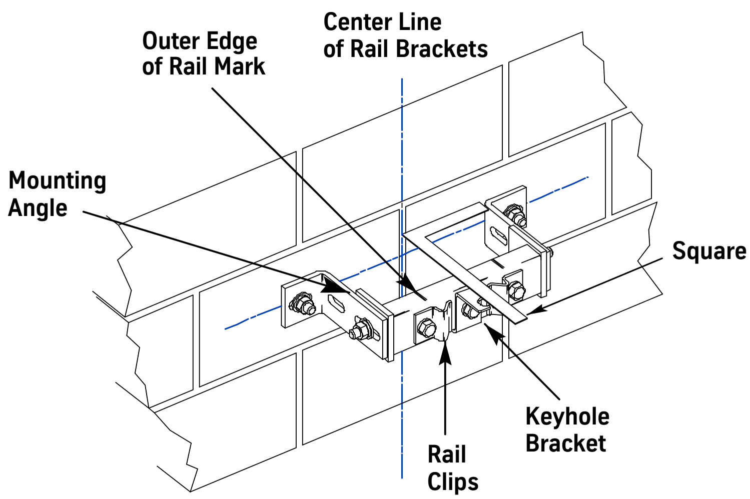


Figure 4 - Rail Bracket Location

Rails & Rail Brackets
(continued)

4. Install the lower rail, and align its outer edges with the marks on the brackets.

Note: The first rail (king rail), must be a 16 foot section. On jobs with extended floor heights (11 feet, 6 inches or greater), place the king rail at the bottom to maintain overhead clearance for hoisting the support beam mounting assembly.

5. Plumb the king rail.
   a. Use magnets to attach plumb lines to the front and side of the upper bracket at the top rail.
   b. Adjust the top of the rail so that the distance between the plumb line and rail is exactly the thickness of the magnets (measured at the top and bottom).
   c. Lock the first rail in place.

6. Mount rail brackets on the opposite wall, and align them to the wall marks.

7. Attach the other rail to its brackets, and plumb, front–to–back.

8. Use a Distance Between Guides (DBG) gauge to adjust the face of this rail to the king rail.

9. Install support beam mounting assembly for hoisting and setting the jack. See Figure 5.

Note: If additional height is needed, install a 4′ to 6′ section of rail on top of the existing rail; then install the support beam mounting assembly.

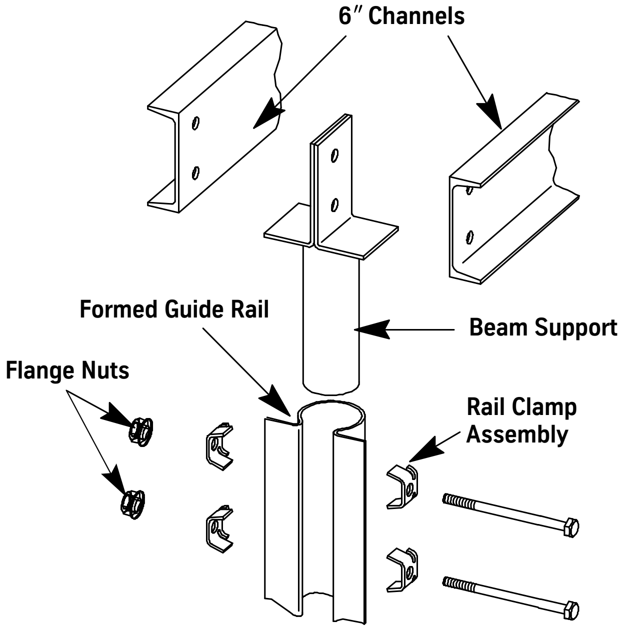


Figure 5 - Support Beam Mounting

Prepare the Jack

Note: To eliminate the chance of possible damage during shipment, the casing flange gasket is not packed in the proper installation sequence and MUST be installed between the guide assembly and jack casing flange. See Figure 6 for proper installation sequence

.

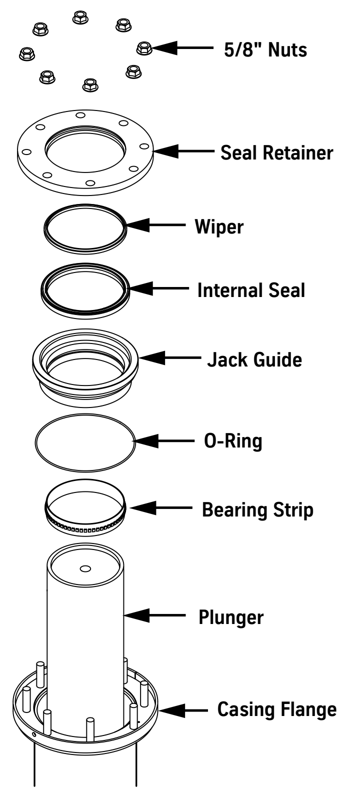


Figure 6 - Guide Assembly Installation Sequence

1. Measure all the casing sections and add the dimensions, making allowances for the joints.

2. Measure all the plunger sections and add their dimensions. The length of the casing and the plunger should be relatively the same.

3. The plunger lengths should be equal to the total travel.

   Total travel = overtravel + floor–to–floor height

Install the PVC Pipe

CAUTION

- When assembling the PVC pipe, the assembly sequence numbers (stamped on casing sections) must be adhered to.
- To avoid damage to the jack casing during multi-section assembly, closely follow the steps in this procedure.

1. Locate the bottom section of the casing, and inspect the inside. Remove any trash.

2. Lower casing into the jack hole, and leave 3′ or 4′ of the casing extended out of the hole.

3. Fasten a clamp with a handle around the outside of the lower section of the casing approximately 2′ from the top. See Figure 7. Be careful not to overtighten as casing can become oval-shaped.

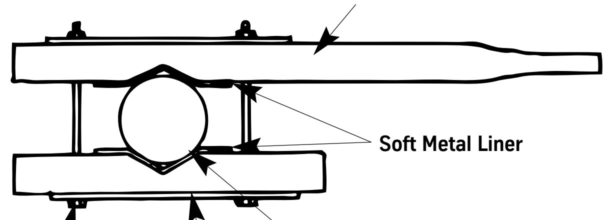


Figure 7 - Casing Clamp

4. Uncover the next section of the casing, and inspect the inside. Remove any trash.

5. Hoist and lower the upper section into position over the lower section until the threaded connections line up.

   a. Fasten a second clamp to the bottom end of the upper section.

   b. Thoroughly clean the male and female threads.

   c. Apply a thin coat of plunger joint lubricant (#9840011 or equivalent) on the male threads.

   d. Align the sections to avoid cross–threading.

6. Screw the two sections together to form a tight joint, and check the straightness of the casing. Use the machined groove on the upper section to verify that the casing is flush with top of the coupling on the lower casing section. See Figure 8 on page 1-8.

Note: If the threads are clean, lubricated, and properly aligned, the sections should easily screw together.

CAUTION

Do not use excessive force to screw the sections together. If resistance is encountered before the sections are completely tightened, unscrew the sections, repair the threads, realign the sections, and reassemble.

Install the PVC Pipe
(continued)

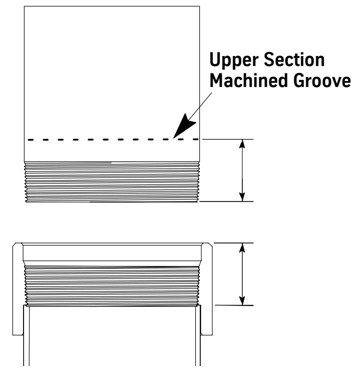
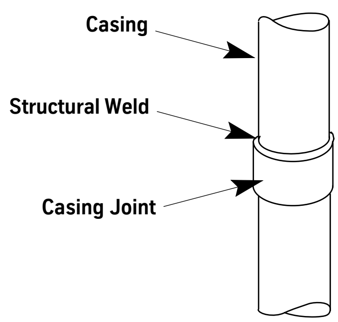


Figure 8 - Machined Groove (available up to 6-S)

7. Weld the casing joint (structural weld). See Figure 9.
   a. Lay 1″ long welds on opposite sides, and 90° to each other.
   b. Lay a bead of required size between welds on opposite sides until a continuous bead is achieved. Go back and forth in 1″ to 2″ segments.
   c. Check again for straightness.

Note: To ensure leak-proof operation and adequate pressure resistance, casings must be welded at all joints.

8. Remove the two clamps from the casing, and lower the casing into the hole.
9. Repeat steps 3 through 8 until all casing sections are assembled in their proper sequence.



The weld must be a structural type, indicated by the symbol.

Jack Size	Weld
ALL	1/4″ See below

- Before welding, be sure the steel is clean. Remove burrs, paint, or coating in the weld area.
- Perform all welding in a well ventilated area. Ref: ANSI Z49.1, safety in welding , cutting, and allied processes.
- Welding shall conform to ASME A17.1/CSA B44 safety code for elevators and escalators, Section 8.8, other governing elevator code, or appropriate local regulatory authority.
- Fillet weld each cylinder joint to ensure leakproof operation and adequate pressure resistance. Ultimate tensile strength for electrode used should be no less than 70,000 psi.
- Base metal for jack cylinders will be ASTM A53, Grade B. Base metal for couplings will be ASTM A53 Grade B, A106 Grade B or A519, Grade 1026.
- Refer to AWS D1.1 for suitable structural mild steel preheat specifications.
- Visual inspection of welds to AWS D1.1 or CSA W59 (whichever is applicable) is recommended before painting or creating obstructions that would prevent the welds from being inspected.

Figure 9 - Structural Welding of Casing Joints

Install the PVC Casing

ASME A17.1 requires that all jacks installed below ground must be protected from corrosion.

Recommended Tools

Hoist	Cable clamp	Wire brush
Portable saw	Safety solvent	Drill motor
Tape measure	Gorilla glue (supplied with jack)	$^3/_8$" drill bit
$^1/_8$" diameter steel cable	Black enamel paint, w/brush	

1. Install and lubricate the o-ring in the PVC flange.
2. Install the evacuation tube.
3. Hoist the assembled and welded jack casing at least one foot clear of the pit floor.
4. Swing the jack casing clear of the hole, and temporarily secure.

Notes:

- For couplings: Glue the coupling to a piece of PVC that does not have a bell end. See Table 1 on page 1-10 for Manufacturer's Gorilla PVC Set and Cure Schedules.
- 14″ PVC and larger will not have bell ends.

5. While clamping below the coupling or bell end, lower a PVC section into the jack hole.

Note: If the jack hole is sufficiently dry, then the PVC cap may be glued in place before lowering the first section into the jack hole.

6. Glue the next section to the previous section per Table 1 on page 1-10, and repeat this process until all sections of PVC are glued together

Note: The top of the PVC sticking out of the jack hole should be a bell end or a coupling.

7. With the PVC clamped below the bell end or coupling, lift and lower the jack assembly into the PVC.The PVC should touch or come within $^1/_2$" of the pit mounting brackets on the jack.
8. Position the clamp assembly (274BX) so that the holes are above the PVC flange by $^3/_8$".
9. Use holes in the clamp assembly as a template, and match drill the PVC for the $^3/_8$" bolts.
10. Assemble the $^3/_8$" bolts and clamp nuts with the nuts on the inside of the PVC. DO NOT OVERTIGHTEN.
11. Glue the PVC cap to the pipe (if not previously installed). See Table 1 on page 1-10.

Note: If water is present in hole, lift the entire assembly clear of the jack hole and dry the bottom of the PVC and jack, and glue the PVC cap to the pipe per the instructions on the PVC glue can.

12. Allow the glue to cure per Table 1 on page 1-10.
13. Lower the entire assembly into the jack hole.
14. Install the water sensor (as required).

Manufacturer's Gorilla PVC Set and Cure Schedules

Note: Due to many variables in the field, these figures should be used as a general guide only.

<table>
<tr><td colspan="5">Average Initial Set Schedule for Gorilla PVC Solvent Cement
Initial Set Schedule is the necessary time to allow before the joint can be carefully handled.</td></tr>
<tr><th>Temperature Range</th><th colspan="2">Pipe Sizes 2-1/2″ to 8″</th><th>Pipe Size
10″ to 15″</th><th>Pipe Size
15″ +</th></tr>
<tr><td>60°- 100° F</td><td colspan="2">38 minutes</td><td>2.5 hours</td><td>5 hours</td></tr>
<tr><td>40°- 60° F</td><td colspan="2">3 hours</td><td>11 hours</td><td>21 hours</td></tr>
<tr><td>0°- 40° F</td><td colspan="2">18 hours</td><td>36 hours</td><td>72 hours</td></tr>
<tr><td colspan="5">Average Joint Cure Schedule for Gorilla PVC Solvent Cement
Joint Cure Schedule is the necessary time to allow before pressurizing the system. In damp or humid weather, allow 50% more cure time. These figures are estimates based on laboratory tests using water. Extended set and cure times are required for chemical applications. Relative humidity 60% or less.</td></tr>
<tr><th rowspan="2">Temperature Range</th><th colspan="2">Pipe Size 2-1/2″ to 8″</th><th>Pipe Size
10″ to 15″</th><th>Pipe Size
15″ +</th></tr>
<tr><th>Up to 160 psi</th><th>Above 160 to 370 psi</th><th>Up to 100 psi</th><th>Up to 100 psi</th></tr>
<tr><td>60°- 100° F</td><td>2 hours</td><td>30 hours</td><td>60 hours</td><td>90 hours</td></tr>
<tr><td>40°- 60° F</td><td>5 hours</td><td>64 hours</td><td>128 hours</td><td>8 days</td></tr>
<tr><td>0°- 40° F</td><td>108 hours</td><td>12 days</td><td>12 days</td><td>21 days</td></tr>
</table>

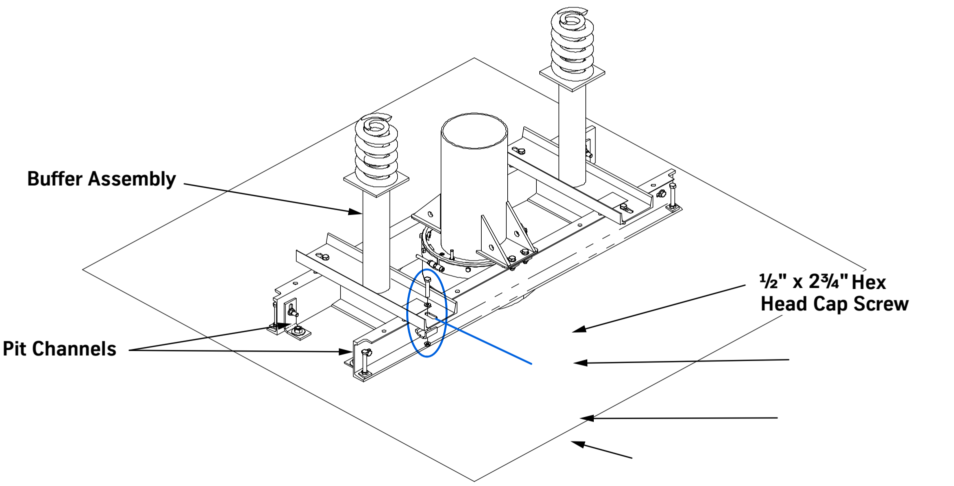
Table 1 - Manufacturer's Gorilla PVC Set and Cure Schedules

Install the Pit Channel and Buffer Stands

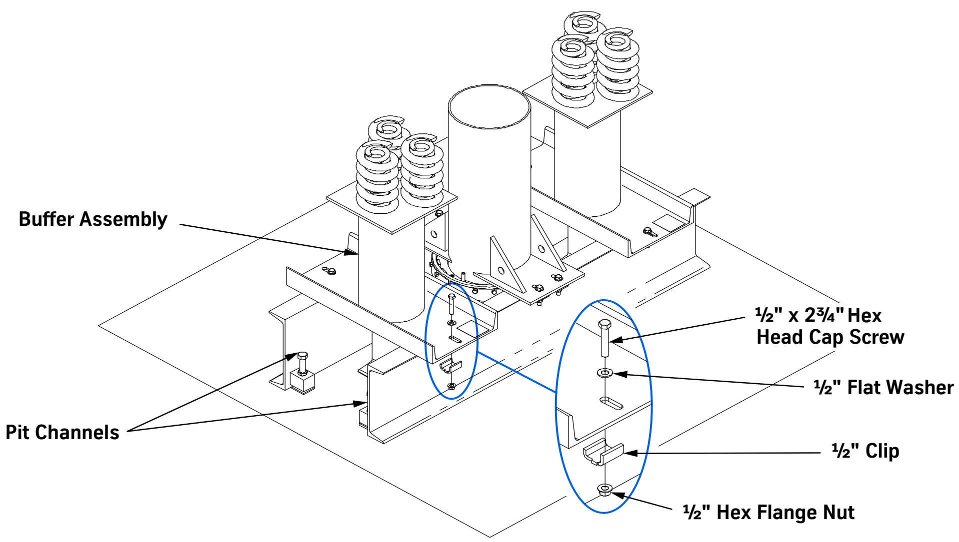
1. Use the supplied leveling brackets and hardware to anchor the pit channels to the pit floor. See Figure 10 on page 1-11.

2. Position buffer stands according to job layout, and attach the stands to the pit channels.

Install the Pit Channel and Buffer Stands
(continued)



Example Buffer Arrangement for 3S - 6S



Example Buffer Arrangement for 6S Oversize - 15S

Figure 10 - Pit Channel with Buffer Stands Installation Examples

Plumb the Jack

Spider Jack Plumb

- An alternate plumbing method is on page 1-13.
- Recommended tool - Plunger Lifting Tool 850PR1 (plunger must be removed).

1. Place a support across the hoistway as far above the jack as possible.
2. Locate the connection (shown as the pulley) directly above the center of the jack. See Figure 11 for all steps in this procedure.

Note: The jack cannot be more than $^1/_2$" off the centerline.

3. Fasten the spider to the plumb line, and hang it from the support.
4. Note the location of the spider.
5. Shift the pulley on the support until the spider falls directly above the casing.

Note: If the pulley is not located correctly, the jack cannot be plumbed properly.

6. Fasten the pulley firmly in place so that it cannot shift.
7. Slowly lower the spider into the casing, and note whether the plumb line moves as the spider descends. See Figure 11.

- When the jack is plumb, the plumb line will be in the center of the top of the jack, and the spider will rotate freely in the bottom of the casing.
- If the plumb line is not at the exact center of the top of the jack, the casing is out of plumb, and must be shifted at the bottom to bring it into plumb. Use shims and jack bolts.
- When the spider is at the bottom of the casing, the plumb line must be at the exact center of the top of the jack.
- If the top of the jack is moved, the pulley must be relocated.

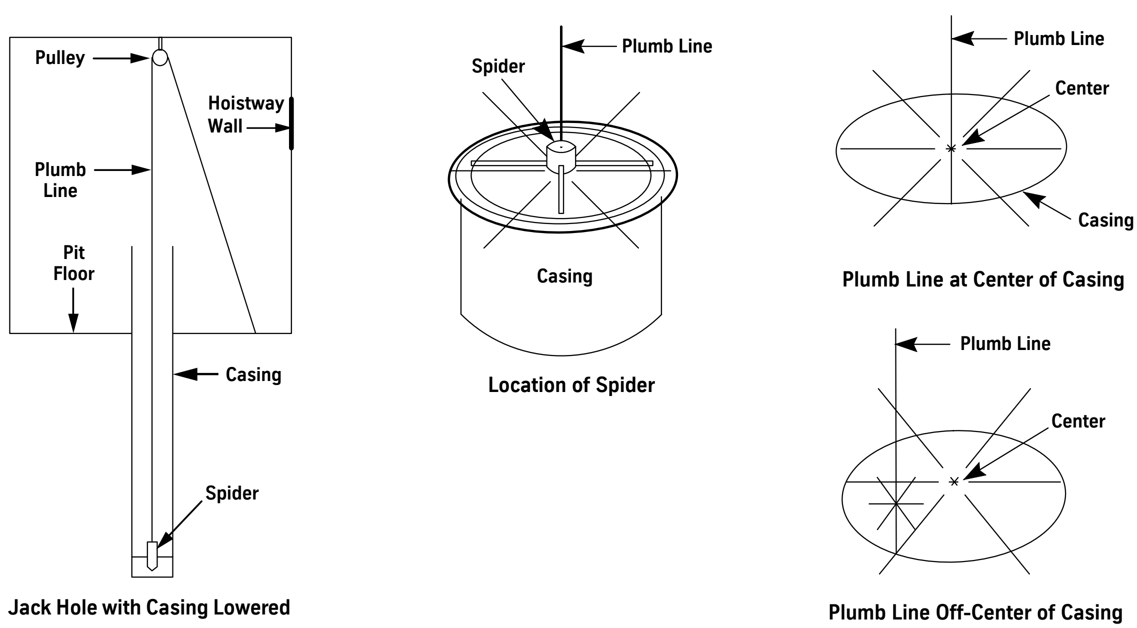


Figure 11 - Spider Jack Plumbing Method

Plumb the Jack

(continued)

Alternate Jack Pluming Method
(for multi-section large diameter jack casings)

1. Mount two guide lines 6″ from spider line to form a right angle. See Figure 12.

2. Lower the spider into the casing until it reaches the bottom.

Note: As the spider is lowered, watch for bends or curves in the casing.

3. Move the bottom of the casing until the spider line measures exactly 6″ from each of the plumb guide lines.

CAUTION **If unable to shift the casing bottom and the board has to be moved off-center, call Manufacturing to have the platform design checked for off-center loading. The casing may have to be pulled out of the hole and reinserted to obtain a closer center.**

4. Move the top of the casing until spider line falls in the exact center of the casing.

Note: When the casing is plumb, the spider line will be exactly 6″ from both guide lines and at the exact center of the top of the casing.

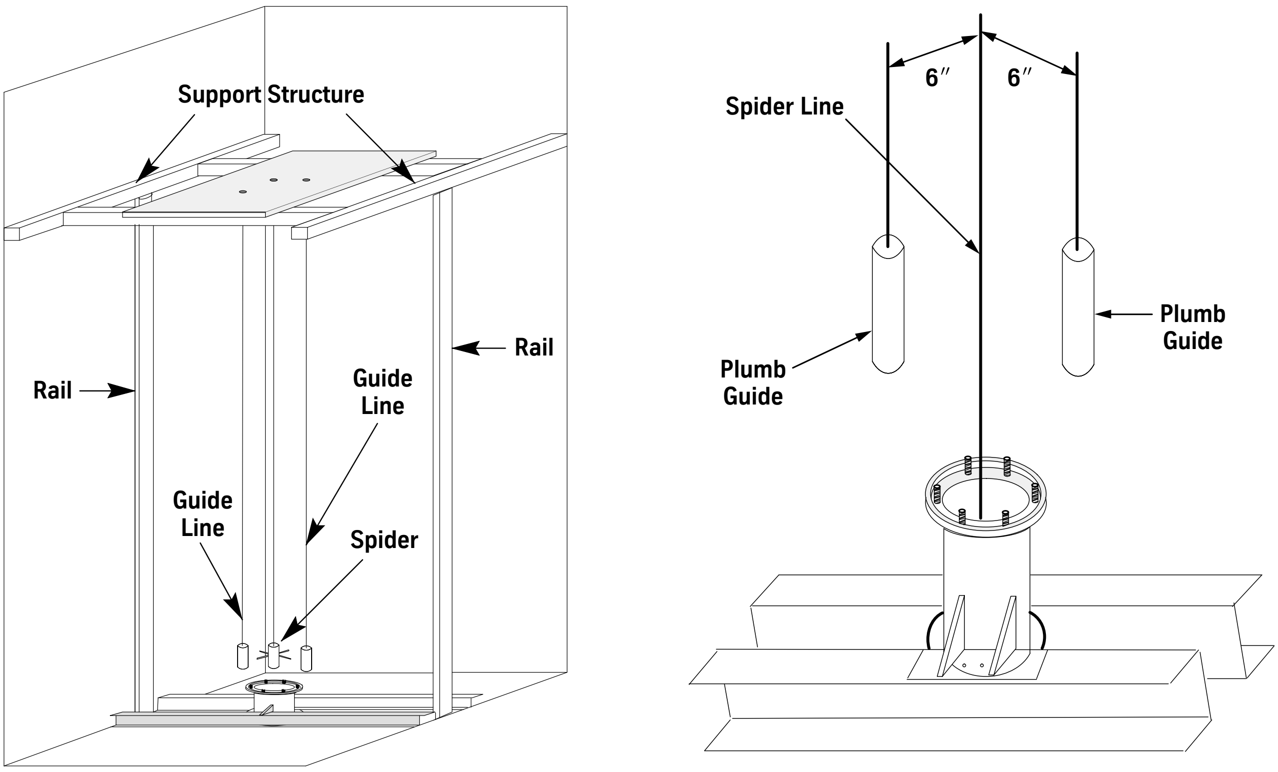


Figure 12 - Alternate Jack Plumbing Method

Backfill the Hole

1. Use sand or a similar non-corrosive material to fill the hole carefully and evenly about three feet above the bottom of the casing.

Note: To avoid pushing the casing out of plumb, slowly add the material in small portions around the casing.

2. Check the plumb line to ensure that the casing did not move.
3. If the casing moves out of plumb, "jet" the jack assembly and adjust as needed to attain the plumb line.
4. Install support material around the top of the jack casing, and seal hole with concrete.
5. Tighten the tie–down bolts on the pit channels.
6. After the jack is plumb, shim and/or grout the pit channels between the channel and the floor at the edge of the jack hole.

Install the Plunger

1. Unwrap the lower section of the plunger.
2. Lower the plunger section into the casing until 2 or 3 feet of the plunger is extended above the casing flange.
3. Secure a jack clamp to the plunger section 2 or 3 feet below the threaded connection, and lower this section until the clamp rests on the casing flange. See Figure 13.
4. Clean the plunger threads of any foreign material.
5. Unwrap the next section, and check that the identifying numbers match.
6. Hoist and lower this section directly over the first section, and install a second jack clamp 2 to 3 feet above the threads.
7. Lubricate the o-ring with oil, pass it over the plunger threads, and mount the o-ring in the o-ring groove. See Figure 14 on page 1-15.

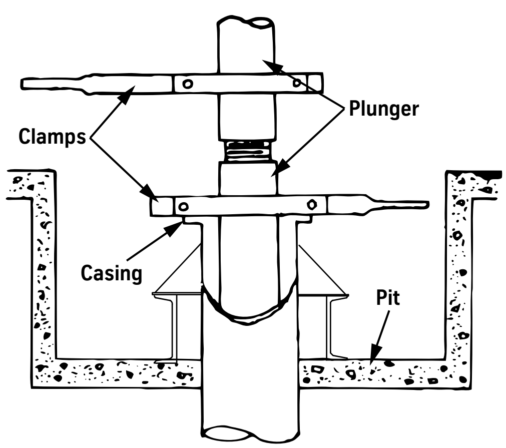
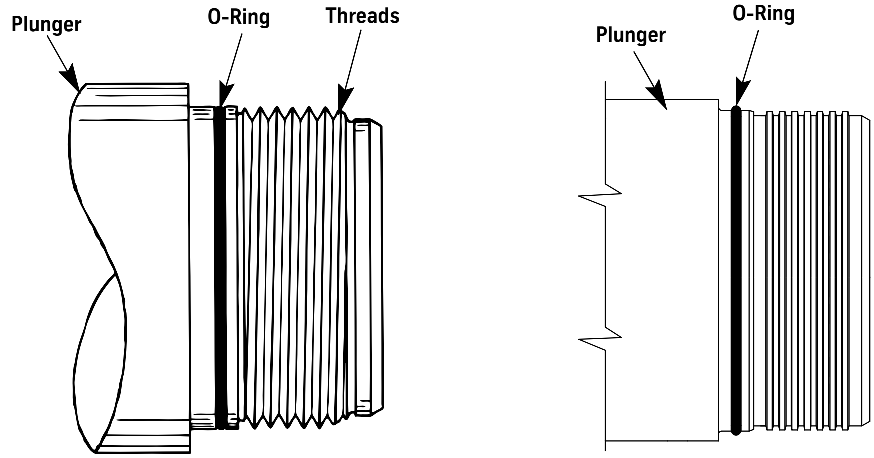


Figure 13 - Jack Clamp

Install the Plunger
(continued)



Plunger with V-Threads

Plunger with Spirolok Threads

Figure 14 - O-Ring on Plunger Threads

8. Thoroughly clean the male and female threads, and apply a thin coat of plunger joint lubricant (#9840011 or equivalent) on the male threads.

9. Align the sections to avoid cross–threading.

CAUTION **Do not use excessive force to screw the sections together. If resistance is encountered before the sections are completely tightened, unscrew the sections, repair the threads, realign the sections, and reassemble.**

10. With the threads properly engaged, screw the two sections of the plunger firmly together until the two blue alignment marks (one on either side of the joint) are opposite each other.

Notes:

- If the threads are clean, lubricated, and properly aligned, the sections should easily screw together.
- The two blue alignment marks are placed on the plunger during manufacturing, and will pass each other slightly due to “thread stretch.”

11. Inspect the pipe for any burrs at the joint. If any are found, use very fine emery paper to smooth them.

12. Repeat steps 6 through 12 until all sections of the plunger are assembled.

13. Lower the assembled plunger into the casing.

Notes:

- Sometimes a travel limiting ring is provided, which fits at the joint of a multi–section plunger.
- When a travel limiting sleeve is provided, slip it over the plunger after the casing is filled with oil with longest section last. Let it come to rest on the stop ring.

Install the Guide Assembly and Casing Flange Gasket

1. Dip the casing flange gasket in oil. Place it over the end of the plunger and down into the groove in the jack casing flange.

Notes:

- Position the casing flange gasket between the guide assembly and casing flange in the casing flange groove. See Figure 15.
- When installing the guide assembly take care not to dislodge, pinch, or cut the casing flange gasket.

2. Place the guide assembly over the plunger, and line up the studs on the casing flange with the holes in the guide assembly flange.

3. Install nuts and washers, and tighten as necessary.

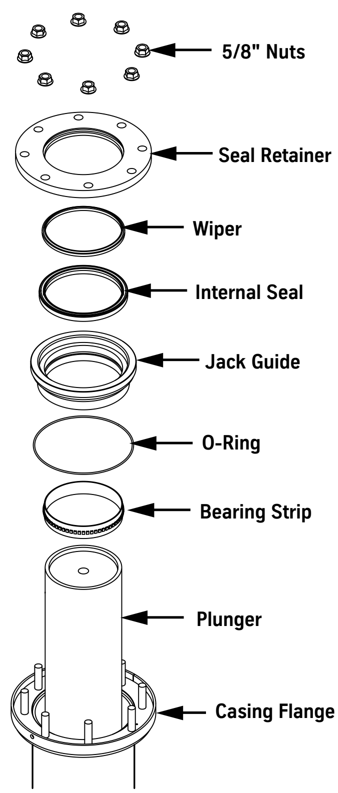


Figure 15 - Guide Assembly Sequence

Install the Seal

1. Use a premium grade paraffin based oil to lubricate the seal and the exposed surface of the plunger.
2. Place the seal on top of the plunger. Make sure the lip of the seal faces down toward the pressure side. See Figure 16.
3. Carefully position the seal to evenly slide down the plunger.

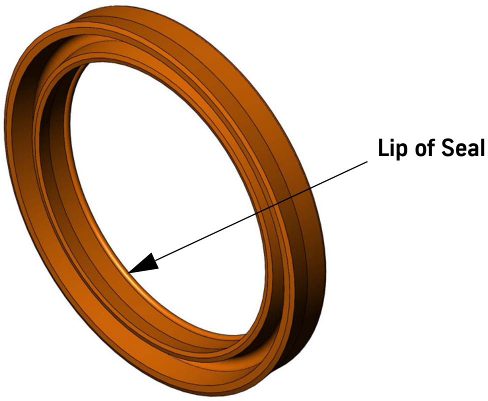


Figure 16 - Seal Orientation

4. Work the seal evenly down the plunger until it bottoms in the stuffing box.
5. Check that the seal is bottomed evenly, all the way around the plunger.
   a. Install the seal retainer with the wiper (if applicable).
   b. For the 3-S jack: install the retainer ring.
   c. For the 4-S jack or higher:
      - Install and finger-tighten the retainer nuts.
      - Tighten the nuts in even rotation until the seal retainer seats against the guide assembly flange.

Note: When properly installed, there will be no gap or clearance between the seal retainer flange and the guide assembly flange.

Install the Overspeed Valve

1. Install the overspeed valve within 12″ of the jack. See Figure 17 for proper orientation of the valve.

2. Turn the adjustment screw out (counter–clockwise) to ensure that the valve does not set during construction and adjustment of the control valve.

CAUTION **This valve is directional. The jack must be connected to the outlet designated as “JACK.”**

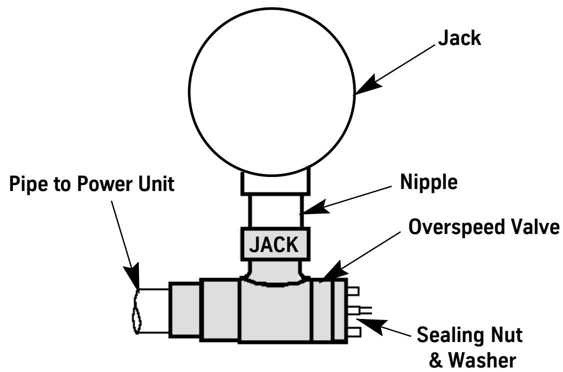


Figure 17 - 2" Overspeed Valve (90° shown, in line available)

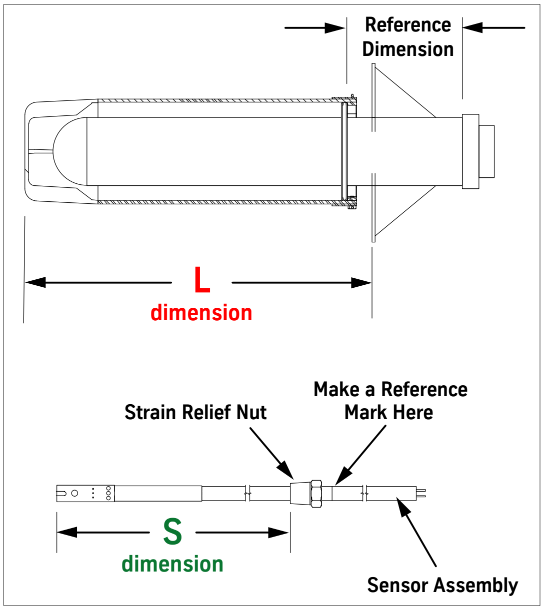
3. Complete the oil line piping from the overspeed valve to the shutoff valve.

4. Install piping from the shutoff valve to the power unit.

5. Install the appropriate pipe stands to support the oil line.

MULTI- SECTION JACKS

Install the Jack Sensor



When Overall Jack Length is Known

1. Remove the $^1/_4$" - 28 manufacturing plug installed in the metal ring at the top of the jack casing.

Note: During installation, keep the sensor as clean as possible.

2. Measure for wire length.
   a. Measure the L dimension on the jack. See the diagram.
   b. Adjust the strain relief nut so that S = L – 4 inches.
   c. Make a reference mark as shown.
   d. Tighten the strain relief nut on the sensor lead.
   e. Install the sensor through the $^1/_4$"- 28 opening in the top of the jack casing.

When Overall Jack Length is Not Known

1. Remove the $^1/_4$" - 28 manufacturing plug installed in the metal ring at the top of the jack casing.

Note: During installation, keep the sensor as clean as possible.

2. Measure for wire length.
   a. Find the total travel dimension on the job layout drawings.
   b. Measure the reference dimension. See the diagram.
   c. Adjust the S dimension = Total travel - Reference dimension + 7 inches.

Note: This initial setting should be within ± 6" of the final adjustment.

   d. Make a reference mark as shown.
   e. Hand-tighten the strain relief nut on the sensor lead.
   f. Install the sensor, and find out if the cable goes slack.
      - If the cable goes slack:
        Pull up until the cable is taut, then pull up an additional $2^1/_2$". Slide the strain relief down to the bulkhead, and tighten the strain relief nut on the cable.
      - If the cable does not go slack:
        Let the sensor down until the cable goes slack. Pull up until the cable is taut, then pull up an additional $2^1/_2$". Slide the strain relief down to the bulkhead, and tighten the strain relief nut on the cable.

Install the Jack to the Platen Connection

1. Connect the plunger to the platen, and prepare the elevator for service.
   a. Use the supplied hardware to clip the platen plate to the bolster channels.Do not fully tighten the hardware so that the platen can be moved.
   b. Position the platform close to the bottom landing.
   c. Manually activate the power unit to slowly push the plunger up against the platen plate.
   d. Install the jump bolt through the platen plate, and tighten in the jack.
   e. Align the platen (as necessary), and tighten the platen clips to the bolster channels. See Figure 18.
   f. Move the car up, and remove all material that was used to support the car.
   g. Check for clear access of the entire hoistway.
2. Verify that the oil is at the proper level in the power unit, and bleed all air out of the jack.
3. Run the car up and down several times. Check that the plunger does not rub the casing at any point in the hoistway.

Note: If necessary to prevent the plunger from rubbing on the casing, slightly move the platen.

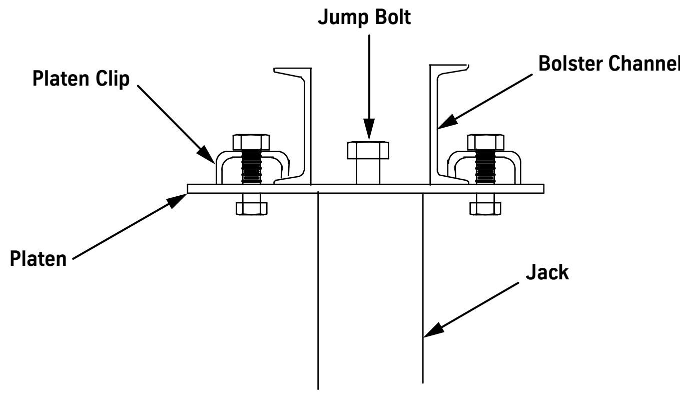


Figure 18 - Jump Bolt through Platen Plate

Control Valve Adjustment
Overspeed Valve Adjustment

When the job is complete and all cab weight is final, perform the final control valve adjustment. See the appropriate component manual for details.

Install the Support Pipes

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

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

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

5. If the clearances are satisfactory, locate and install the provided anchor bolts. See Figure 19 for dimensions.
6. Place each bracket over a bolt, and tighten the bolt.
7. Place the support pipes on the brackets.

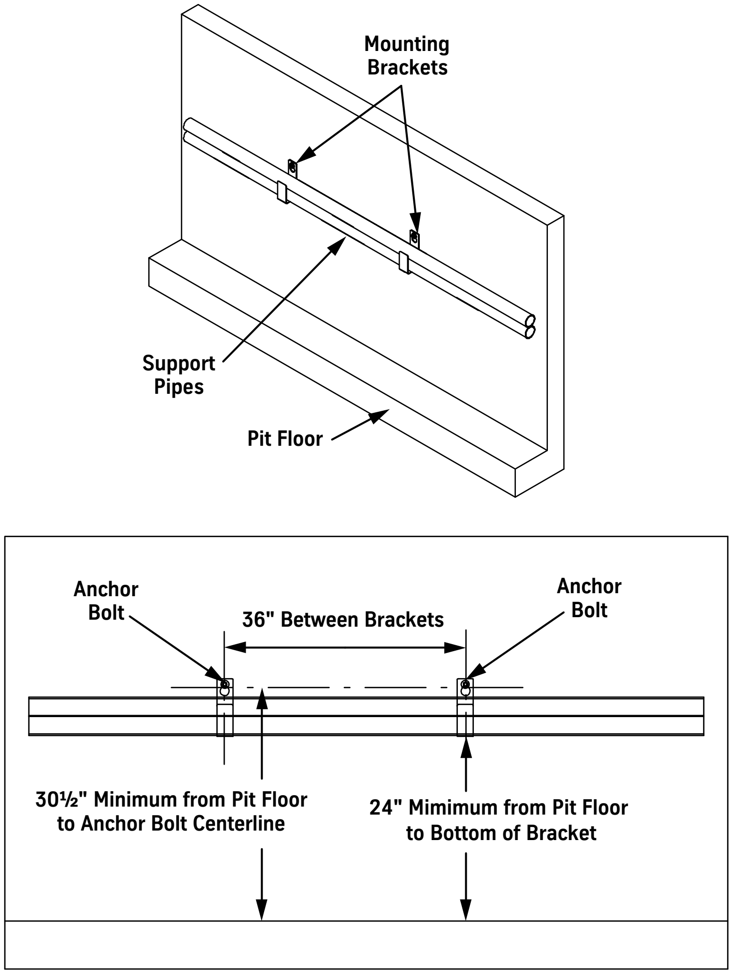


Figure 19 - Support Pipe Mounting Bracket Kit

Maintenance

Seal Replacement

1. Before replacing the seal, check the entire length of the plunger for scratches and nicks, and polish out all scratches with a fine emery cloth.
2. Place two pipes (approximately 5 ft. in length) over the formed spring guides on the buffer stands.
3. Use Inspection Operation to carefully lower the car down on the pipe stands.
4. Turn OFF, Lock, and Tag out the mainline disconnect.
5. Mark the exact location of the platen plate on the bolster.
6. Loosen the bolts holding the platen to the bolster channels.
7. Move the clips out of the way.
8. Open the manual lowering valve to lower the plunger completely.
9. Remove the 1” bolt and platen from the top of the plunger.
10. Close the shut off valve.
11. Use two flat blade screwdrivers to remove the spiral snap ring.
12. Screw two #10-24 screws into the tapped holes in the seal retainer.
13. Use two pairs of pliers to pull the retainer from the recess.
14. Screw the packing removal tools or two drywall screws into the seal.
15. Without scratching the plunger or seal recess in the guide, pull the seal from the recess.
16. Use clean rags to remove all oil from the seal recess. A new seal will not properly seat in a recess containing oil.
17. Check the seal recess for any scratches which can cut the seal; polish out any scratches or replace the guide.

Install New Seal

See Install the Seal on page 1-17.

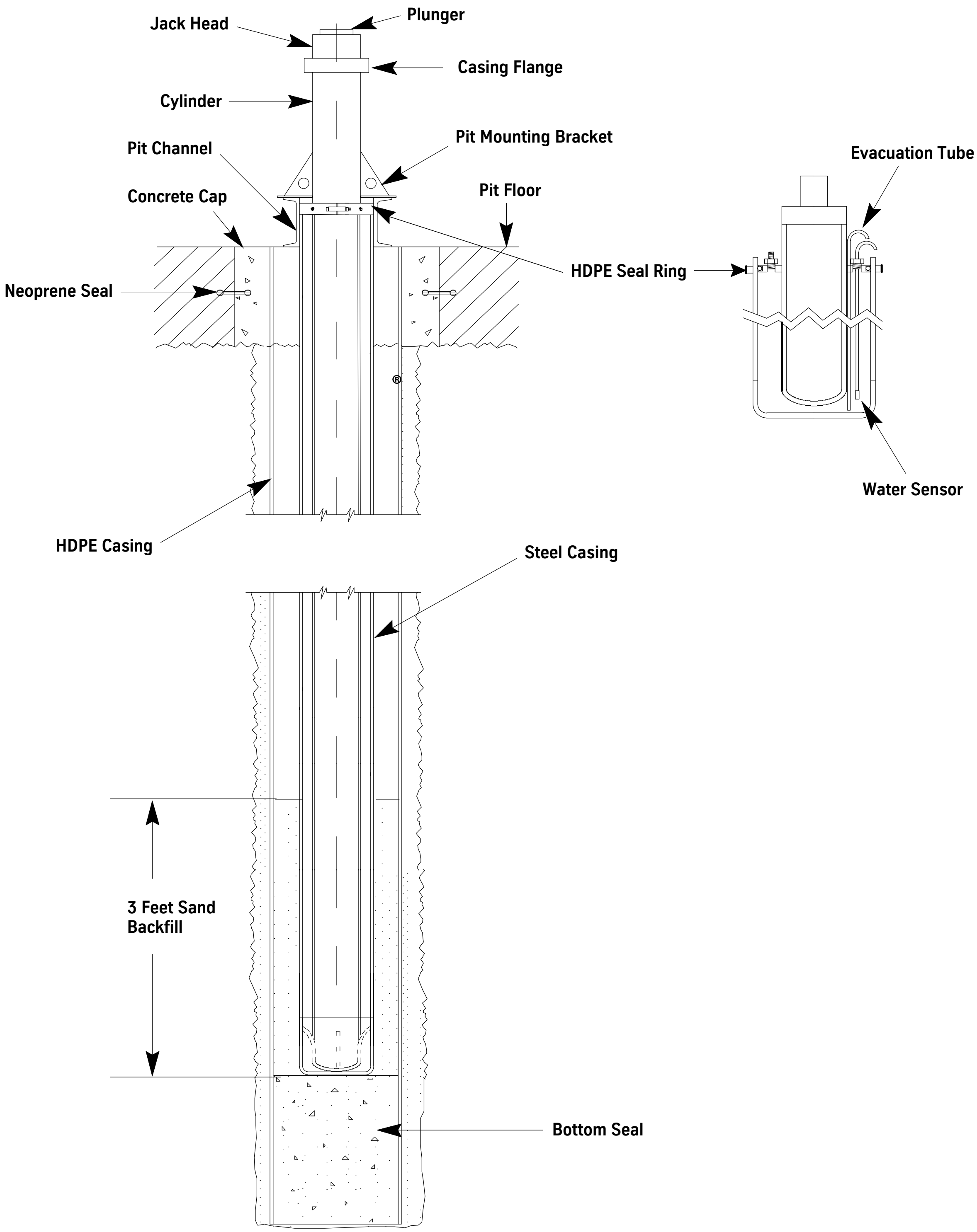
Replacement Parts

Replacement Parts begin on page 1-39.

CONVENTIONAL JACKS

Single Section Jacks
Overview

Single Section Jack with High Density Polyethylene (HDPE) Pipe

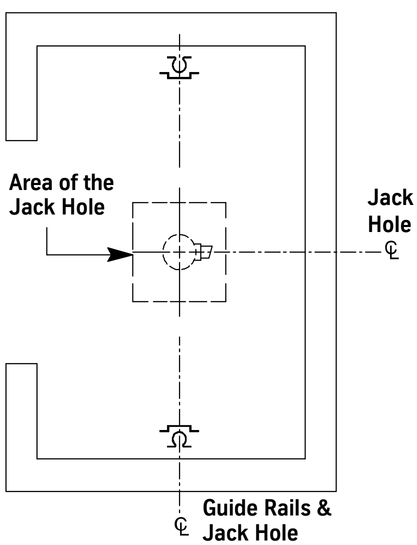


Jack Hole Measurement and Drilling

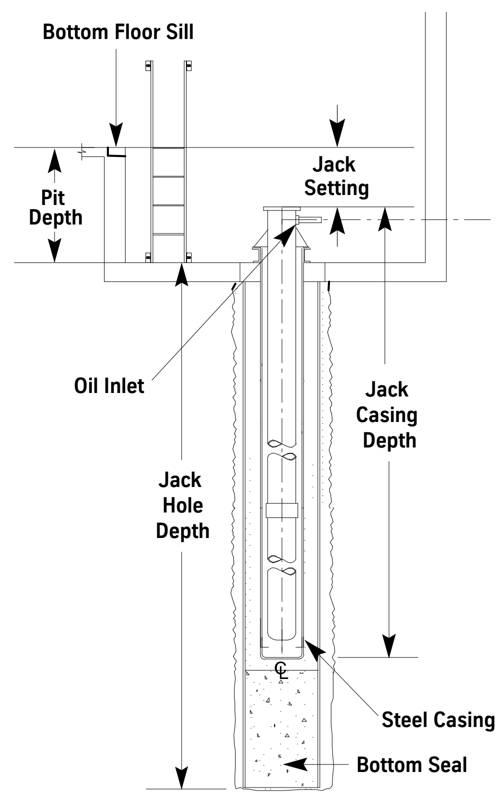
1. Use the job layouts that include a sectional view and a hoistway plan to determine the proper location for the jack assembly. For an example, see Figure 20.
2. Verify that the pit dimensions are correct per the job layout.
3. Measure and mark the exact location for the jack's center lines.
4. Mark the location of the jack hole.
5. Add the following measurements to determine the total minimum depth of the jack hole:
   The complete length of the jack casing + 3 inches + the length of the bottom seal.
6. Verify the jack casing size, including the protection system and coupling, to determine the proper drill size. See Conventional Jack Data, starting on page 1-126.
7. After verifying that the drill size allows ample space for plumbing, set up the drilling rig and begin drilling.

Notes:

- Check that the hole is plumb every ten feet. Make corrections as needed.
- To prevent the hole from caving in, place a steel casing in the hole.



Hoistway Plan Example



Jack Sectional View

Figure 20 - Hoistway Plan and Sectional View

Prepare the Hoistway

1. Compare the center line of the rails and the jack hole to hoistway layout. See Figure 21.

CAUTION **The rails and jack must maintain a common center line. If necessary, relocate (push or pull) the rails. This common center line may be violated only if the platform design has been checked by manufacturing for off-center loading. If there is side-to-side deviation of the placement of the jack between the rails, call manufacturing.**

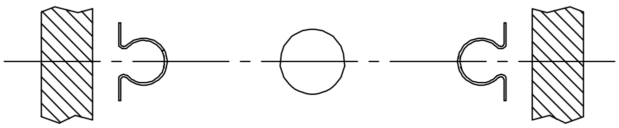


Figure 21 - Rail and Jack Centerline

2. From the top landing, check the travel and plumb of the front walls and floor landings. See Figure 22.

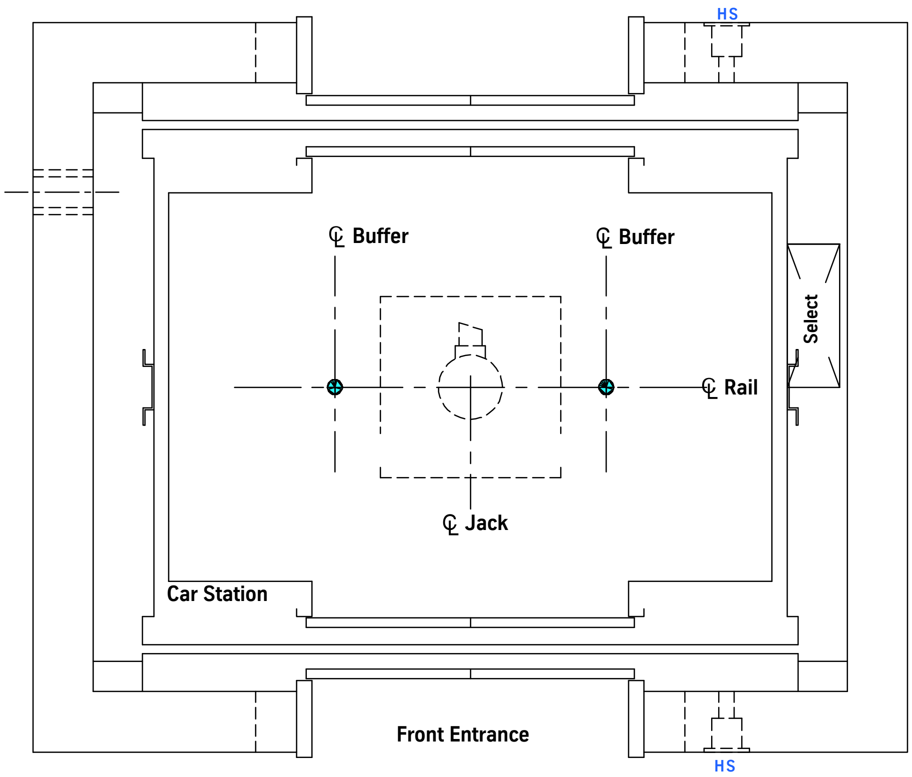


Figure 22 - Example Layout

Installation

Rails & Rail Brackets

1. Mark the center lines for the jack - across the pit floor, and the center line of the rails on the hoistway wall.

Notes:
- The center line is determined from the “corridor line” supplied by the contractor.
- The center line of each rail bracket and the two outer edges of the rail are marked by manufacturing for rail alignment.

2. Install a rail bracket on one wall in the pit.
   a. Mark the wall to show the location of the lowest rail bracket - at a solid anchor point 6” to 8” below the lowest floor on the pit side wall.
   b. Drill the holes for the anchor bolts, or weld the bracket to the beam. See Figure 23.
   c. Loosen the rail clips, and center and tighten the keyhole bracket (alignment tab).
   d. Center and tighten the mounting angles to the wall.
   e. Align and plumb the bracket to the mounting angles (per alignment marks), and lock the bracket to the mounting angles. See Figure 23.
   f. Repeat the above steps to install the second floor bracket.
3. Use a proper method for access, and install the remaining rail brackets on the current working side.

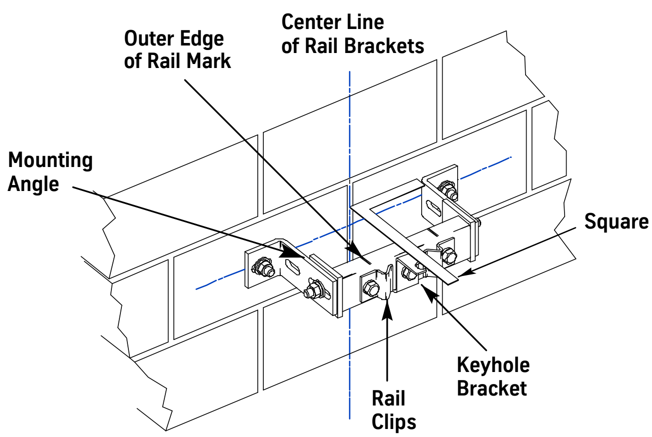


Figure 23 - Rail Bracket Location

4. Install the lower rail, and align its outer edges with the marks on the brackets.

Note: The first rail (king rail), must be a 16 foot section. On jobs with extended floor heights (11 feet, 6 inches or greater), place the king rail at the bottom to maintain overhead clearance for hoisting the support beam mounting assembly.

5. Plumb the king rail.
   a. Use magnets to attach plumb lines to front and side of the upper bracket at the top rail.
   b. Adjust the top of the rail so that the distance between the plumb line and rail is exactly the thickness of the magnets (measured at the top and bottom).
   c. Lock the first rail in place.

Rails & Rail Brackets

(continued)

6. Mount rail brackets on the opposite wall, and align them to the wall marks.

7. Attach the other rail to its brackets, and plumb, front–to–back.

8. Use a Distance Between Guides (DBG) gauge to adjust the face of this rail to the king rail.

9. Install the support beam mounting assembly for hoisting and setting the jack. See Figure 24.

Note: If additional height is needed, install a 4′ to 6′ section of rail on top of the existing rail; then install the support beam mounting assembly.

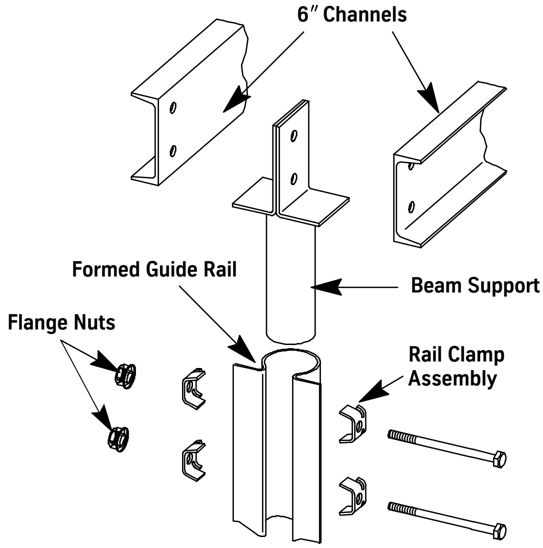


Figure 24 - Support Beam Mounting

Prepare the Jack

CAUTION **If the jack assembly is to be installed and left for some time prior to the completion of the elevator, the casing MUST be filled with oil to prevent rust.**

1. Remove the shipping strap that holds the plunger in the casing, and pull the plunger out to the full extent of its travel.

Note: Take care not to damage the plunger finish.

2. Inspect the exposed plunger for any possible shipping damage or corrosion that would pass through the seal during inspection. If so, contact manufacturing.

3. Measure the length of the exposed plunger, which should be equal to the total travel.

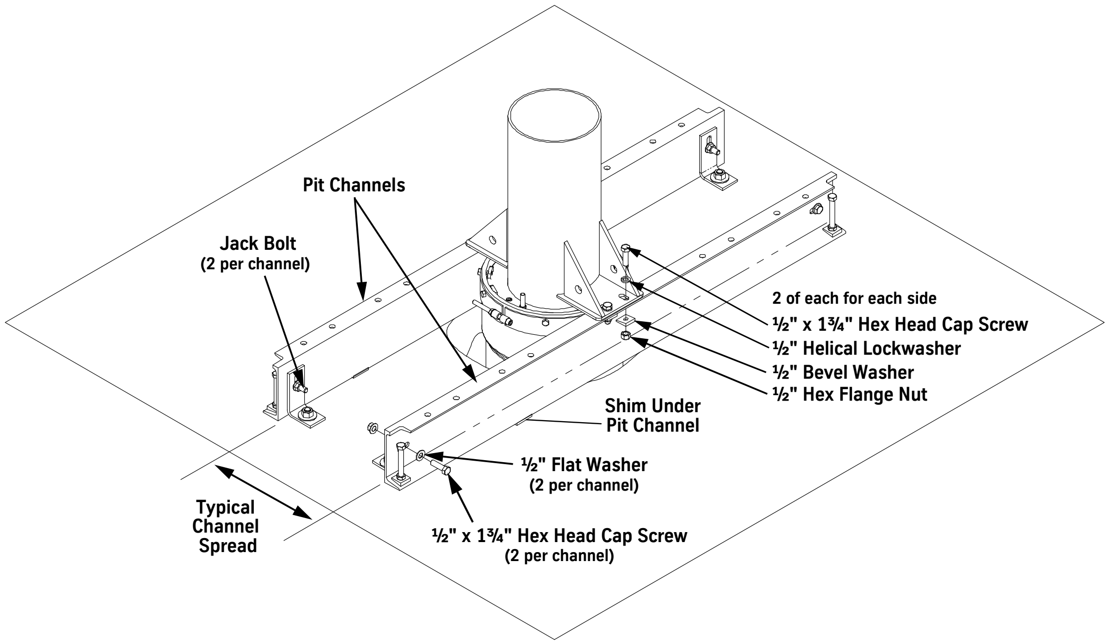
   Total travel = overtravel + floor–to–floor height

Note: If the exposed plunger measures noticeably less than the total travel, measure the length of the jack casing and compare it with the exposed plunger length. In some cases, plunger protection has been added during manufacturing—a metal tag is attached to the casing. Before installation, remove the plunger protection.

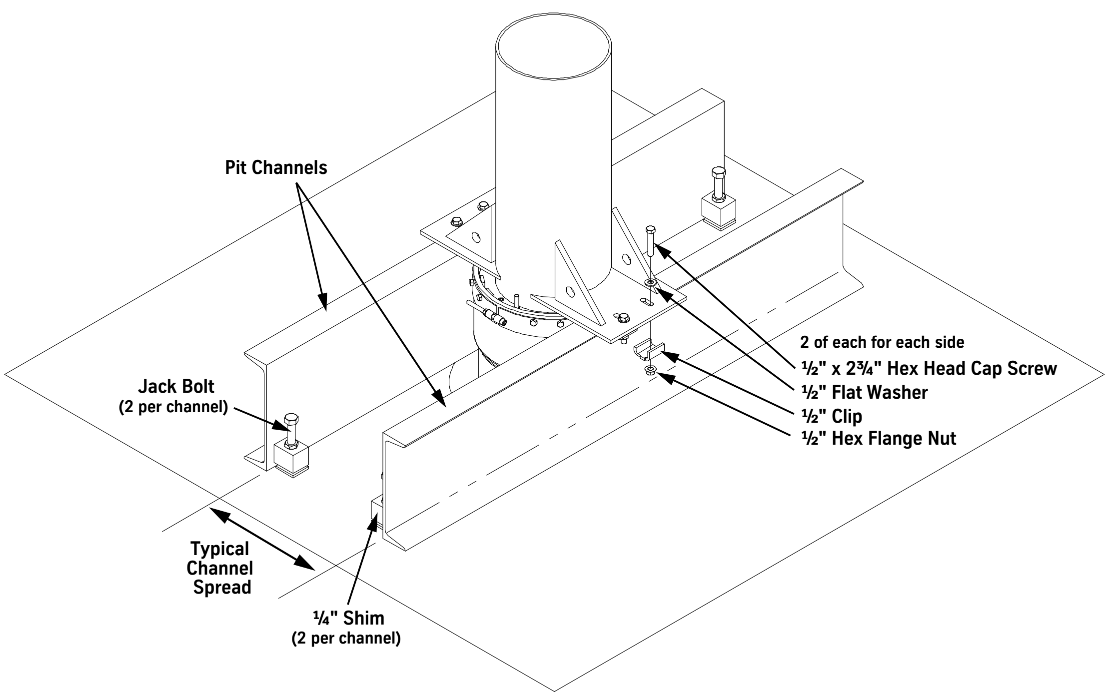
4. Push the plunger back into the jack casing.

Install the Jack

1. Use a clevis and safety hook with latch to hoist and lower the jack into place.
2. Bolt the pit channels firmly against the clamp ring of the HDPE jack covering. See Figure 25.



Installation Arrangement for 3S – 6S Jacks



Installation Arrangement for 6S Oversize – 15S Jacks

Figure 25 - Pit Channel Installation

Plumb the Jack

1. Install and plumb the first rails and brackets.
2. Center the piston and pit steel to the center of the rails, and fasten to the pit floor.
3. Pull the centering line cable out $^{1}/_{8}$". See Figure 26.
4. String a wire across the top of the first set of rails, and attach the centering line at the center point of the rails.
5. Move the jack with the jack bolts until centering line is in center of the platen plate bolt hole.

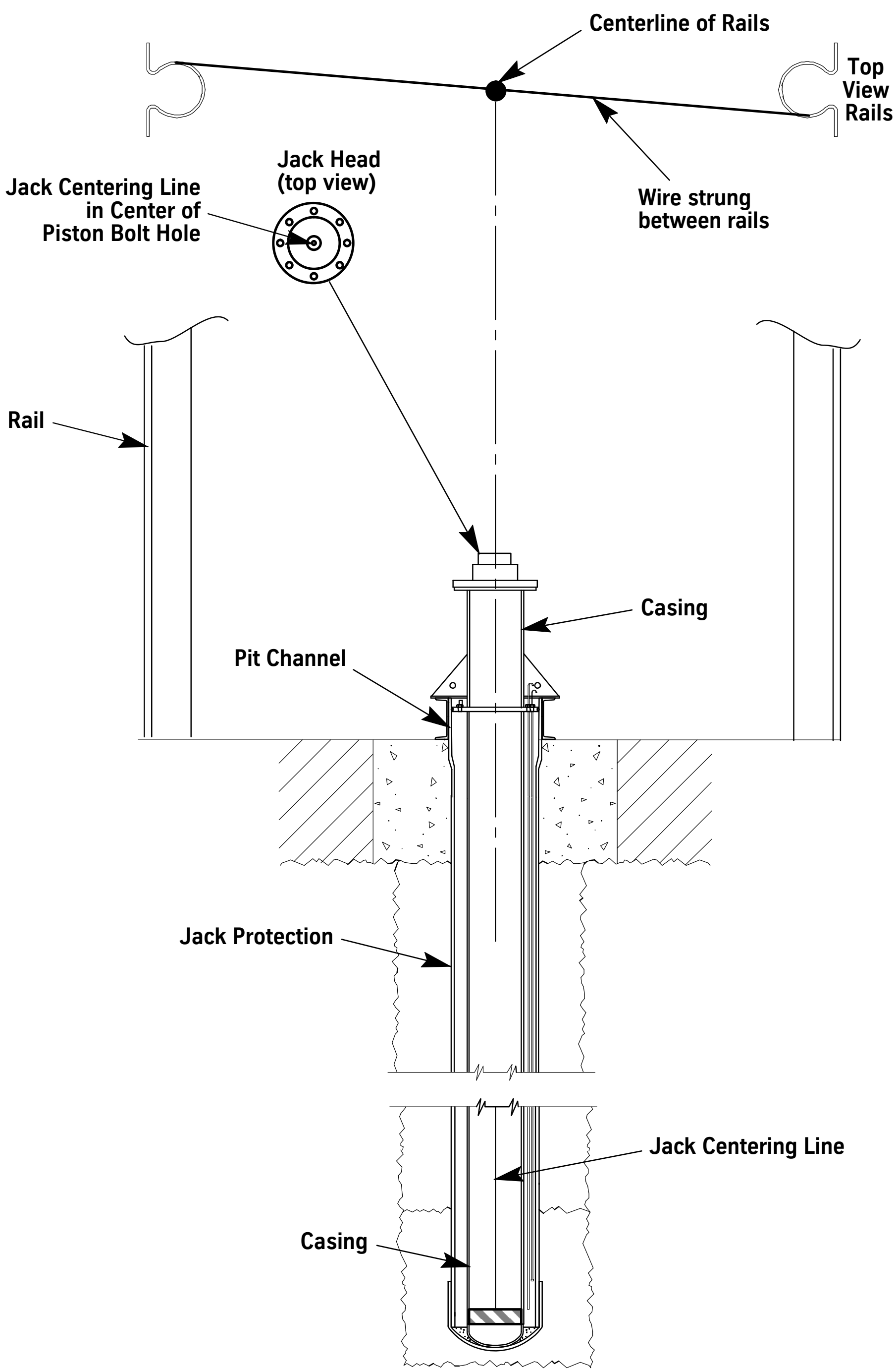


Figure 26 - Jack Alignment

Backfill the Hole

1. Use sand or a similar non-corrosive material to fill the hole carefully and evenly about three feet above the bottom of the casing.

Note: To avoid pushing the casing out of plumb, slowly add the material in small portions around the casing.

2. Check the plumb line to ensure that the casing did not move.
3. If the casing moves out of plumb, "jet" the jack assembly and adjust as needed to attain the plumb line.
4. Install support material around the top of the jack casing, and seal hole with concrete.
5. Tighten the tie–down bolts on the pit channels.
6. After the jack is plumb, shim and/or grout the pit channels between the channel and the floor at the edge of the jack hole.
7. Reinstall the plunger (if applicable).

Install the Guide Assembly and Casing Flange Gasket

1. Dip the casing flange gasket in oil. Place it over the end of the plunger and down into the groove in the jack casing flange.

Notes:
- Position the casing flange gasket between the guide assembly and casing flange in the casing flange groove. See Figure 27.
- When installing the guide assembly take care not to dislodge, pinch, or cut the casing flange gasket.

2. Place the guide assembly over the plunger, and line up the studs on the casing flange with the holes in the guide assembly flange.

3. Install nuts and washers, and tighten as necessary.

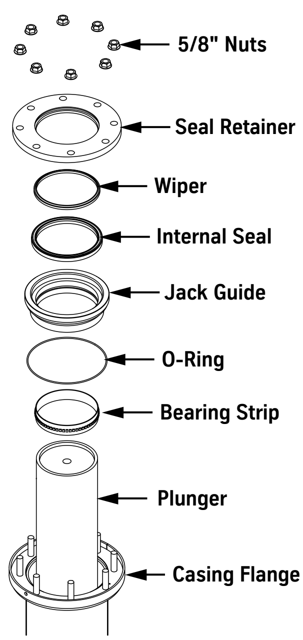


Figure 27 - Guide Assembly Sequence

Install the Seal

1. Use a premium grade paraffin based oil to lubricate the seal and the exposed surface of the plunger.
2. Place the seal on top of the plunger. Make sure the lip of the seal faces down toward the pressure side. See Figure 28.
3. Carefully position the seal to evenly slide down the plunger.

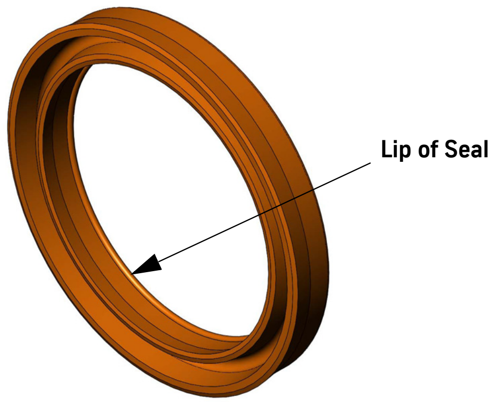


Figure 28 - Seal Orientation

4. Work the seal evenly down the plunger until it bottoms in the stuffing box.
5. Check that the seal is bottomed evenly, all the way around the plunger.
   a. Install the seal retainer with the wiper (if applicable).
   b. For the 3-S jack: install the retainer ring.
   c. For the 4-S jack or higher:
      - Install and finger-tighten the retainer nuts.
      - Tighten the nuts in even rotation until the seal retainer seats against the guide assembly flange.

Note: When properly installed, there will be no gap or clearance between the seal retainer flange and the guide assembly flange.

Install the Overspeed Valve

1. Install the overspeed valve within 12″ of the jack. See Figure 29 for proper orientation of the valve.

2. Turn the adjustment screw out (counter–clockwise) to ensure that the valve does not set during construction and adjustment of the control valve.

CAUTION **This valve is directional. The jack must be connected to the outlet designated as "JACK."**

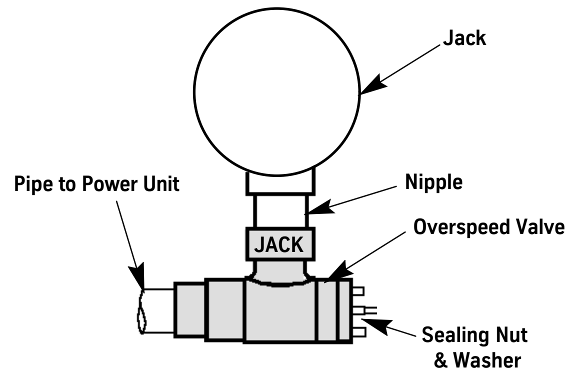


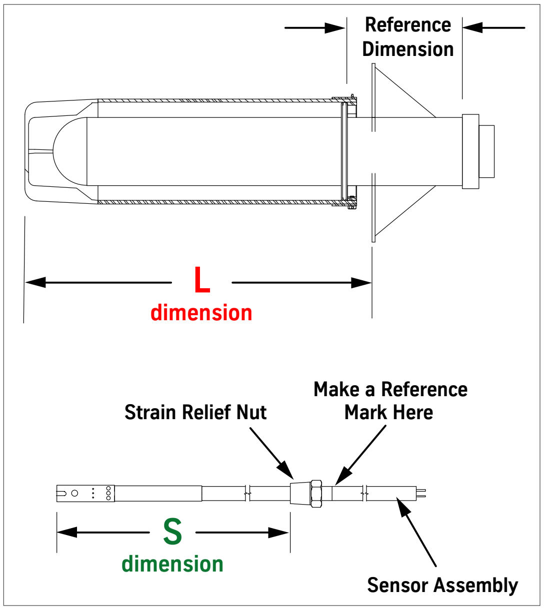
Figure 29 - 2" Overspeed Valve (90° shown, in line available)

3. Complete the oil line piping from the overspeed valve to the shutoff valve.

4. Install piping from the shutoff valve to the power unit.

5. Install the appropriate pipe stands to support the oil line.

Install the Jack Sensor



When Overall Jack Length is Known

1. Remove the $^1/_4$" - 28 manufacturing plug installed in the metal ring at the top of the jack casing.

Note: During installation, keep the sensor as clean as possible.

2. Measure for wire length.
   a. Measure the L dimension on the jack. See the diagram.
   b. Adjust the strain relief nut so that S = L – 4 inches.
   c. Make a reference mark as shown.
   d. Tighten the strain relief nut on the sensor lead.
   e. Install the sensor through the $^1/_4$"- 28 opening in the top of the jack casing.

When Overall Jack Length is Not Known

1. Remove the $^1/_4$" - 28 manufacturing plug installed in the metal ring at the top of the jack casing.

Note: During installation, keep the sensor as clean as possible.

2. Measure for wire length.
   a. Find the total travel dimension on the job layout drawings.
   b. Measure the reference dimension. See the diagram.
   c. Adjust the S dimension = Total travel - Reference dimension + 7 inches.

Note: This initial setting should be within ± 6" of the final adjustment.

   d. Make a reference mark as shown.
   e. Hand-tighten the strain relief nut on the sensor lead.
   f. Install the sensor, and find out if the cable goes slack.
      - If the cable goes slack:
        Pull up until the cable is taut, then pull up an additional $2^1/_2$". Slide the strain relief down to the bulkhead, and tighten the strain relief nut on the cable.
      - If the cable does not go slack:
        Let the sensor down until the cable goes slack. Pull up until the cable is taut, then pull up an additional $2^1/_2$". Slide the strain relief down to the bulkhead, and tighten the strain relief nut on the cable.

Install the Jack to the Platen Connection

1. Connect the plunger to the platen, and prepare the elevator for service.
    a. Use the supplied hardware to clip the platen plate to the bolster channels.Do not fully tighten the hardware so that the platen can be moved.
    b. Position the platform close to the bottom landing.
    c. Manually activate the power unit to slowly push the plunger up against the platen plate.
    d. Install the jump bolt through the platen plate, and tighten in the jack.
    e. Align the platen (as necessary), and tighten the platen clips to the bolster channels. See Figure 30.
    f. Move the car up, and remove all material that was used to support the car.
    g. Check for clear access of the entire hoistway.
2. Verify that the oil is at the proper level in the power unit, and bleed all air out of the jack.
3. Run the car up and down several times. Check that the plunger does not rub the casing at any point in the hoistway.

Note: If necessary to prevent the plunger from rubbing on the casing, slightly move the platen.

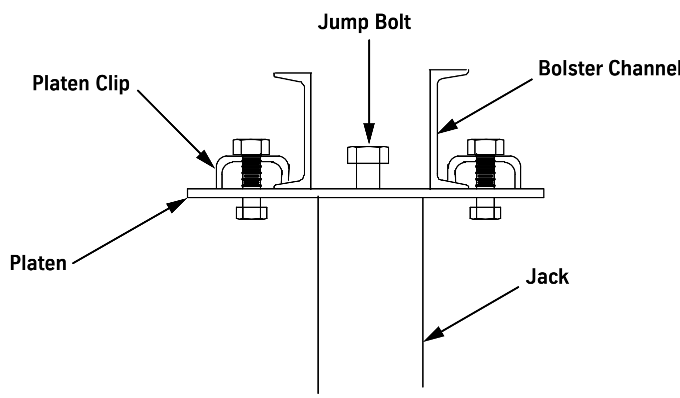


Figure 30 - Jump Bolt through Platen Plate

Control Valve Adjustment
Overspeed Valve Adjustment

When the job is complete and all cab weight is final, perform the final control valve adjustment. See the appropriate component manual for details.

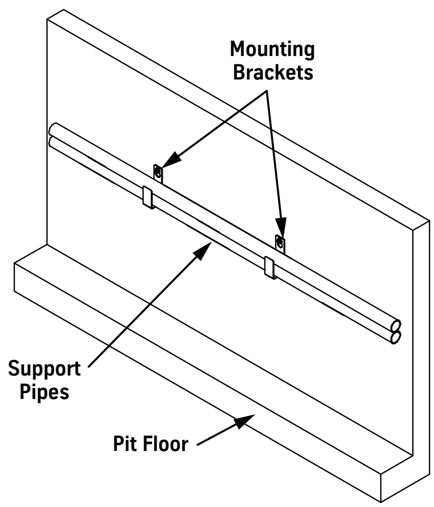
Install the Support Pipes

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

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

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

5. If the clearances are satisfactory, locate and install the provided anchor bolts. See Figure 31 for dimensions.
6. Place each bracket over a bolt, and tighten the bolt.
7. Place the support pipes on the brackets.



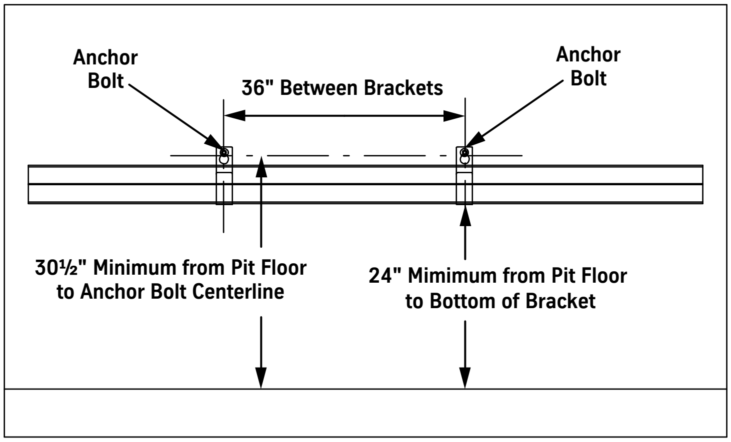


Figure 31- Support Pipe Mounting Bracket Kit

HDPE System Testing

Sensor Test

Note: If a sensor is not available, continue to the next section.

1. Use an ohmmeter and alligator clips to measure the resistance between the two wires at the sensor leads (red and black).
2. Use Table 2 to determine if any corrective action is needed.

Resistance Reading	Indication / Action
Less than 990,000 Ohm	• Water is present in the casing. **Note**: If water is detected, evacuate the system and measure the resistance again. • The sensor has a short circuit.
990,000 Ohm – 1,010,000 Ohm	Sensor is working and there is no accumulation of water.
Greater than 1,010,000 Ohm	Possible broken lead on the sensor.

Table 2 - Ohmmeter Resistance Readings

Evacuation Test

Note: A compressed air source is required for this procedure. See Figure 32 for all steps in this procedure.

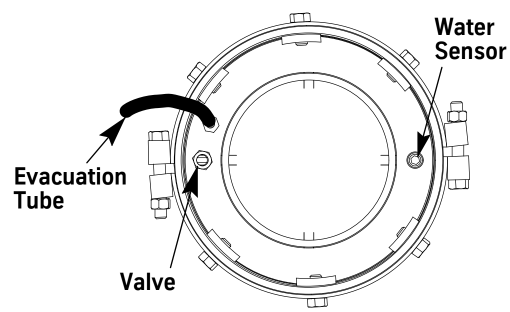


Figure 32 - HDPE Pipe, Top View

1. Make a mark (for correct position on reinstallation) where the strain relief fitting is set on the sensor wire, and remove the sensor from the HDPE/PVC.
2. Install a pipe plug, ($^1/_4$" NPT), to seal the port where the sensor was removed.
3. Remove the tape from the evacuation tube, and apply 10 psi air pressure through the valve and into the system.
4. Check for airflow from the evacuation tube,

- For positive airflow: the system does not contain water/oil. Continue to the next section.
- For no airflow: the system does contain water and/or oil. Use the following procedure to identify and correct any issues.

HDPE System Testing
(continued)

Determine if Oil is Present

a. Increase air pressure to approximately 20 psi and expel the liquid, retaining some of the liquid in a clear container.

b. Allow the liquid in the container to set undisturbed for 30 minutes.

c. Note the color, appearance, and smell of the liquid to determine if oil is present.

d. If oil is present, see Table 3 to resolve any issues.

Determine if Water is Present

a. Visually inspect the area to determine if any water is present.

b. See Table 3 to resolve any issues.

<table>
<tr><th>Status</th><th>Cause</th><th>Solution</th></tr>
<tr><td rowspan="3">If oil is present</td><td>Damage to the HDPE/PVC jack o-ring</td><td rowspan="3">Contact your supervisor for corrective action. After corrective action is complete, repeat this procedure.</td></tr>
<tr><td>A leaking joint</td></tr>
<tr><td>A pinhole in the weld</td></tr>
<tr><td rowspan="4">If water is present</td><td>The pit is, or has been, flooded</td><td rowspan="2">Make a mark (for correct position on reinstallation) where the strain relief fitting is set on the sensor wire, and remove the sensor from the HDPE/PVC. Repeat this action once daily until all moisture has been removed from the system.</td></tr>
<tr><td>A wet hole during installation, and the PVC end cap was put in place after the casing was exposed to water which allowed moisture inside the PVC.</td></tr>
<tr><td>Damage to HDPE/PVC to the jack o-ring.</td><td rowspan="2">Contact your supervisor for corrective action. After corrective action is complete, repeat this procedure.</td></tr>
<tr><td>Damage to HDPE/PVC pipe.</td></tr>
</table>

Table 3 - Evacuation Test Results

5. Verify that the sensor has an ohmmeter reading between 990,000 and 1,010,000 ohms.

6. Clamp the evacuation tube, and pressurize the system to 20 psi.

7. Record the pressure gauge reading, and let the system stand for 1 hour.

8. Apply soapy water to the edge of the sealing ring and to the fittings installed in the sealing ring when pressure testing the system. The bubbles show any leaks.

9. After 1 hour, check the system pressure.
   - If the system pressure does not drop, continue with this procedure.
   - If the system pressure does drop and there are no leaks around the ports or the seal ring, the jack protection system must be removed and repaired. Contact your supervisor for corrective action, and when complete, repeat this procedure.

10. Wrap tape on the end of the evacuation tube to prevent any water or dirt from entering.

11. Verify that the sensor has an ohmmeter reading greater than 990,000 ohms and less than 1,010,000 ohms.

12. Remove the pipe plug in the sensor port, and reinstall the sensor assembly.

13. Confirm that the sensor has an ohmmeter reading greater than 990,000 ohms and less than 1,010,000 ohms.

Maintenance

Seal Replacement

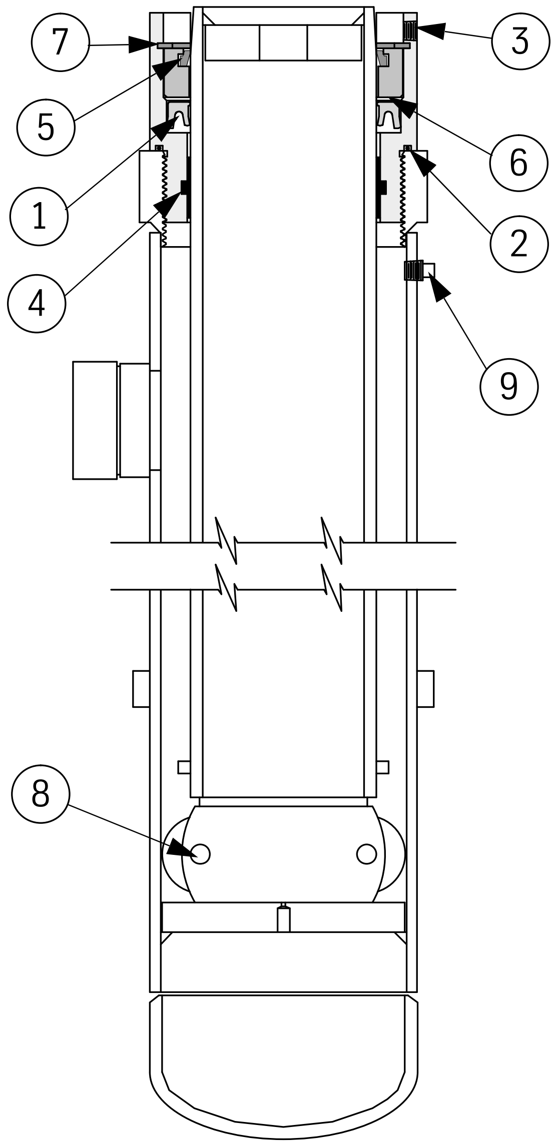
1. Before replacing the seal, check the entire length of the plunger for scratches and nicks, and polish out all scratches with a fine emery cloth.
2. Place two pipes (approximately 5 ft. in length) over the formed spring guides on the buffer stands.
3. Use Inspection Operation to carefully lower the car down on the pipe stands.
4. Turn OFF, Lock, and Tag out the mainline disconnect.
5. Mark the exact location of the platen plate on the bolster.
6. Loosen the bolts holding the platen to the bolster channels.
7. Move the clips out of the way.
8. Open the manual lowering valve to lower the plunger completely.
9. Remove the 1” bolt and platen from the top of the plunger.
10. Close the shut off valve.
11. Use two flat blade screwdrivers to remove the spiral snap ring.
12. Screw two #10-24 screws into the tapped holes in the seal retainer.
13. Use two pairs of pliers to pull the retainer from the recess.
14. Screw the packing removal tools or two drywall screws into the seal.
15. Without scratching the plunger or seal recess in the guide, pull the seal from the recess.
16. Use clean rags to remove all oil from the seal recess. A new seal will not properly seat in a recess containing oil.
17. Check the seal recess for any scratches which can cut the seal; polish out any scratches or replace the guide.

Install New Seal

See Install the Seal on page 1-31.

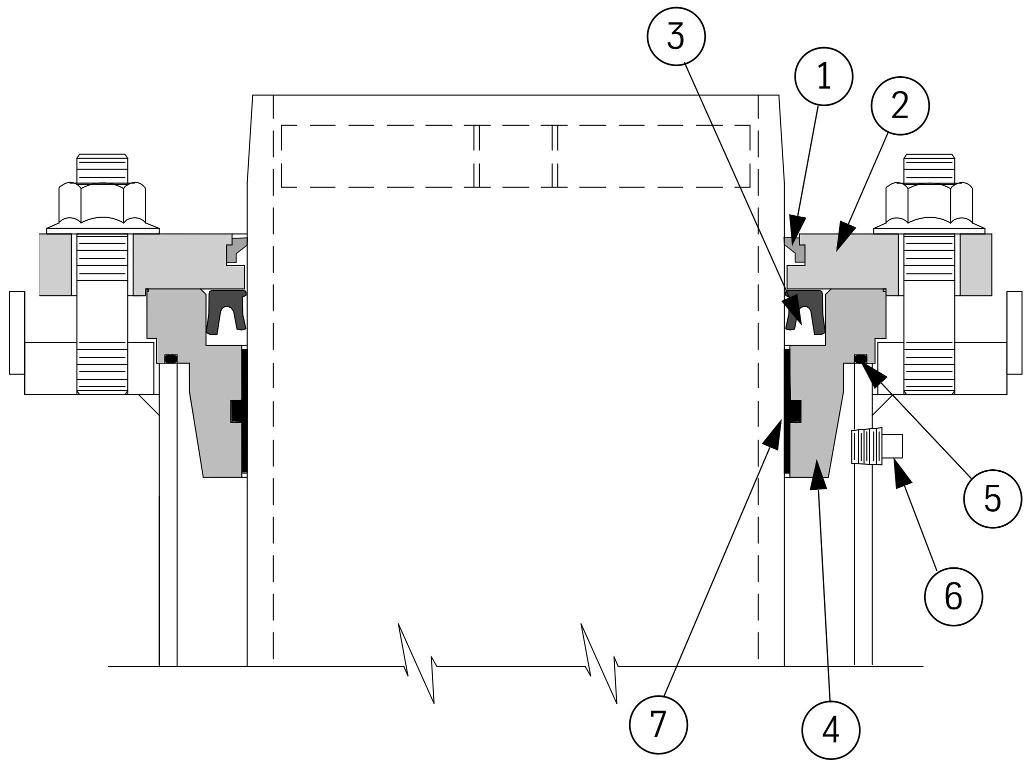
Replacement Parts

3-S Jack



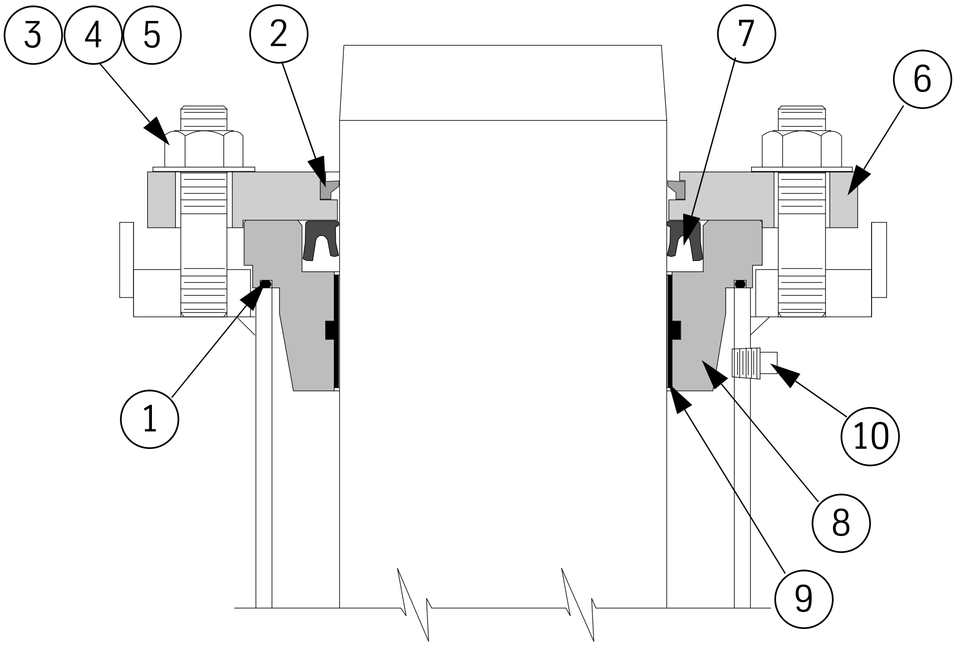
Item	Part No.	Print No.	Description
1	9723134	732BH1	Seal
2		139358	Gasket O–ring
3		454AN1	Guide Assembly
4	9811576	137995	Bearing Strip
5	9723821	123833	Wiper
6		148113	Seal Retainer
7	9739350	139357	Retainer Ring
8	9739610	139612	Roller Kit
9		886BN1	Bleeder Valve
		886CF1	Bleeder Valve Body

4-S, 5-S, and 6-S Jacks



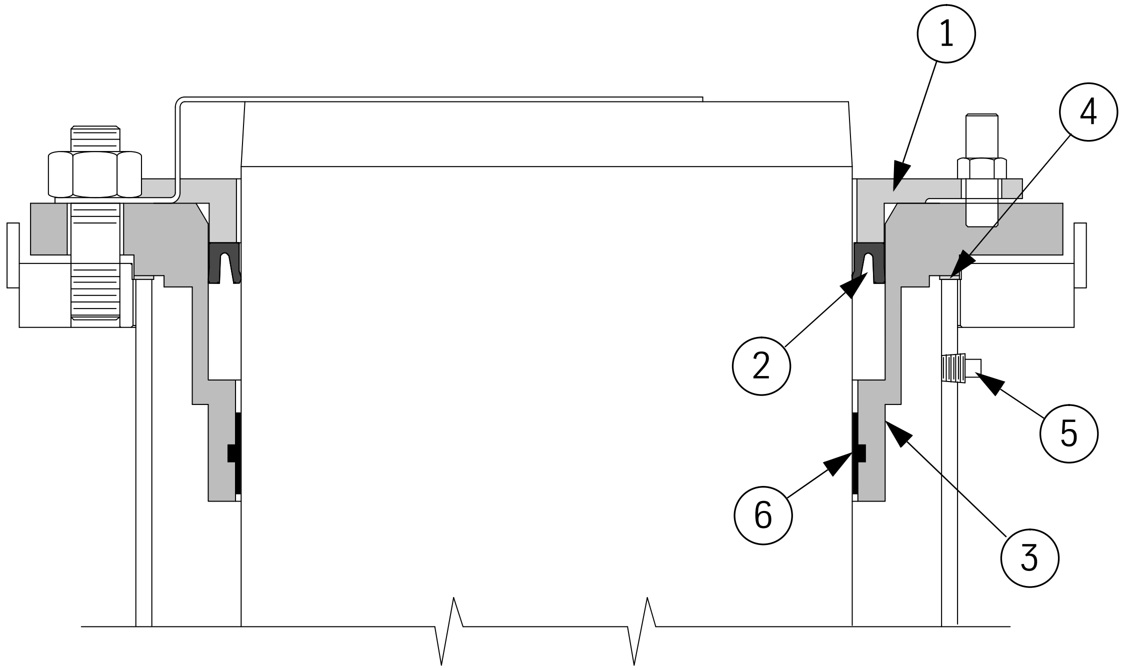
	4–S		5–S		6–S		
Item	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Description**
1		732BF1		732BF2	9767547	732BF3	Wiper
2		713AG4		713AG5		713AG6	Seal Retainer
3	9761500	732BH2	9761512	732BH3	97615241	732BH4	Seal
4		454DN4	9811825	454DN5		454DN6	Guide Assembly
5	9729010	129029	9729021	129030	9729021	129030	O-Ring
6		886CF1		886CF1		886BN1	Bleeder Valve
		886BN1		886BN1		886CF1	Bleeder Valve Body
7		142BX1		142BX2		142BX3	Bearing Strip

7-S and 8-S Jacks



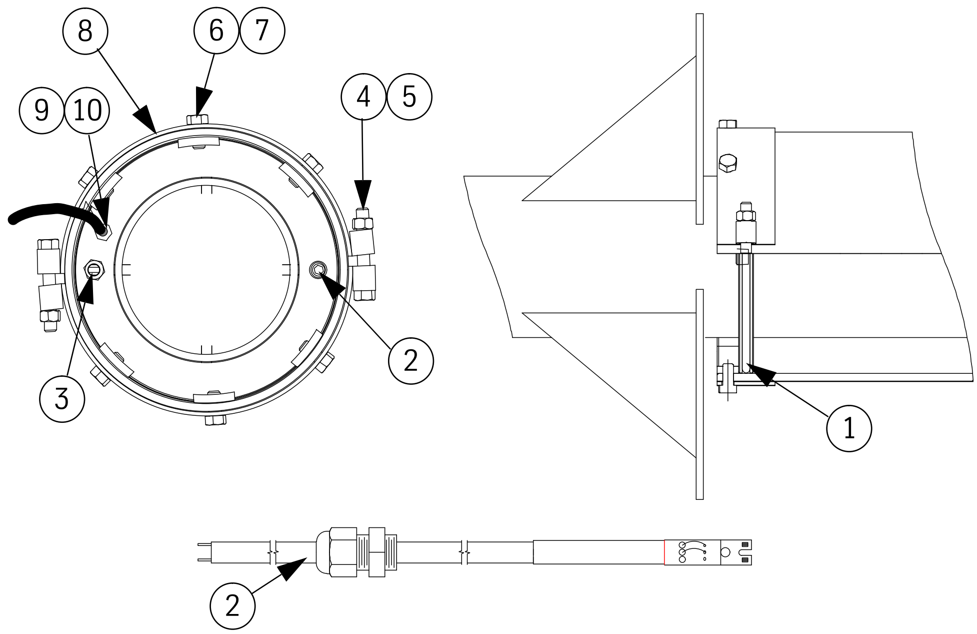
	7–S		8–S		
Item	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Description**
1	9708534	77145		77145	Gasket
2		732BN7		732BN8	Wiper
3		398AN1		398AN1	Stud, Flange
4	9758214	393DF1	9758214	393DF1	FS, Nut, NHF .625 ZH
5	9877642	27764	9877642	27764	Special Washer
6		716AH7		713AJ8	Retainer Seal
7	9761536	732BP7		732BP8	Seal
8		454EB7		454EB8	Guide Assembly
9	9739506	142AX5	9739609	142AX6	Bearing Strip
10		886CF1		886BN1	Bleeder Valve
		886BN1		886CF1	Bleeder Valve Body

9-S, 10-S, 12-S, and 15-S Jacks



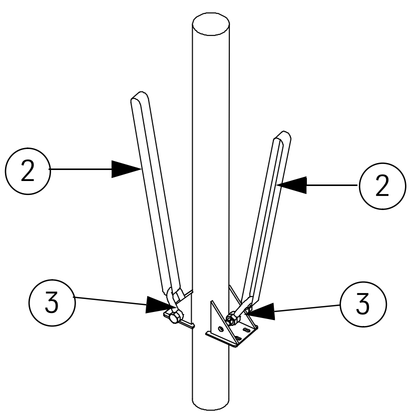
	9–S		10–S		12–S		15–S		
Item	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Part No.**	**Print No.**	**Description**
1	9817141	41978	9817207	114991		26940		115016	Seal Retainer
2	9767216	102636	9767228	102637	9767230	102638	9767241	102639	Seal
3		454AY2		454BB2		454BB3		454BD1	Guide Assembly
4	9708558	77144	9708558	77144	9708613	77143		115016	Copper Gasket
5		886CF1		886CF1		886CF1		886CF1	Bleeder Valve
		886BN1		886BN1		886BN1		886BN1	Bleeder Valve Body
6	9739701	142AX7	9738710	142AX8	9738812	142AX9	9738915	142AX10	Bearing Strip

HDPE Pipe



	3-S Jack	4-S Jack	5-S Jack 6-S Jack	
Item	**Print No.**	**Print No.**	**Print No.**	**Description**
1	608AC1	608AC2	608AC3	O-Ring
2	736AX1	736AX1	736AX1	Water Sensor, 38’ lead
3	886BA2	886BA2	886BA2	Tank Valve, Brass
4	274BX1	274BX2	274BX3	Clamp Assy, HDPE or PVC
4	880EG1	880EG1	880EG1	Nylon Evacuation Tube
6	642GC1	642GC1	642GC1	Liquid Tight (Pipe Fitting)

Jack Hoisting Kit



	200ATB1	200ATB2	
Item	**Print No.**	**Print No.**	**Description**
1		200BFK2	Jack Bolt Kit
	200BFK1		Jack Bolt Kit
2		767A2	Sling, endless, 2.000 width, 2 ply (11,000 lb. vert).
	767A1		Sling, endless, 1.000 width, 2 ply (6,000 lb. vert.)
3		741AR2	D Shackle with safety pin, steel .875
	741AR1		D Shackle with safety pin, steel .625

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TWIN POST JACKS

Single Stage, 2-S & 3-S
Two Stage Telescoping, 2.5-T & 3-T
Three Stage Telescoping, 2.5-T-3

Twin Post Jack - two jacks, one on each side of the elevator car.

Single Stage Jack has a single plunger.

Two Stage Telescoping Jack has a pair of two stage plungers.

Three Stage Telescoping Jack has a pair of three stage plungers.

Note: Three Stage Telescoping Jack installation begins on page 1-81.

TWIN POST JACKS

TWIN POST JACKS
Single Stage, 2-S & 3-S
Two Stage Telescoping, 2.5-T & 3-T

Installation

Power Unit

Position the power unit according to job layout, and use four $^1/_2$" anchors to secure it to the machine room floor (Manufacturing supplies anchors for seismic jobs only). See Figure 33.

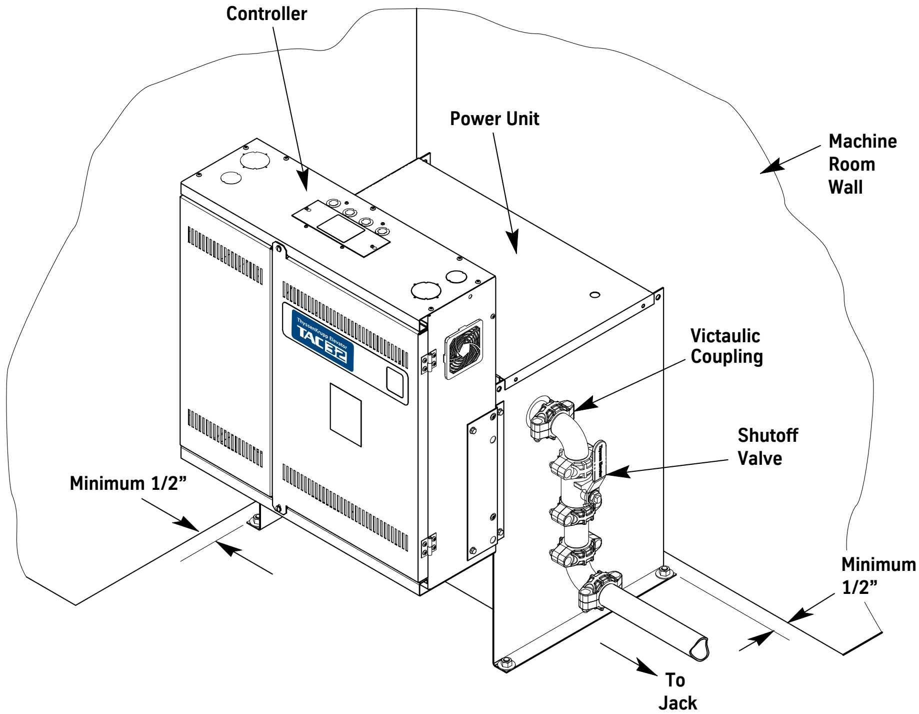


Figure 33 - Power Unit Placement and Piping

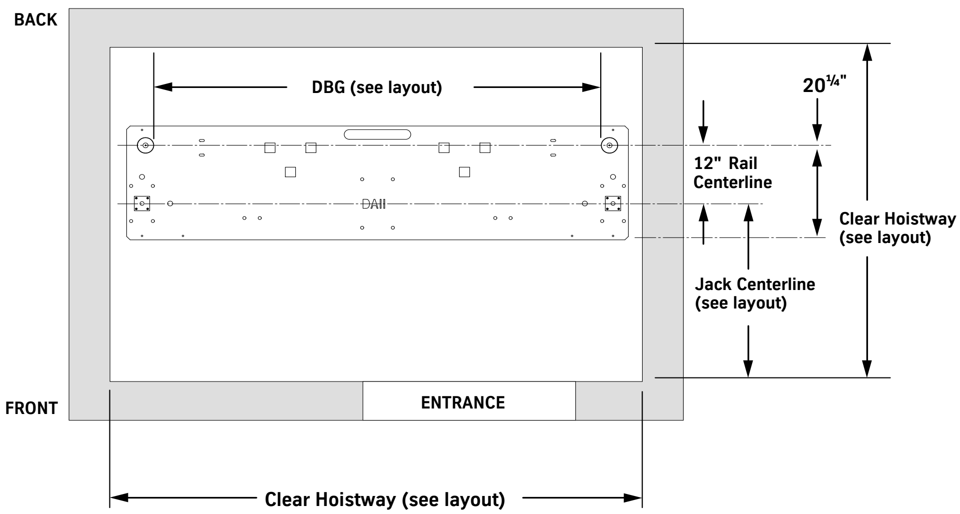
Pit Template

1. Verify that the hoistway position is correct with reference to the building grid or corridor lines (if supplied).
2. Verify that the pit's width and depth are correct per the layout; check the squareness.
3. Place the pit template on the pit floor, and position it per the layout.
4. Place a laser on each end of the template, and survey the hoistway. See Figure 34 on page 1-47.
5. Adjust the pit template so that the centerlines of the rail and jack match the layout.
6. Measure from the laser line to the back of the hoistway to ensure that the car has adequate running clearance.
7. Verify that the pit template is level and square, and then use a $^1/_2$" concrete anchor in each corner to secure it to the pit floor.

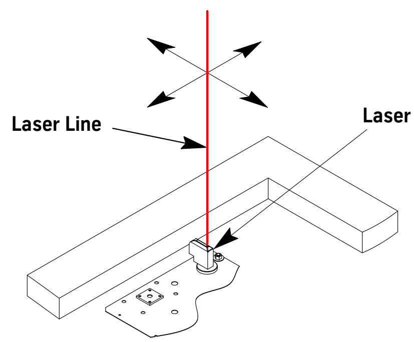
Note: If the pit depth is correct, and the template is within 1" of level side-to-side, the jacks and buffers can be shimmed when they are installed.

Pit Template

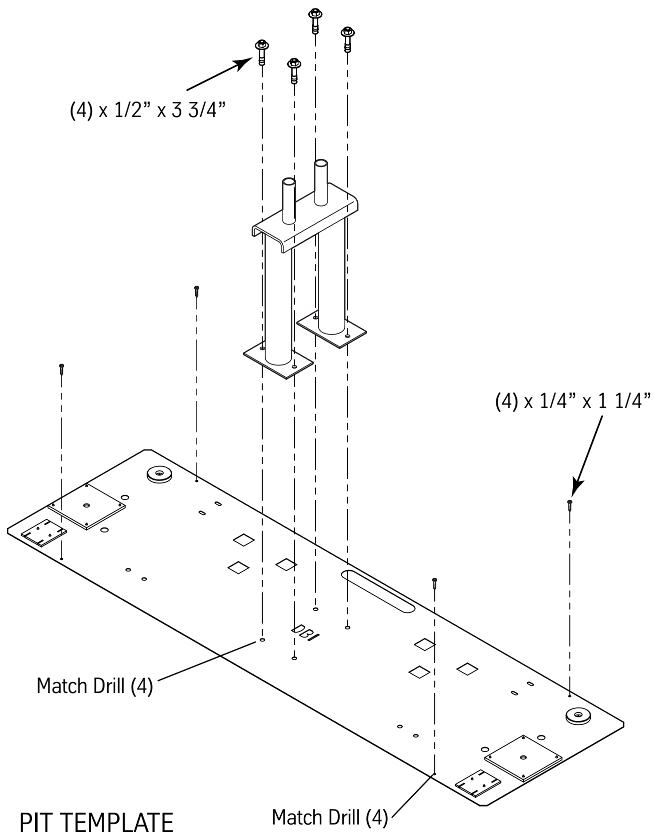
(continued)



HOISTWAY LAYOUT



HOISTWAY SURVEY with LASER



PIT TEMPLATE

Figure 34 - Pit Template Hoistway Layout

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 35 on page 1-49.

2. Install a bottom rail bracket.

    a. Place a target in the locating hole of the rail bracket.

    b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.

    c. Completely anchor the rail bracket.

3. Repeat step 2 for the opposite side bottom rail bracket.

4. Measure the distance between the two rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.

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

6. Install a second tier rail bracket.

    a. Place a target in the locating hole of the rail bracket.

    b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.

    c. Completely anchor the rail bracket.

7. Repeat step 6 for the opposite second tier rail bracket.

8. Measure the distance between the two second tier rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.

Car Rail Brackets
(continued)

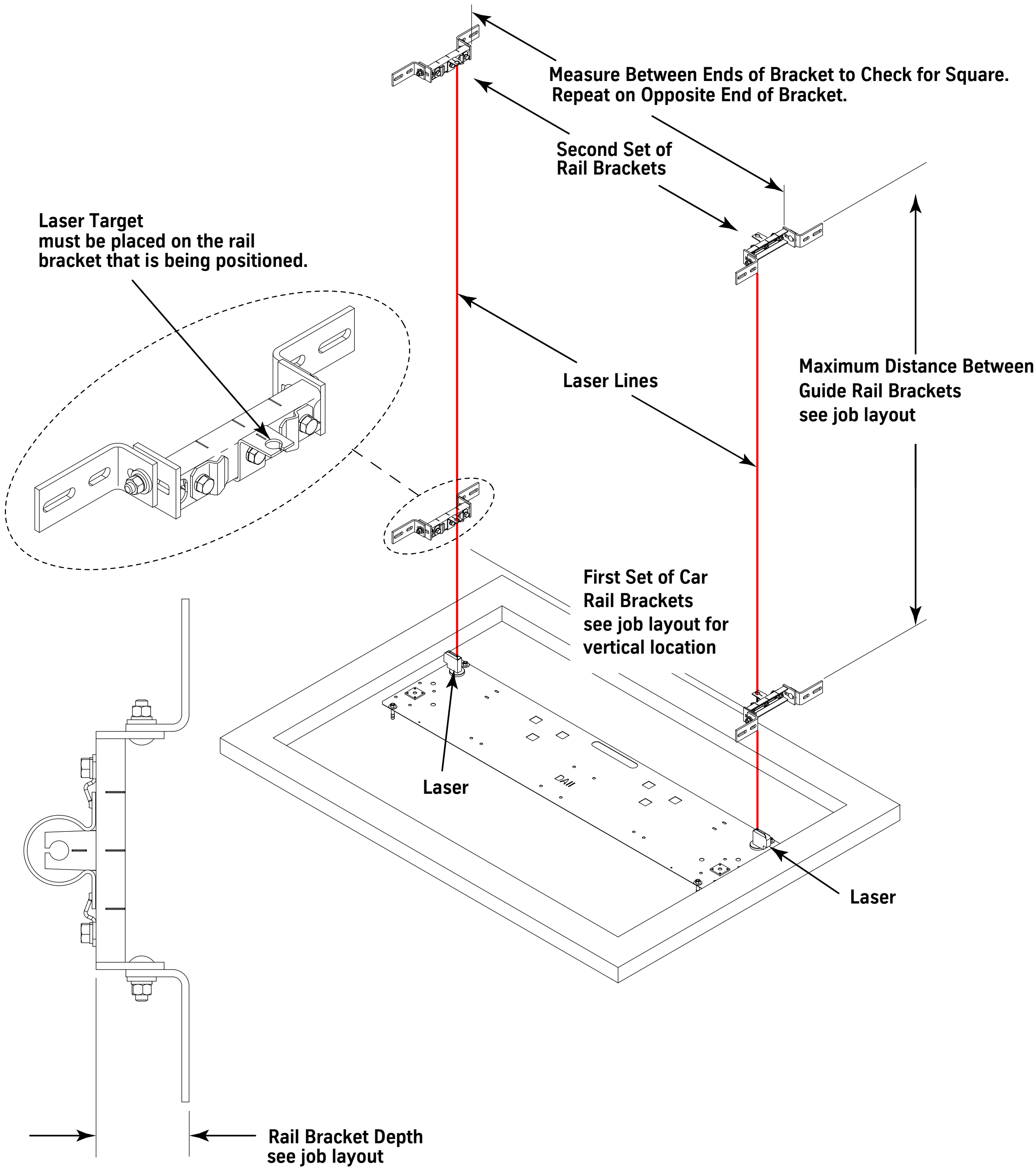


Figure 35 - Car Rail Bracket Installation

Car Rail Installation

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

1. Place the first rail on the template and against the rail bracket(s).
2. Press the rail onto the tapered keyhole brackets. See Figure 36.
3. Use the provided slip clips to attach the rail to the bracket.
4. Tighten the clips with the heel of the clip butted against the rail.
5. Repeat step 1 through step 4 for the opposite side.

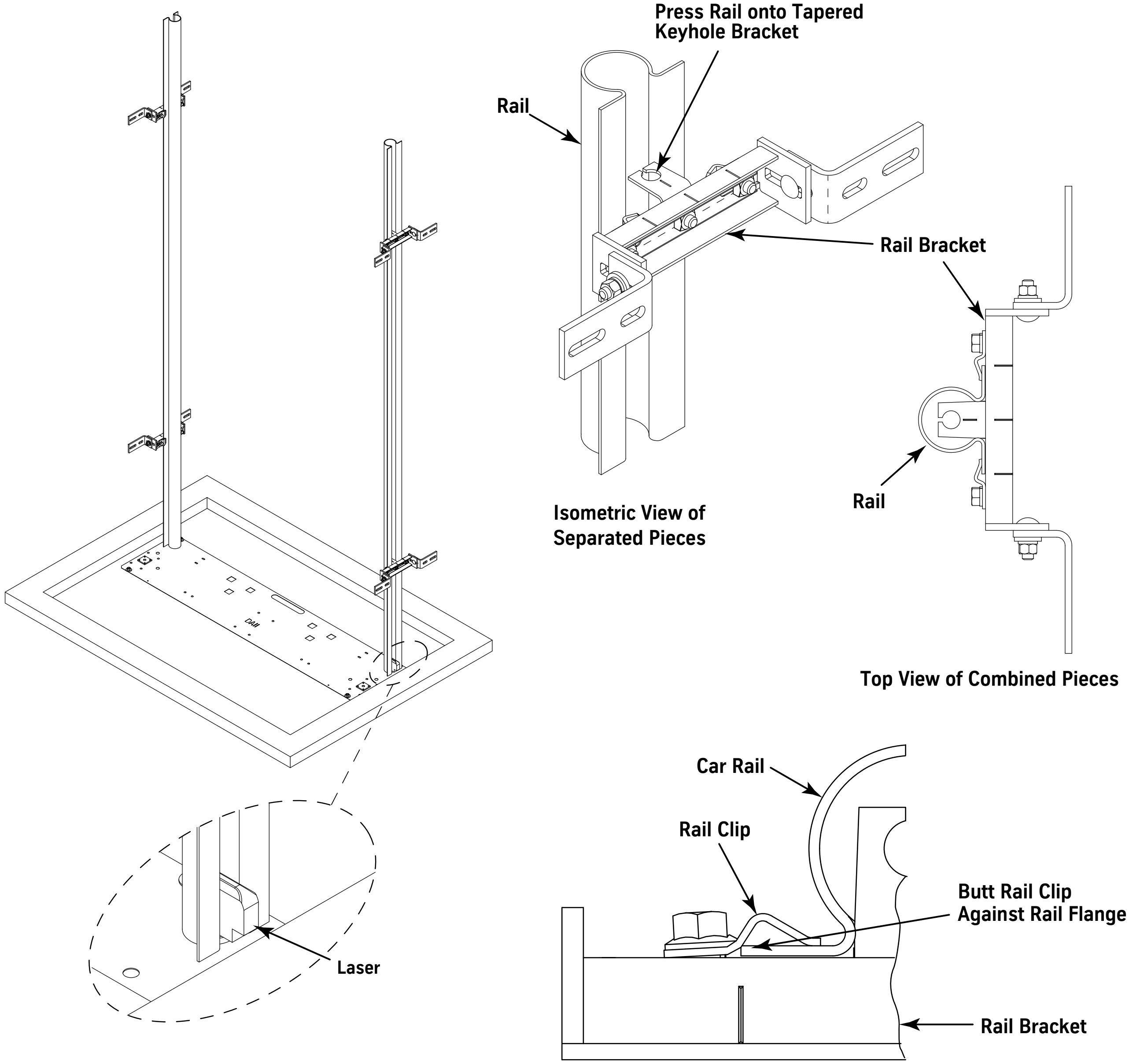


Figure 36 - Car Rail Installation

Jack Installation

See Figure 37 on page 1-52 for all steps in this procedure.

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

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

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

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

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

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

5. Install the 90° barbed elbow.

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

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

8. Use the laser to plumb the jack, and make sure that dimensions A and B are 2” at each end.

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

9. Tighten all bolts on the jack support bracket.

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

Jack Installation

(continued)

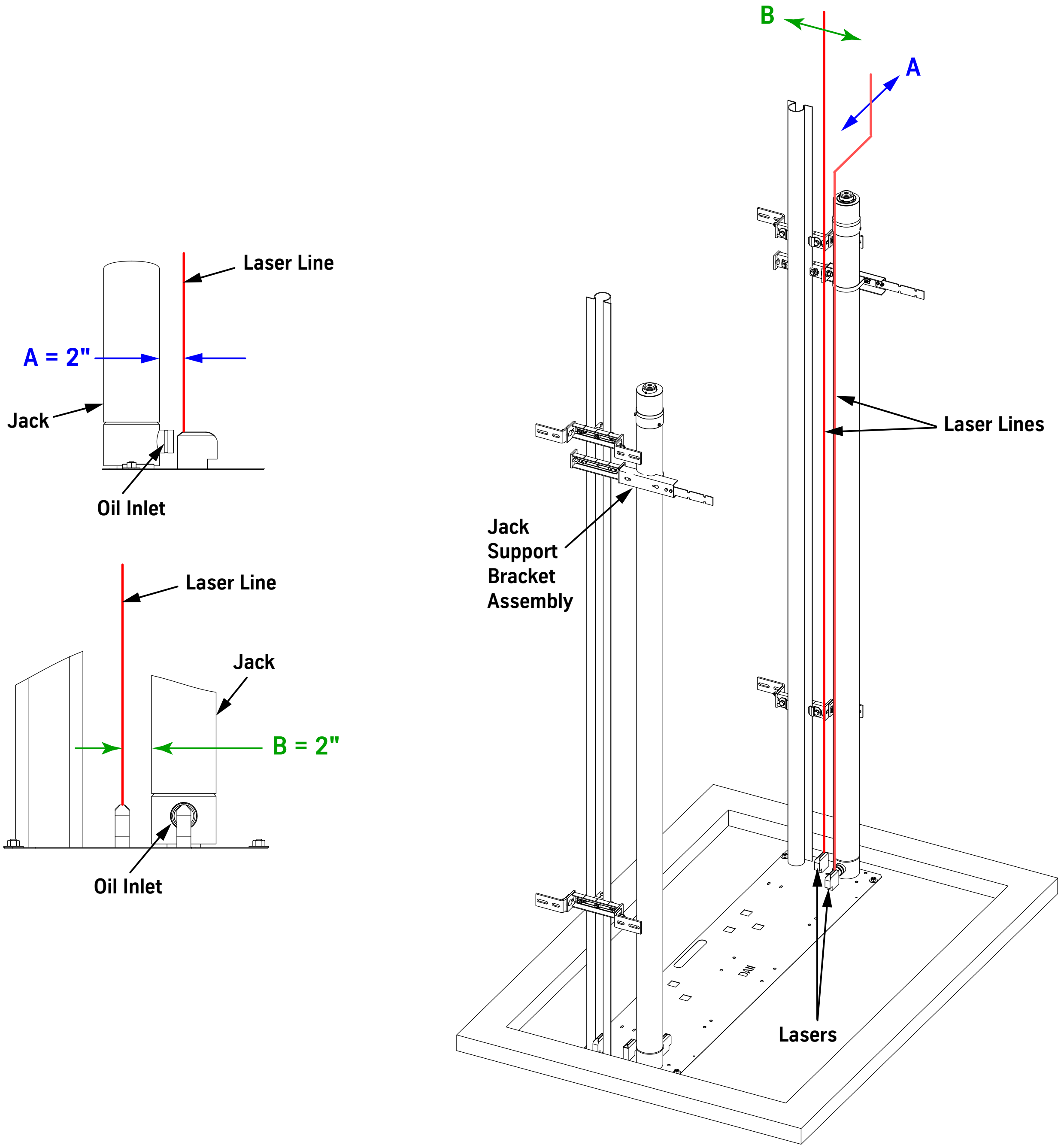


Figure 37 - Jack Installation (Two Stage Shown)

Piping

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

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

2. Start installation with the jack that is nearest to the oil line that enters the hoistway, and install the Victaulic tee on that jack. See Figure 38 below, and Figure 39 on page 1-54.
3. Remove any debris from the inside of all pipes.
4. Install the Victaulic couplings, and connect the provided seamless pipe from the tee to the opposite jack inlet.
5. Install the overspeed valve to the tee.
6. Connect the end labeled JACK directly to the Victaulic tee.
7. Refer to the job layout, and use the shortest route available to avoid building obstructions to construct the oil line from the overspeed valve to the power unit. Install the shutoff valve as close to the power unit as possible.

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 oil line is run in ceiling: Ensure the contractor signs the *Remote Elevator Equipment Room Piping Verification* form located in the *Project Management Book*. (The oil line must have a label every ten feet identifying it as a high-pressure oil line.)

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

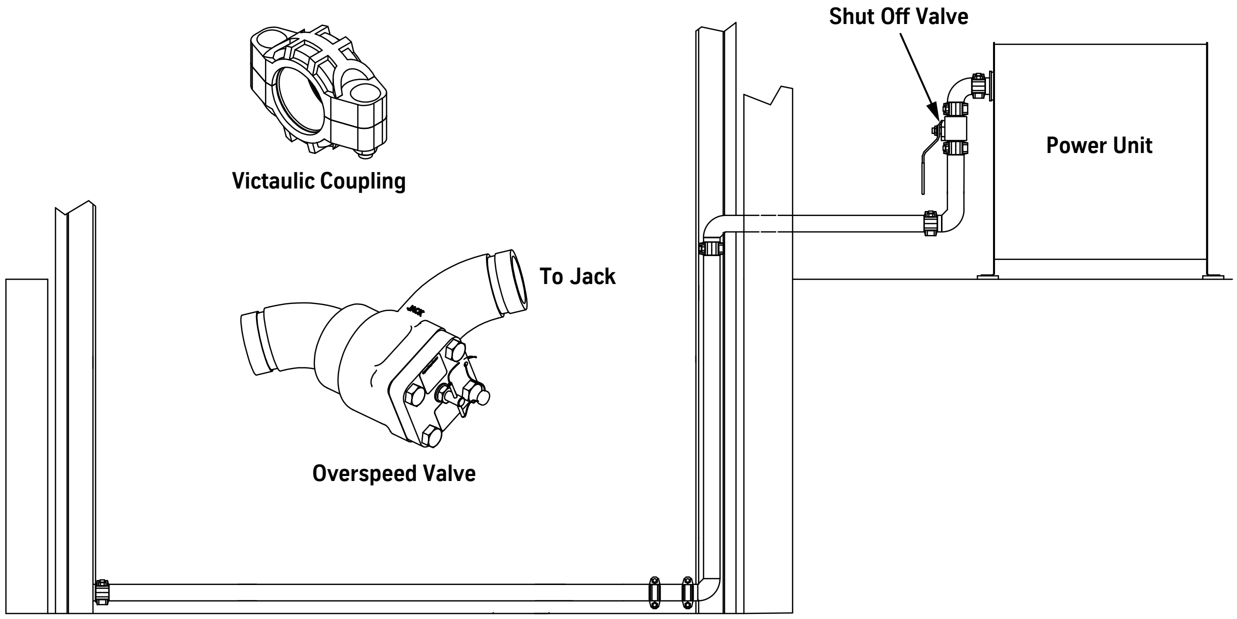


Figure 38 - Piping Installation from the Jack to the Power Unit

Piping
(continued)

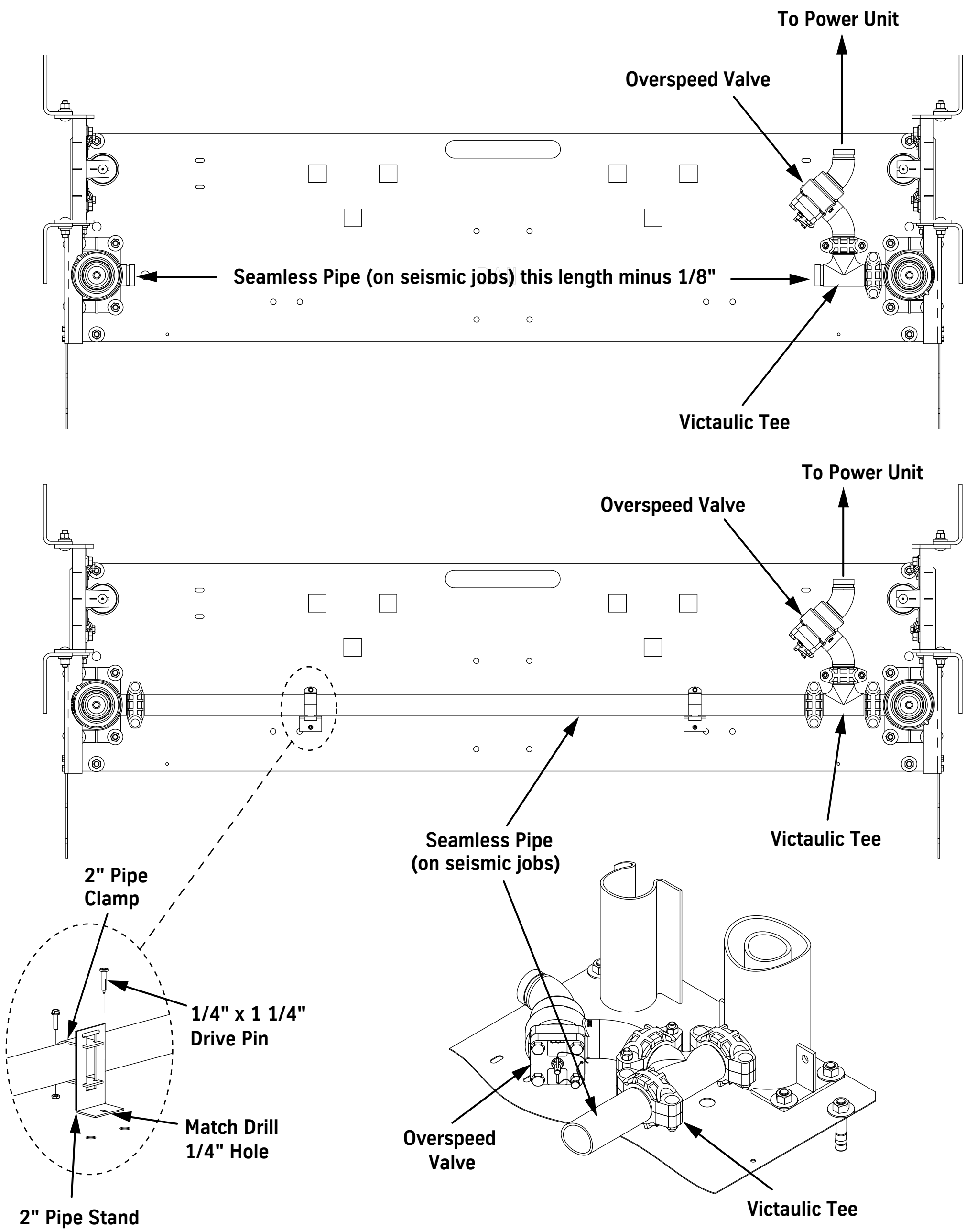


Figure 39 - Piping Between the Jacks

Buffer Stand

1. Place the buffer stand on the pit template. See Figure 40.
2. Shim between the template and the buffer stand to level and plumb the stand.
3. Match drill four holes for $^1/_2$" concrete anchors. Holes must be a minimum $2^3/_4$" deep to obtain a minimum $2^1/_4$" penetration.
4. Anchor the buffer stands with $^1/_2$" anchors. Leave room for 1" of shimming between the buffer and the pit template.

Note: If shimming is not needed during installation, anchors can be driven and tightened later.

5. Install the pit ladder per the layout.

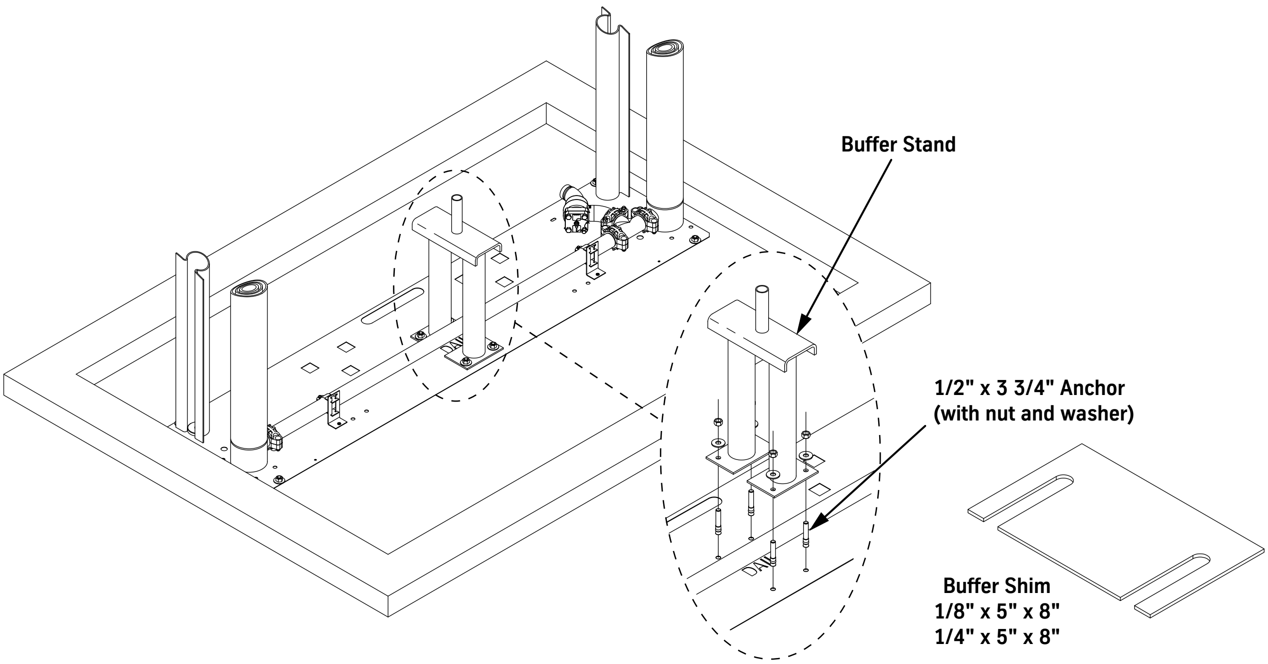


Figure 40 - Buffer Stand Installation

Car Frame

Stiles

1. Use (4) $^{5}/_{8}$" x $1^{1}/_{4}$"hex head cap screws to bolt a lift bracket/platen to each stile. See Figure 41 on page 1-57 for all steps in this procedure.

2. Turn the plunger head of each jack until the bleeder valves are pointing to the rear of the hoistway.

3. Fully compress the jacks.

4. Hoist stile and lift bracket/platen assemblies, and hook them onto their respective plungers.

5. Install the lift bracket/platen assemblies on the jacks.

- Single Stage Jacks, 2-S & 3-S
  a. Install the 2-piece dished washer between the lift bracket/platen assembly and the plunger.
  b. Install the jump bolt through the lift bracket/platen assembly, the dished washer, and into the plunger.

- Two Stage Jacks, 2.5-T & 3-T
  a. On jobs with 3 or more stops: place a sensor cap on each upper plunger, and fasten with #10 screws and nuts.
  b. Check that the tops of the upper plungers are level with each other.
     - If not, place supplied 1" flat washers between the upper plunger and the lift bracket/platen assembly until level.
  c. Install the jump bolt through the lift bracket/platen assembly and into the plunger.

6. Tighten the jump bolt.

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

Car Frame
(continued)

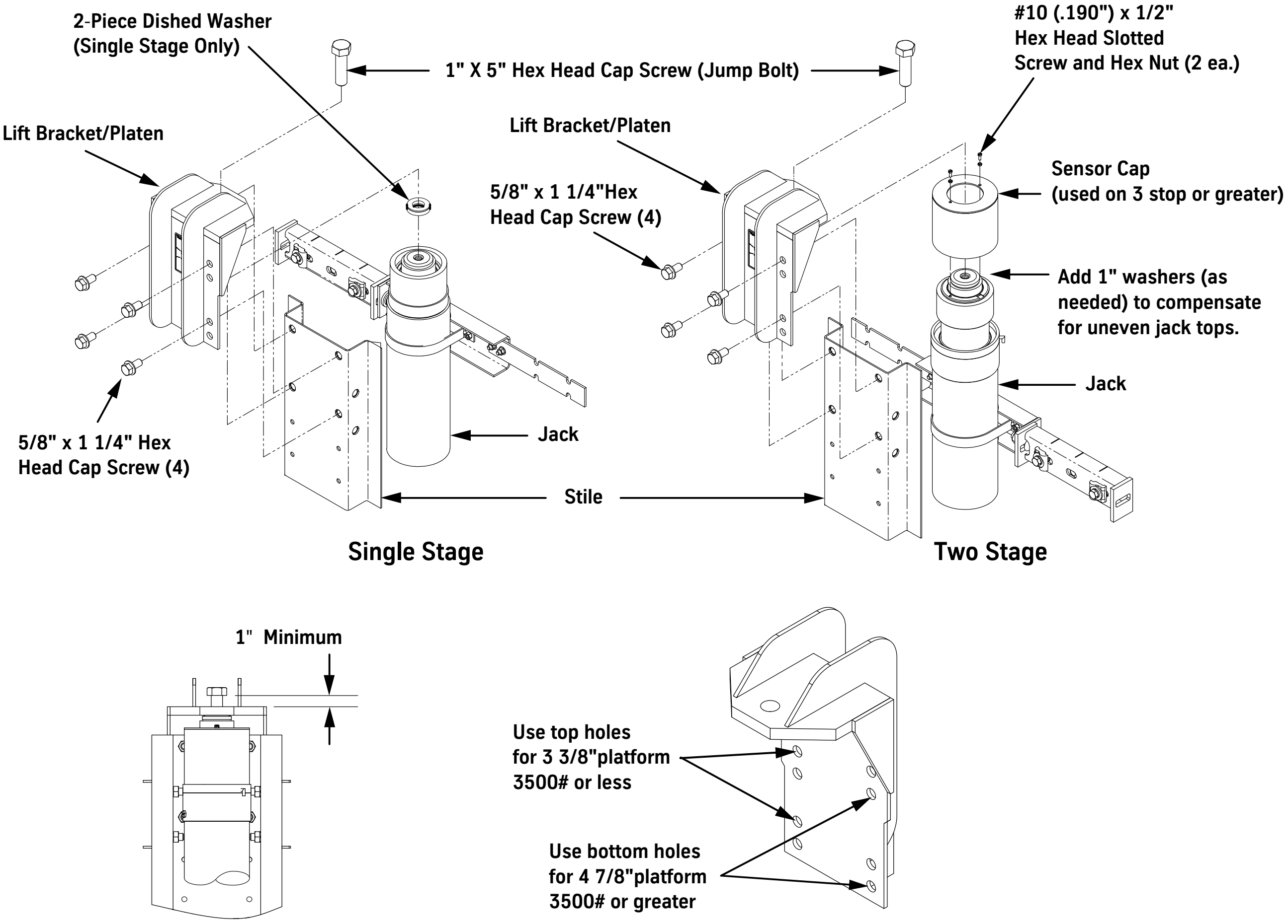


Figure 41 - Lift Bracket/Platen Assembly Installation on Stile and Jack

Car Frame
(continued)

Bolster

1. Snugly fasten the bolster assembly to the stiles. See Figure 42 for all steps in this procedure.
2. Install the bottom guide shoes on the shoe mount bracket.
3. Equally run both of the post-wise adjustment screws in (clockwise) until each slide guide is touching its corresponding rail.
4. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut, and adjust until both sides are equal.
5. Tighten both locknuts on the post-wise adjustment screws.
6. Level and square bolster channel assembly with the stiles, and then tighten the bolts.

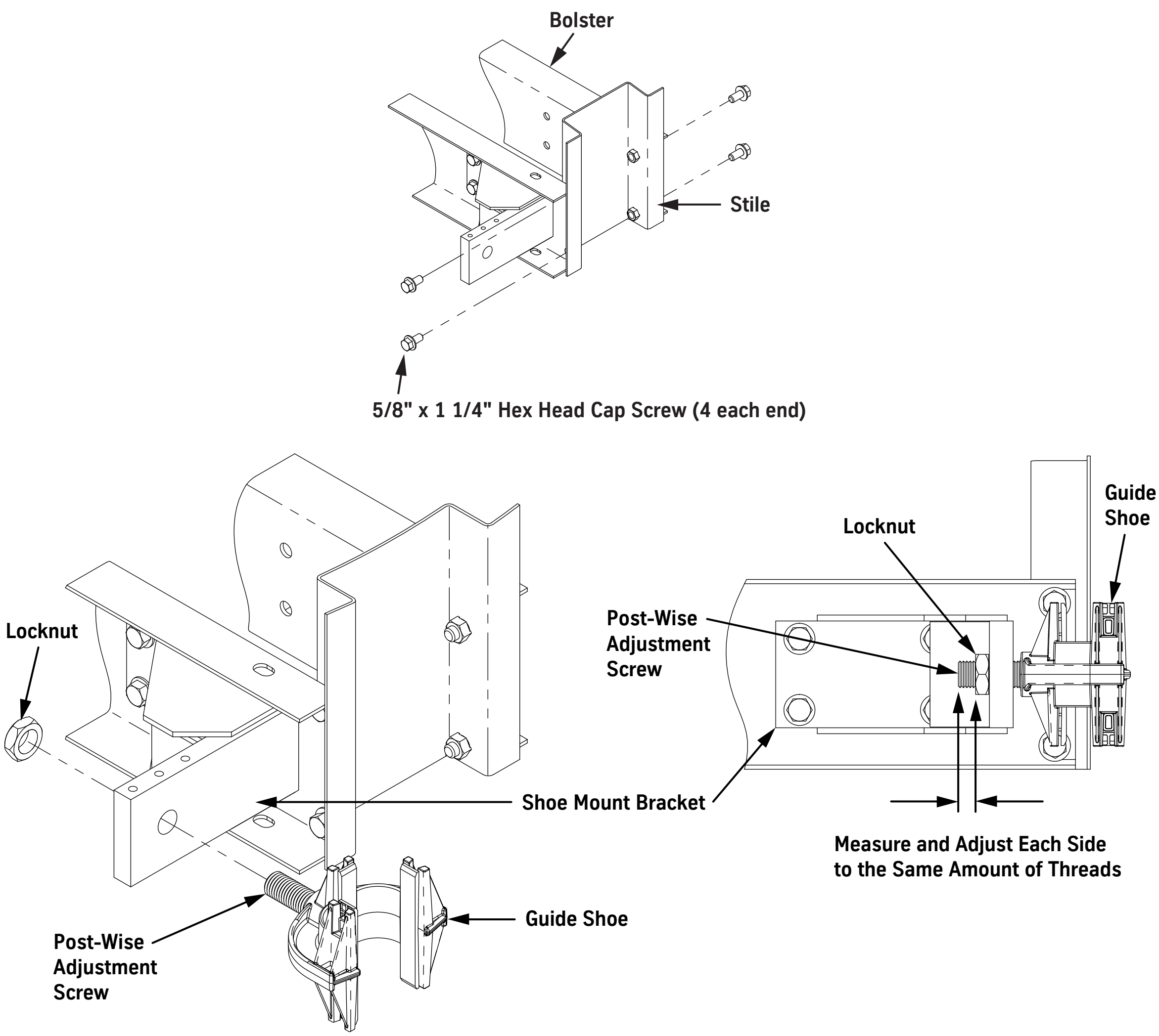


Figure 42 - Install Bolster Assembly (top) and Bottom Guide Shoe

Car Frame
(continued)

Platform

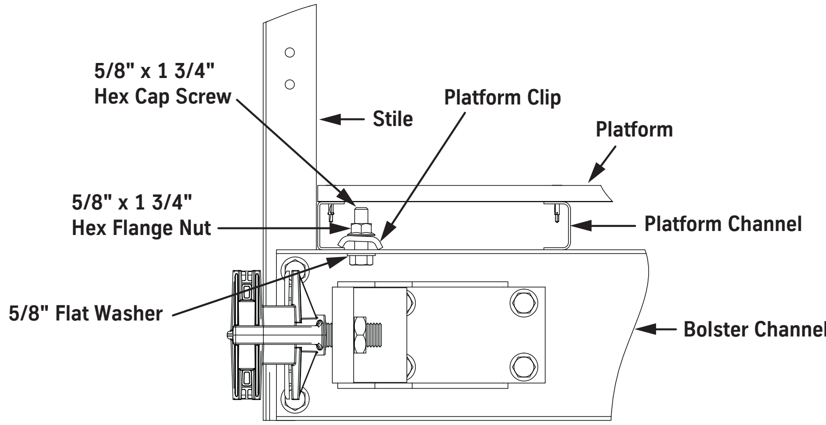
1. Hoist the platform into place, and install the clips and bolts between the platform channels and the tops of the bolster channels. See Figure 43.

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

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

Note: The brace rod goes in the lowest set of $^5/_8$" holes in the stiles.

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



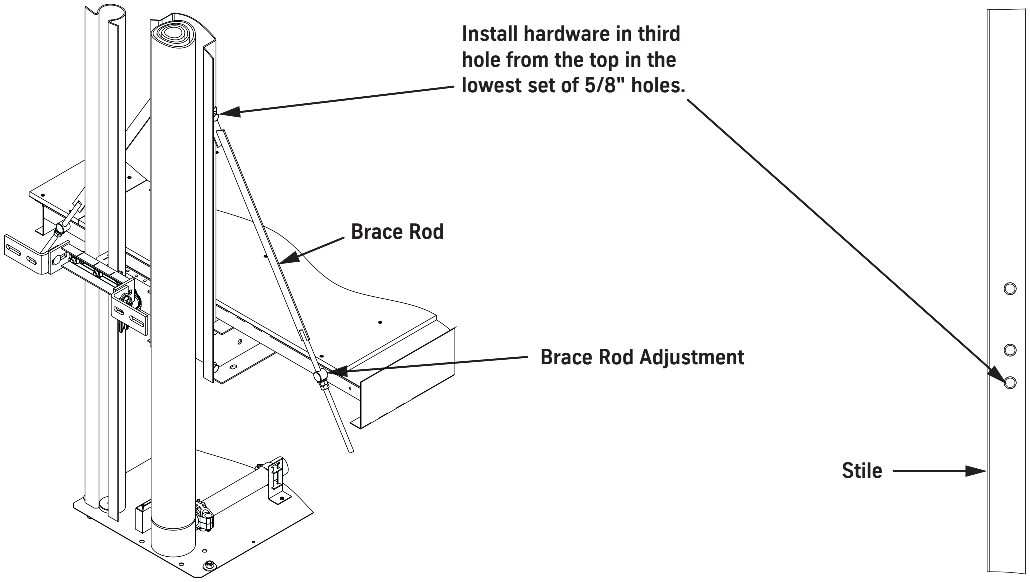


Figure 43 - Platform Installation

Car Frame
(continued)

Crosshead

1. Fasten the two upper guide shoes to the shoe mount bracket on the rear crosshead channel. See Figure 44 for all steps in this procedure.
2. Place the rear crosshead channel between the two stiles in the lowest location, directly above the two rear brace rods about three feet above the platform.
3. Install the hardware to attach the rear crosshead channel to the stiles—do not tighten the bolts at this time.
4. Equally turn both post-wise adjustment screws in until each guide shoe is touching its corresponding rail.
5. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut and adjust until both sides are equal.
6. Tighten the locknuts on the guide shoe post-wise adjustment screws.
7. Use the provided hardware to install the front crosshead channel in its permanent location at the top of the stiles—do not tighten the bolts at this time.
8. Verify that the crossheads are square and plumb with the stiles.
9. Tighten all of the hardware in both crosshead channels.

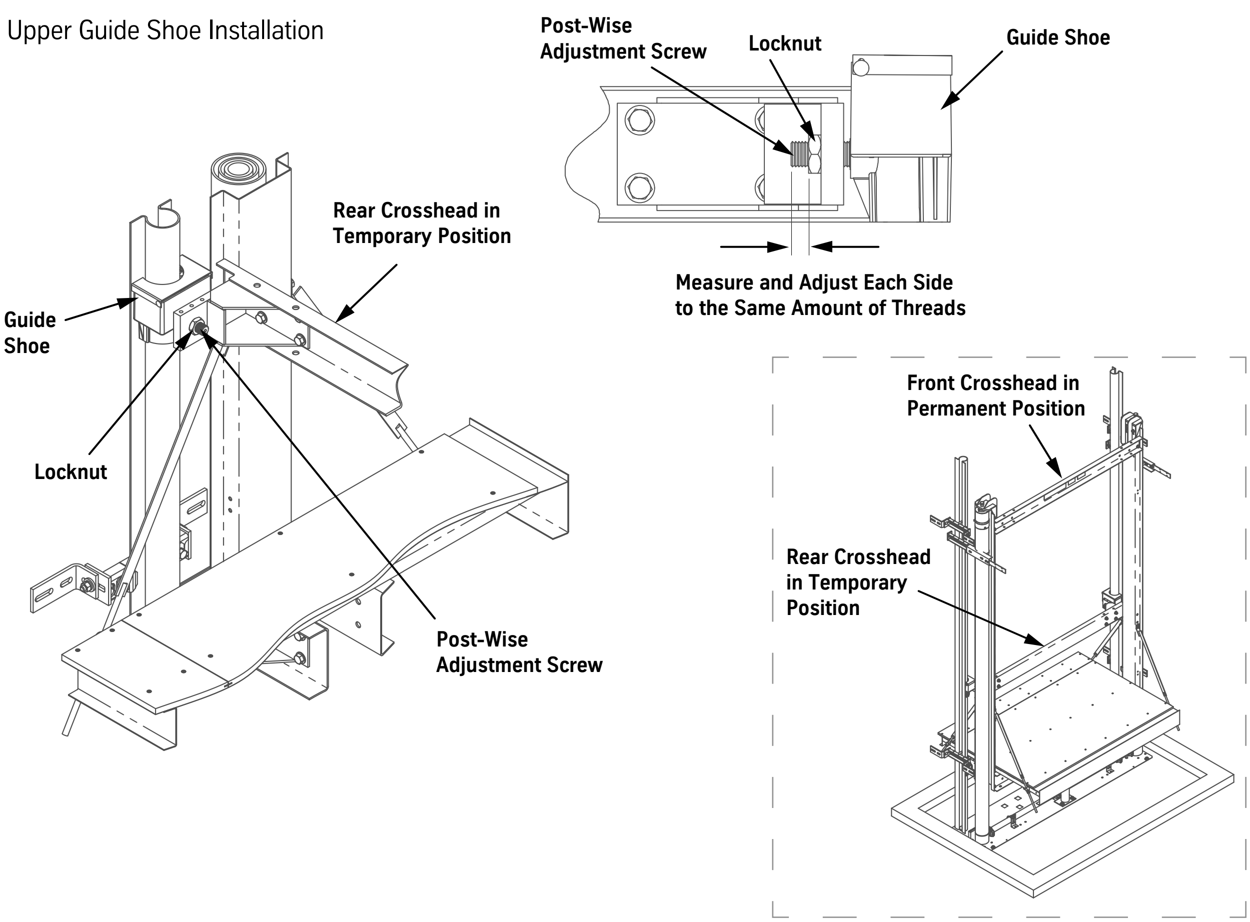


Figure 44 - Crosshead Installation

Car Frame
(continued)

Drip Tube

1. Install the drip tube on the barbed elbow (located on the packing head), and run the tube to a drip pan in the pit. See Figure 45.

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

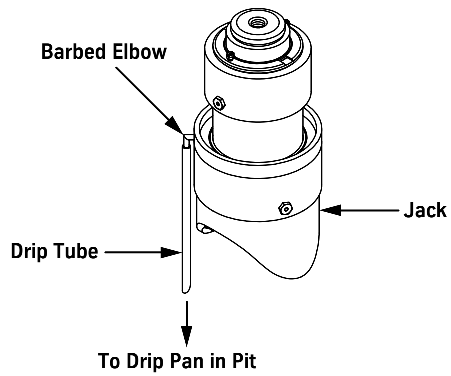


Figure 45 - Drip Tube Installation (Two Stage Shown)

Temporary Operation

1. Fill the power unit with oil.

2. Energize the power unit until the jacks begin to move to fill empty supply lines with oil.

3. Remove the sonotube from below the lower plunger.

4. Turn OFF, Lock, and Tag out the mainline disconnect.

5. Follow the directions on the start-up card inside the controller.

6. Turn ON the mainline disconnect, and verify operation.

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

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

Bleed the Jacks

Single Stage

1. Slightly open both bleeder ports (located at top of each jack) to allow air to enter the valve. See Figure 46.

2. Momentarily energize the pump motor until oil is visible at the bleeder valve.

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

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

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

Two Stage Telescoping

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

2. Slightly open the bottom bleeder valve on each jack.

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

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

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

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

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

5. Progress upward, and repeat steps 1 through 3 for the other bleeder valve pairs.

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

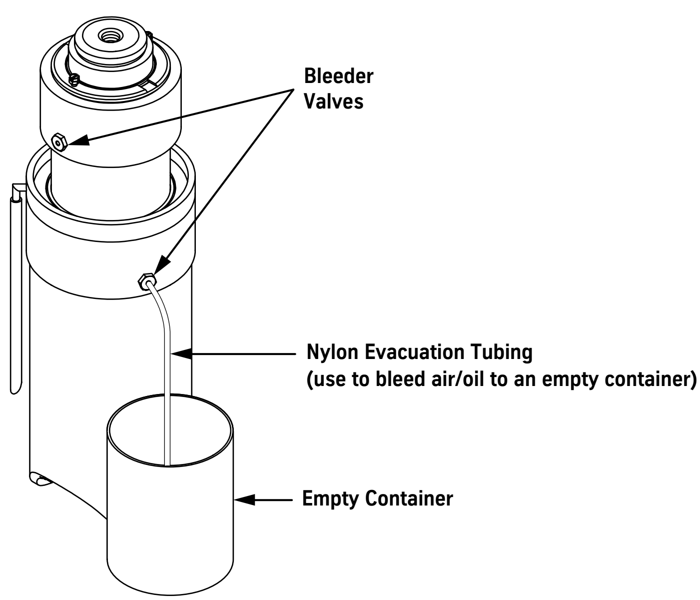


Figure 46 - Bleed the Jacks

Car Guide Rails

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

1. Place the car frame as close as possible to the top of the rails.
2. Install the lasers on the pit template underneath the rails. See Figure 47 on page 1-64 for all steps in this procedure.
3. Install next set of rail brackets. See job layout for maximum distance between brackets.
4. Use the laser lines and the laser target to adjust both rail brackets.
5. Use two splice clamps to install a splice tube in the existing rail, and tighten the splice.
6. Hoist the new rail up, and slide it down over the splice tube.
7. Install the remaining two splice clamps, and tighten the splice.
8. Repeat step 3 through step 7 for the opposite side.

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

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

Car Guide Rails
(continued)

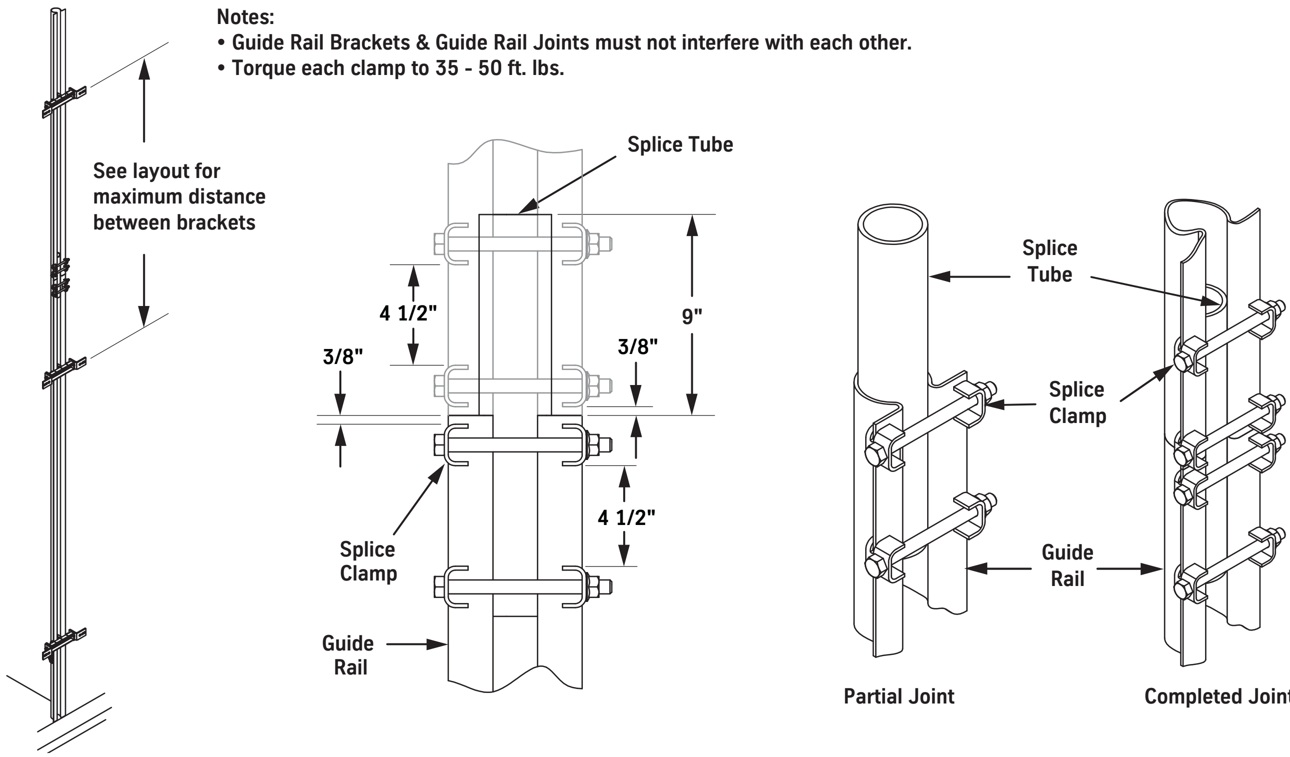


Figure 47 - Rail Splice and Final Rail Installation

Rear Crosshead Channel

1. With the car at the first landing, remove the rear crosshead channel from the stiles and raise it up to its permanent location at the top of the stiles. See Figure 48.

CAUTION

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

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

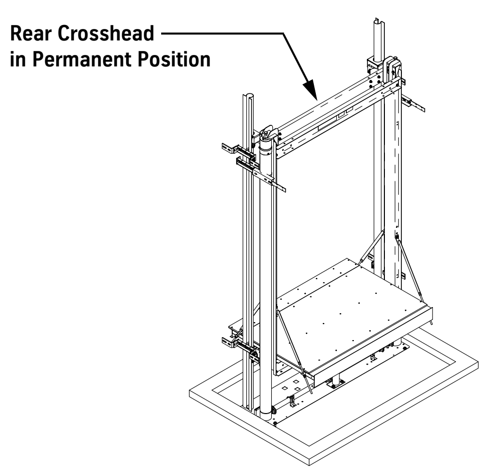


Figure 48 - Rear Crosshead Permanent Position

Install Support Pipes

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

1. Locate and install the provided anchor bolts. See Figure 49 for dimensions.
2. Place each bracket over a bolt, and tighten the bolt.
3. Place the support pipes on the brackets.

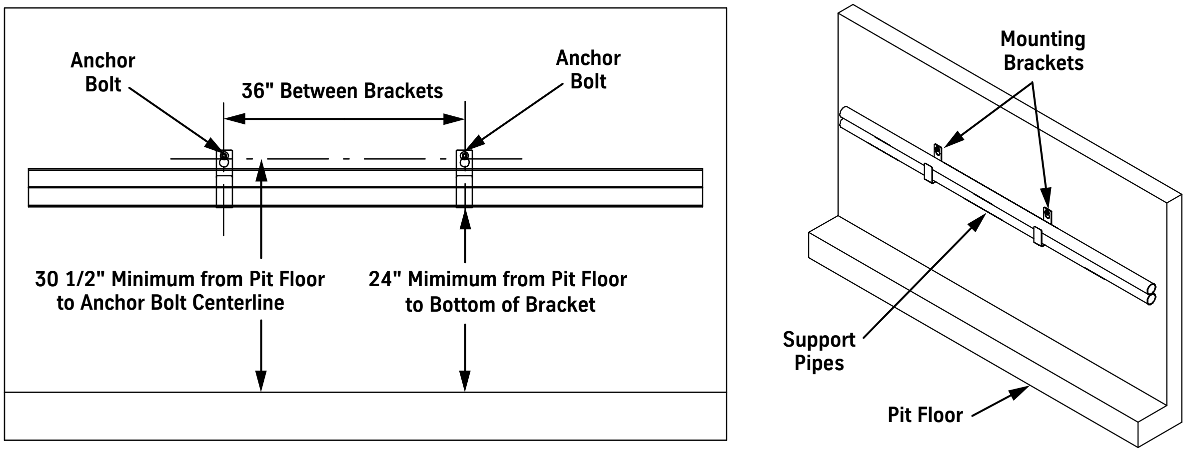


Figure 49 - Support Pipe Mounting Bracket Kit

Sensor Installation

See Figure 50 on page 1-67 and Figure 51 on page 1-68 for details.

Sensor Requirements

Two landing jobs = No sensors.

Three landing jobs = 2 dynamic sensors for the top landing.

Four or more landing jobs = 2 static sensors for each landing, and 2 dynamic sensors for the top landing.

Static Sensors

Activated when the car is stopped level with a landing; when used with four or more landing jobs, two static sensors are required for each 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 must be level with its counterpart.

Sensor Installation

(continued)

2. Mount one static sensor on each side of the hoistway at each landing.
   a. If not already there, position the car level with the bottom landing.
   b. Mount a jack sensor assembly on the car rails so that the sensors are vertically aligned with the vertical center of the sensor plunger cap.
   c. Horizontally adjust the sensors so that they overlap the sensor plunger cap by $^3/_4$". Verify that the sensors will not be activated by the bottom plunger head.
   d. Position the car level with the second landing, and repeat step 2b and step 2c for the second landing.
   e. Repeat step 2b through step 2d for each next intermediate landing.

Note: Ensure that each sensor pair is placed at exactly the same height in the hoistway because each sensor pair must activate at the same time, ± $^1/_8$".

3. Wire all sensors per the job wiring diagrams.
4. Perform a jack resynch, and check the adjustment.

Dynamic Sensors

Activated when the car is moving into the top landing. When used with three or more landing jobs, two dynamic sensors are required for the top 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 must be level with its counterpart.

2. Position the platform level with the top landing.
3. Install the buffer springs (if they have been removed).
4. Lower the platform 60" from the top landing.
5. Locate the top of the upper guide sensor cap, and mark the guide rail at that point.
6. Mount a dynamic sensor assembly on the guide rail with the top of the sensor assembly bracket roughly level with the top of the sensor plunger cap.
7. Level the sensor assembly front-to-back and side-to-side.
8. Repeat step 5 through step 7 for the other side.
9. Level the two sensors with each other. Do not use the sensor plunger caps for reference.

Note: Ensure that each sensor pair is placed at exactly the same height in the hoistway because each sensor pair must activate at the same time, ± $^1/_8$".

10. Horizontally adjust the sensors so that they overlap the sensor plunger cap by $^3/_4$". Verify that the sensors will not be activated by the bottom plunger head.
11. Wire the sensors per the job wiring diagrams.
12. Perform a jack resynch.

Sensor Installation
(continued)

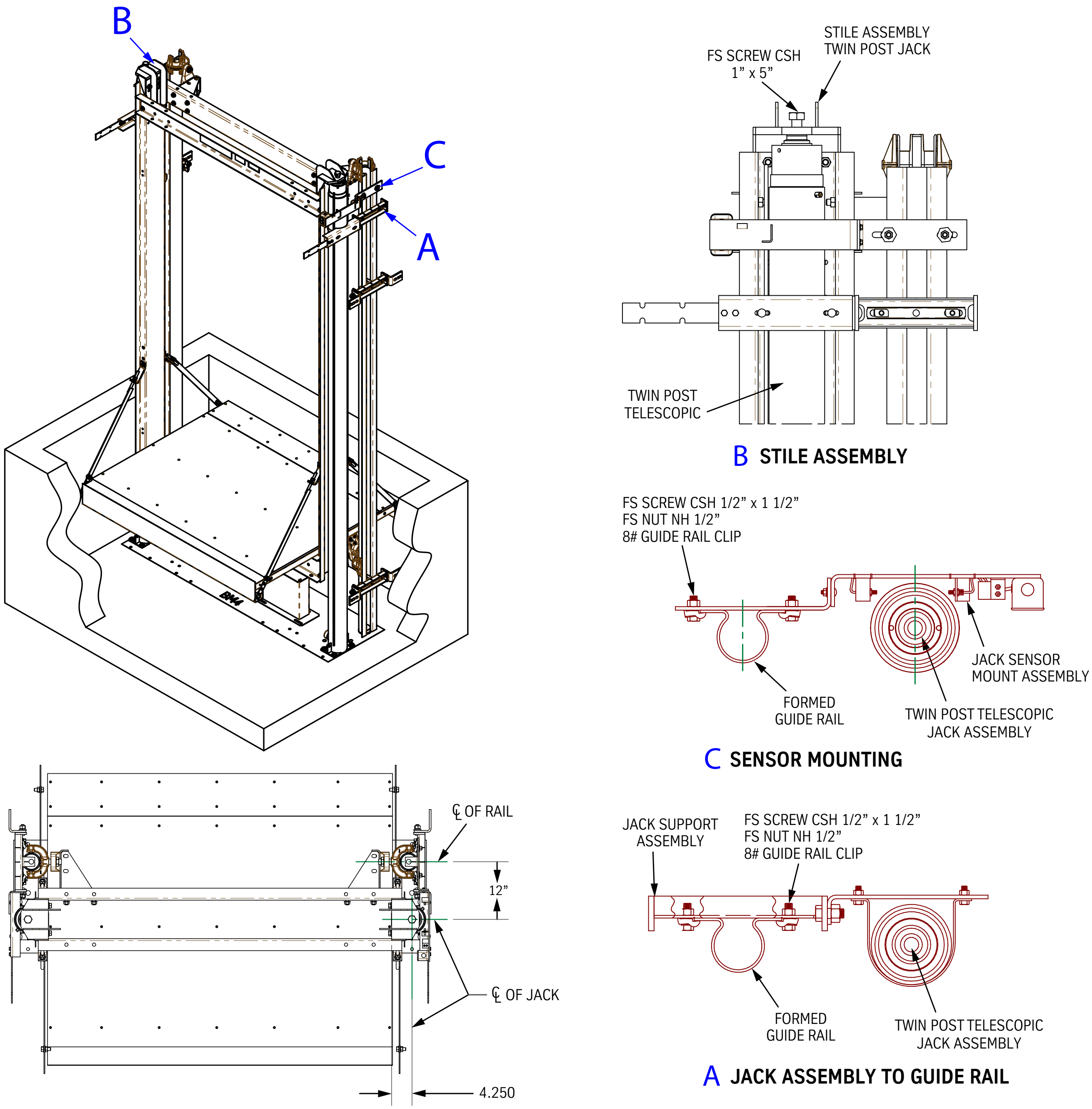


Figure 50 - Sensor Assembly Mounting

Sensor Installation
(continued)

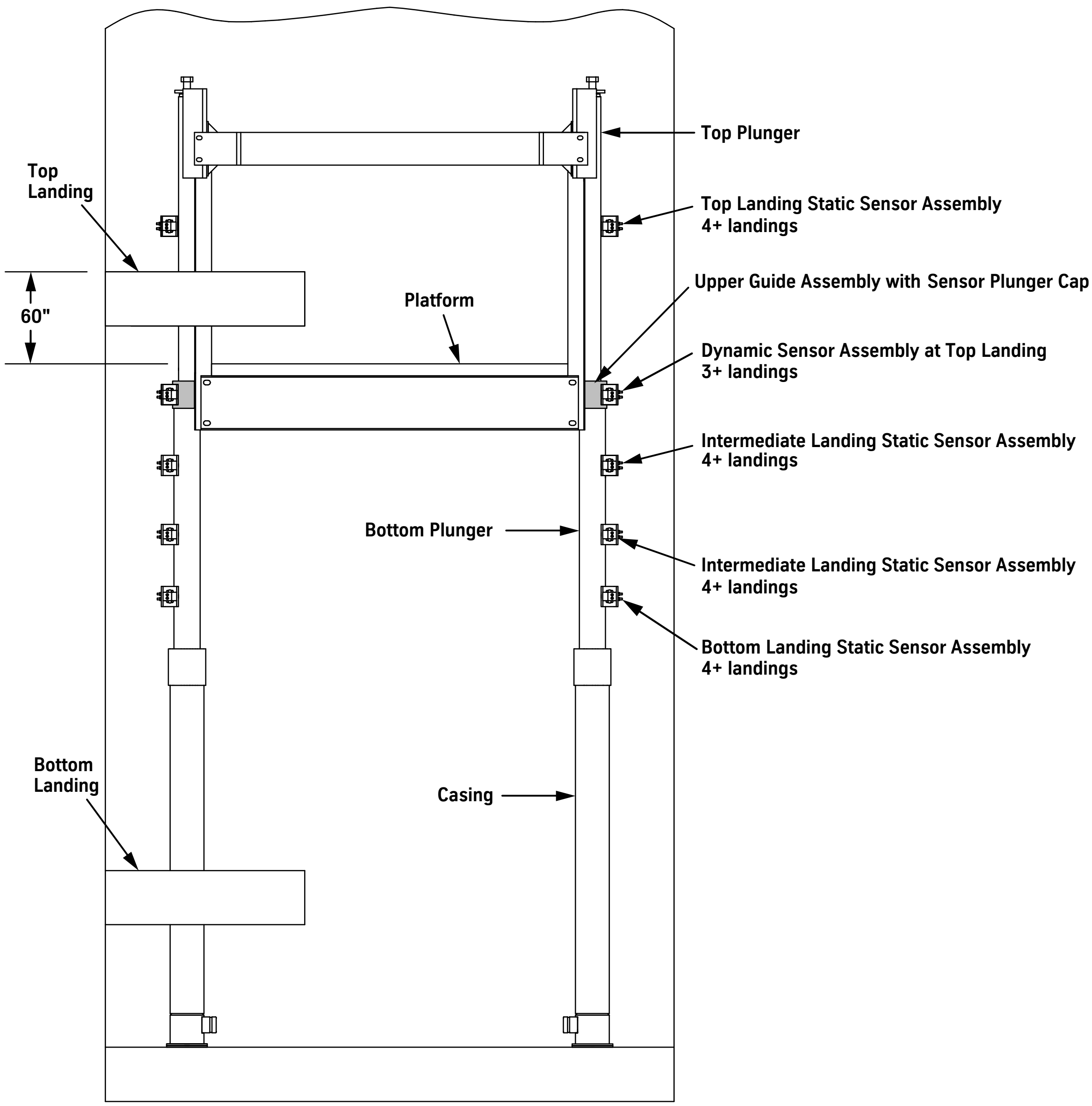


Figure 51 - Hoistway Sensor Installation

Technical Information

Pit Depth Verification After Elevator Installation

1. Place the car at the bottom landing.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Use the manual lowering valve to lower the car down onto the buffer springs.
4. Open the bottom landing hoistway doors.
5. Verify that the car sill is level. If not, correct by shimming the buffer stand; see the Buffer Stand procedure on page 1-55.
6. Measure the distance from the hoistway sill to the car sill, and record this measurement as dimension A.
7. Close the manual lowering valve.
8. Turn ON the mainline disconnect.
9. Run the car Up far enough to gain access into the pit.
10. Turn OFF, Lock, and Tag out the mainline disconnect.
11. Remove the buffer springs.
12. While in the pit, verify that there is nothing to interfere with the car being lowered into the pit, e.g., sprinkler heads.
13. Turn ON the mainline disconnect.
14. Place the car at the bottom landing.
15. Turn OFF, Lock, and Tag out the mainline disconnect.
16. With the manual lowering valve, lower the car until the jacks bottom out.
17. Check that both jacks are fully collapsed.
18. Open the bottom landing hoistway doors.
19. Verify that the car sill is level. If not, correct by adding 1" spacer washers (as needed) between the top of the jack and the lift bracket / platen assembly. See the Car Frame procedure on page 1-56.
20. Measure the distance from the hoistway sill to the car sill, and record this measurement as dimension B.
21. Close the manual lowering valve.
22. Subtract dimension A from dimension B; B - A = C; The value of C should be $2^1/_4$" to $2^1/_2$" if not, before attempting a resynch, make necessary corrections.
23. Turn ON the mainline disconnect, and return the car to service.

Maintenance

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

Single Stage Twin Post Jack

Replace Jack Seals (3.0" & 3.875" dia.)

Seal Removal

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 assembly. See Figure 52.

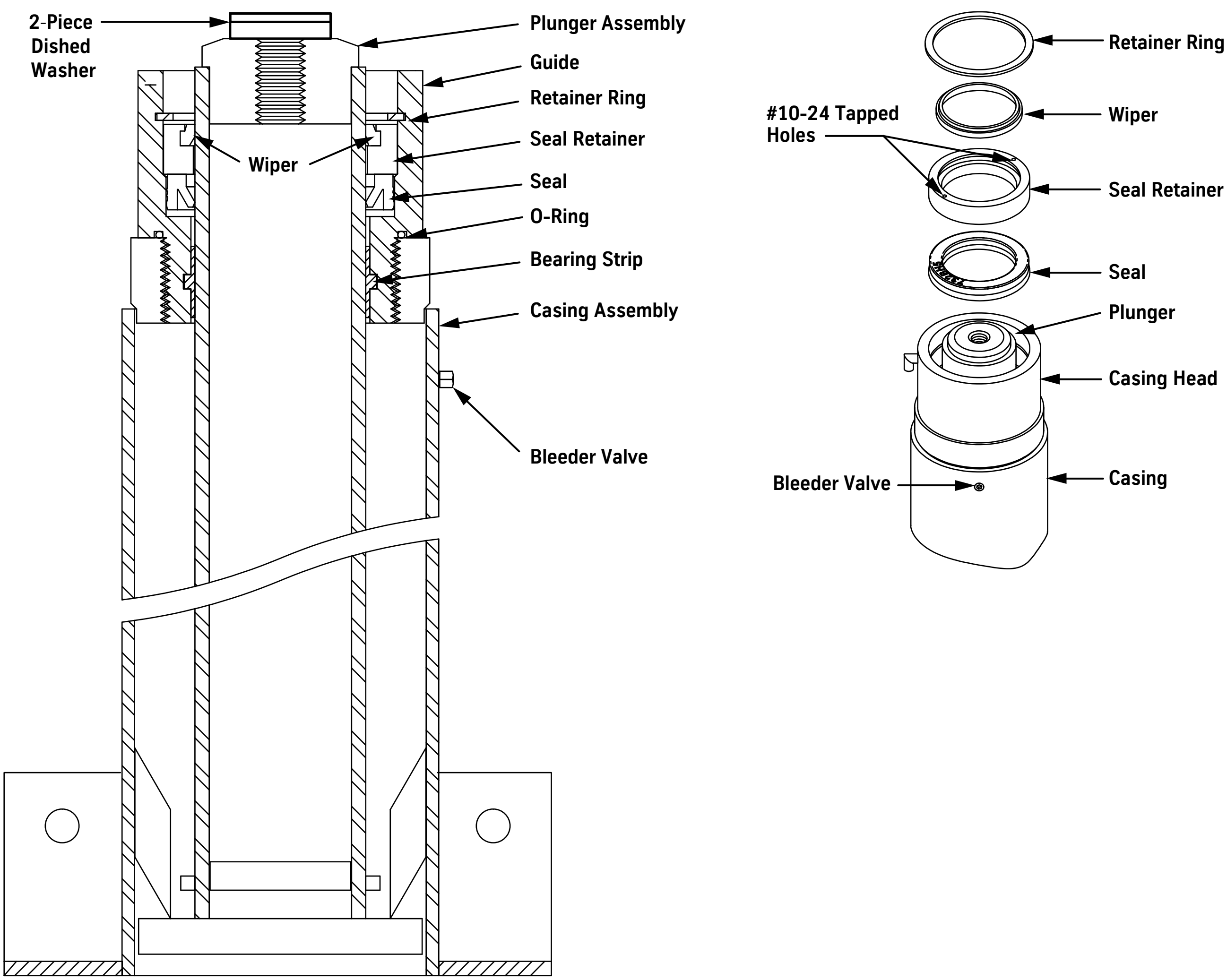


Figure 52 - Remove and Replace Jack Seals

Replace Jack Seals
(continued)

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. Use a pair of pliers to grasp the screws and pull the seal retainer from the recess.
12. Screw packing removal tools or two drywall screws into the seal.
13. Without scratching the plunger or the seal recess in the guide, pull the seal from the recess.
14. Use clean rags to remove all oil from the seal recess because a new seal will not properly seat in a recess containing oil.
15. Check for and polish out any scratches in the seal recess. Replace the guide if there are any scratches which can cut the seal.

Install New Seal

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

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

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

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

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

Maintenance
(continued)

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

Replace Jack Seals and Check Valves

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

Required Tools	Part No.	Print No.	Description	Notes
2.5T Jack	9845604	850RH1	Bullet Seal Tool	Prevents damage to oil seal during assembly
	9844211	850RM1	Plunger Head Seal Loading Tool	
	9844119	850RR1	Plunger Head Seal Loading Tool	
	—	200AHE12	Seal Kit	
3T Jack	9845630	850RK1	Bullet Seal Tool	Prevents damage to oil seal during assembly
	9844200	850RT1	Plunger Head Seal Loading Tool	
	9844302	850RV1	Plunger Head Seal Loading Tool	
	—	200AHE13	Seal Kit	

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

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

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

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

   a. Use 240-320 grit emery cloth to carefully remove any deep scratches, burrs, etc.
   b. Polish the area with 600 grit emery cloth.
8. Use a strap wrench to remove lower plunger guide assembly. Leave seal retainer in place.
9. Temporarily re-assemble the upper plunger guide assembly to the lower plunger.
10. Insert the inlet hose from small electric pump into the casing beside the lower plunger.
11. Place a strap choke under the upper plunger guide, and lift lower plunger out of the jack.
12. As the plunger is hoisted, pump the oil into the five gallon container.

Note: The seal will hang on the casing threads when the lower plunger is lifted. Move the lower plunger side-to-side to get the seal past the threads.

Replace Jack Seals and Check Valves
(continued)

13. Leave the lower plunger suspended.

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

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

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

Repair the Jack

See Figure 53 on page 1-75 for all steps in this procedure.

Lower Plunger

1. Replace the seals and the check valve o-ring of the lower plunger.
   a. With the lower plunger suspended, remove the $^1/_2$" x 1" hex head cap screws, the seal retainer, and the bearing strip from the bottom of the lower plunger.
   b. Remove the external oil seal from the lower plunger base.
   c. Remove the check valve and o-ring from the check valve bore.
   d. Disassemble the check valve, and replace the o-ring on the check valve plunger.
   e. Reassemble the check valve; run the nuts together by hand, and then torque them12 - 13 ft lb.
   f. Install a new o-ring in the check valve bore, and then install the check valve.
   g. Install a new external oil seal on the lower plunger base.
   h. Use a $^1/_2$" x 1" hex head cap screw to attach the seal retainer to the lower plunger base, and then tighten to 30 ft. lbs.
   i. Install a new bearing strip on the seal retainer.
2. Place the external seal tool over the top of the casing.
3. Inspect and, if necessary, repair the surface finish of the lower plunger.
4. Lower the lower plunger into the jack casing.
5. Remove the upper plunger guide from the lower plunger.
6. Remove the external seal tool from the top of the casing.
7. Disassemble lower plunger guide and discard wiper, internal oil seal, and o-ring.
8. Clean the lower plunger guide parts.
9. Use a new wiper, a new internal oil seal, and a new o-ring to reassemble the lower plunger guide. Apply grease to the o-ring to hold it in place.
10. Place the bullet seal tool into the top of the lower plunger.
11. Install the lower guide on the casing.
12. Remove the bullet seal tool.

Repair the Jack
(continued)

Upper Plunger

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

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

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

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

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

Repair the Jack
(continued)

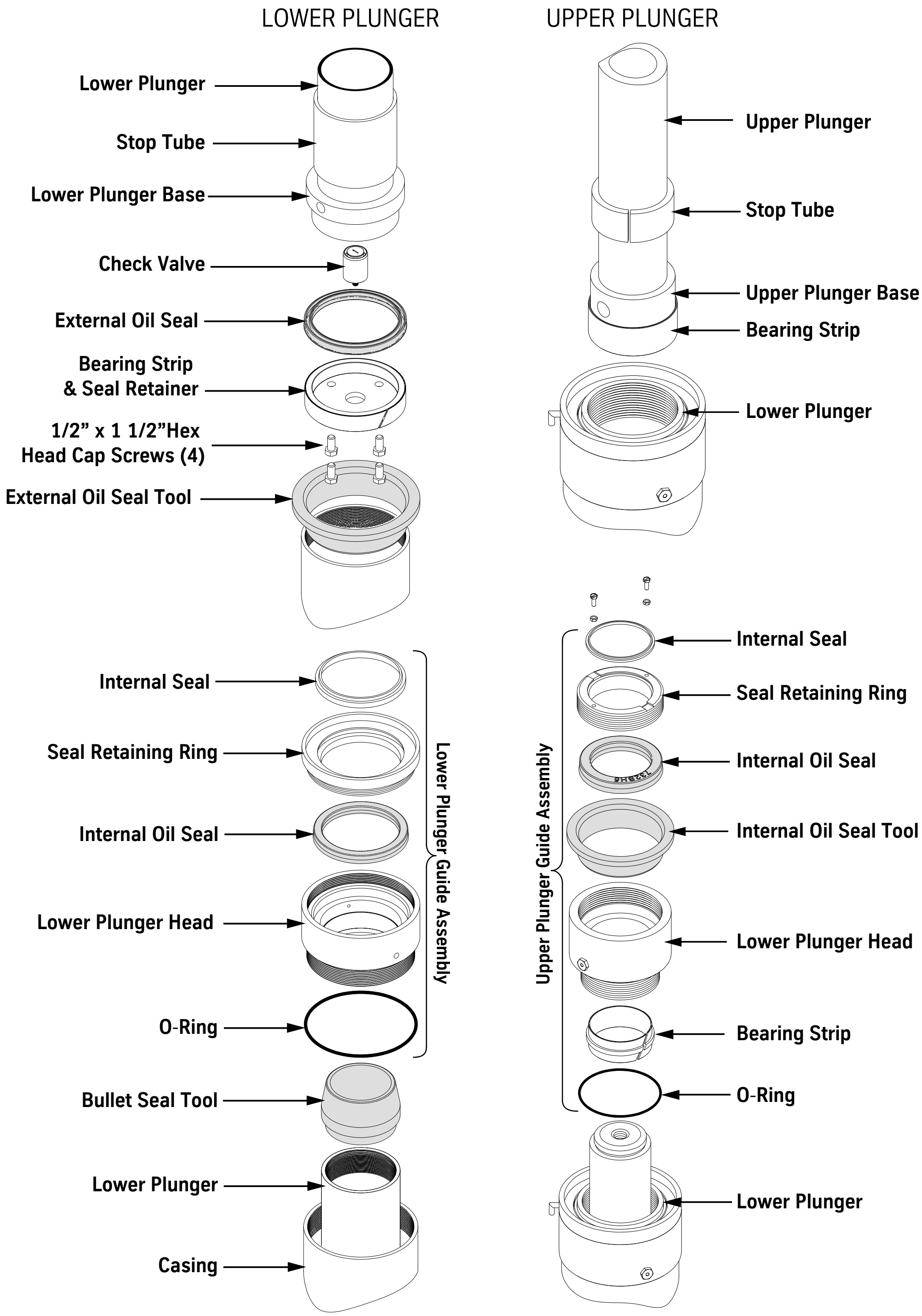
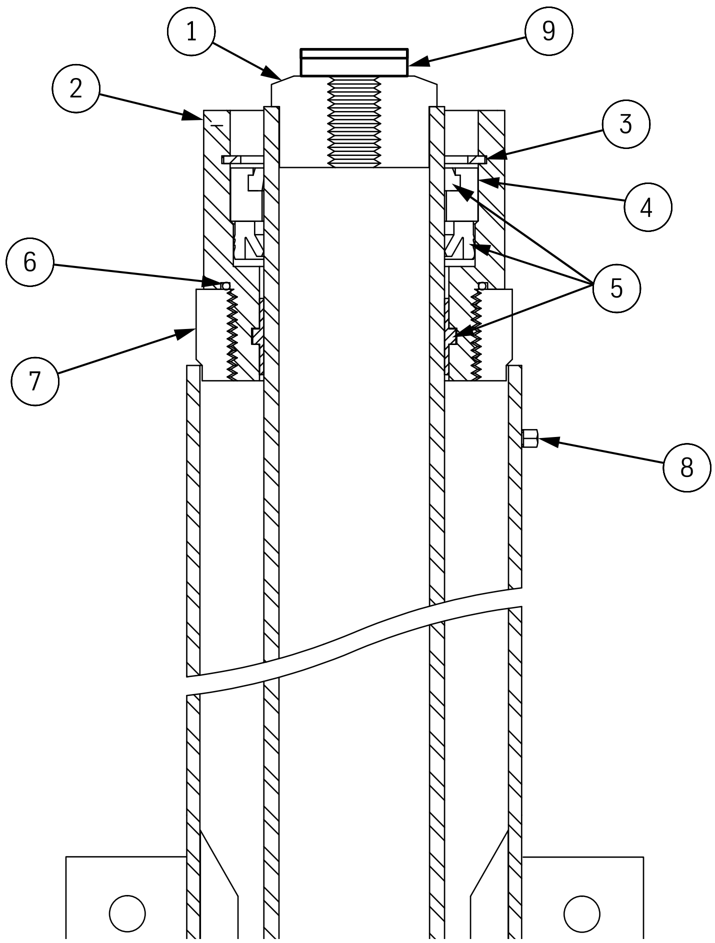


Figure 53 - Lower and Upper Plunger Internal and External Oil Seal Installation

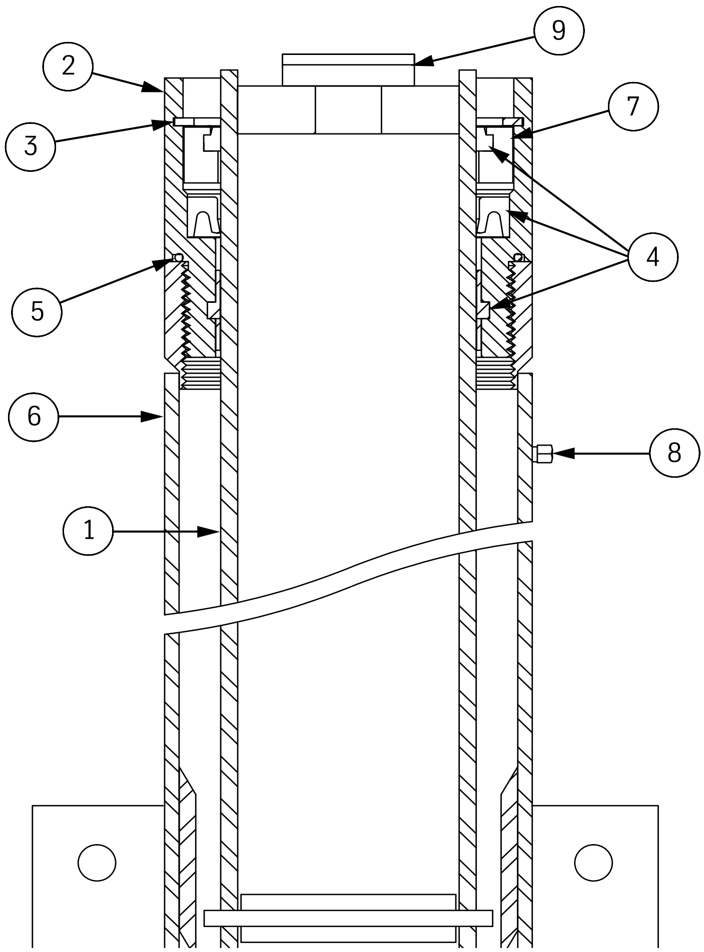
Replacement Parts

Single Stage Twin Post Jack Assembly, 3.00” Diameter



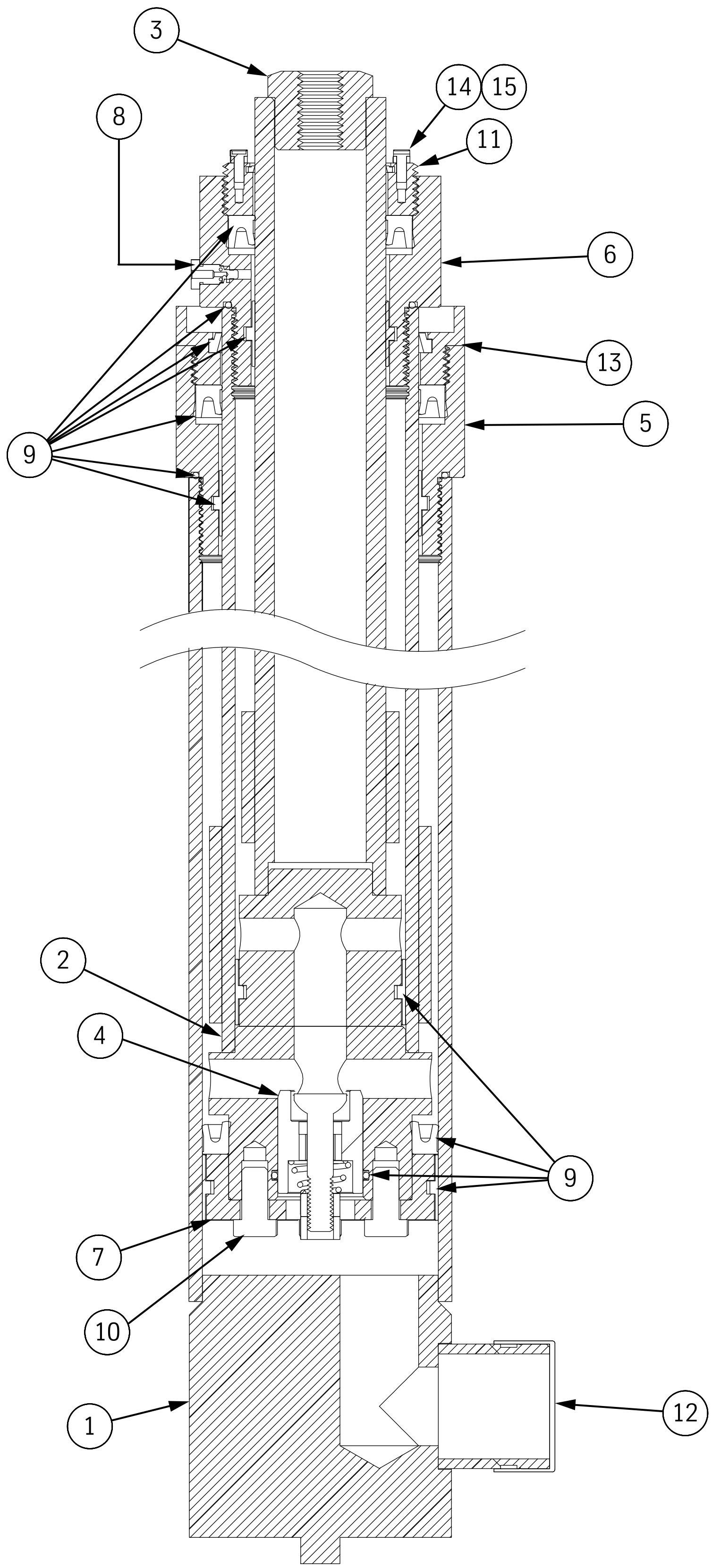
ITEM	PRINT NO.	DESCRIPTION
1	6502AC3	Plunger Assembly
2	454AM2	Plunger Guide
3	717BE1	Ring, Retainer Offset, Internal
4	713AA2	Retainer, Seal, Oil
5	200AEH1	2S Seal Kit
		Seal, Internal, Oil
		Bearing Strip
		Seal, Internal, Type "D" Wiper
6	717AB3	O-Ring
7	6503BN1	Casing Assembly
8	114811	Valve, Bleeder
9	399BC1	Washer, Dished, 2-piece
10	232CD1	Cap, Protective for Victaulic (Not Shown)
11	107846	Plug, Pipe, NPT (Not Shown)
12	700863	Plug, Pipe, (Not Shown)

Single Stage Twin Post Jack Assembly, 3.875” Diameter



ITEM	PRINT NO.	DESCRIPTION
1	6502AD2	Plunger Assembly
2	454AN1	Plunger Guide
3	139357	Ring, Retainer
4	200AEH2	3S Seal Kit
		Seal, Internal, Oil
		Bearing Material
		Wiper
5	139358	O-Ring
6	6503BP1	Casing Assembly
7	148113	Retainer, Seal
8	114811	Valve, Bleeder
9	399BC1	Washer, Dished, 2-piece
10	232CD1	Cap, Protective for Victaulic (Not Shown)
11	107846	Plug, Pipe, NPT (Not Shown)
12	700863	Plug, Pipe, (Not Shown)

Two Stage Twin Post Jack Assembly, 2.5T and 3T



Two Stage Twin Post Jack Assembly Parts List, 2.5T and 3T

ITEM	PART NO.	PRINT NO.		DESCRIPTION
		2.5-T	3-T	
1		6503BM4	6503BM3	Casing Assembly
2		6502AA4	6502AA3	Plunger Assembly, Lower
3		6502AB5	6502AB6	Plunger Assembly, Upper
4	9721824	886BF2	886BF2	Valve Assembly, Check
5		454AJ4	454AJ3	Guide, Lower Plunger
6		454AK2	454AK1	Guide, Upper Plunger
7		712AA4	—	Retainer, Bearing, 4.347" O.D.
		—	712AA3	Retainer, Bearing, 5.098" O.D.
8		886BN1	886BN1	Valve, Bleeder
9		200AEH12	200AEH13	Seal Kit
		732BH6	—	Seal, Oil, Internal, 2.50" I.D.
		—	732BH5	Seal, Oil, Internal, 3.00" I.D.
		732BH7	—	Seal, Oil, Internal, 3.75" I.D.
		—	732BH8	Seal, Oil, Internal, 4.25" I.D.
		732BJ2	—	Seal, Oil, External, 4.50" O.D.
		—	732BJ1	Seal, Oil, External, 5.25" O.D.
		142CG4	142CG3	Bearing, Upper Plunger
		142CG2	142CG1	Bearing, Lower Plunger
		142CH4	142CH3	Bearing, Upper Piston
		142CH2	142CH1	Bearing, Lower Piston
		717BB1	717BB1	O-Ring, #223
		75483	75483	O-Ring, #237
		717BB2	717BB2	O-Ring, #247
		78136	78136	O-Ring, #006
		732AP3	732AP3	Seal, Internal "D" Wiper
		732AR2	732AR2	Seal, Internal "AN" Wiper
10		396EH1	396EH1	FS, Screw, CSH .500" x 1.0" Z
11		717BC4	717BC3	Ring, Retaining, Seal
12		232CD1	232CD1	Cap, Protective 2.378" ID
13		717BP3	717BP4	Ring, Retaining, Seal
14		396PA1	396PA1	FS, Screw, .190" (#10) x .50" Z
15	9702234	700571	700571	FS, Nut, NH, .190" (#10) Z
16		107846	107846	Plug, Pipe, NPT, 2.0"
17	9810043	232AL5	232AL6	Cap, Plunger, Sensor (Not Shown)

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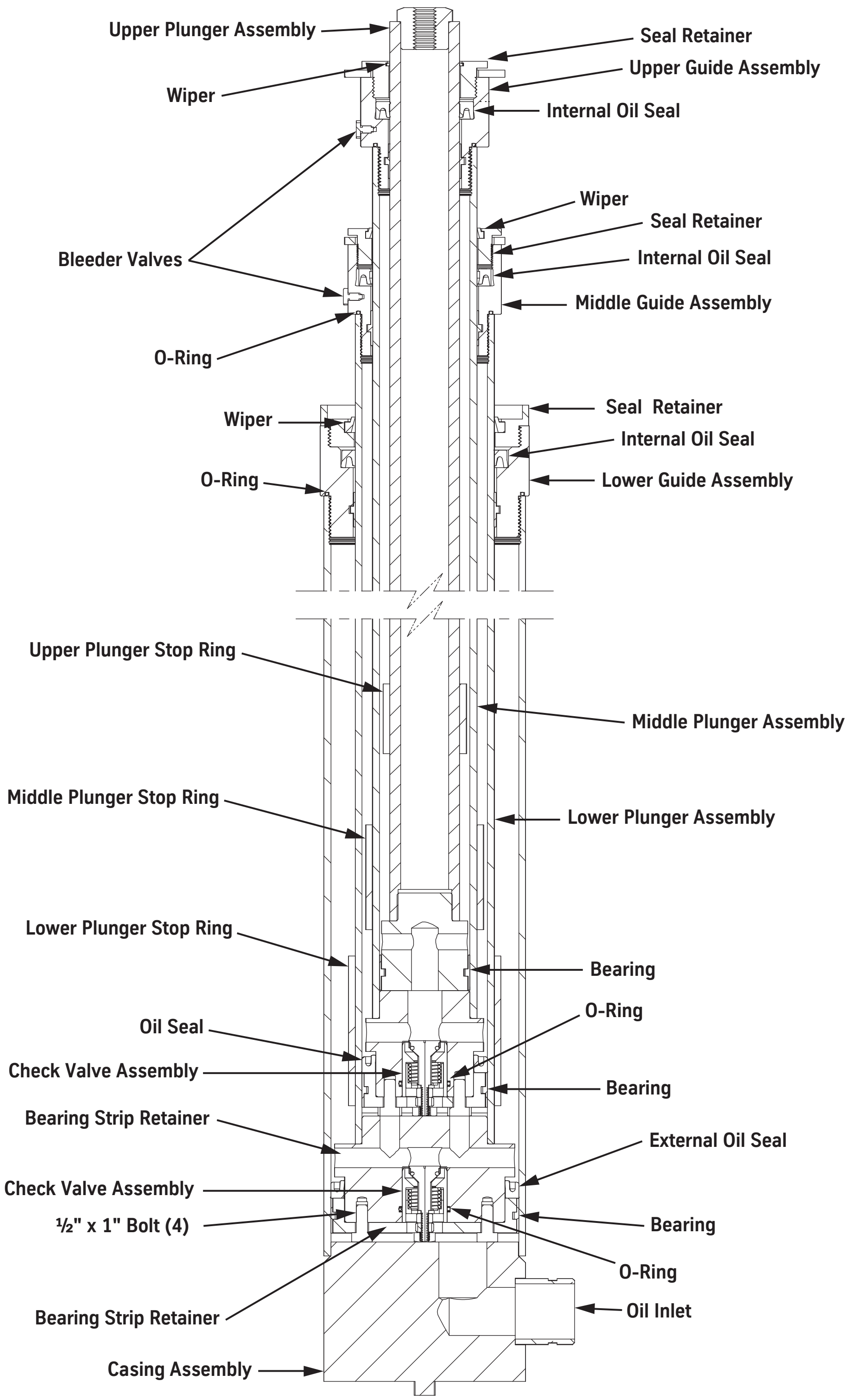
TWIN POST JACKS

Three Stage Twin Post Telescoping Jacks, 2.5-T-III Overview



Installation

Power Unit

Position the power unit according to job layout, and use four $^1/_2$" anchors to secure it to the machine room floor (manufacturing supplies anchors for seismic jobs only). See Figure 54.

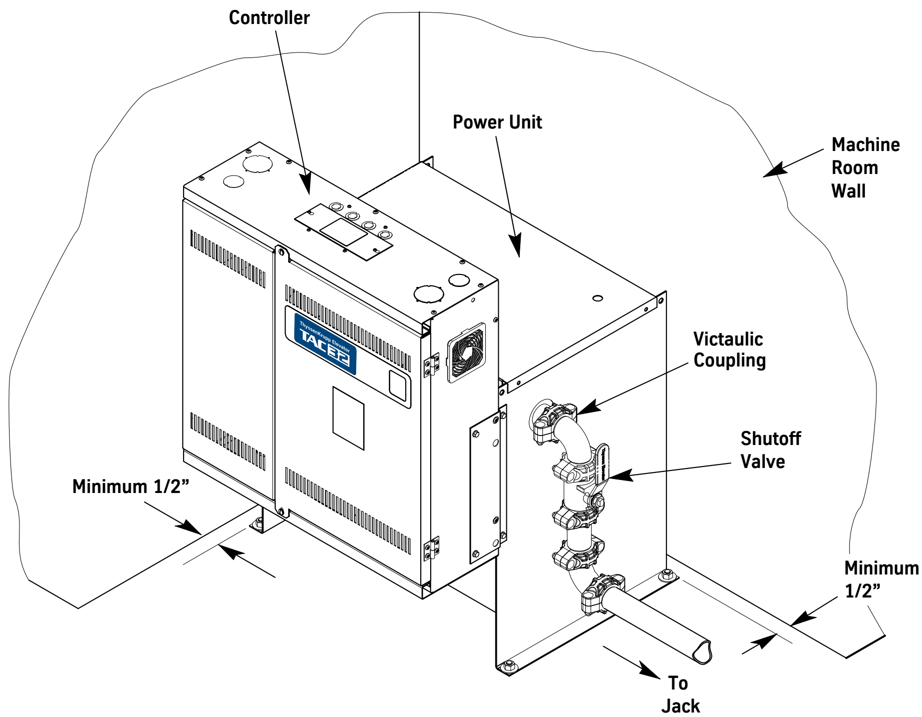


Figure 54 - Power Unit Placement and Piping

Pit Template

1. Verify that the hoistway position is correct with reference to the building grid or corridor lines (if supplied).
2. Verify that the pit's width and depth are correct per the layout; check the squareness.
3. Place the pit template on the pit floor, and position it per the layout.
4. Place a laser on each end of the template, and survey the hoistway. See Figure 55 on page 1-83.
5. Adjust the pit template so that the centerlines of the rail and jack match the layout.
6. Measure from the laser line to the back of the hoistway to ensure that the car has adequate running clearance.
7. Verify that the pit template is level and square, and then use a $^1/_2$" concrete anchor in each corner to secure it to the pit floor.

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

Pit Template

(continued)

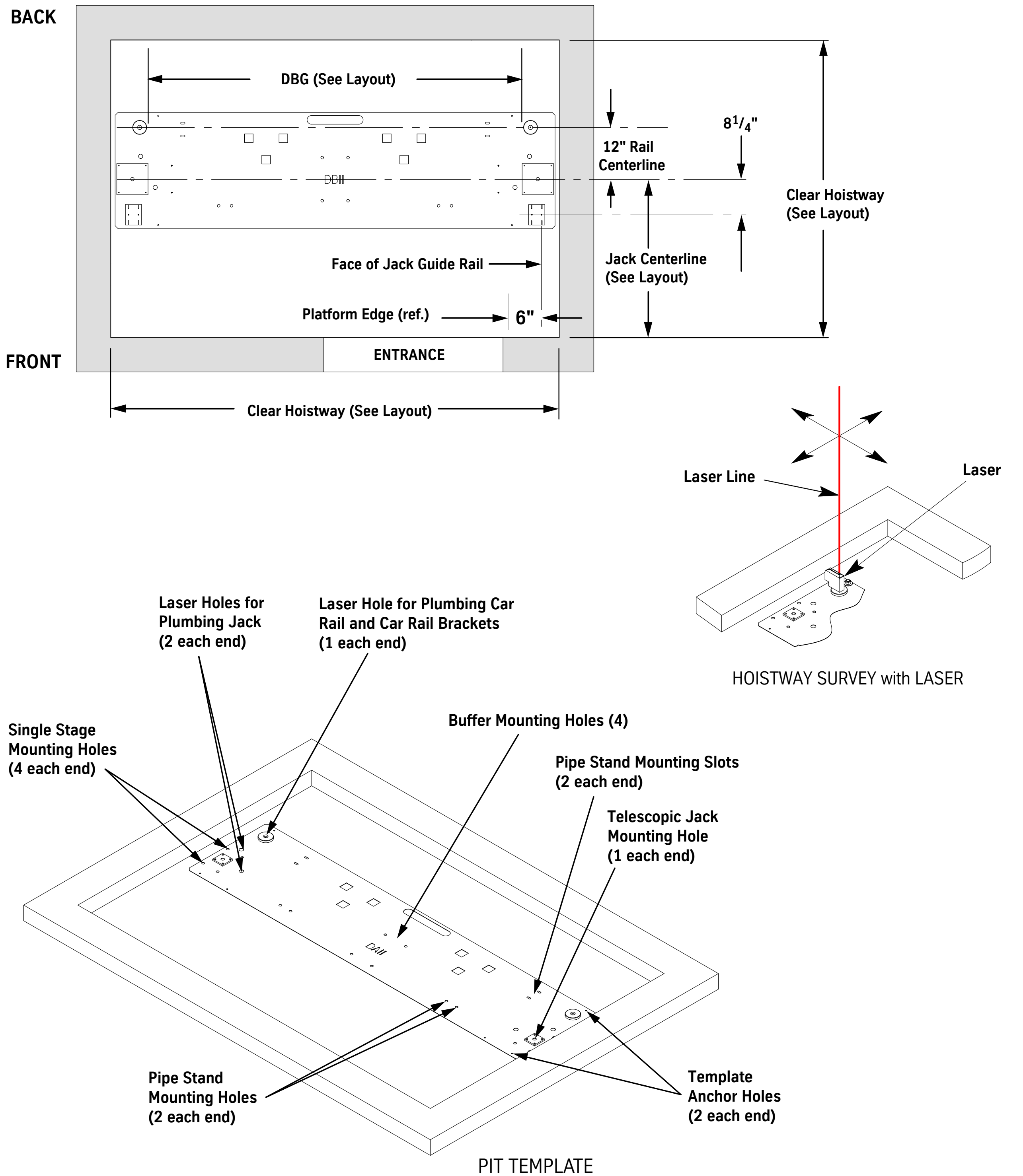


Figure 55 - Pit Template Hoistway Layout

Jack Guide Rails

1. Attach the 8 foot long jack guide rail (with a manufacturing-attached splice jack guide rail) to the mounting brackets on the starter rail at the same elevation and corresponding mounting surface as the first car rail bracket. See Figure 56 on page 1-85.

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

2. Adjust the placement per the job layout.

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

4. Place a laser in the starter rail laser hole.

5. Plumb the starter rail with the laser, and then tighten the jack guide rail mounting brackets to the wall and to the starter rail.

Note: The face of starter rail and horizontal center of rail opening will align with laser beam.

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

Jack Guide Rails
(continued)

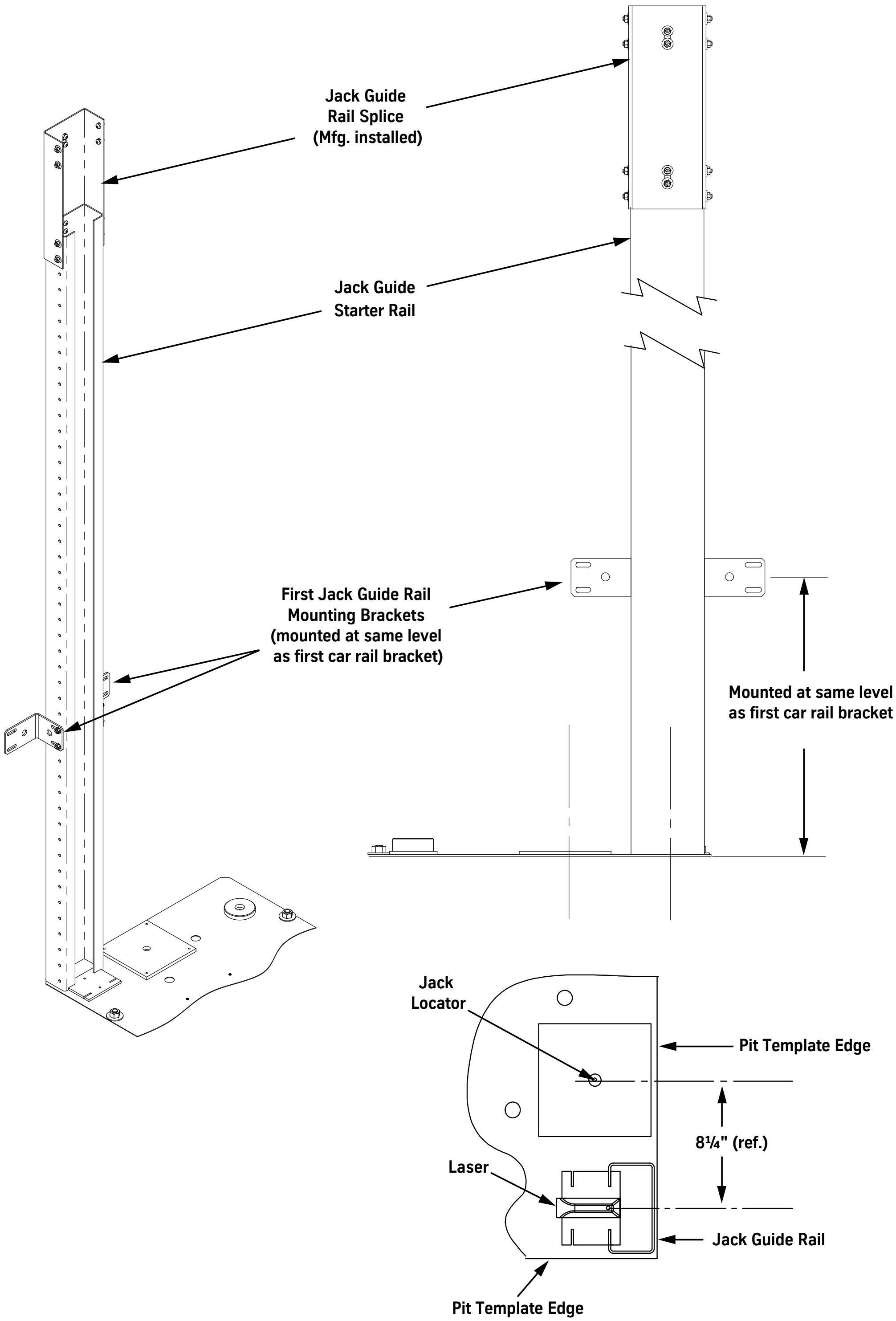


Figure 56 - Install the Jack Guide Rails

Car Rail Brackets

1. Set the depth of all rail brackets per the dimensions given on the layout. See Figure 57 on page 1-87.
2. Install a bottom rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
3. Repeat step 2 for the opposite side bottom rail bracket.
4. Measure the distance between the two rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.
5. Remove the targets from the first set of rail brackets.
6. Install a second tier rail bracket.
   a. Place a target in the locating hole of the rail bracket.
   b. Per the layout, place and adjust the rail bracket until the laser beam is centered in the target.
   c. Completely anchor the rail bracket.
7. Repeat step 6 for the opposite second tier rail bracket.
8. Measure the distance between the two second tier rail brackets from both ends of the brackets to ensure that they are square (faced) to one another.

Car Rail Brackets
(continued)

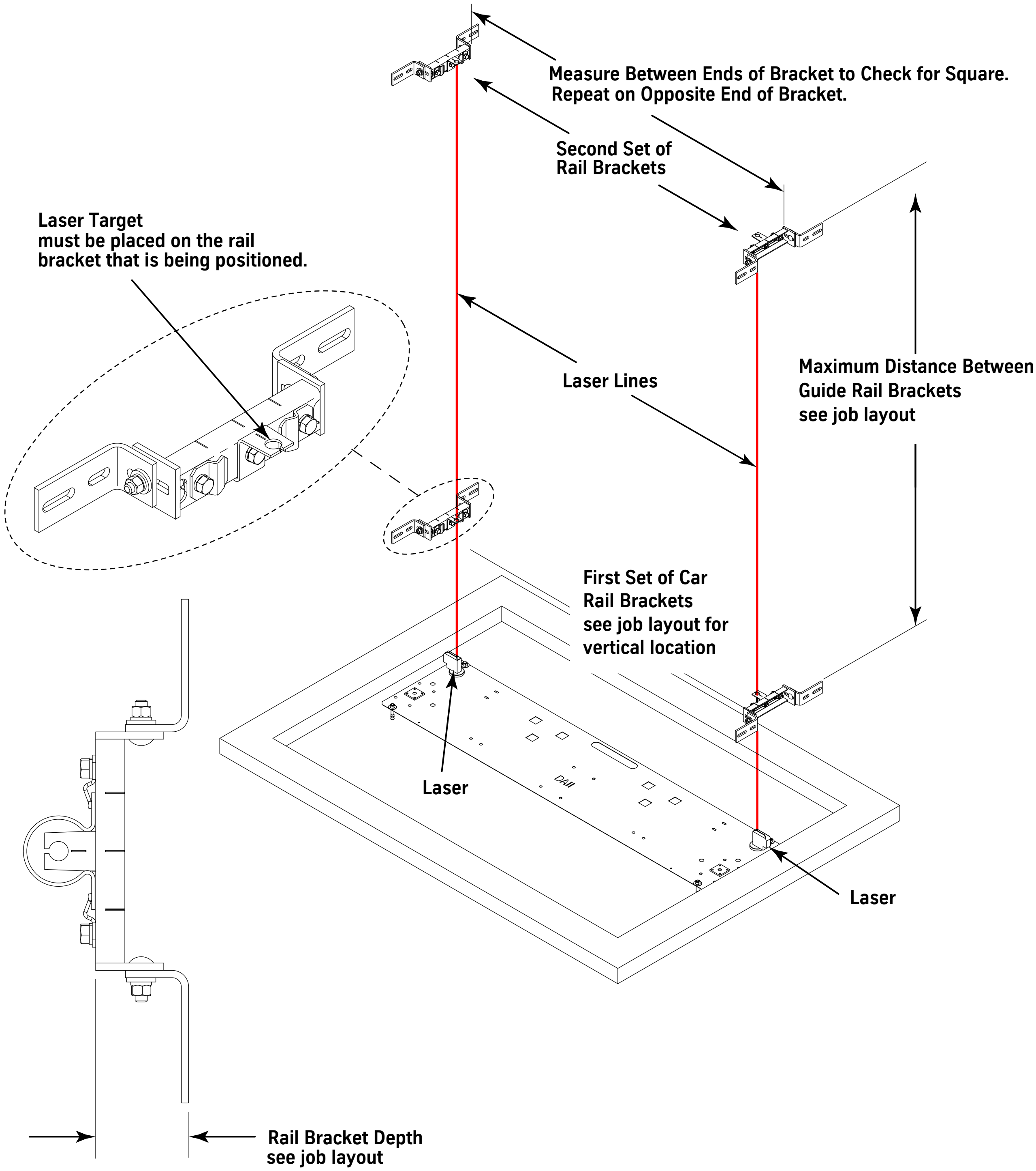


Figure 57 - Car Rail Bracket Installation

Car Rails

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

1. Place the first rail on the template and against the rail bracket(s).
2. Press the rail onto the tapered keyhole brackets. See Figure 58.
3. Use the provided slip clips to attach the rail to the bracket.
4. Tighten the clips with the heel of the clip butted against the rail.
5. Repeat step 1 through step 4 for the opposite side.

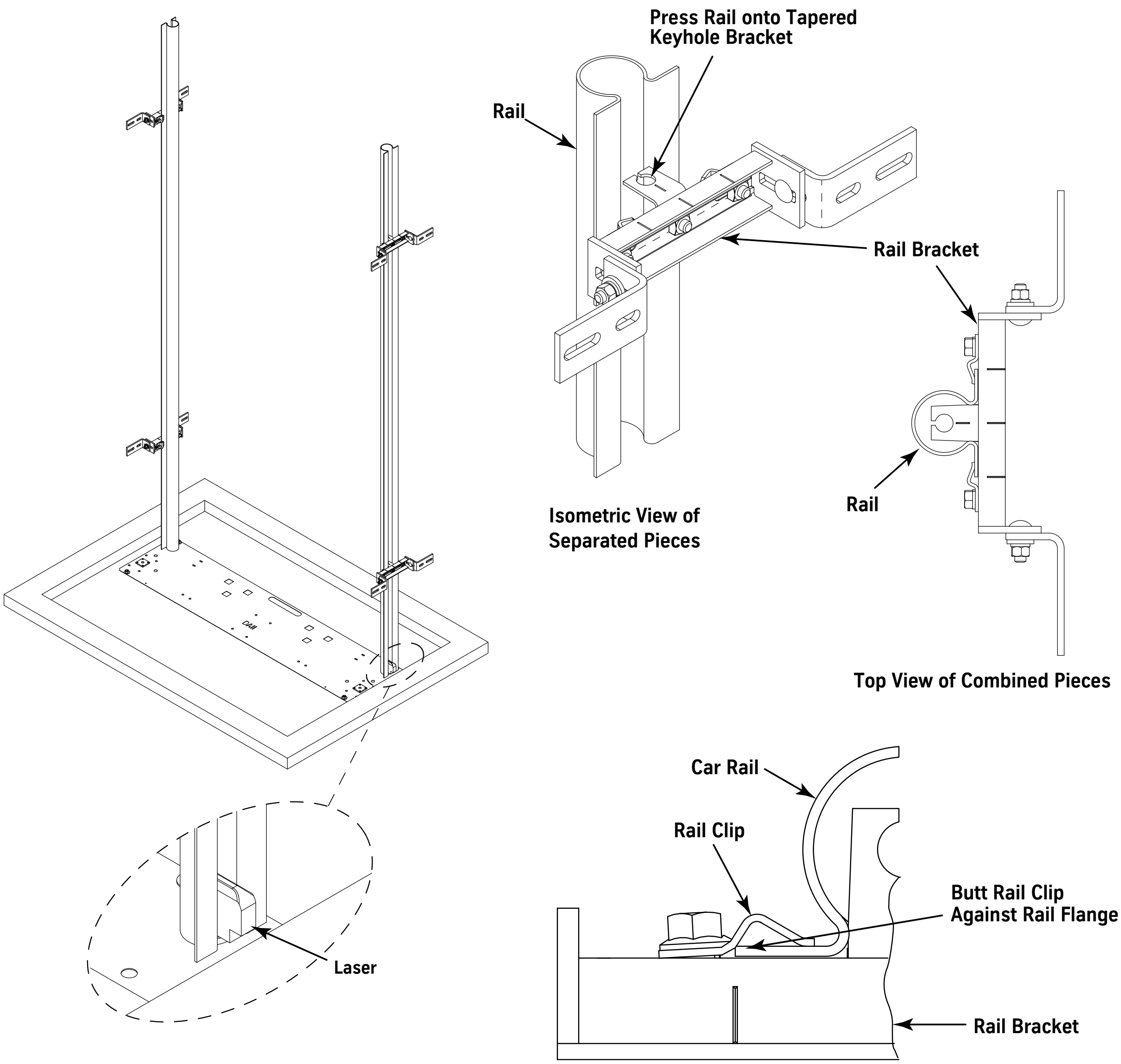


Figure 58 - Car Rail Installation

TWIN POST JACKS

Jack Installation

1. Attach the jack support bracket to the car guide rail just below the top of the jack casing. See Figure 59 below and Figure 60 on page 1-90 for all steps in this procedure.

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

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

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

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

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

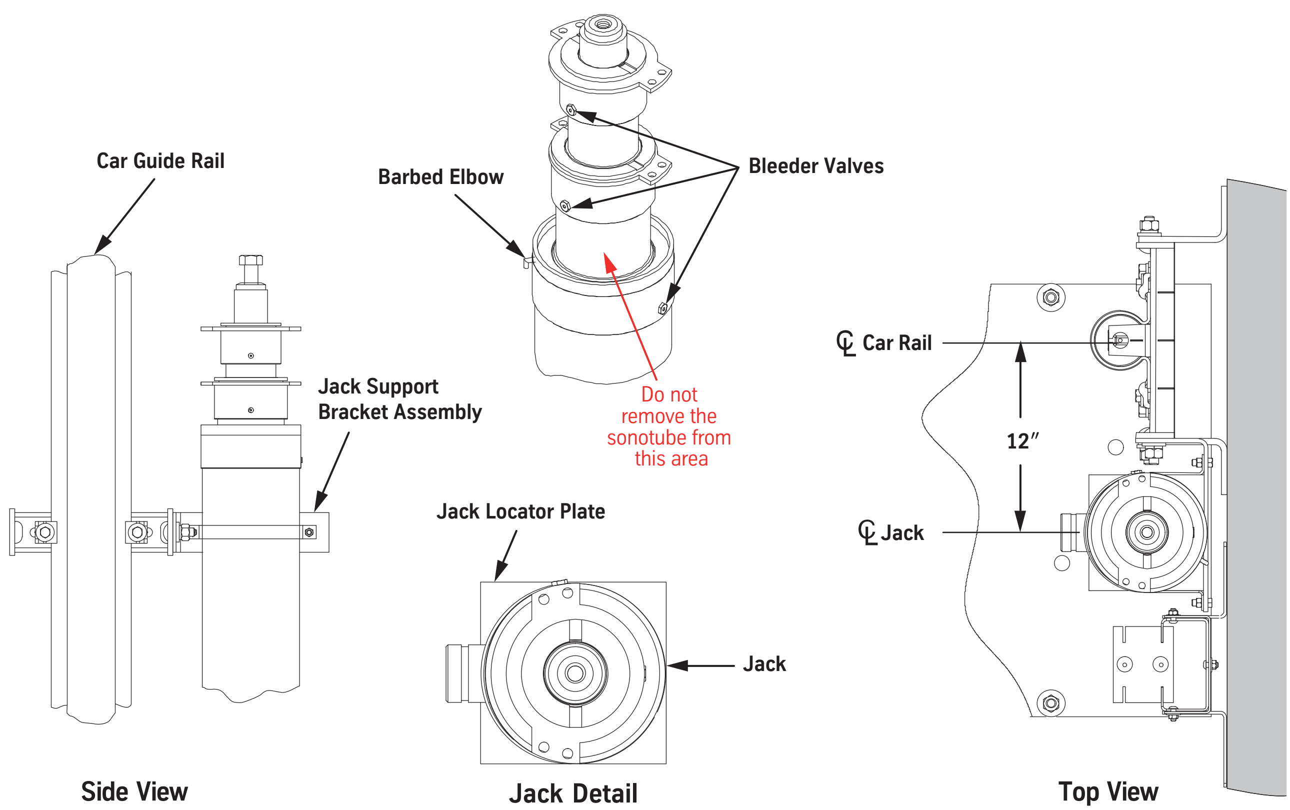


Figure 59 - Jack Support Bracket Installation

Jack Installation
(continued)

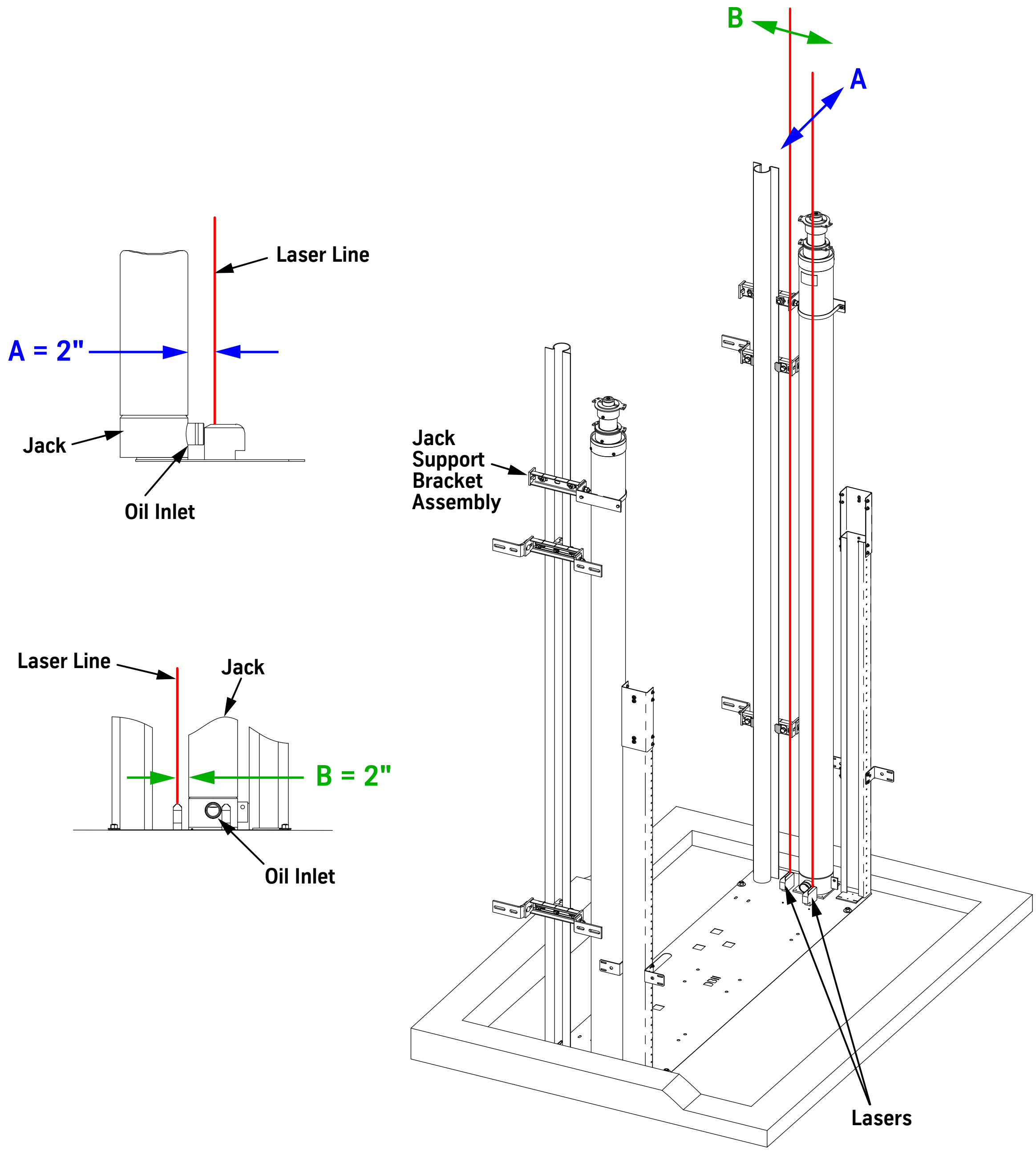


Figure 60 - Telescoping Jack Installation

Piping

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

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

2. Start installation with the jack that is nearest to the oil line that enters the hoistway, and install the Victaulic tee on that jack. See Figure 62 below, and Figure 61 on page 1-91.
3. Remove any debris from the inside of all pipes.
4. Install the Victaulic couplings, and connect the provided seamless pipe from the tee to the opposite jack inlet.
5. Install the overspeed valve to the tee.
6. Connect the end labeled JACK directly to the Victaulic tee.
7. Refer to the job layout, and use the shortest route available to avoid building obstructions to construct the oil line from the overspeed valve to the power unit. Install the shutoff valve as close to the power unit as possible.

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: Ensure that the contractor signs the *Remote Elevator Equipment Room Piping Verification* form located in the *Project Management Book*. (The oil line must have a label every ten feet identifying it as a high-pressure oil line.)

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

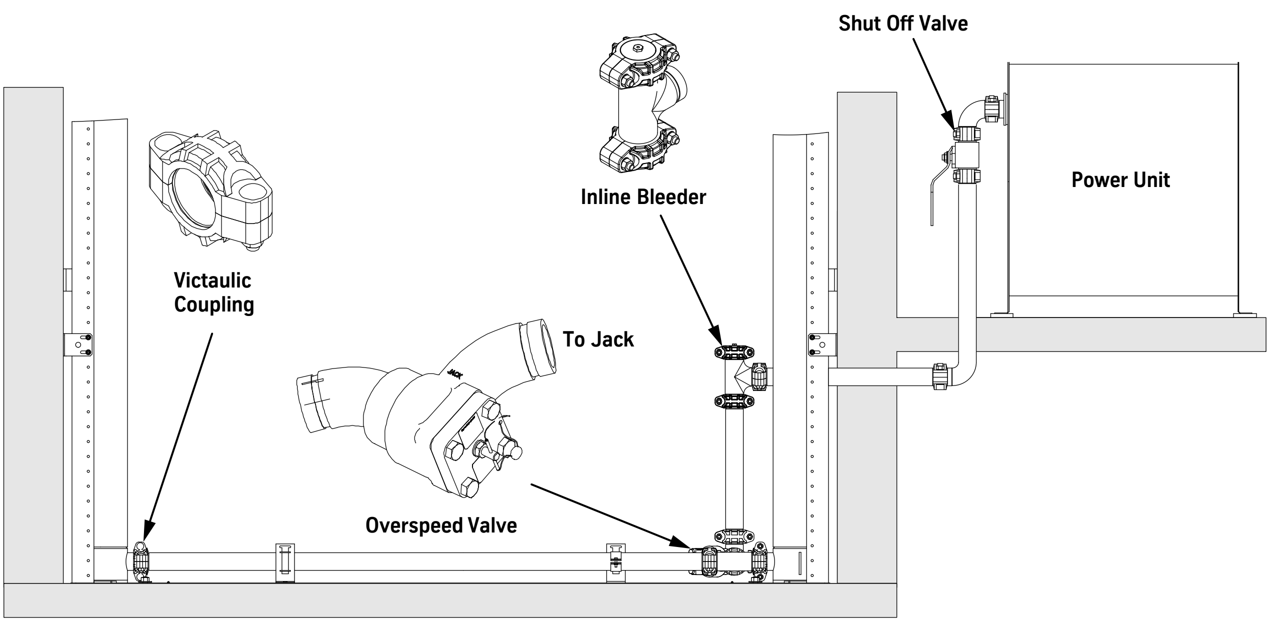


Figure 61 - Piping Installation from the Jack to the Power Unit

Piping
(continued)

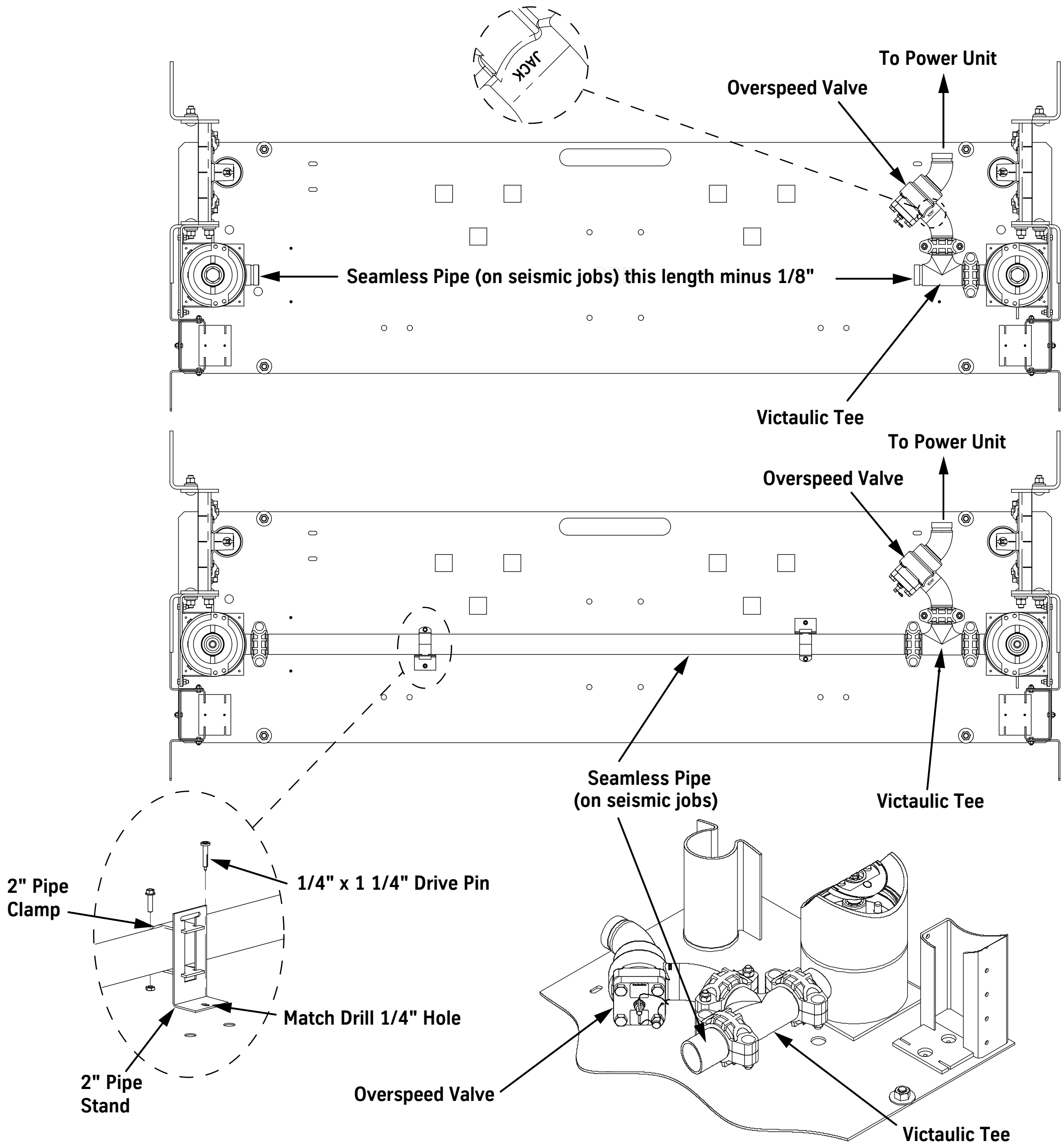


Figure 62 - Piping Between Jacks

Buffer Stand

1. Place the buffer stand on the pit template. See Figure 40.
2. Shim between the template and the buffer stand to level and plumb the stand.
3. Match drill four holes for $^1/_2$” concrete anchors. Holes must be a minimum 2 $^3/_4$” deep to obtain a minimum 2$^1/_4$” penetration.
4. Anchor the buffer stands with $^1/_2$” anchors. Leave room for 1” of shimming between the buffer and the pit template. See Figure 40.

Note: If shimming is not needed during installation, anchors can be driven and tightened later.

5. Install the pit ladder per the layout.

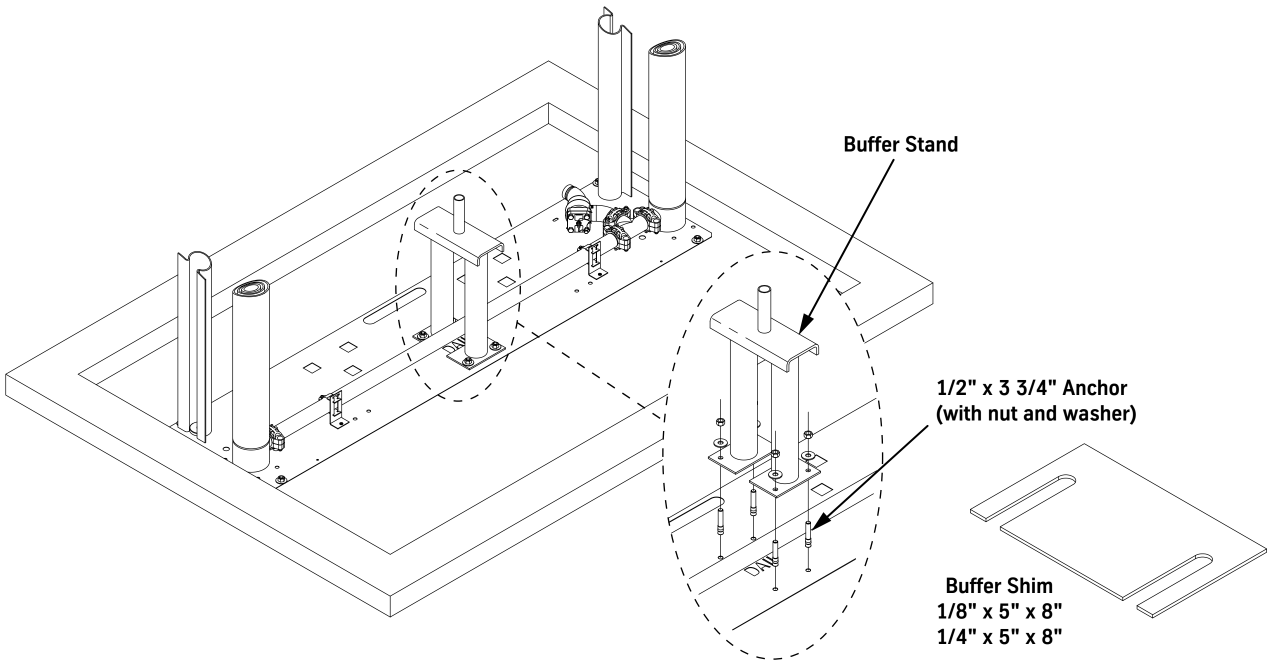


Figure 63 - Buffer Stand Installation

Car Frame

Stiles

1. Use four $^5/_8$" x $1^1/_4$"hex head cap screws to bolt a lift bracket/platen to each stile. See Figure 41 on page 1-57 for all steps in this procedure.

2. Turn the plunger head of each jack until the bleeder valves are pointing to the rear of the hoistway.

3. Fully compress the jacks.

4. Hoist the stile and lift bracket/platen assemblies, and hook them onto their respective plungers.

5. Check that the tops of the upper plungers are level with each other. If not, place supplied 1" flat washers between the upper plunger and the lift bracket/platen assembly until level.

6. Install the jump bolt through the lift bracket/platen assembly and into the plunger.

7. Tighten the jump bolt.

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

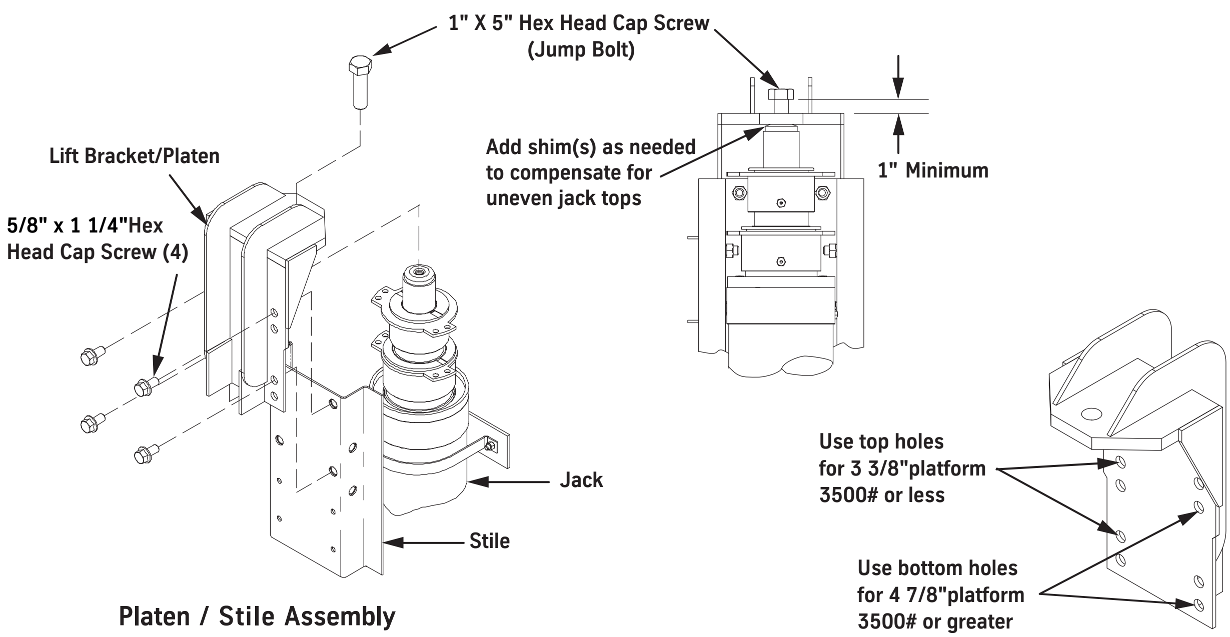


Figure 64 - Lift Bracket / Platen Mounting on Stile and Jack

Car Frame
(continued)

Bolster Assembly and Bottom Guide Shoes

1. Snugly fasten the bolster assembly to the stiles. See Figure 65 for all steps in this procedure.

2. Install the bottom guide shoes on the shoe mount bracket.

3. Equally run both of the post-wise adjustment screws in (clockwise) until each slide guide is touching its corresponding rail.

4. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut, and adjust until both sides are equal.

5. Tighten both locknuts on the post-wise adjustment screws.

6. Level and square the bolster channel assembly with the stiles, and then tighten the bolts.

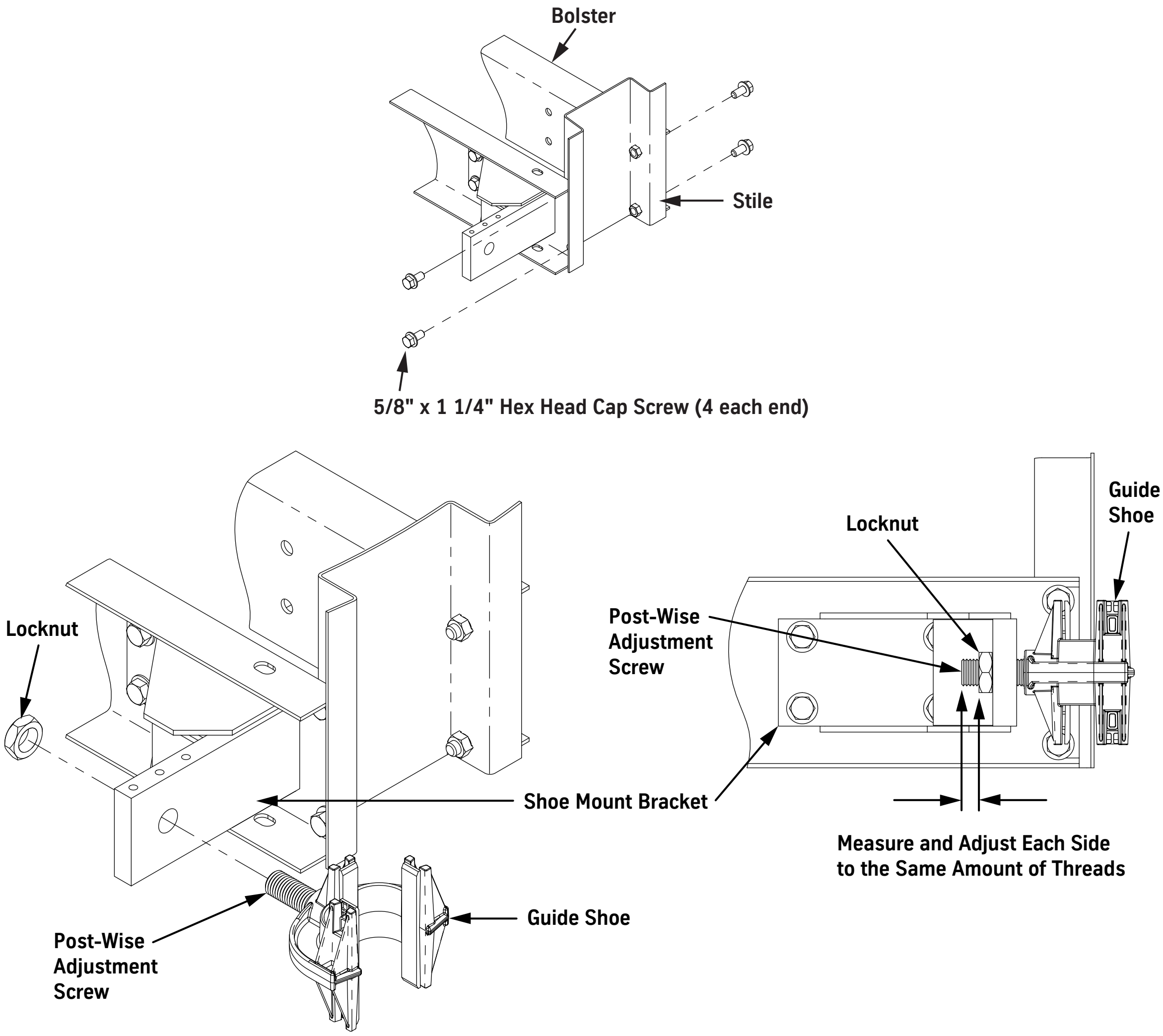


Figure 65 - Install Bolster Assembly and Bottom Guide Shoe

Car Frame
(continued)

7. Place the Follower Rail Template on top of the bolster. Ensure that the ends protrude into their respective jack starter rail. See Figure 66.

8. Align the inside edge of the template notch with the edge of the bolster channel and clamp it to the bolster.

9. On one end of the bolster, square the stile against the corresponding edges of the template, and tighten the fasteners holding the stile and bolster together.

10. On the other end of the bolster, square the stile against the corresponding edges of the template, and then tighten the fasteners on this side of the bolster.

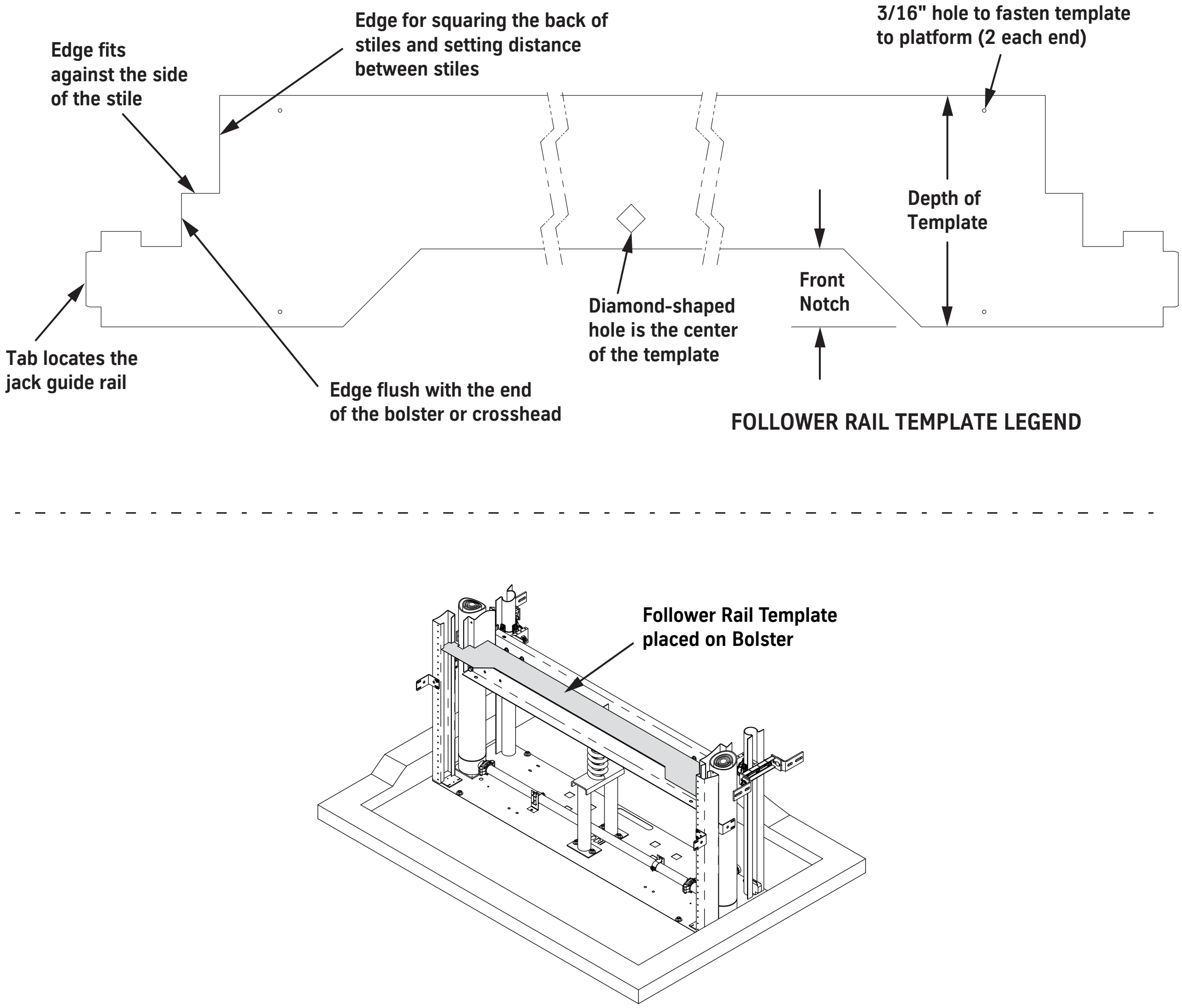


Figure 66 - Follower Rail Template Installation

Car Frame
(continued)

Platform and Brace Rods

1. Hoist the platform into place, and install the clips and bolts between the platform channels and the tops of the bolster channels. See Figure 67.
2. Adjust the platform to the rails according to the job layout dimensions, and then tighten the bolts.
3. Install the four brace rods between the stiles and the four corners of the platform.

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

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

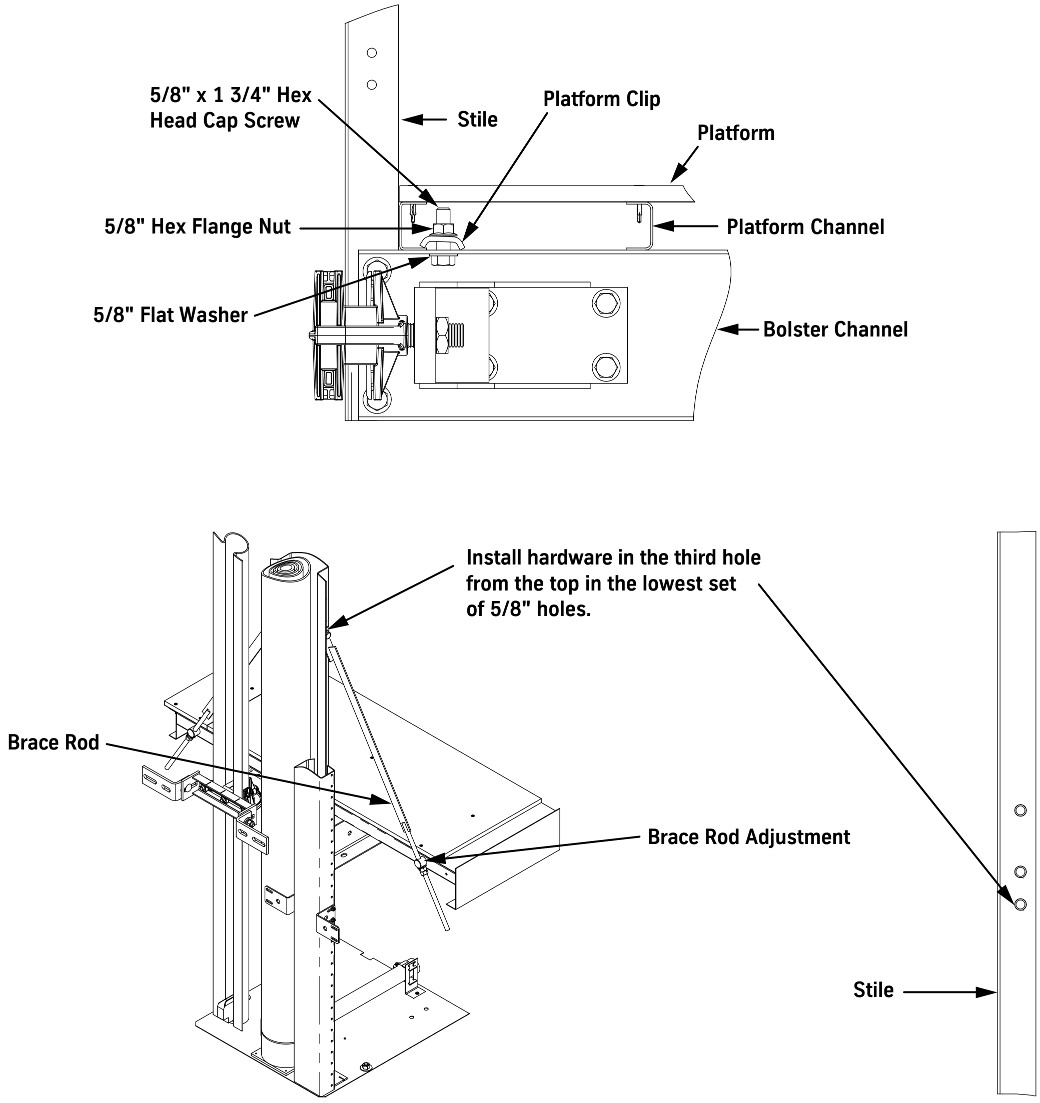


Figure 67- Platform and Brace Rod Installation

Car Frame
(continued)

Crosshead and Upper Guide Shoes

1. Fasten the two upper guide shoes to the shoe mount bracket on the rear crosshead channel. See Figure 68 (below) and Figure 69 on page 1-99 for all steps in this procedure.
2. Place the rear crosshead channel between the two stiles in the lowest location, directly above the two rear brace rods about three feet above the platform.
3. Install the hardware to attach the rear crosshead channel to the stiles—do not tighten the bolts at this time.
4. Equally turn both post-wise adjustment screws in until each guide shoe is touching its corresponding rail.
5. To ensure that the frame is centered between the rails, measure the amount of thread protruding past each locknut and adjust until both sides are equal.
6. Tighten the locknuts on the guide shoe post-wise adjustment screws.
7. Use the provided hardware to install the front crosshead channel in its permanent location at the top of the stiles—do not tighten the bolts at this time.
8. Place the follower rail template on the bottom of the front crosshead.
9. Verify that the crossheads are square and plumb with the stiles.
10. Tighten all of the hardware in both crosshead channels.

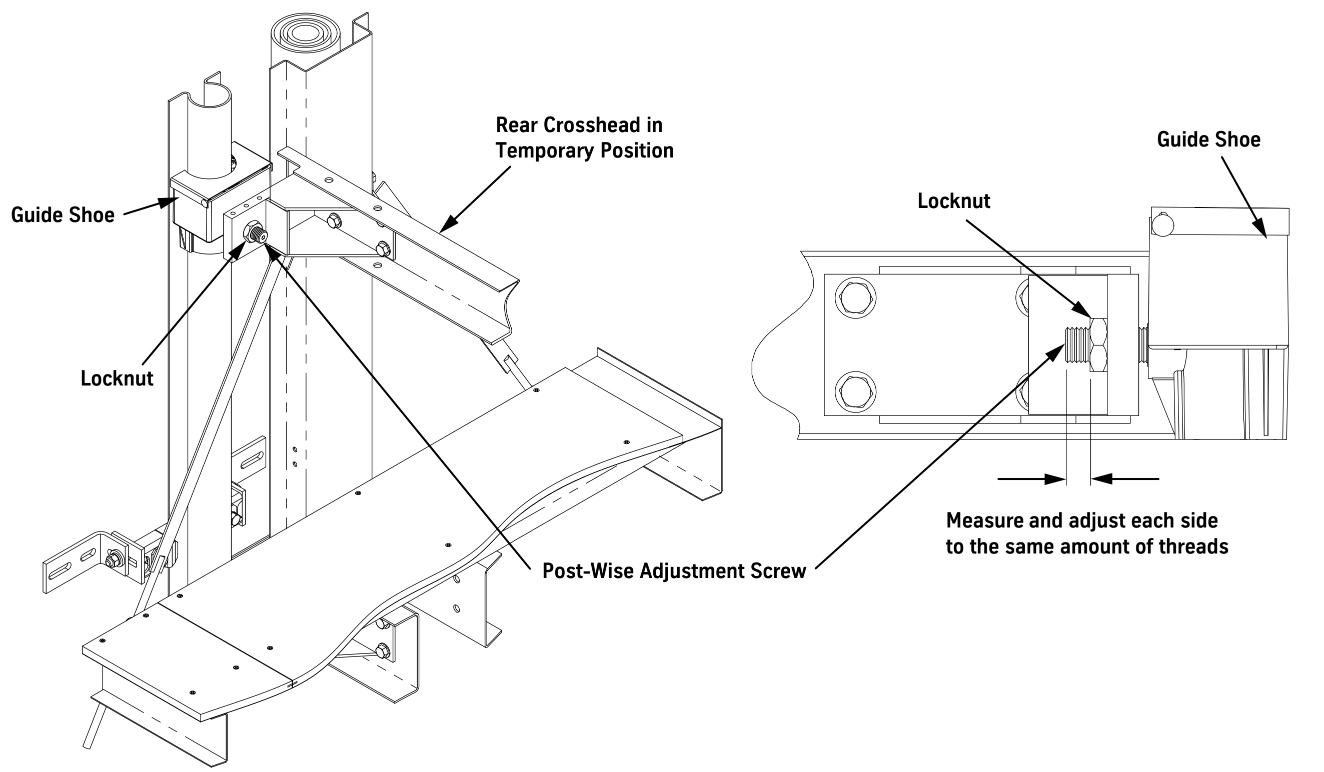


Figure 68 - Install Upper Guide Shoes

Car Frame
(continued)

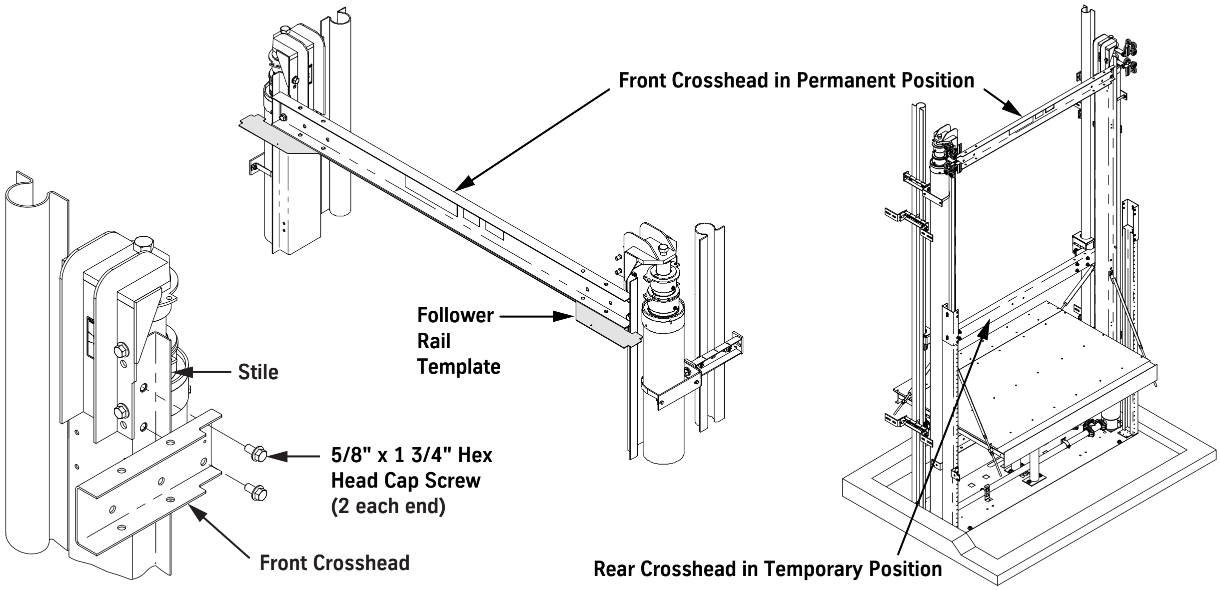


Figure 69 - Install Crosshead

Drip Tube

1. Install the drip tube on the barbed elbow (located on the packing head), and run the tube to a drip pan in the pit. See Figure 70.

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

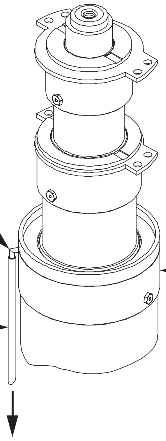


Figure 70 - Drip Tube Installation

Temporary Operation

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

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

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

Bleed the Jacks

1. Insert one end of the nylon evacuation tubing from the jack accessory kit into one of the bottom bleeder valves, and the other end of the tube into an empty container. See Figure 71.
2. Slightly open the bottom bleeder valve on each jack.

Note: This jack has four bleeder valves. Two are located in the jack casing; use the one that is the most accessible.

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

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

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

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

5. Progress upward, and repeat 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 sonotube from the lower plunger.

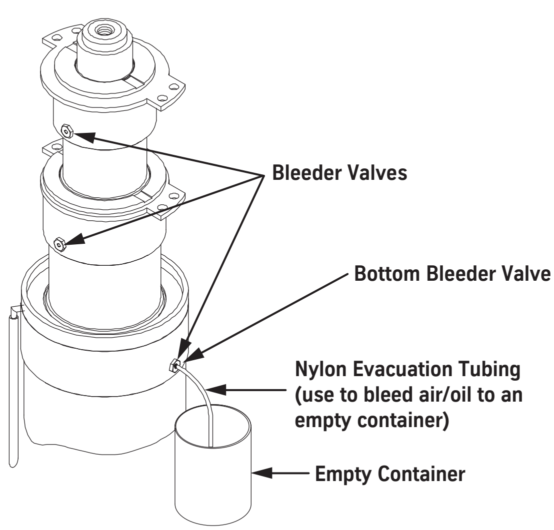


Figure 71 - Bleed the Jacks

Car Guide Rails

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

1. Place the car frame as close as possible to the top of the rails.
2. Install the lasers on the pit template underneath the rails. See Figure 72 for all steps in this procedure.
3. Install next set of rail brackets. See job layout for maximum distance between brackets.
4. Use the laser lines and the laser target to adjust both rail brackets.
5. Use two splice clamps to install a splice tube in the existing rail, and tighten the splice.
6. Hoist the new rail up, and slide it down over the splice tube.
7. Install the remaining two splice clamps, and tighten the splice.
8. Repeat step 3 through step 7 for the opposite side.

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

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

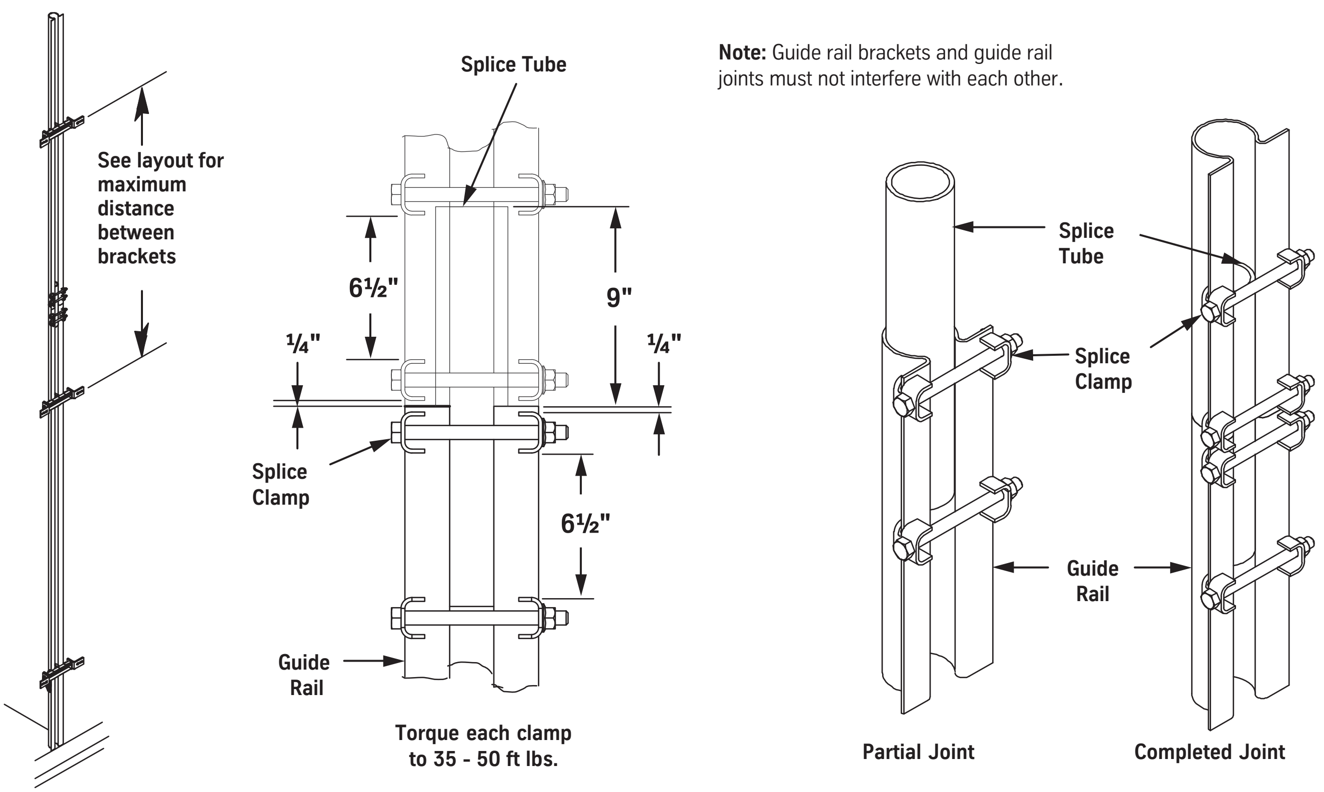


Figure 72 - Rail Splice and Final Rail Installation

Rear Crosshead Channel

1. With the car at the first landing, remove the rear crosshead channel from the stiles and raise it up to its permanent location at the top of the stiles. See Figure 73.

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

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

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

4. Use wood screws to fasten the template to the platform.

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

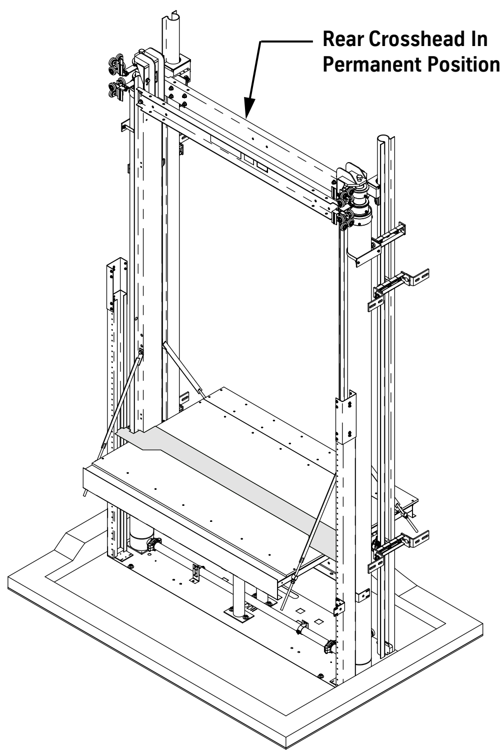


Figure 73 - Rear Crosshead Permanent Position

Install the Support Pipes

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

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

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

5. If the clearances are satisfactory, locate and install the provided anchor bolts. See Figure 74 for dimensions.
6. Place each bracket over a bolt, and tighten the bolt.
7. Place the support pipes on the brackets.

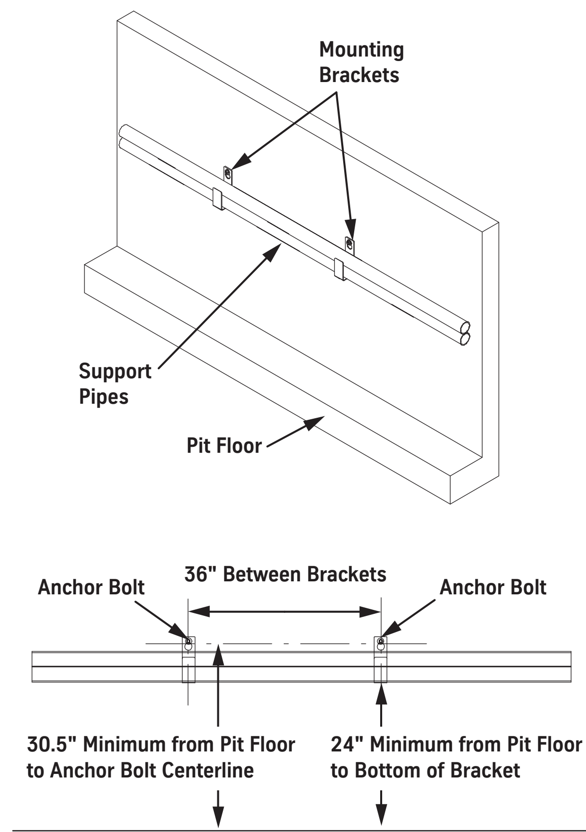


Figure 74 - Support Pipe Mounting Bracket Kit

Jack Guide Rail

1. Attach the jack guide rail brackets to the jack guide rail in a position corresponding to the nearest car rail bracket mounting surface. See Figure 75.

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 rail to avoid interference with roller guide.**

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

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

3. Install the splices. See Figure 76 on page 1-105.

4. Use either method below to estimate the length of the jack guide.
   - With the car at the bottom landing, the length of jack guide rail required above the middle plunger is two-thirds of the total travel plus 12 inches.
   - Place the car in full overtravel. From the car top, estimate the highest point that could be reached by the top jack roller guide. The jack guide rail will extend just past this point.

5. Use a laser to plumb the guide rail. See the pit template for location.

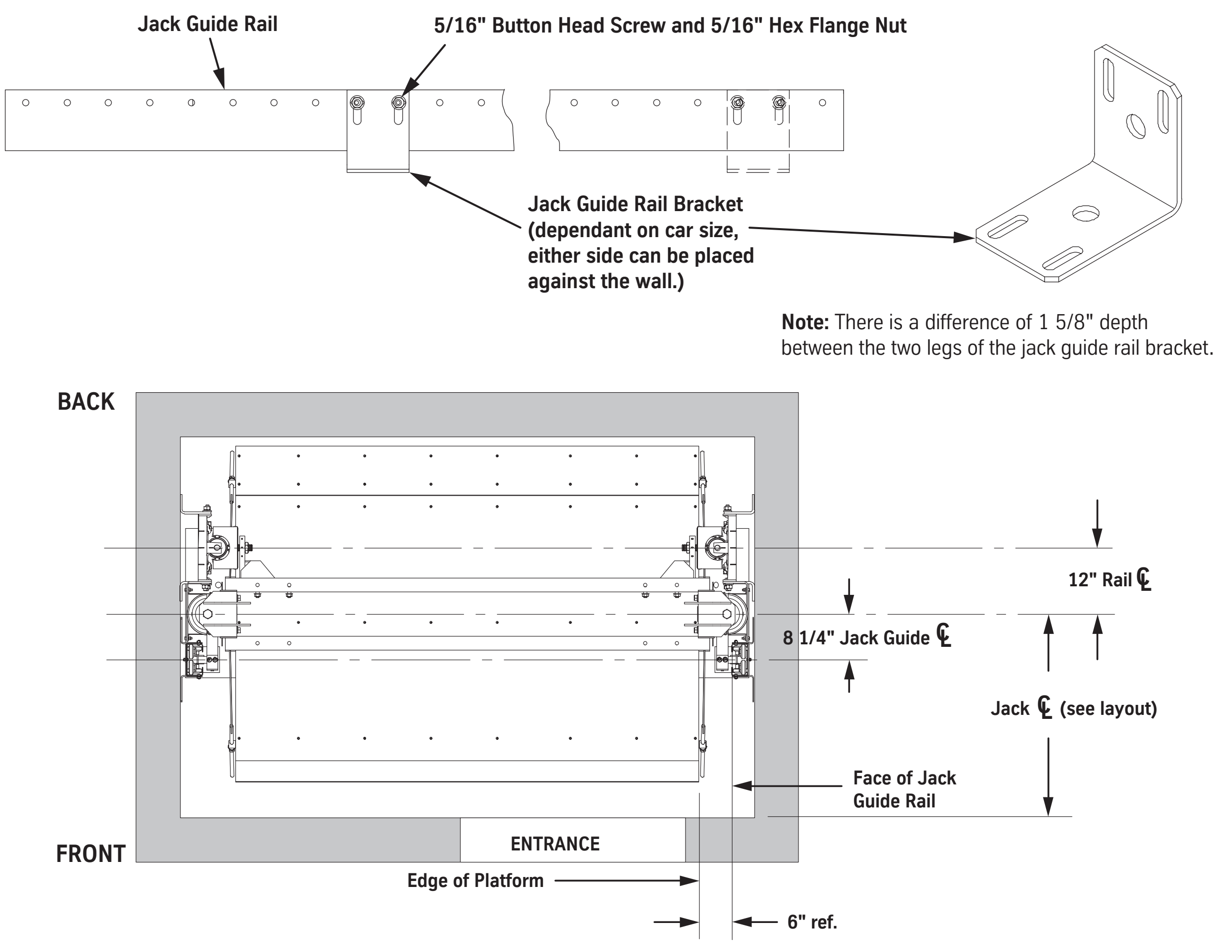
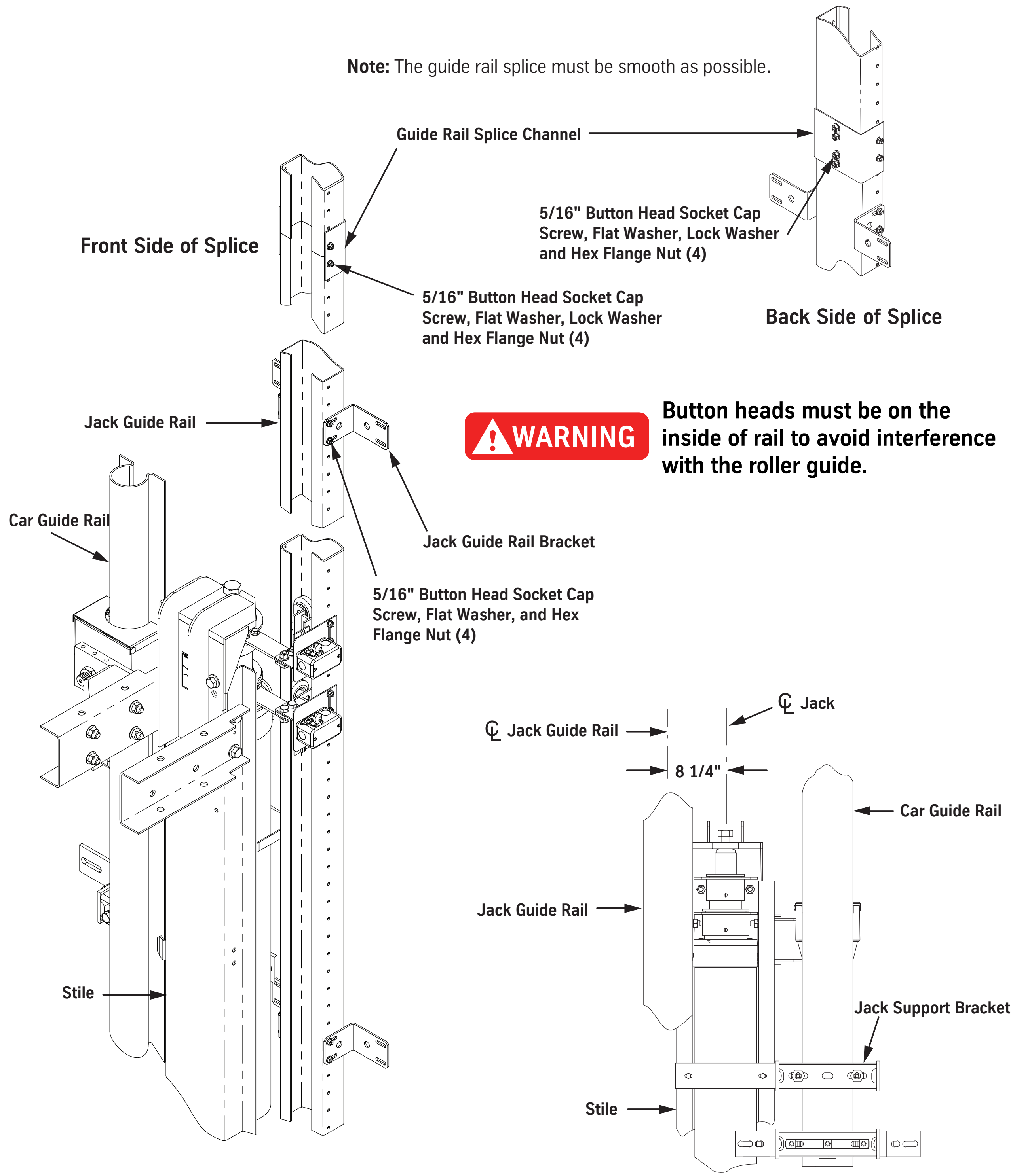


Figure 75 - Jack Guide Rail Mounting Brackets to Jack Guide Rail Assembly

Jack Guide Rail
(continued)

Note: The guide rail splice must be smooth as possible.



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

Figure 76 - Stack the Jack Guide Rail Channels

Jack Plunger Roller Guides

See Figure 77 on page 1-107 (top plunger) and Figure 78 on page 1-108 (bottom plunger) 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. See the labels on the roller guides for the correct orientation.**

1. With the long side up, and from the open splice at the top of the starter rail, slide the top plunger roller guide into the guide rail.

2. Raise the plunger roller guide to a point above the jack, and suspend it with an object such as a long screwdriver.

3. With the long side down, and from the open splice, slide the bottom plunger roller guide into the guide rail and suspend it.

4. Match the offset of the guide shoe mounting ring from the centerline of the jack.

Note: The guide shoe mounting rings are free to turn on the jack plunger guides.

5. Use two $^3/_8$" hex head flange screws and flange nuts to install a guide shoe mount on the lower guide shoe mounting ring on the jack, and tighten.

6. With long sides pointed down, use two $^1/_2$" x 1 $^1/_4$"hex head cap screws to install the plunger roller guide and the sensor pickup assembly.

7. Install a $^1/_2$" lockwasher and hex nut on each cap screw, and tighten.

8. Use two $^3/_8$" hex head flange screws and flange nuts to install a guide shoe mount on the upper guide shoe mounting ring, and tighten.

9. Retrieve the top plunger roller guide.

10. With long sides pointed up, use two $^1/_2$" x 1$^1/_4$" hex head cap screws to install the plunger roller guide and the sensor pickup assembly.

11. Install a $^1/_2$" lockwasher and hex nut on each cap screw and tighten.

12. Repeat this procedure for the other side.

Jack Plunger Roller Guides
(continued)

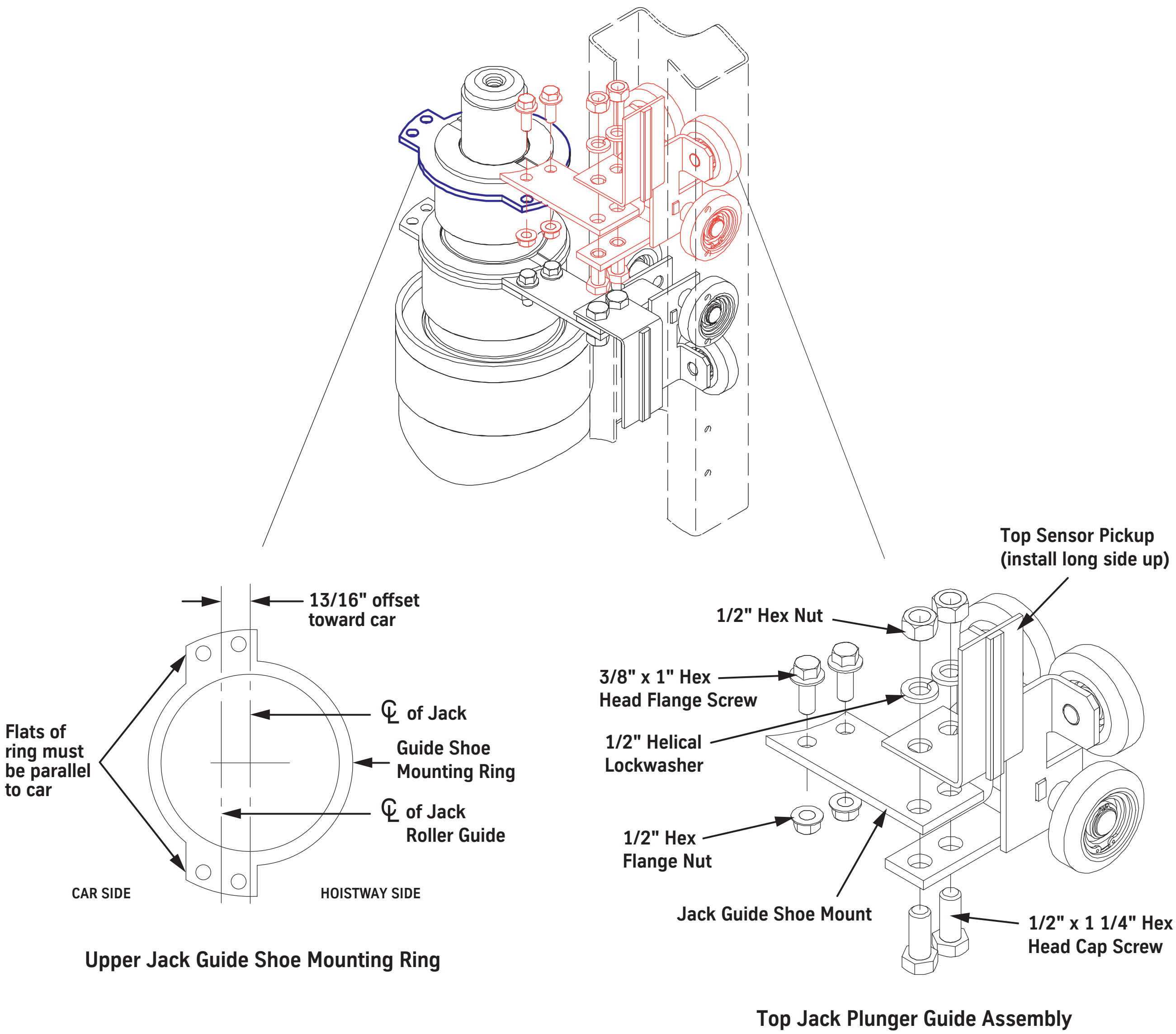


Figure 77 - Top Jack Plunger Guide Installation

Jack Plunger Roller Guides

(continued)

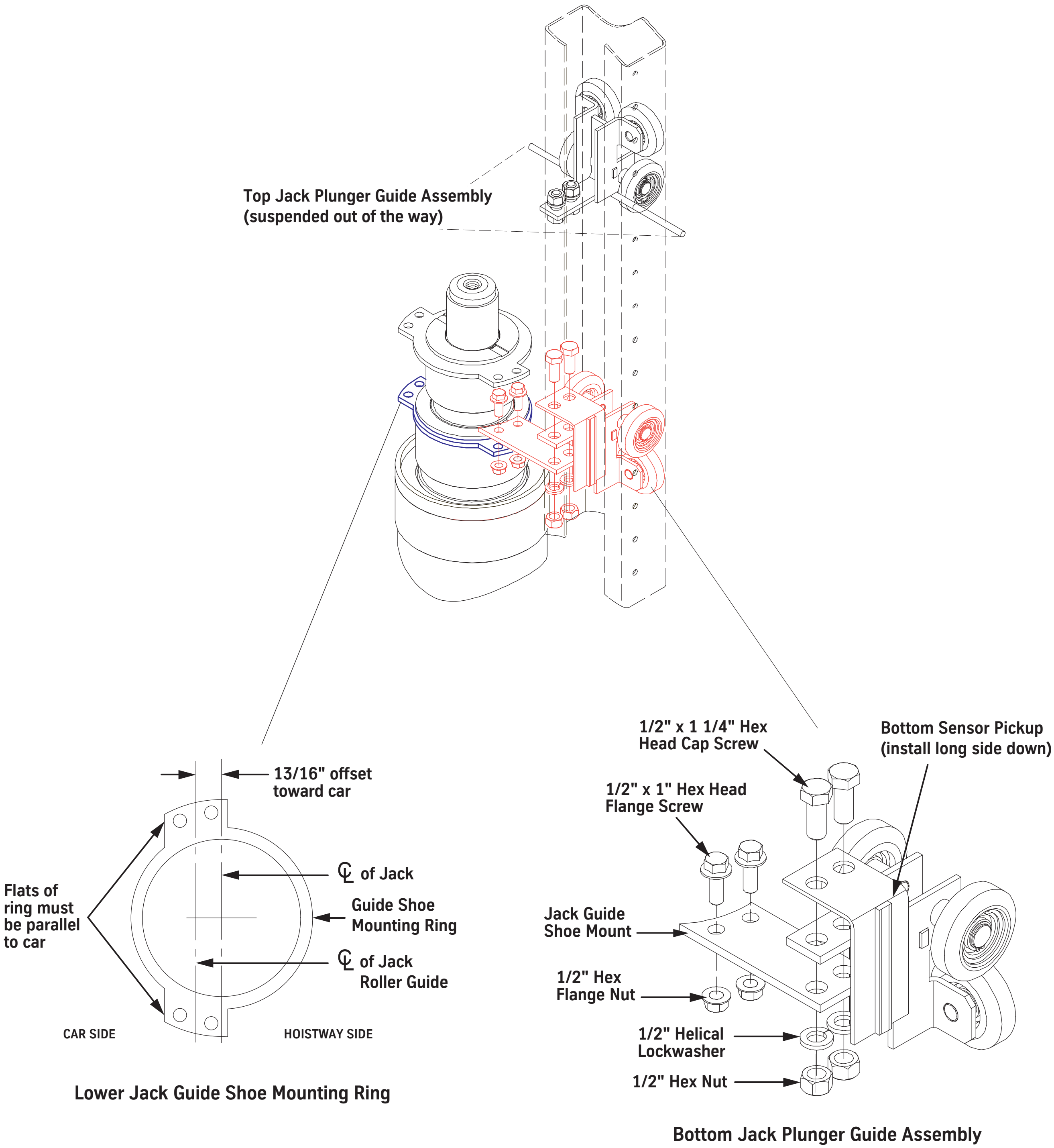


Figure 78 - Bottom Jack Plunger Guide Installation

Sensors

See Figure 79 on page 1-110 and Figure 80 on page 1-111 for the following procedure.

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

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

Sensors
(continued)

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

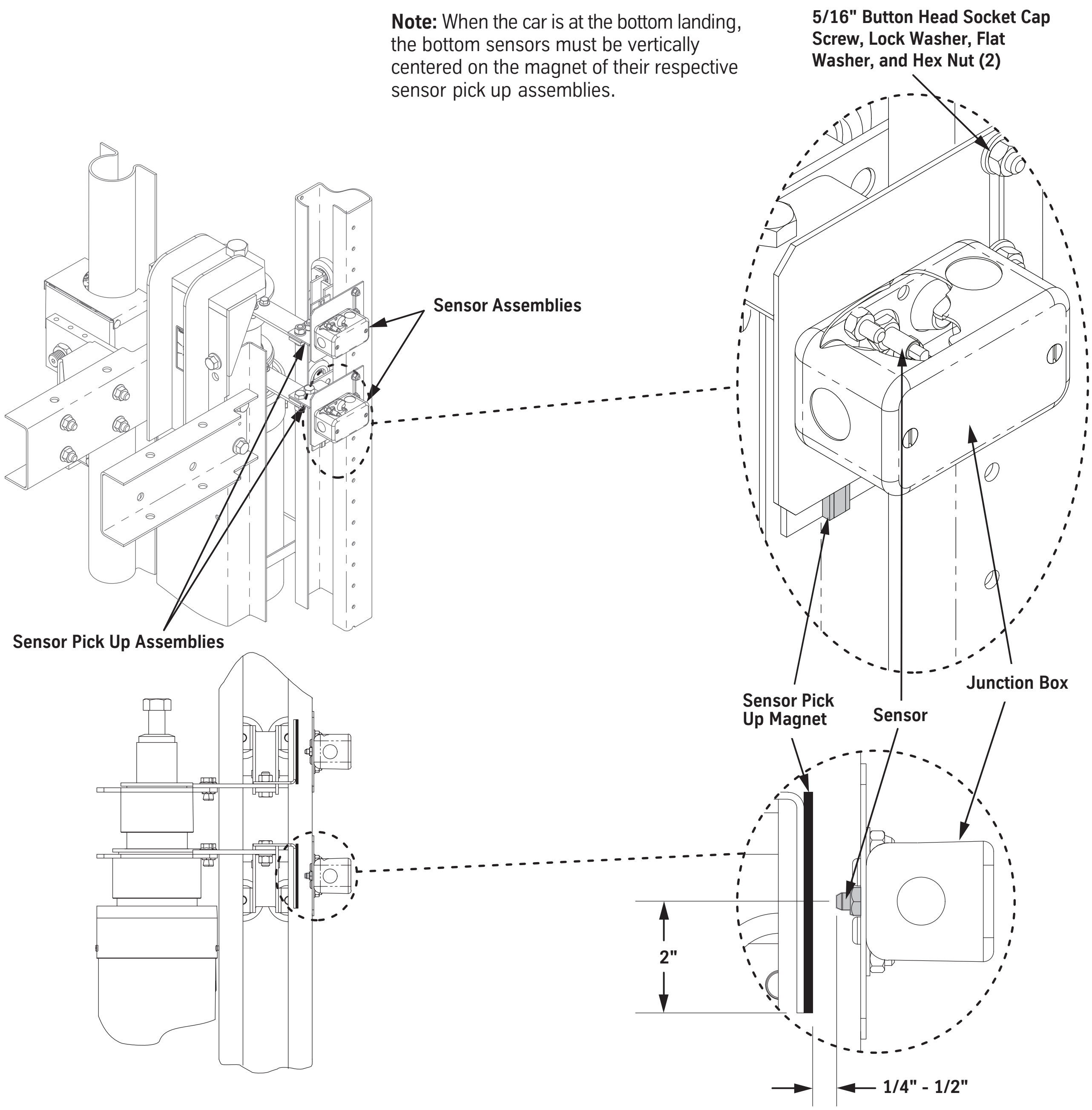
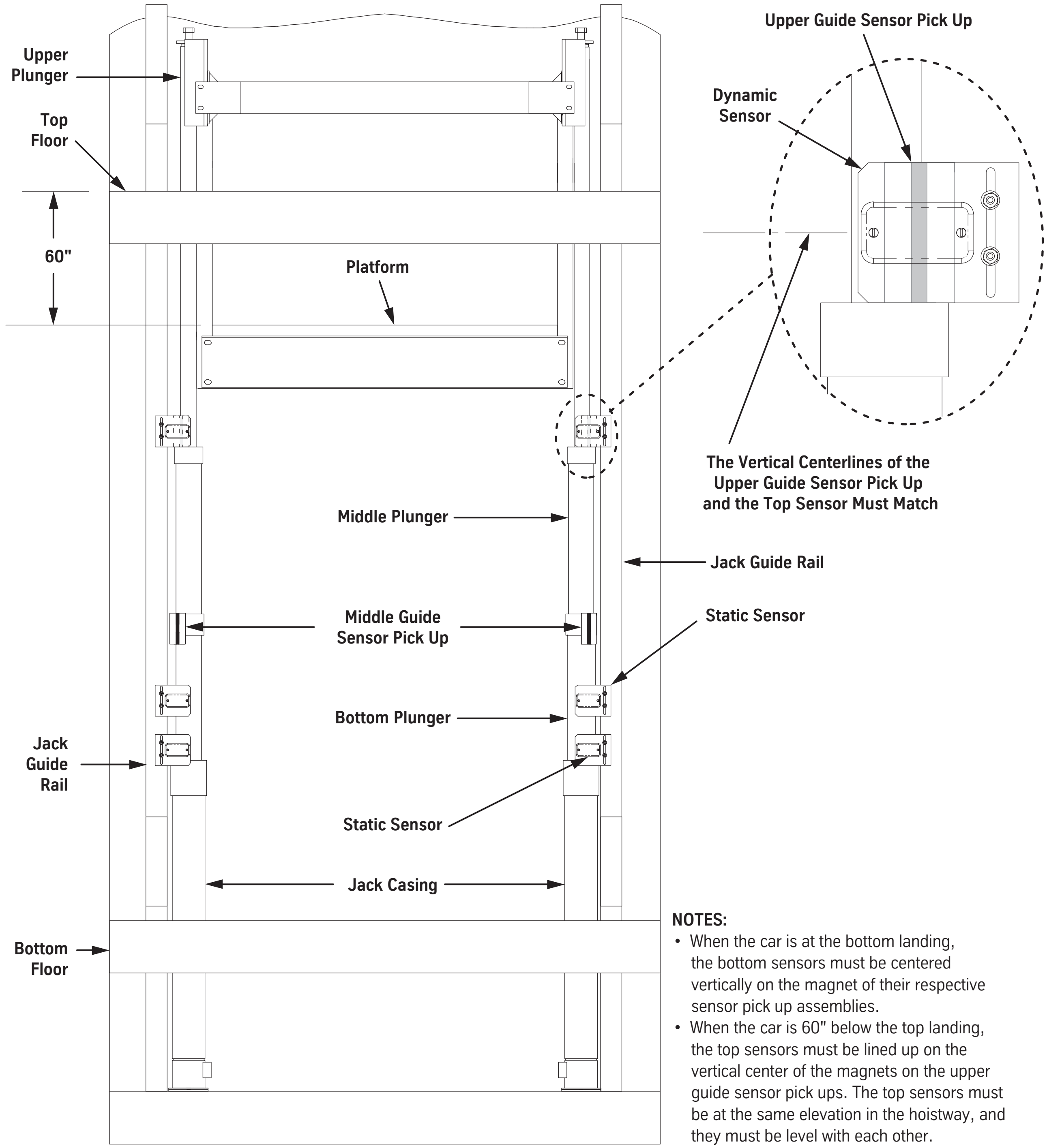


Figure 79 - Static Sensor Installation

Sensors
(continued)



NOTES:
- When the car is at the bottom landing, the bottom sensors must be centered vertically on the magnet of their respective sensor pick up assemblies.
- When the car is 60" below the top landing, the top sensors must be lined up on the vertical center of the magnets on the upper guide sensor pick ups. The top sensors must be at the same elevation in the hoistway, and they must be level with each other.

Figure 80 - Dynamic Sensor Installation

Top and Bottom Overtravel Check

Note: Top overtravel must be $^1/_2$" more than bottom overtravel.

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

1. Remove the buffer springs (if installed).
2. Lower the car until both jacks bottom out, and then check for $8^1/_2$" of bottom overtravel.
3. Run the jacks onto the stop rings, and then check for 9" top overtravel.

Maintenance

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

Replace Jack Seals and Check Valves

Recommended Tools

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

Required Tools

Part No.	Print No.	Description
9862741	200AHE14	Seal Kit
9723215	886BX1	Check Valve Assembly
9773253	1105AL3	Three Stage Seal Tool Kit
9849350	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

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

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

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

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

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

Replace Jack Seals and Check Valves

(continued)

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

10. Temporarily re-assemble the upper plunger guide assembly to the middle plunger.

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

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

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

Note: The seal will hang on the casing threads when the middle plunger is lifted. Move the middle plunger side-to-side to get the seal past the threads.

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

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

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

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

   b. Polish the area with 600 grit emery cloth.

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

17. Temporarily re-assemble the middle plunger guide assembly to the lower plunger.

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

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

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

21. Leave the lower plunger suspended.

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

Repair the Jack

Lower Plunger - See Figure 81 on page 1-117.

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

Repair the Jack

(continued)

Middle Plunger - See Figure 81 on page 1-117.

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

Repair the Jack
(continued)

Upper Plunger - See Figure 81 on page 1-117.

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

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

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

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

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

Repair the Jack

(continued)

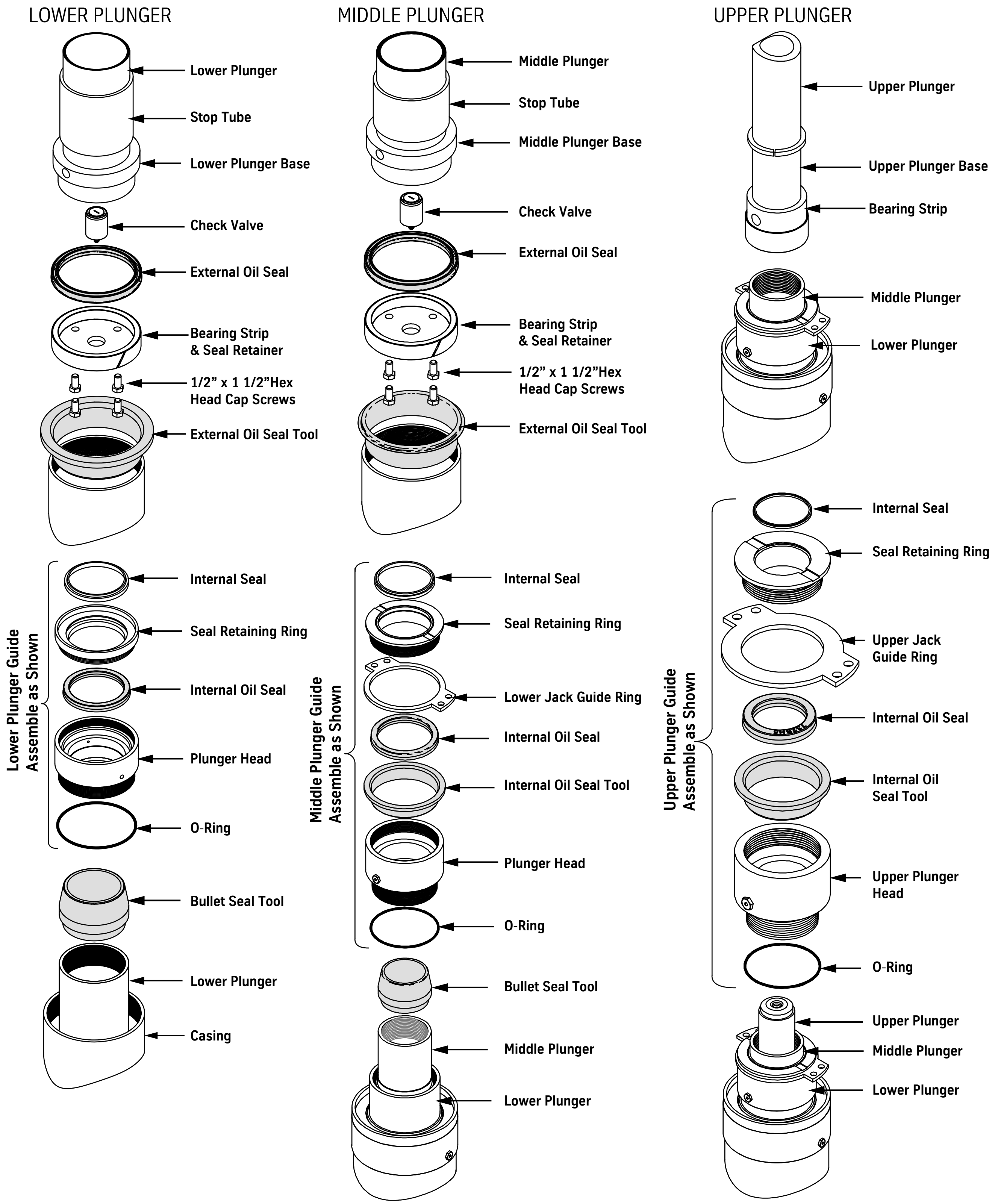


Figure 81 - Jack Plungers Internal and External Oil Seal Installation

Jack Resynch Tests

Static Sensor Test (Four landings or more)

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

Notes:

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

6. Turn OFF, Lock, and Tag out the mainline disconnect.
7. Re-connect the first landing static sensor.
8. Turn ON the mainline disconnect.
9. Verify that the car runs on Automatic Operation.

Dynamic Sensor Test (Three landings or more)

1. Place the car at the bottom landing.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Remove one sensor input wire.
4. Turn ON the mainline disconnect.
5. Enter a car call to the top landing.

Note: As the car nears the top landing, the car should stop, return to the bottom landing and shut down.

6. Turn OFF, Lock, and Tag out the mainline disconnect.
7. Replace the sensor input wire.
8. Turn ON the mainline disconnect.
9. Verify that the car runs on Automatic Operation.

Jack Resynch Tests

(continued)

Static Leak Test (identify the cause of a shutdown)

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

1. Verify that there are no external leaks.
2. Remove the buffer springs.
3. Move the car to the bottom landing.
4. Place the car on Inspection Operation.
5. Open the manual lowering valve.
6. Let the car lower until both jacks are fully collapsed.
7. Let the car sit for at least 10 to 15 seconds.
8. Close the manual lowering valve, and ensure that each plunger head is level with its counterpart.
9. Park the car about 12″ above the bottom landing to ensure that the plungers are extended several inches, but not enough to prevent measuring their positions from the car top.
10. Close the shutoff valve in the machine room.
11. Measure from the lifting bracket (platen) down to the sensor cap on each jack.
12. Record the distances and the time (before measurement).
13. Let the car sit for about 30 minutes.
14. Again, measure from the lifting bracket (platen) to the sensor cap on each jack.
15. Record the distances and the time (after measurement).
16. Compare the before and after measurements.

Note: A difference of $^{1}/_{4}$” to $^{1}/_{2}$” is acceptable; more could indicate an internal leak, which would require the jack to be rebuilt.

Jack Resynch Tests
(continued)

Cycle Test (identify the cause of a shutdown)

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

- If the jacks are out of synch and there is no obvious internal or external leak, use the following list to check for and correct any alignment problems.
    a. The DBG is correct over the entire travel.
    b. The car rails are plumb.
    c. The tip of the each jack base is down into its respective hole in the pit template.
    d. The car frame is square.
    e. The centerlines of the guide shoes are 12" from the centerline of the jump bolt and jack.
    f. The buffer stands are level.

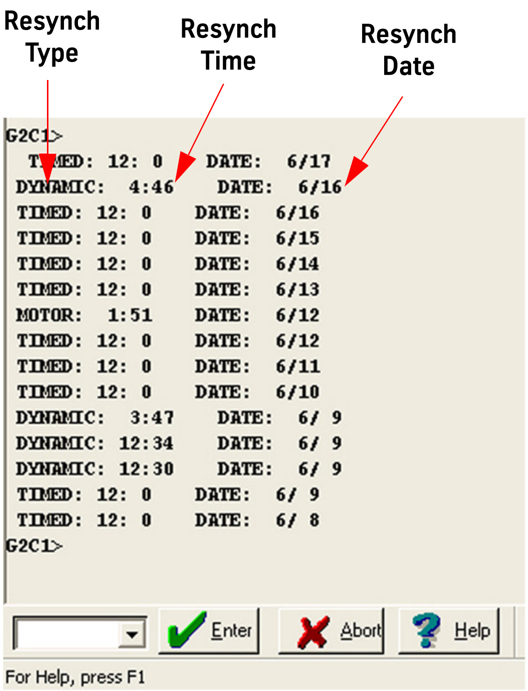
- Before rebuilding a telescopic jack, verify the following items:
    a. The lifting brackets are in the correct holes. See label on the bracket or Figure 41 on page 1-57.
    b. The top and bottom overtravel is correct.
    c. The net travel is correct.
    d. The pit depth and level is correct.
    e. The rail bracket quantity and spacing is correct.

IMS Jack Resynch

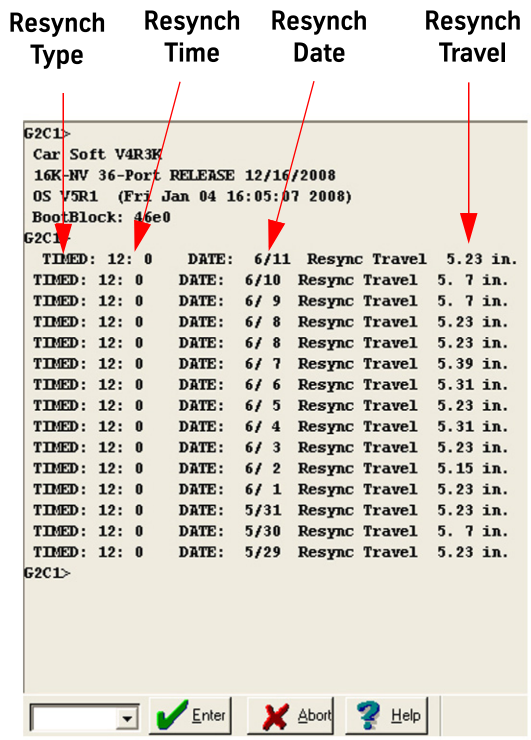
1. Connect an IMS laptop to the controller.
2. Start IMS, and open the remote FAST window.
3. Enter the current data in the TIM (Time) and DAT (Date) Adjustments, and when correct, save these values with the WRT Command.

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

4. Enter a WJR Command to display the jack resync history data. See Figure 82.



Pre V4R3K WJR Command Screen



V4R3K (& higher) WJR Command Screen

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

Figure 82 - WJR Command Screen

Resynch with IMS
(continued)

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

Table 4 - IMS Data

Resynch with IMS

(continued)

WJR Command Results

1. Static or Dynamic Resynchs

- the timed and motor resynchs are not working properly
- the jacks are unable to resynch properly
- elevators with high traffic

2. Motor Resynchs

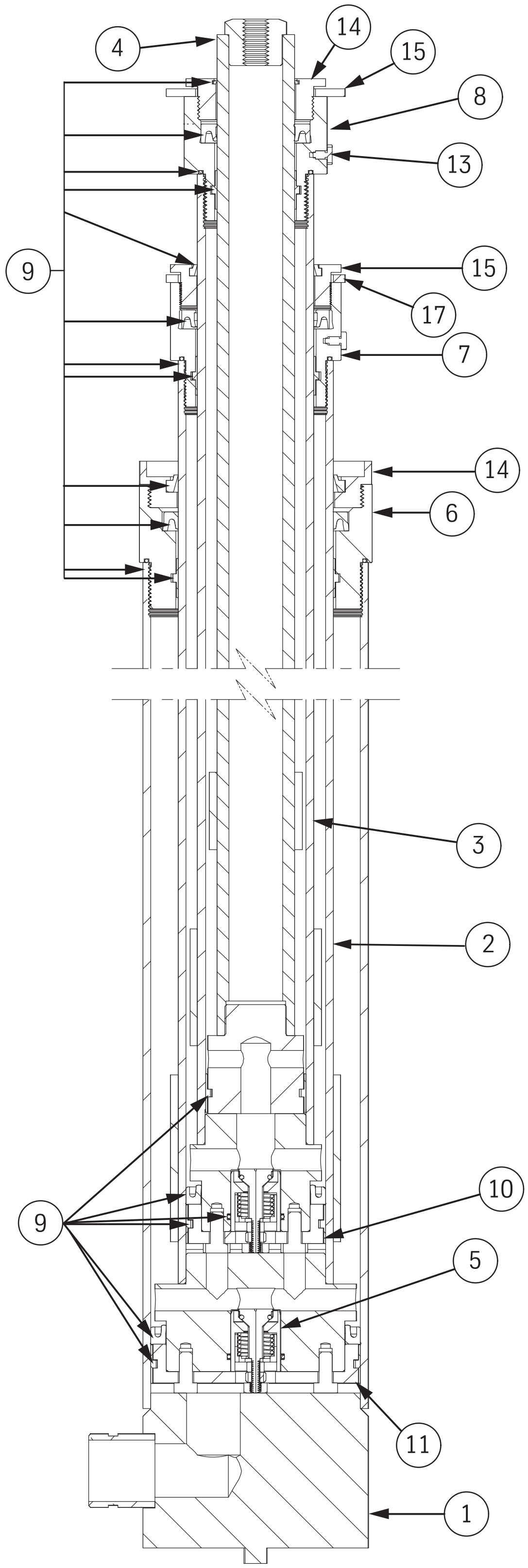
- Check the 044 Adjustment, and set to the default value of 1500 (range 100-2500).
- Adjust the default setting of the 029 Adjustment to match the job conditions; there has to be ample time for the car to lower past the bottom floor level and sit on the buffer springs for 6-10 seconds to synchronize the fluid levels in the jack sections.

Troubleshooting Guide

Problem	Possible Causes	Possible Solutions
Upper stage of jack will not extend until the bottom stage has reached it's stop ring.	All of the air not bled from jack.	Extend jacks and bleed.
	Valve or bottom piston seal leaking.	Replace seal and the check valve.
Vibration in jack. More noticeable in Up leveling, and Down start from the top landing.	Jack is not installed plumb. Metal in bearing strip.	Add 1 quart Caterpillar Oil Additive (1U-9891) to vibrating jack.
Frequent need to resynch due to an external oil leak from the upper seals.	Worn seals in the guide assemblies.	Replace the seal. See Jack Seal Replacement on page 1-112.
Frequent need to resynch because an oil leak from the upper stage to the lower stage; internal leak, upper plunger shrinking.	Worn bottom seal.	Replace bottom seal.
	A leaking check valve.	Replace the check valve.

Replacement Parts

Three Stage Telescoping Jack, 2.5 T-III



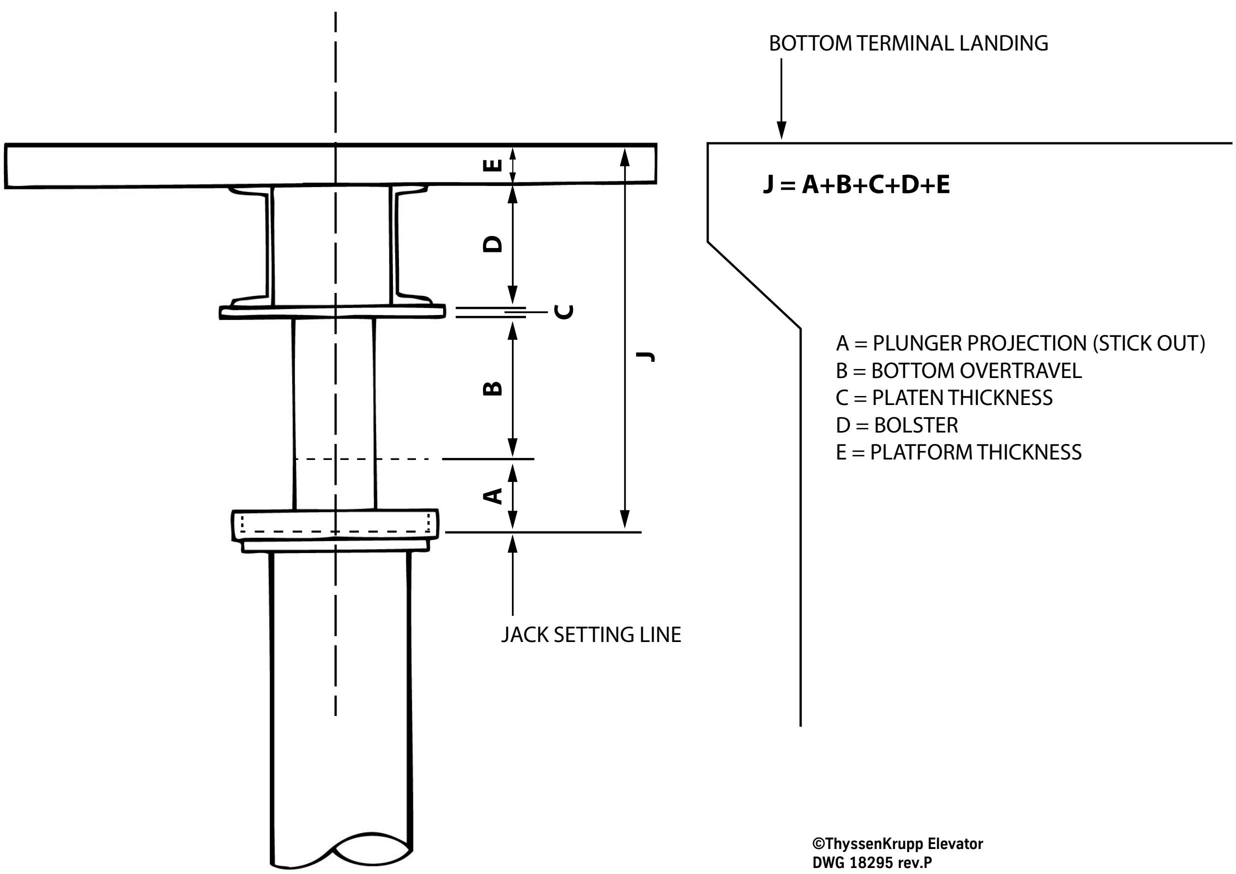
Three Stage Telescoping Jack, 2.5 T-III, Parts List

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		6503CA1	Casing Assembly
2		6502AV1	Plunger Assembly, Lower
3		6502AT1	Plunger Assembly, Middle
4		6502AW2	Plunger Assembly, Upper
5		886BX1	Valve, Check
6		454EG1	Guide, Lower Plunger
7		454AJ4	Guide, Middle Plunger
8		454AK2	Guide, Upper Plunger
9		200AEH14	Seal Kit
		732BH6	Seal, Oil, Internal, 2.50" I.D.
		732BH5	Seal, Oil, Internal, 3.00" I.D.
		732BH7	Seal, Oil, Internal, 3.75" I.D.
		732BH8/BH9	Seal, Oil, Internal, 4.25" I.D.
		732BJ2	Seal, Oil, External, 4.50" O.D.
		732BJ3	Seal, Oil, External, 5.25" O.D.
		142CG4	Bearing, Upper Plunger
		142CG2	Bearing, Lower Plunger
		142CH4	Bearing, Upper Piston
		142CH2/CH5	Bearing, Lower Piston
		717BB1	O-Ring, #223
		75483	O-Ring, #237
		717BB2/3	O-Ring, #247
		78136	O-Ring, #006
		732AP2/AP4	Seal, Internal "D" Wiper
		732AR1	Seal, Internal "AN" Wiper
10		712AA4	Retainer, Bearing, 4.347" O.D.
11		712AT1	Retainer, Bearing, 5.098" O.D.
12		886BN1	Valve, Bleeder
13		732BT1	Ring, Retaining, Seal
14		732BV1/BV2	Ring, Retaining, Seal
15		596DT2	Ring, Guide Shoe, Jack, Upper
16		596DT1	Ring, Guide Shoe, Jack, Lower

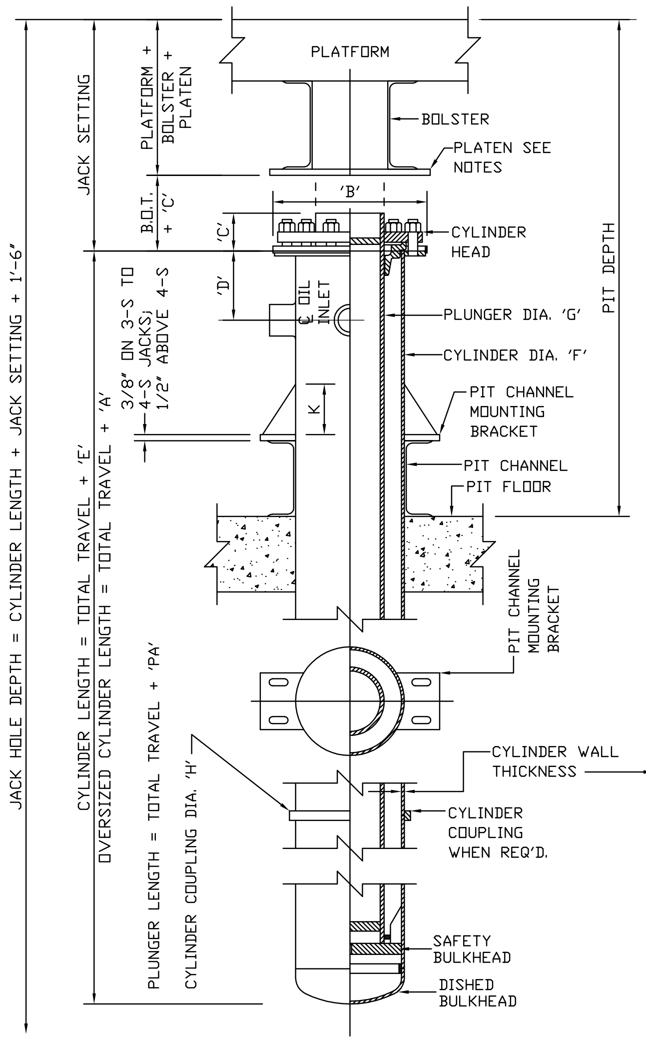
Reference Information

Conventional Jack Data

Jack Size	Standard Cylinder Length = Total Travel +	Oversize Cylinder Length = Total Travel +	Plunger Stick Out Above Cylinder Flange	Bolts: Platen-to-Plunger
3-S	9.375	–	3.000	(1) 1.000 x 3.500 Hex Head Cap Screw
4-S	8.813	10.813	3.000	
5-S	9.313	9.750	3.000	
6-S	9.313	9.750	3.000	
7-S	9.938	10.938	3.000	
8-S	9.938	10.938	3.000	
9-S	12.938	14.375	2.500	
10-S	13.313	14.375	2.500	
12-S	15.313	–	2.500	
15-S	15.375	–	6.000	
Note: If special platen plates are used, then the bolt length must be checked for each job.				



Conventional Jack Dimensions



NOTES:

1.) SEE SHEET 3-E-1.2 FOR OILDRAULIC CONVENTIONAL JACK PLUNGER PROPERTIES, AND FOR PLUNGER WALL THICKNESSES.

2.) THE MAXIMUM PRESSURE ON ANY CONVENTIONAL JACK CYLINDER OVER 12 3/4" DIAMETER IS 400 P.S.I.

3.) SEE SHEET 3-E-1.4 FOR NON-ISOLATED PLATENS

4.) ISOLATED RUBBER PLATENS = 1 3/4" THICK ON 3-S THRU 7-S JACKS, AND 2" THICK ON 10-S AND 12-S JACKS. NOTE 1 3/4" THICKNESS CAN ALSO BE USED ON 8-S AND 9-S JACKS WITH A MAXIMUM GROSS LOAD ON THE JACK OF 12,000 LBS. AND A MAXIMUM PLUNGER WEIGHT OF 2,700 LBS. CALL THE FACTORY IF GROSS LOAD OR PLUNGER WEIGHT EXCEEDS ABOVE ON 8-S AND 9-S JACKS, IF JACK IS LARGER THAN 12-S, OR SPECIAL BOLSTERS REQUIRED.

5.) THE MINIMUM VERTICAL CLEARANCE BETWEEN THE PIT FLOOR AND THE LOWEST STRUCTURAL OR MECHANICAL PART INSTALLED BENEATH THE PLATFORM, INCLUDING A PLUNGER FOLLOWER GUIDE, SHALL BE NOT LESS THAN 24". THIS CLEARANCE MUST MAINTAIN A HORIZONTAL AREA OF 24" X 47". TRENCHES, DEPRESSIONS, OR FOUNDATION ENCROACHMENTS CANNOT BE INCLUDED. THIS CLEARANCE IS NORMALLY TAKEN BETWEEN THE PIT FLOOR AND CAR BOLSTERS, CALL THE FACTORY IF IN DOUBT OR WHEN A SHALLOW (LESS THAN 4'-0") PIT IS REQUIRED.

	JACK MODEL									
	3-S	4-S	5-S	6-S	7-S	8-S	9-S	10-S	12-S	15-S
A		10 3/16"	9 3/4"	9 3/4"	10 15/16"	10 15/16"	14 3/8"	14 3/8"		
B	5 9/16"	10 1/4"	12 1/4"	12 1/4"	15 3/4"	15 3/4"	16 3/4"	16 3/4"	20 3/4"	23"
C	3"	3"	3"	3"	3"	3"	2 1/2"	2 1/2"	2 1/2"	6"
D	6 3/4"	5 1/2"	5 1/2"	5 1/2"	6"	6"	6"	6"	6"	6"
E	9 3/8"	8 13/16"	9 3/16"	9 3/16	9 15/16"	9 15/16"	12 15/16"	13 5/16"	15 5/16"	15 3/8"
F	5 9/16"	6 5/8"	8 5/8"	8 5/8"	10 3/4"	10 3/4"	12 3/4"	12 3/4"	16"	20"
G	3.873	4.360	5.425	6.485	7.488	8.488	9.488	10.613	12.613	15.738
H	6 1/4"	7 1/2"	9 5/8"	9 5/8"	12"	12"	14"	14"	17 1/2"	21 1/2"
J	7/32"	7/32"	7/32"	7/32"	1/4"	1/4"	1/4"	1/4"	5/16"	3/8"
K	6"	6"	6"	6"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	8"	8"
PA	5 1/4"	5 1/4"	5 1/4"	5 1/4"	5 5/16"	5 5/16"	6 7/8"	7 3/8"	8"	8 3/16"
AREA	11.781	14.93	23.115	33.030	44.032	56.578	70.696	88.456	124.937	194.519
DISPL	0.61	0.78	1.20	1.72	2.29	2.94	3.67	4.60	6.49	10.10

NOTE: DISPL = GALLONS OF OIL DISPLACED PER FOOT OF TRAVEL
AREA = PLUNGER AREA IN SQUARE INCHES

ThyssenKrupp Elevator

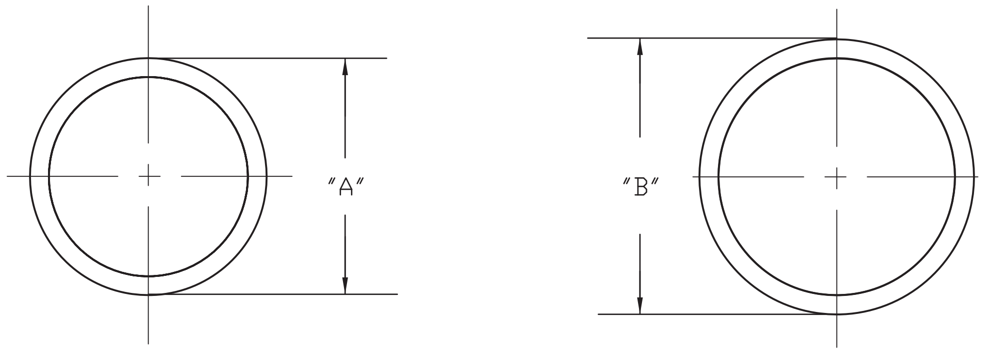
OILDRAULIC CONVENTIONAL JACK DIMENSIONS

REF. DWG.: 18293, 18295, 196AGV, 196AEF | DWN.: HMD | DATE: 04-11-11

 | DO NOT SCALE THIS DRAWING | LAYOUT MANUAL | 3 | E | 2

HDPE & PVC Casing and Coupling Diameter

HDPE & PVC CASING & COUPLING OUTSIDE DIAMETER



HDPE & PVC CASING DIAMETER

PVC COUPLING DIAMETER

	"A" CASING	"B" COUPLING
JACK - 3-S	8 5/8"	10 7/8"
JACK - 4-S	10 3/4"	12 3/4"
JACK - 5 & 6-S	12 3/4"	14"
JACK - 7 & 8-S	14"	16"
JACK - 9 & 10-S	16"	18"
JACK - 12-S	20"	25"
JACK - 15-S	24"	28"

FOR OVERSIZE JACK GO TO NEXT SIZE UP INFORMATION

ThyssenKrupp Elevator

HDPE & PVC CASING AND COUPLING DIAMETER

REF. DWG.: 642DJ, 642JY

DWN.: HMD | DATE: 03-12-10

DO NOT SCALE THIS DRAWING

LAYOUT MANUAL | 3 | E | 2.1

OVERSPEED VALVE

OVERSPEED VALVE

(2) Overspeed Valve Contents

Printed in USA January, 2015

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Specifications

2” Overspeed Valve

- Print Number: 886AH1 (90°)
- Print Number: 886AH3 (In-Line)
- Minimum Flow: 50 GPM
- Maximum Flow: 230 GPM
- Maximum working pressure: 600 PSI
- Line Connections: Threaded/90°, Victaulic/In-line

3” Overspeed Valve

- Print Number: 886AM1 (90°)
- Print Number: 886AM3 (In-Line)
- Minimum Flow: 150 GPM
- Maximum Flow: 500 GPM
- Maximum working pressure: 600 PSI
- Line Connections: Threaded/90°, Victaulic/In-line

Installation

1. Install the valve within 12 inches of the jack(s) or the tee connecting multiple jacks. See Figure 1 or Figure 2 for proper orientation of the valve.

2. Turn the adjustment screw out (counterclockwise) to ensure that the valve does not set during construction and adjustment of the control valve.

Note: This valve is directional. The jack must be connected to the outlet designated for the jack

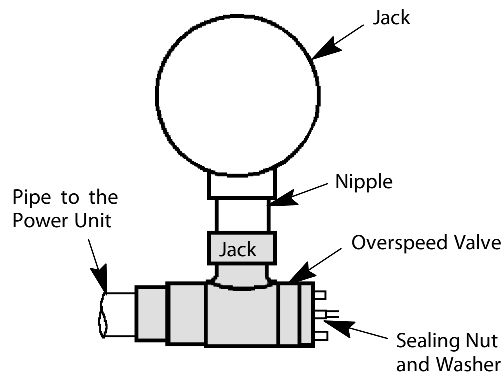


Figure 1 - 90° Overspeed Valve

Figure 2 - 3” Dual Jack Overspeed In-Line Valve Installation

Adjustment

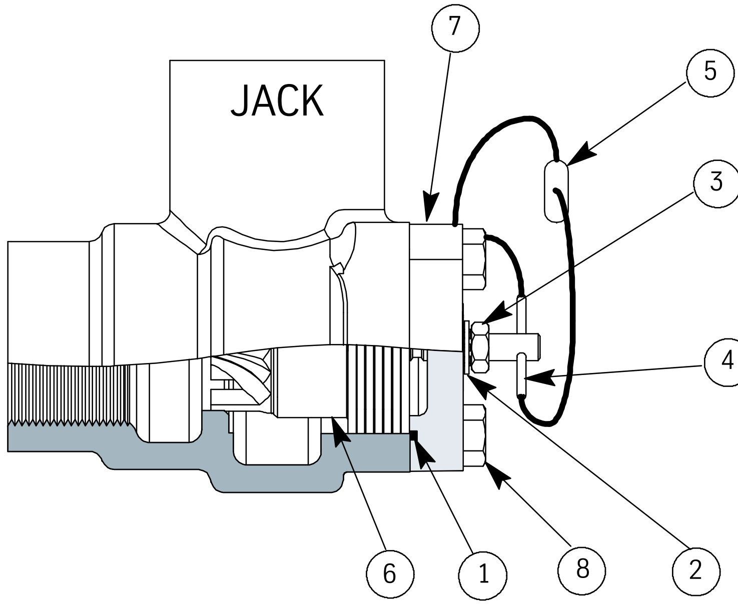
WARNING **During this procedure, do not allow personnel to remain in the pit when the car is running.**

1. Verify that the job is complete and all of the cab weight is final.
2. Place a full load on the car.
3. Turn the adjustment screw on the valve clockwise a small amount and run the car down. Repeat this process until the overspeed valve sets.

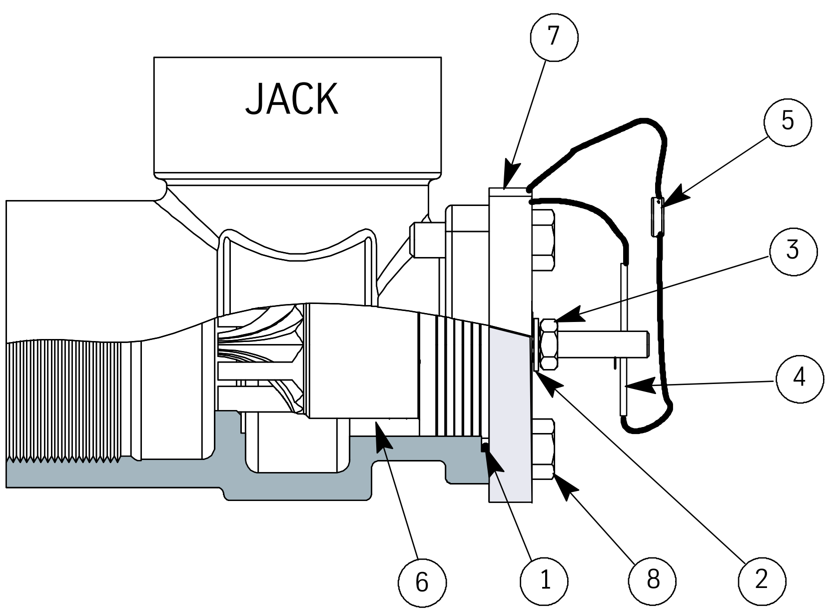
Note: During this procedure it may be necessary to make multiple down runs, especially if the travel is short.

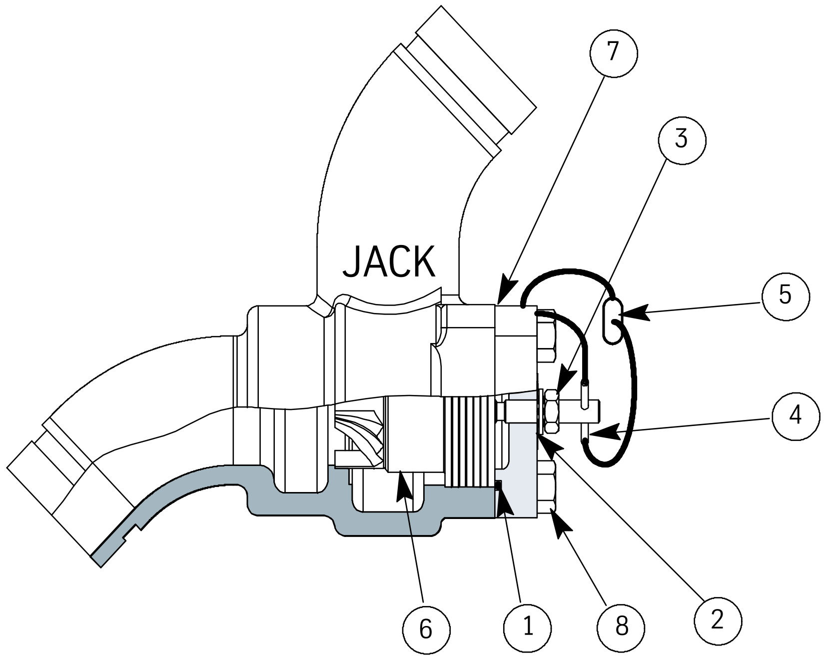
4. Turn the adjustment screw OUT (counterclockwise) one-half turn and tighten the locknut.
5. Run the car down from the top landing to the bottom landing at full speed to ensure that the valve does not set with a full load and full travel.
6. Tighten the .375” nut against the sealing washer to seal the adjustment screw.
7. Drill the nut and install a lead seal.

Replacement Parts

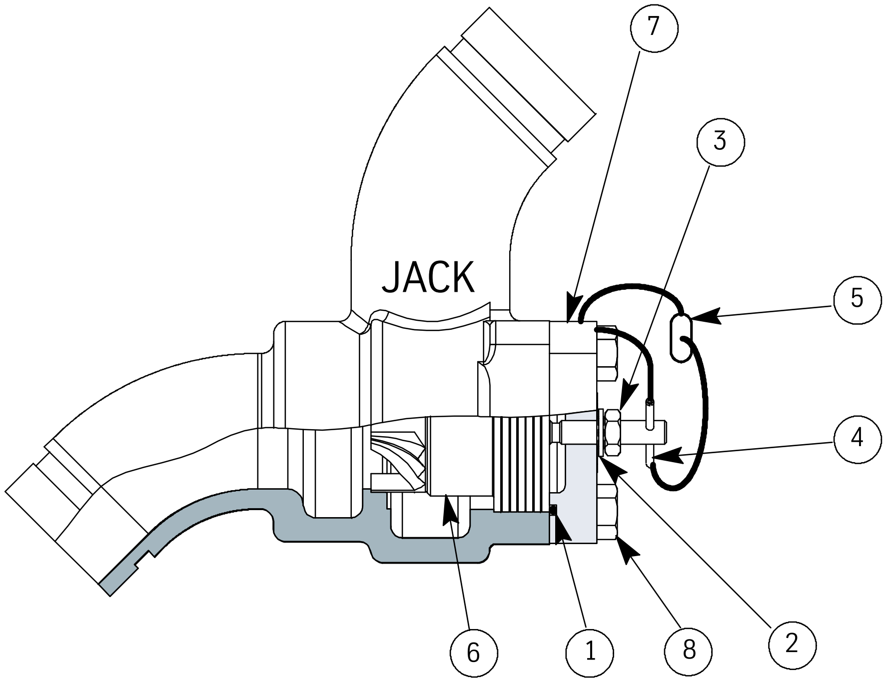


2” Overspeed Valve 90°





2” Overspeed In-line Valve



3” Overspeed In-line Valve

Replacement Parts List

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9709836	75478	O-ring (2” valve)
	9754702	75480	O-ring (3” valve)
2	9748477	148477	Washer, sealing
3	9719386	100746	Nut, .375” Z
4		394AD2	Pin
5	9804559	70455	Seal, lead
6		886AK2	Piston assembly 2” valve (Includes adjusting screw)
		886AP1	Piston assembly 3” valve (Includes adjusting screw)
7		232BD1	Cap, regulator (2” valve)
		232BJ1	Cap, regulator (3” valve)
8		150319	Screw, FS, CSH .500-13 x 1.250 UH
9	9767034		Kit, overspeed 90° valve, 2”(Includes overspeed valve, 2 threaded- to-victaulic nipples, and one victaulic coupling)
10	9764076		Kit, overspeed 90° valve, 3”(Includes overspeed valve, 2 threaded- to-victaulic nipples, and one victaulic coupling)
11		200RR5	Kit, overspeed in-line valve, 2”(Includes overspeed in-line valve, and one victaulic coupling)
12		200RR6	Kit, overspeed in-line valve, 3”(includes overspeed in-line valve, and one victaulic coupling)

ROLLER GUIDES

ROLLER GUIDES

(3) Roller Guide Contents

Printed in USA January, 2015

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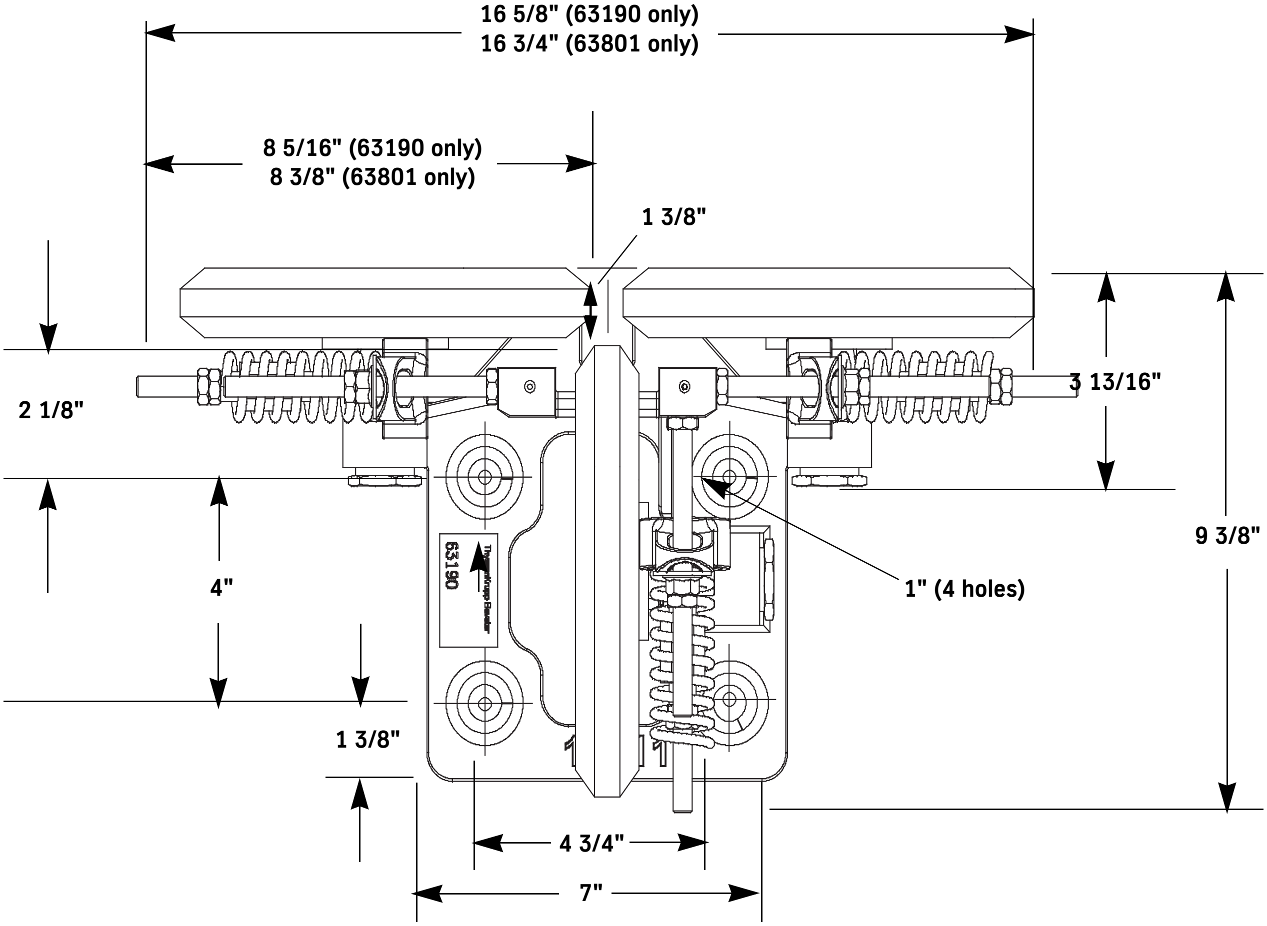
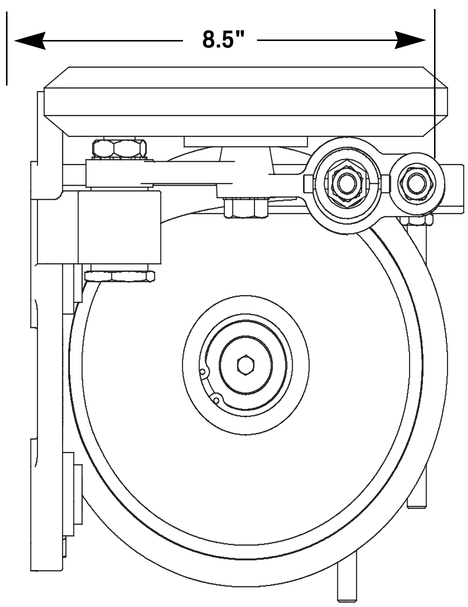
Assembly Data

8 inch Roller Guide (63190 and 63801)



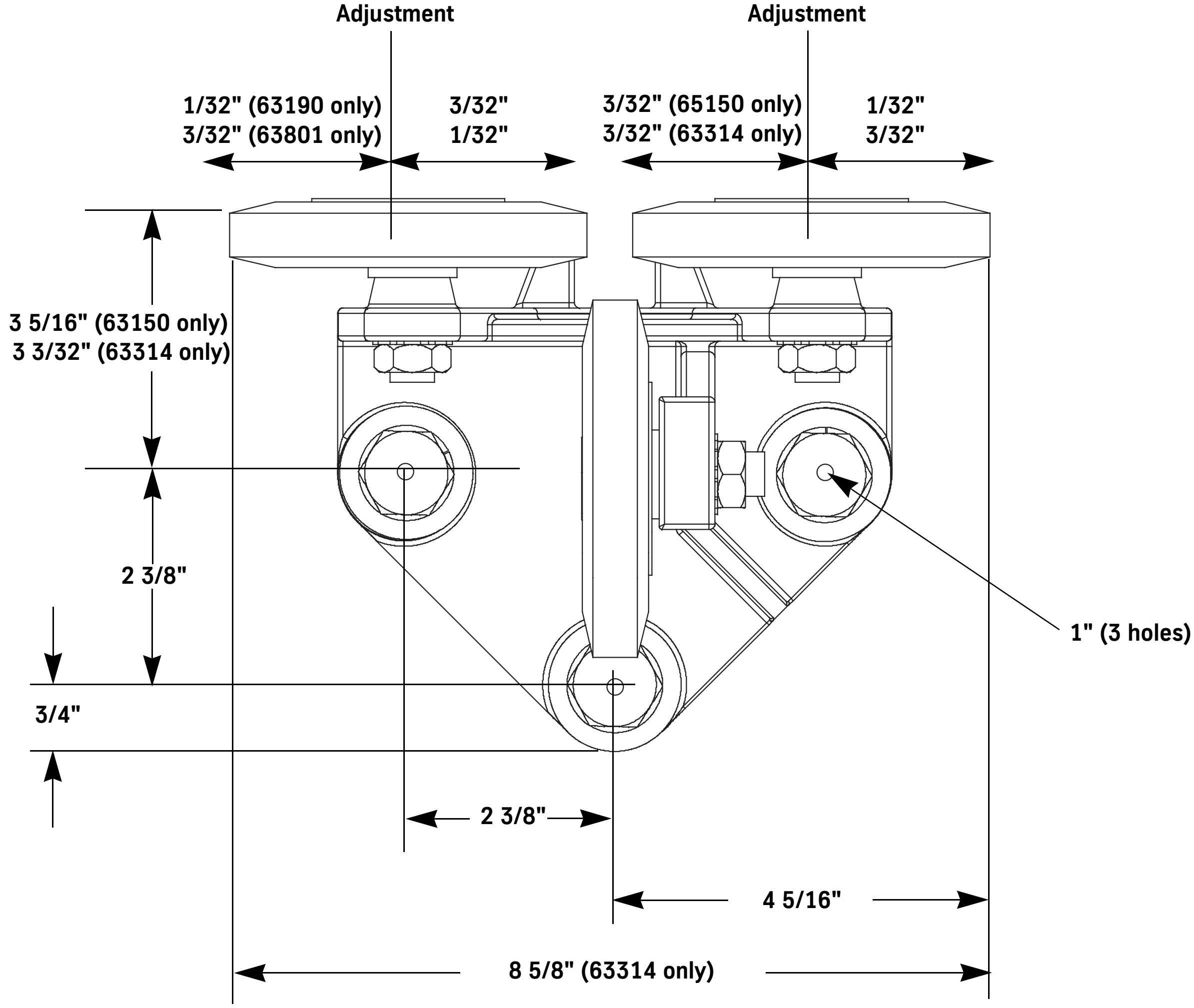


Specifications

Speed: Up to 1000 fpm

Load: Front-to-Back and Side-to-Side: 400 lbs. running, empty car balanced. Unbalanced load not to exceed 70 lbs, 35 lbs. for car speed > 500 fpm. 2000 lbs. loading.

4 inch Roller Guide (65150 and 63314)



Specifications

65150 Assembly

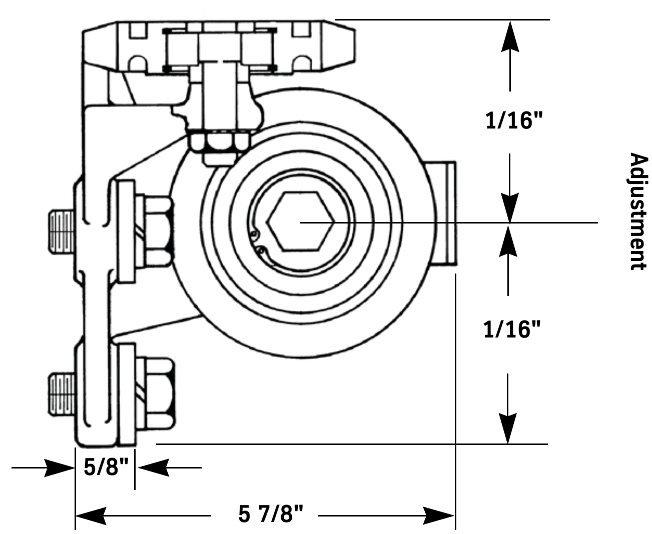
Counterweight: Maximum Speed = 1000 fpm

Maximum Running = 50 lbs.

63314 Assembly

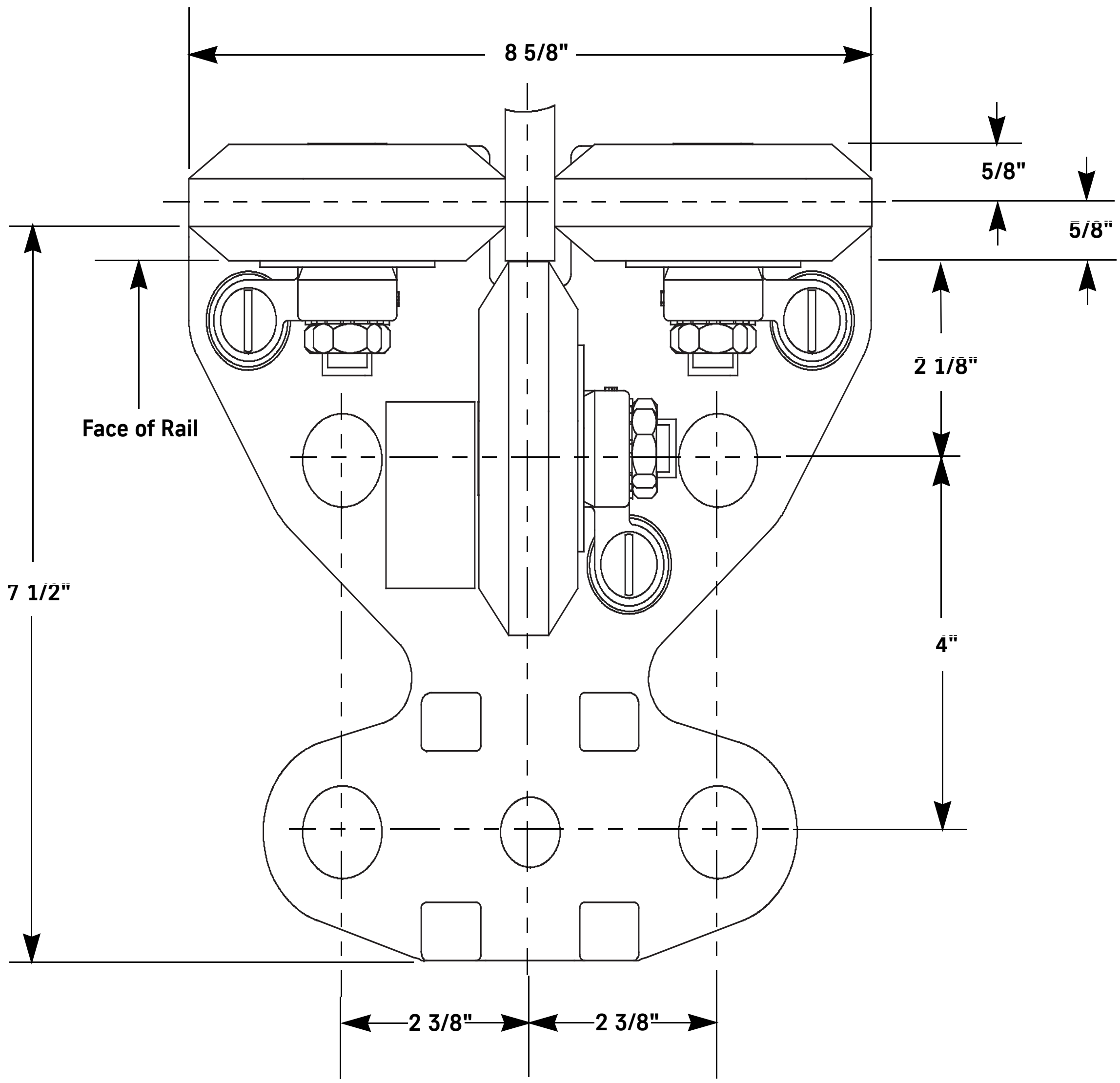
Counterweight: Maximum Speed = 450 fpm

Maximum Load per Roller = 35 lbs.



4 inch Roller Guides

(continued)



Specifications

Speed: Maximum 250 fpm with 5000 lbs. load per roller

Load: Front to back:350 lbs. running, empty car balanced. 2000 lbs. loading.

Side to side:400 lbs. running, empty car balanced. 2000 lbs. loading.

8 inch Roller Guides
63190 and 63801

CAUTION **Roller Guides MUST NOT be used during building construction or temporary service. Use temporary sliding blocks (Part Number 9825575, available from the Parts Warehouse). See Figure 1.**

Figure 1 - Temporary Sliding Block

Preliminary Check

Verify the following:

- The rails are smooth, free of rust, clean and dry.
- The rail splice joints and gouges have been filled and filed smooth.
- The car frame is square and plumb.
- The car is balanced. Use the weight frame as necessary.

Adjustment

1. Position the car at lower end of travel; leave room for access to the pit beneath the car.
2. Place the car on Inspection Operation.
3. Turn OFF, Lock and Tag out the mainline disconnect.
4. From the pit, post-wise center the car on the rails and clamp in place with the safety jaws.
5. Set the spring adjustment sleeves. See Table 1 and Figure 2.

Net Lifting Capacity	Number of Working Coils*
2750 lbs. or less	8
2751 lbs. to 3750 lbs.	7
3751 lbs. to 5000 lbs.	6
* From the flat end of the spring (not including it) to the first Allen set screw.	

Table 1 - Spring Adjustment

6. Lightly fasten the guides to the bottom of the car.

Note: Special "thick" washers go on top of the base between the base and the lockwasher.

Adjustment
(continued)

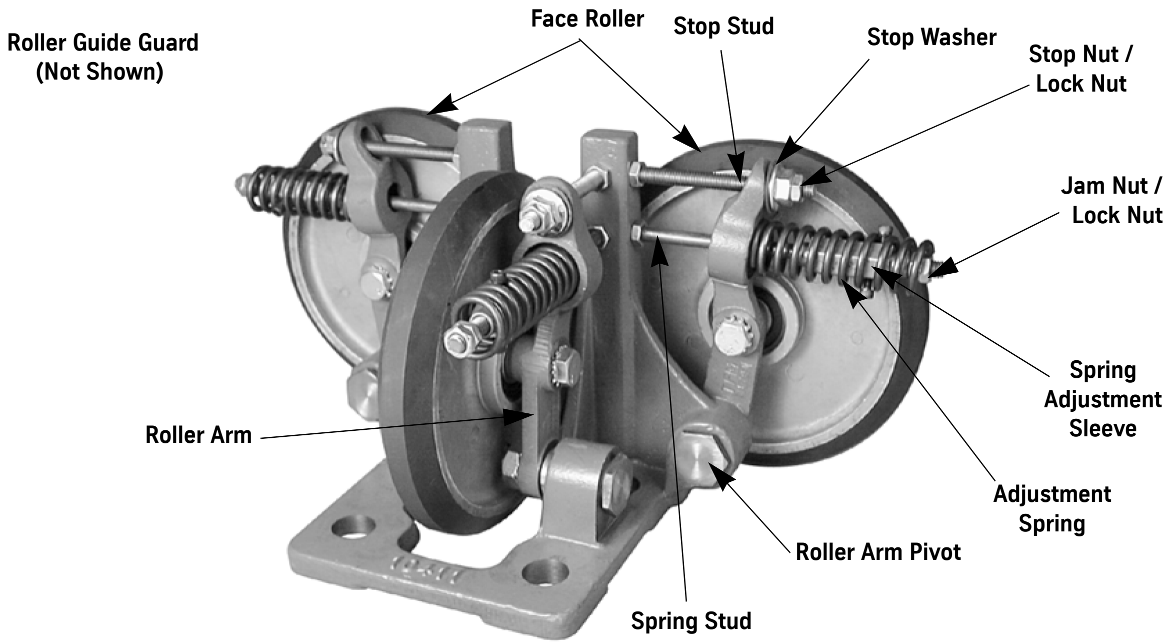


Figure 2 - 63190 or 63801 Roller Guide Assembly

7. Shift the base as required to center the slot on the rail. See Figure 2.

Notes:
- The distance from the face of the rail to the back of the slot should be approximately $^{1}/_{4}$". See Figure 3.
- The base must be square to the rail within ±2°
- Shim the base as necessary, so the rollers are perpendicular to the rails.

8. Tighten the mounting bolts firmly.

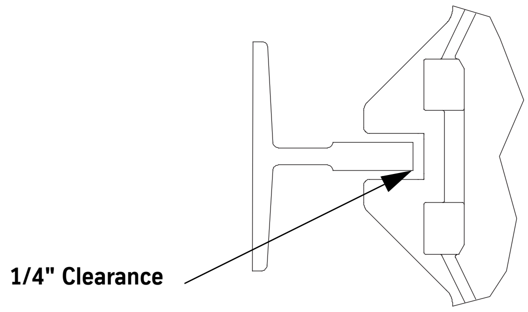


Figure 3 - Rail to Guide Throat Clearance

9. Hold the face roller lightly against the rail and adjust the stop nut for 5/16" clearance between the face roller arm and the stop washer. Repeat this operation for the opposite roller guide assembly.

Note: To hold this position, tighten the stop by hand.

Spring Tension and Stop Clearance Adjustment

1. Place the springs and adjustment sleeves for the face rollers over the studs. Make sure the studs are straight and tight. See Figure 4 for this and all remaining steps in this procedure.

2. Put on the jam nuts and the lock nuts and tighten until they come into contact with the adjustment sleeve, then turn two more times. Verify that the Allen set screws are set vertical and then tighten the locknut.

3. Adjust the roller arm stops for a clearance of $^1/_8$″ between the roller arm and the stop washer.

4. Assemble the post roller springs and adjustment sleeves in the same manner as for the face rollers.

5. Adjust the roller stops. See Step 3.

6. Adjust the roller guide assemblies on top of the car.

Note: The stiles must be centered on the rails.

7. Turn ON the mainline disconnect.

8. Release the safety device.

9. Run the car at slow speed up and down the length of the hoistway to check general clearances, the leveling devices, door equipment, etc.

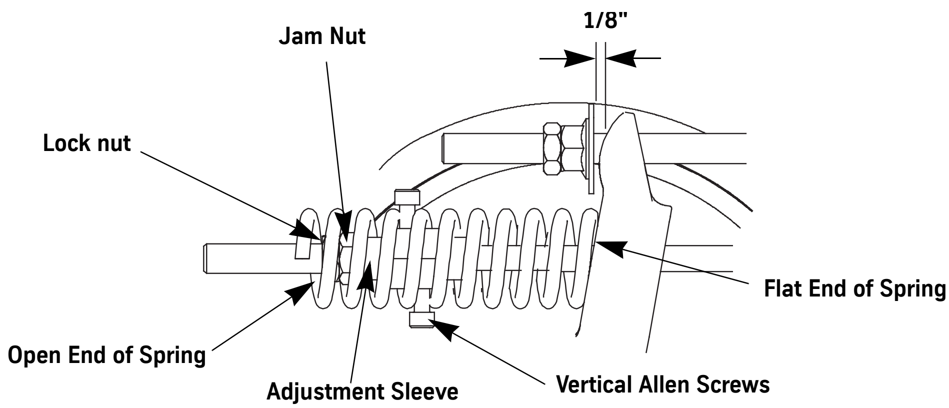


Figure 4 - Spring Tension and Stop Clearance Adjustment

Final Spring Adjustment

Note: Make the final spring adjustments with an empty car at the middle of the hoistway.

CAUTION **Make the following adjustments if necessary on each roller guide without creating excessive tire pressure.**

1. Ensure that the car doors are closed.
2. Increase spring tension on one of any pair of springs to center slot in guide base on the rail.

Note: Due to the friction between the rubber tires and the rail, it is necessary to move the car a few feet after each spring adjustment is made to allow the car to center itself.

ROLLER GUIDES

Final Stop Adjustment

1. Run the car with eccentric loading up and down for several full trips.

Notes:

- When there is an eccentric load on the car it is acceptable for the roller arms to hit and ride on their stop washers, but the slots in the guide bases and the safety components must not scrape.
- The amount of eccentric loading depends on the size of the car and also how many people can stand comfortably along each side of the car.

2. Place approximately 75 lbs. for each foot of wall length against the rear wall of the cab.
3. Check for clearance between the rail and the guide throat and between the rail and the safety jaws.
4. Check to ensure that each and every roller can be turned by hand.

Note: If not, determine the cause of the excessive tire pressure and correct the problem before the roller guides are put into service.

5. Install the roller guide guard. See Figure 5.

Lubrication

No lubrication should be used on the roller guide or the rail.

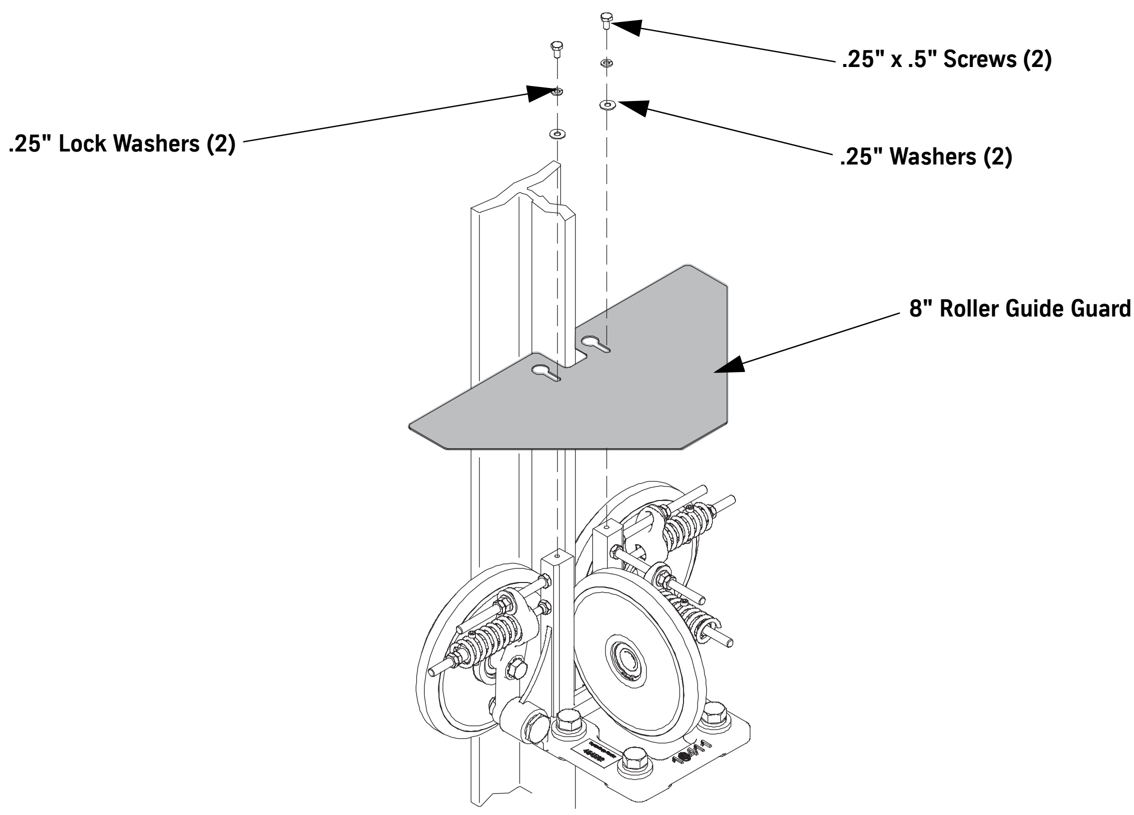


Figure 5 - Roller Guide Guard Installation

4 inch Counterweight Roller Guides 63314 and 65150

CAUTION **Roller Guides MUST NOT be used during building construction or temporary service. Use temporary sliding blocks (Part Number 9825575, available from the Parts Warehouse). See Figure 6.**

Figure 6 - Temporary Sliding Block

Preliminary Check

Verify the following:

- The rails are smooth, free of rust, clean and dry.
- The rail splice joints and gouges have been filled and filed smooth.
- The car is balanced. Use the weight frame as necessary.
- The counterweight is not binding.

Installation

1. Loosen the locknuts and turn the roller shafts until maximum clearance between the rollers is obtained. See Figure 7.
   a. Mount the roller guides and use the special washers on top of the base, between the guide base and the lockwashers.
   b. Block the bottom of the counterweight frame so that it is on the centerline of the rails and space between the stile and rail is the same on both sides.

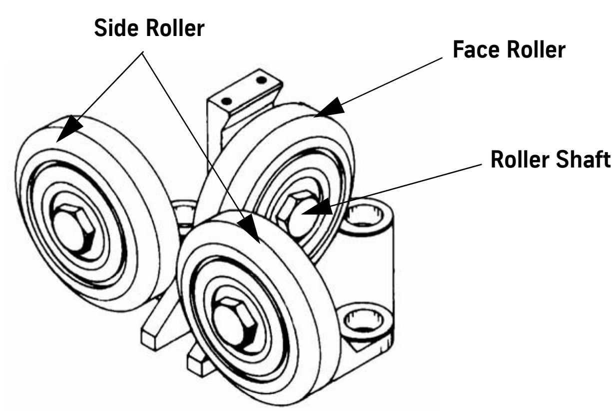


Figure 7 - Roller Guides on Counterweights

Installation
(continued)

2. Fasten the base tightly and tap the base with a hammer until equal space and clearance is obtained between the rail and the sides of the throat. The face roller should barely touch on the face of the rail.

Note: Verify that the rollers are square and plumb with the rail. If necessary, use shims to square up the base.

3. Install the top roller assemblies. See Step 1.

4. Adjust the top face rollers by turning the roller shafts. When adjusted, at least one face roller can be turned by hand with little effort.

5. Adjust the top side rollers by turning the roller shafts. Adjust for equal clearance between the rail and throat. When adjusted, the side rollers should offer the same resistance when turned by hand.

6. Lock the roller shafts without allowing the shafts to turn.

7. Adjust the bottom face rollers by turning the shafts so that rollers can still be turned by hand with little effort. Lock the shafts in place.

8. Adjust the bottom side rollers so that the clearance in the guide throat is evenly divided. Both front and rear rollers should offer the same resistance when turned by hand. Lock the shaft in place.

Lubrication

No lubrication should be used on the roller guide or the rail.

4 inch Roller Guide
67960

CAUTION **Roller Guides MUST NOT be used during building construction or temporary service. Use temporary sliding blocks (Part Number 9825575, available from the Parts Warehouse). See Figure 8.**

Figure 8 - Temporary Sliding Block

Preliminary Check

Verify the following:

- The rails are smooth, free of rust, clean and dry.
- The rail splice joints and gouges have been filled and filed smooth.
- The car is balanced. Use the weight frame as necessary.
- The counterweight is not binding.

Installation

Note: Part number 42254 (rail clip) must be used with 8# rails.

1. Verify that the car is centered post-wise and set the car on the safety.

2. Back off all adjusting screws and flange nuts until the roller arms lean away from the safety slot in the base. For this step and all remaining steps in this procedure, see Figure 9.

3. Install the lower roller guides first, centering each safety slot on the guide rail with the bottom of the slot approximately $^{1}/_{4}$″ from the face of the rail.

Notes: Shim between base and mounting plate, if necessary, to plumb all rollers.

4. Hold the face roller in contact with the rail and turn the adjusting screw until it bottoms out lightly on the base. Back off the screw two turns and lock it with the jam nut.

5. Hold each side roller in contact with the rail and turn the screw until it bottoms out lightly on the base. Back the screw off one turn and lock it with the jam nut.

6. Raise the car to release the safety.

7. While the car is centered between the rails and the rails are centered in the slots, turn the flange nuts against the rubber springs to bring each roller firmly in contact with the rail.

8. With the car still balanced, install the top roller guides centering each safety slot on the rail with the bottom of the slot approximately $1^{1}/_{4}$″ from the face of the guide rail.

Installation

(continued)

Note: Shim between base and mounting plate, if necessary, to plumb all rollers

9. Keep the car centered between the rails and the rails centered in the slots and repeat step 4 through step 7.
10. Place 75 lbs. for each foot of cab width against the rear cab wall and run the car up and down. If the safety jaws/safety slots drag on the rails, adjust the adjacent screws $^1/_4$″ turn at a time until clearance is obtained.
11. Move the weights to the front of the cab and adjust the screws (if necessary).
12. Place 75 lbs. for each foot of cab depth against one cab side wall and, if necessary, adjust screws as above. Adjust face roller screw $^1/_4$″ turn at a time until clearance is obtained. Repeat this step for the other side wall.
13. Remove all weights from the car.
14. Turn each flange nut until the chamfer on the rubber spring is no longer visible under the flange. The car should remain centered between the rails and the rails centered in the slots.

Note: The amount of final pre-load on the rubber springs will depend on the size of the car. Deep cars, in general, will require additional pre-load on the side springs as wide cars will require more pre-load on the face springs.

Lubrication

No lubrication should be used on the roller guide or the rail.

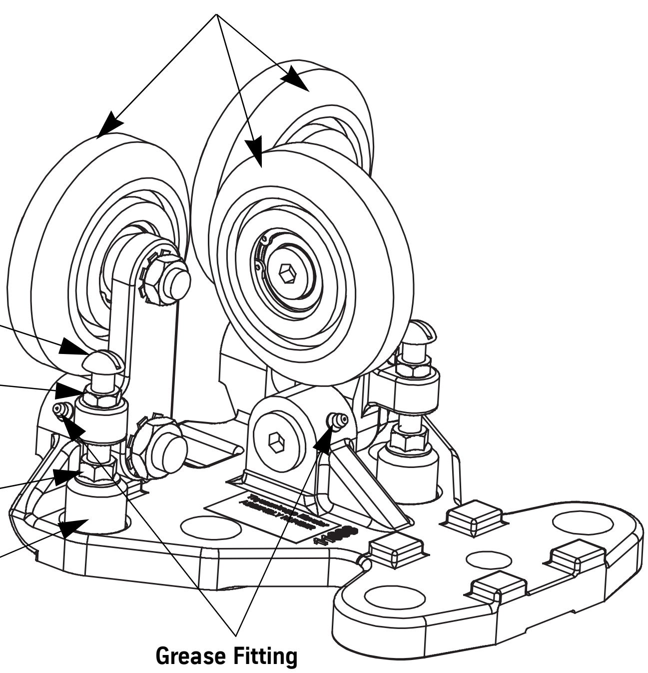


Figure 9 - 4-Inch Roller Guide Assembly 67960

2 $^{5}/_{8}$ inch Roller Guide
454BR

Formed Omega Rail C12 and C7

CAUTION **Roller Guides MUST NOT be used during building construction or temporary service. Use temporary sliding blocks (Part Number 9825575, available from the Parts Warehouse). See Figure 10.**

Figure 10 - Temporary Sliding Block

Preliminary Check

Verify the following:

- The rails are smooth, free of rust, clean and dry.
- The rail splice joints and gouges have been filled and filed smooth.
- The car is balanced. Use the weight frame as necessary.
- The counterweight is not binding.

Installation

Note: The Roller Guide Assembly for the Formed Omega Rails C12 and C7 are used on the counterweight rails for traction elevators.

1. With the counterweight frame centered and in-line with the counterweight guide rails, square the guide shoe assembly to the counterweight frame.
2. Tighten down each guide shoe so that the post-wise roller touches the face of the rail.
3. With the guide shoe mounted, rotate the eccentric on the front and rear rollers until the rail is centered in the retainer base of the guide shoe. Do not over tighten the rollers against the rail.

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Installation
(continued)

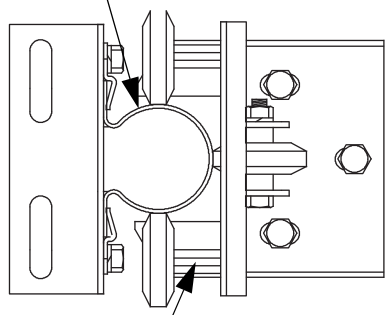


Figure 11 - Roller Guide Assembly 454BR, Formed Omega Rail C12 and C7

Troubleshooting

Problem	Solution
Noise	Dirty or Damaged Rail
	Bad Roller Assembly
Rapid Wear	Misalignment to Rail
	Excessive Rail Pressure
Vibration	Dirty or Damaged Rail
	Misalignment to Rail
	Bad Roller Assembly
	Mis-adjusted

Lubrication

No lubrication should be used on the roller guide or the rail.

3-Stage Jack Roller Guides

See the *3-Stage Jack* manual for instructions.

Roller Guides 200BEH

CAUTION **Roller Guides MUST NOT be used during building construction or temporary service. Use temporary sliding blocks (Part Number 9825575, available from the Parts Warehouse). See Figure 12.**

Figure 12 - Temporary Sliding Block

Preliminary Check

Verify the following:

- The rails are smooth, free of rust, clean and dry.
- The rail splice joints and gouges have been filled and filed smooth.
- The car frame is square and plumb.
- The car is balanced. Use the weight frame as necessary.

Adjustment

1. Position the car at the middle of the hoistway.
    - The rubber surfaces of the roller guides must be free of warp.
    - The roller arms must move easily.
    - Gaps between the car sling and guide rails must be equal on both sides and the roller guides correctly positioned.
2. Place the car on Inspection Operation.
3. Turn OFF, Lock, and Tag out the mainline disconnect.
4. Verify that the car is centered post-wise, and clamp in place with the safety jaws.
5. Loosen nuts from the spring screws and the rubber buffer.

Note: The arms must be free, permitting the car movement to align the roller guide with the guide rail. See Figure 15.

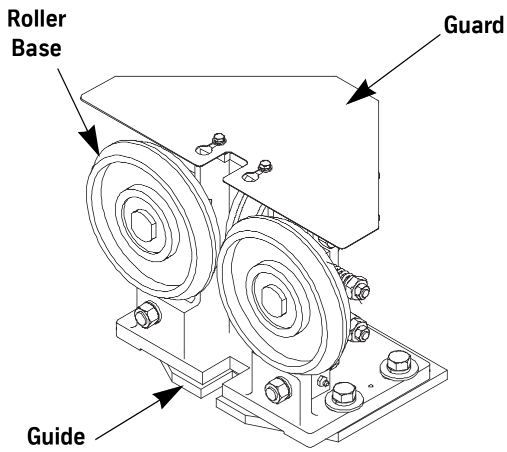
6. Verify the guides are aligned with rollers properly before making any further adjustments.
    - The roller base must be level and perpendicular to guide rail.
    - Gaps between roller base and guide rail must be $^{5}/_{16}$" (8 mm). See Figure 14.
7. Reassemble the spring screws and set its nuts.
8. Set the spring measure to 1 $^{11}/_{32}$" (34 mm).

Note: The gap between rubber buffer and arm must be within $^{1}/_{16}$"(2 mm).

9. Repeat the procedure for the upper roller guides.
10. The gap between rubber buffer and arm must be with $^{1}/_{16}$" (2 mm).

ROLLER GUIDES

Roller Guides
(continued)



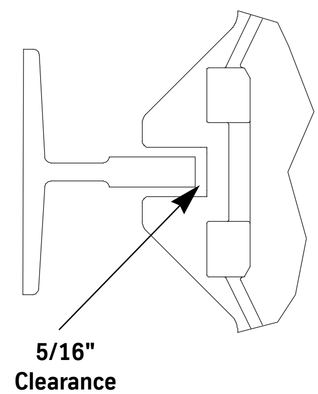


Figure 13 - Side View with Guard

Figure 14 - Rail to Guide Throat Clearance

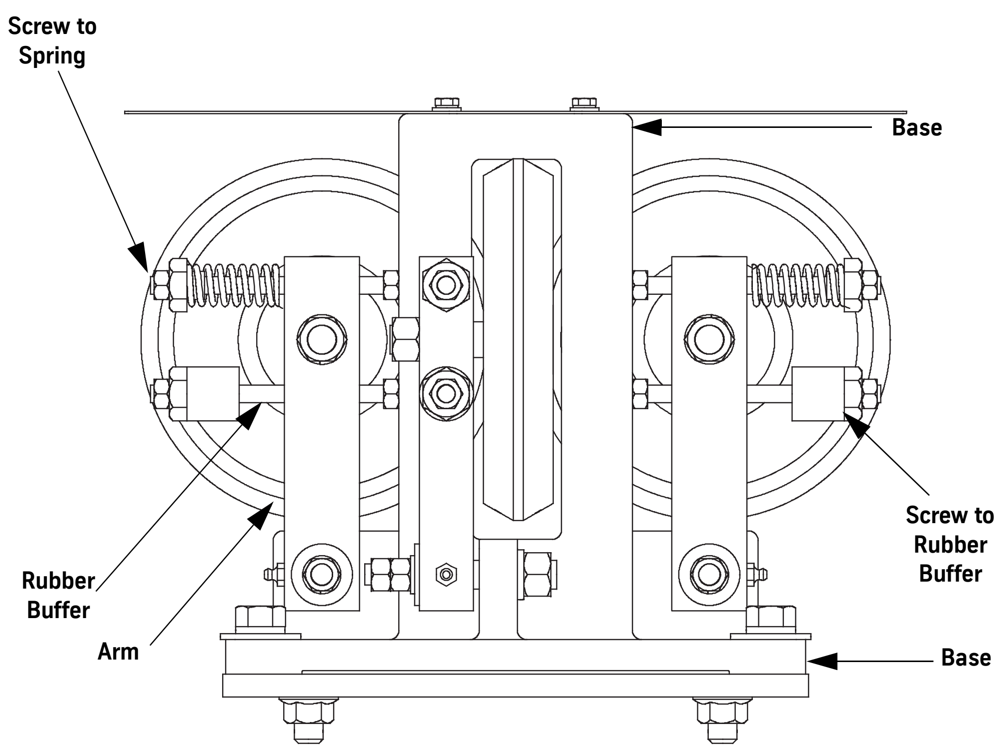
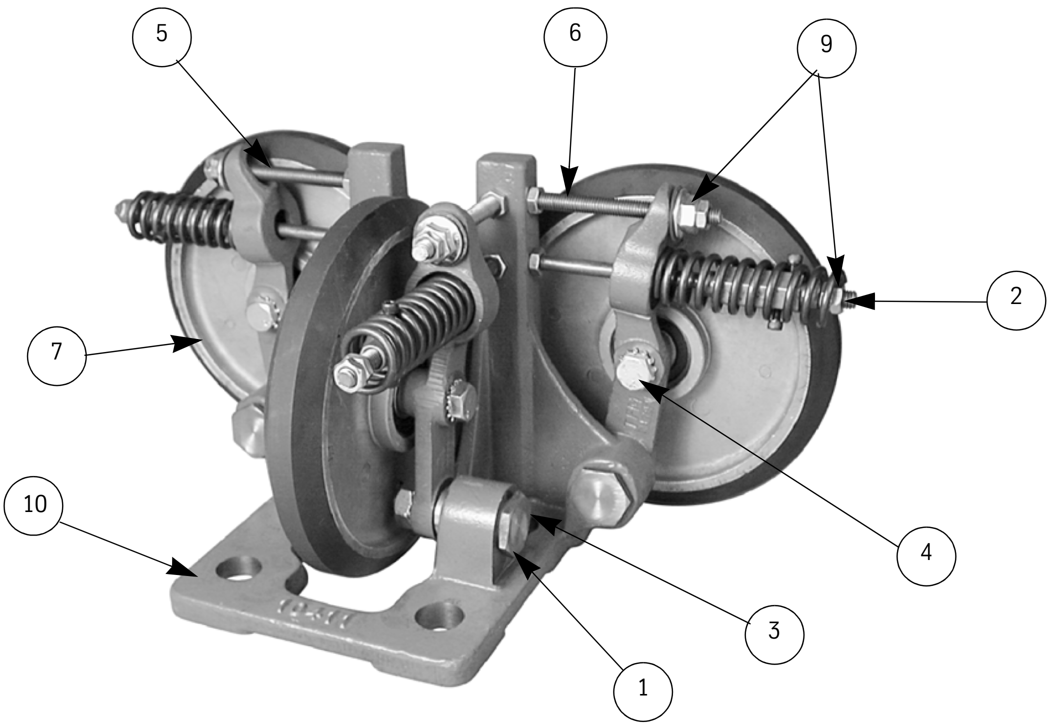


Figure 15 - Front View

Replacement Parts

8 inch Roller Guide - 63190, 63801



Item	Part No.	Print No.	Description
1	9747928	75508	Bearing, Bronze, B1418-12
2		718BR1	Rod, Threaded, Ø .375, Zinc, 8"
3	9747424	27727	Shaft, 8" Roller Arm
4	9747620	27728	Shaft, 8" Roller
5	9747722	27729	Arm, Roller, RH 8"
6	9747825	27730	Arm, Roller, LH 8"
7	9831824	63182	Assembly, Roller, 8" DIA
8	9700640	200LG1	Kit, Bolt, Roller Guide (Not Shown.)
9	9700687	700583	Nut, Jam, 3/8"-16
10		27758	Base, Guide, 8"
11		451LR	Guard, Roller Guide, 8" (Not Shown. See Figure 5.)
12		700321	Screw, .250"-20 x .5" (Not Shown. See Figure 5.)
13		700382	Washer, .25" Narrow (Not Shown. See Figure 5.)
14		700405	Lock Washer, .25" (Not Shown. See Figure 5.)

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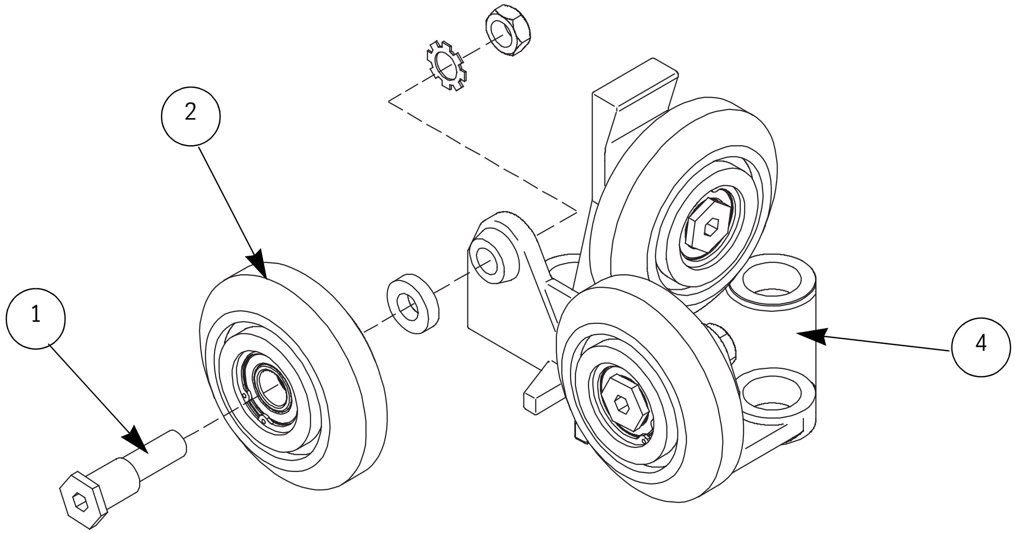
4 inch Roller Guide - 65150



Item	Part No.	Print No.	Description
1	9832774	63277	Roller, Car Guide, 4" DIA, 1.25" Wide
2	9786600	28660	Roller Guide Shaft
3	9700640	200LG1	Kit, Bolt, Roller Guide (Not Shown.)
4		29244	Base, Guide, 4"

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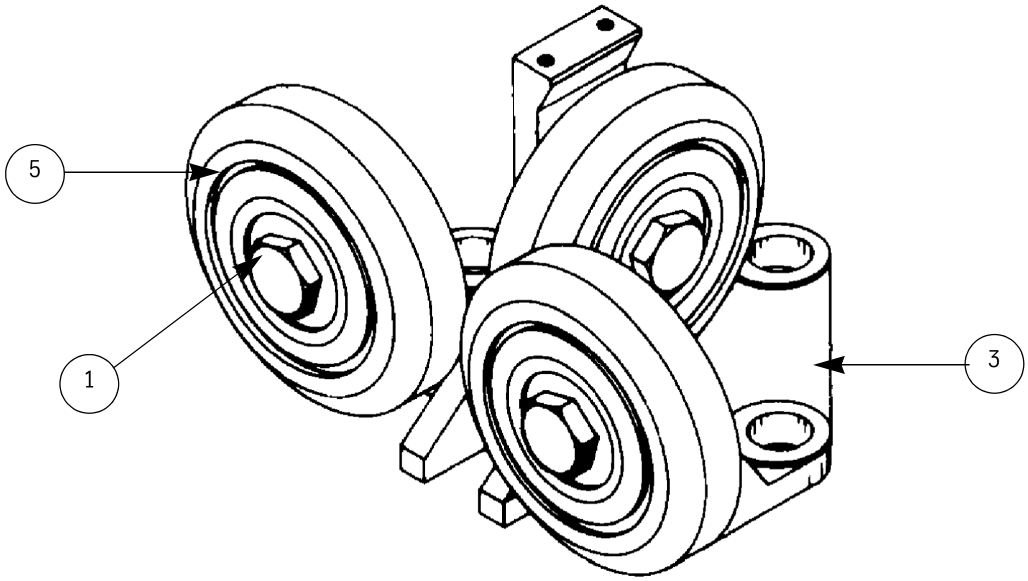
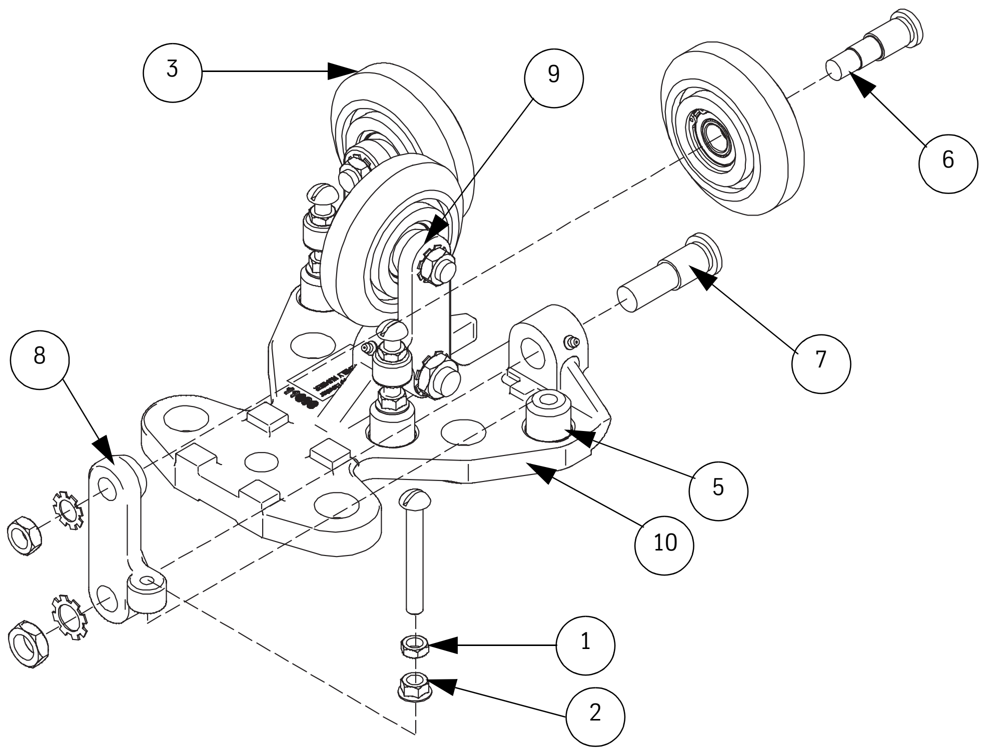
4 inch Roller Guide - 63314



Item	Part No.	Print No.	Description
1	9758645	29161	Spacer Roller Guide 4" DIA
2	9831873	63187	Roller, 4" DIA, Counterweight Guide
3		29244	Base, Guide, 4"
4	9700640	200LG1	Kit, Bolt, Roller Guide (Not Shown.)
5		63187	Assembly, Roller 4"

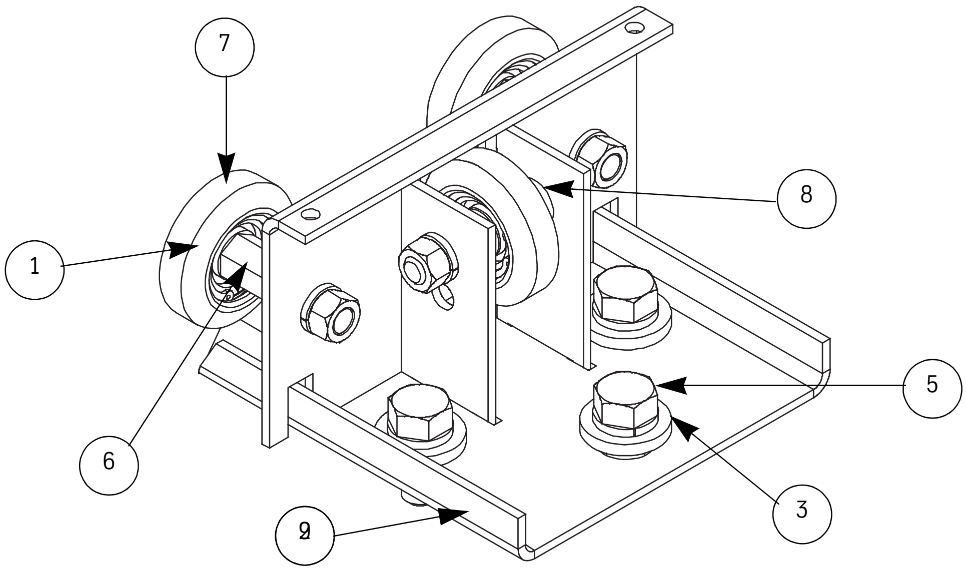
ROLLER GUIDES

4 inch Roller Guide - 67960



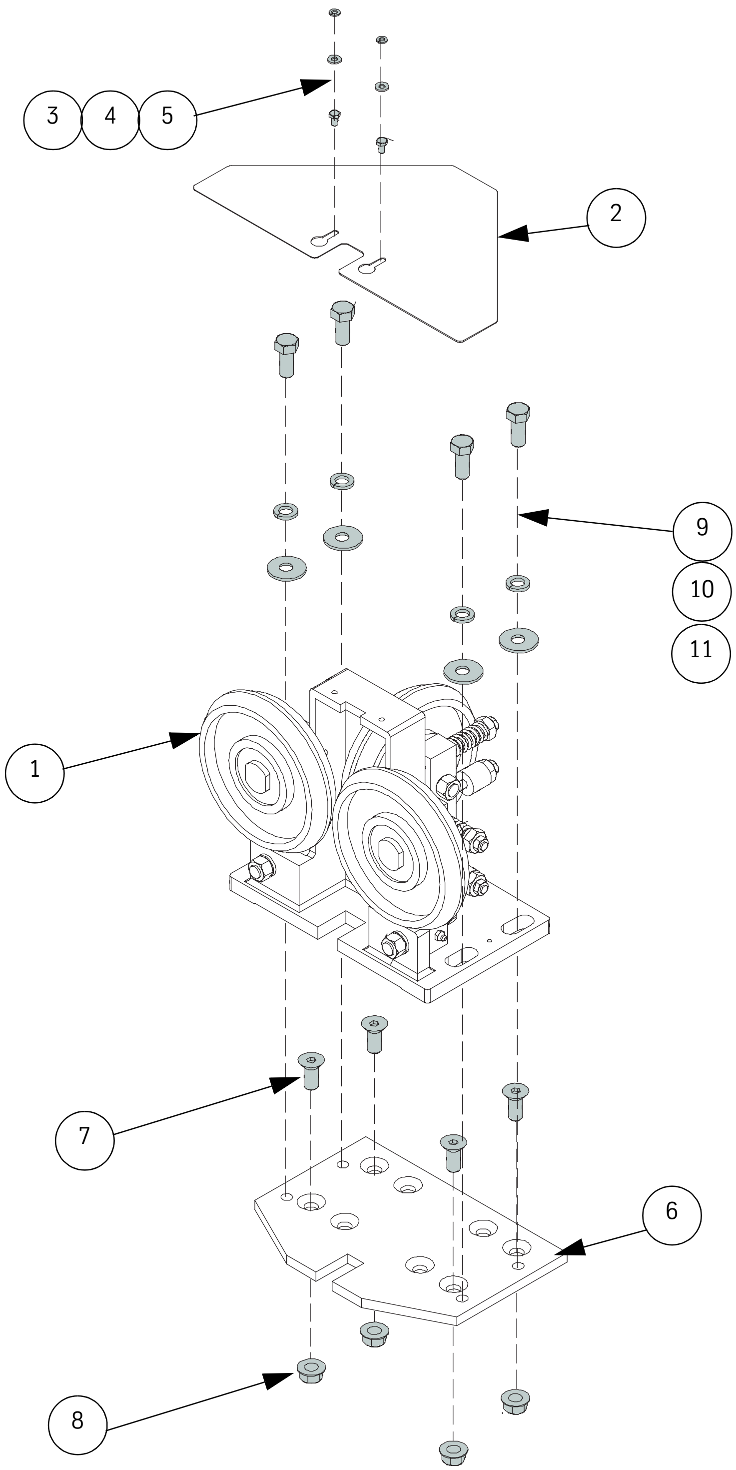
Item	Part No.	Print No.	Description
1	9700687	700583	Nut, Jam, 3/8"-16
2	9846803	77572	Nut, 3/8"-16 UNC
3	9832774	63277	Roller, Car Guide, 4" DIA
4		130558	Bolts, Roller Guide Package (Not Shown.)
5		77794	Rubber, Spring
6	700034	744GF1	Shaft, Roller
7		45196	Shaft, Roller Arm
8	11007	45198	Roller, Arm, RH, 4" DIA
9	11006	45201	Roller, Arm, LH, 4" DIA
10	11008	45200	Base, Guide, 4"

Formed Omega Rail - C12 and C7454BR



Item	Part No.	Print No.	Description
1		717BT3	Retainer Ring, External
2	9700640	200LG1	Kit, Bolt, Roller Guide (Not Shown.)
3		70083	Washer, LWHR, 0.500 Z
4		70108	Nut, NH, .500 Z (Not Shown.)
5		70072	Screw, CSH, 0.500
6		744DY1	Shaft, Counterweight Roller Guide, C12
7		454BT1	Assembly, Roller Guide, 2.625
8		781BL1	Spacer, Roller Guide, 2.625
9		114AM1	Base, Guide Shoe, C12 and C73

7 $^{7}/_{8}$ inch (200 mm) Roller Guide - 200BEH



Item	Print No.	Description
1	454EY001	Guide, 200 mm Roller, Drilled
2	451LR1	Guard, 8.000 Roller
3	700321	Screw, CSH, .250-20 x .500
4	700382	Washer, FWA, .250
5	700405	Washer, LWHR, .250
6	165AXJ001	Roller Mounting Plate
7	396TB2	Screw, CSFHS, .625-11 x 2.500
8	393BE4	Nut, NHF, .625
9	70082	Washer, LWHR, .625
10	70159	Screw, CSH, .625-11 x 1.500
11	127929	Washer, FWA, .625 Wide

Appendix - Car Balancing Frame

Notes:

- Before car balancing, make sure that the cab, flooring and door operator installation is complete. After car balancing, complete the final roller guide adjustment.
- This frame is supplied on all jobs using roller guides when the car speed is 400 fpm or higher, when unusual conditions require, or when specified.
- Filler blocks are to be provided by the installer. The frame capacity is 10 blocks.
- Perform all balancing checks with the car doors CLOSED.

Installation and Adjustment

1. Place car in center of the hoistway where balanced weights can be loaded inside the car.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Verify that the hitch plate is in the center of the crosshead.
4. Loosen the lock nut and adjustment nut on all springs on the top roller guides.
5. Loosen the lock nut and adjustment nut on all roller arm stops.

Note: Rollers should now be free from the rail and allow the top of the car to move until the throat of the roller guide base touches the rail.

6. With the car suspended from the cables only and with the doors closed, walk to the front and the back of the car top.
   a. If the car top swings evenly in the direction of your weight on both sides of the cross-head, the car static balance is correct.
   b. If the car top remains against one side of the roller guide base while moving from front to back, the balance frame will need to be mounted on the platform on the light end of the car.

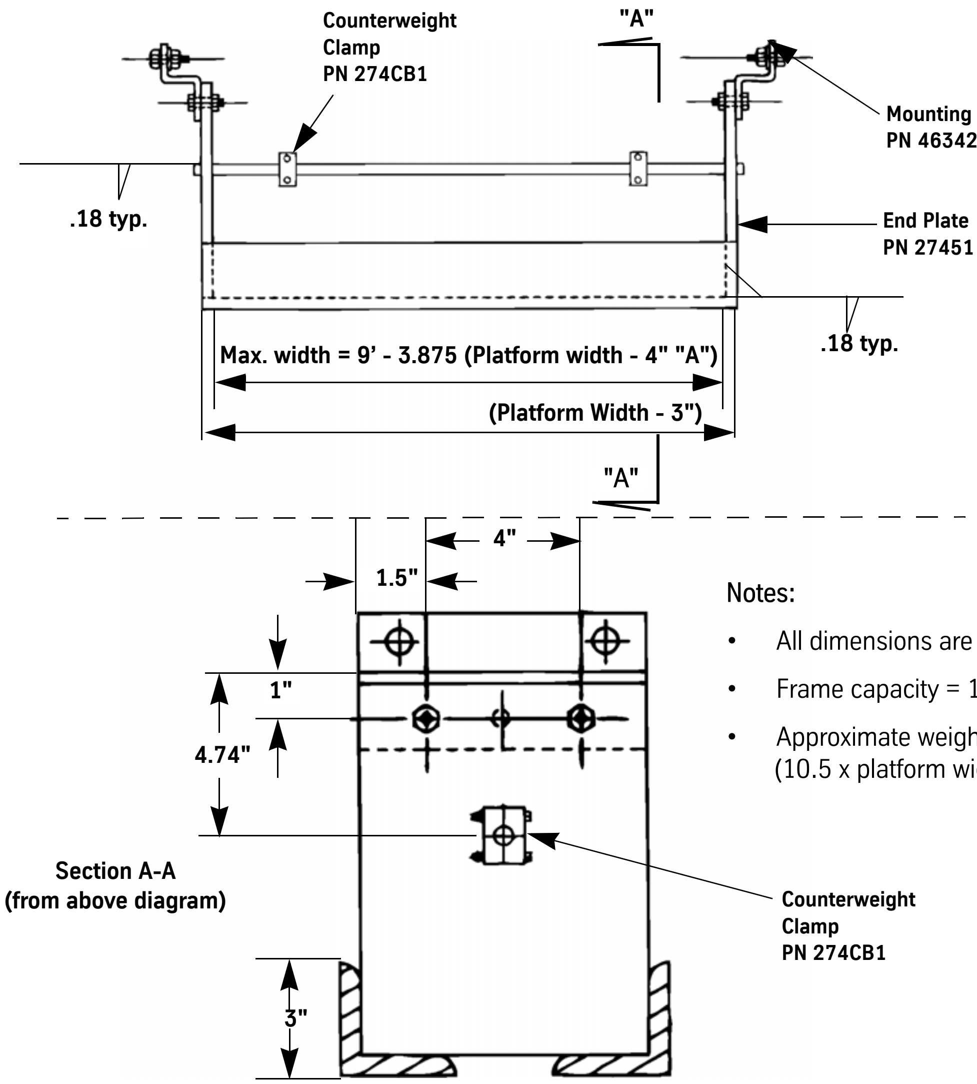
Note: Do not mount the balance frame at this time.

7. If the weight frame is required, begin placing weights on the car floor directly above where the balance frame will be mounted. After each weight is positioned, perform Step 6 and continue until the car static balance is correct.
8. Verify the post-wise position of the weights by shifting them until the car moves with equal pressure between the rails.
9. After a complete, balanced condition has been achieved, the car should fall back to exactly the same center position (front to back and post-wise if the top of the car is pushed over in any direction).
10. Record the number and position of weights required to balance the car and then remove the weights from the car.
11. To allow car movement, temporarily replace the spring adjustment nuts and stop adjustment nuts.
12. Turn ON the mainline disconnect.
13. Move the car down to a position where the weight frame can be mounted.
14. Turn OFF, Lock and Tag out the mainline disconnect.
15. Mount the weight frame.

Installation and Adjustment

(continued)

16. Install the number of weights recorded in Step 10, less one weight to compensate for the weight of the frame. Position the weights post-wise according to the location recorded.
17. Lock the weights in place with the two clamps provided.
18. Turn ON the mainline disconnect.
19. To adjust the roller guides, see the 8" *Roller Guide Adjustment* section.



Notes:

- All dimensions are for reference only.
- Frame capacity = 10 blocks @ 30 lbs.
- Approximate weight of frame in lbs. = .22 + (10.5 x platform width in feet)

Figure 16 - Balancing Frame Assembly

Installation and Adjustment
(continued)

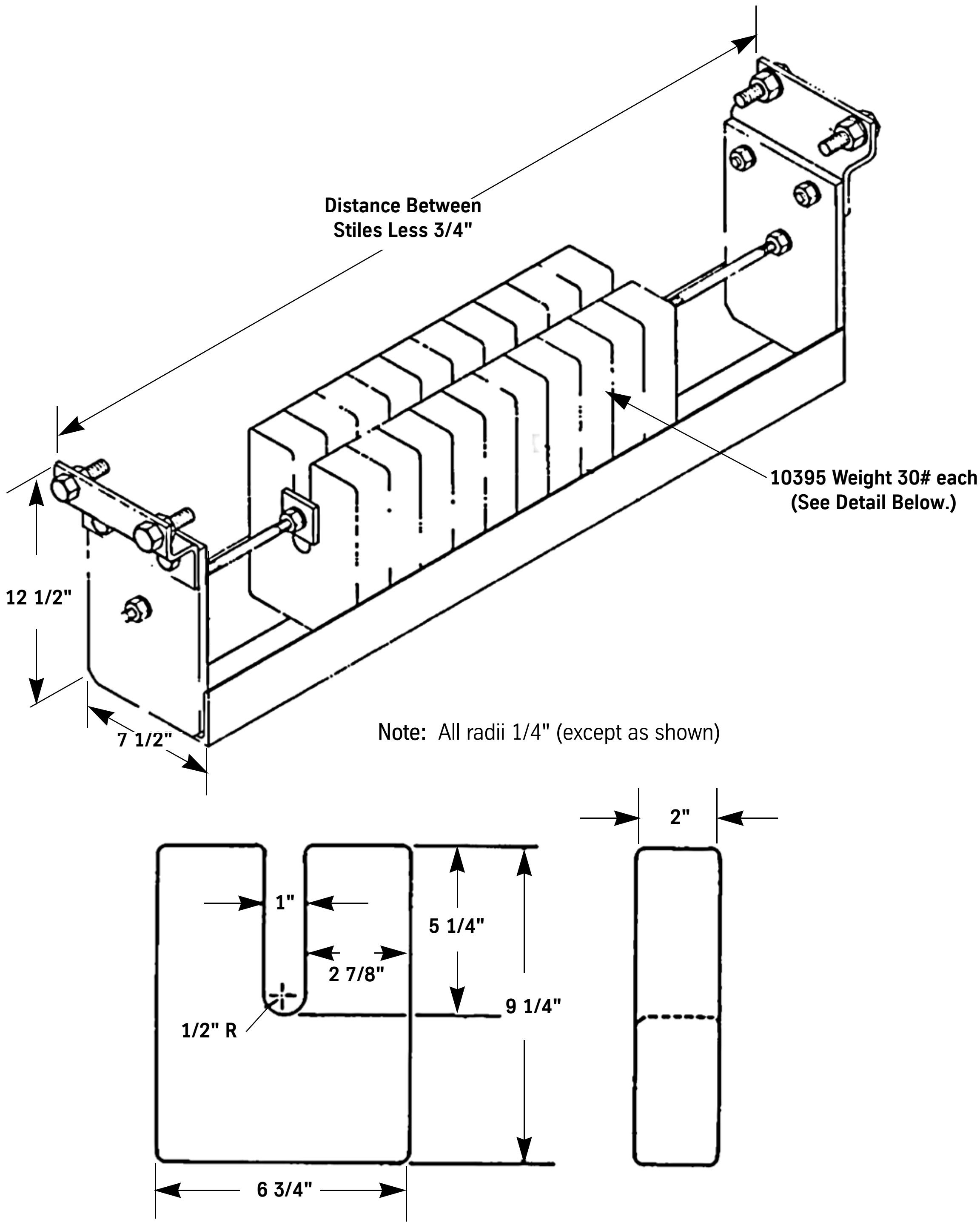


Figure 17 - Balancing Frame and Weights

DOOR RESTRICTOR

DOOR RESTRICTOR

(4) Door Restrictor Contents

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Overview

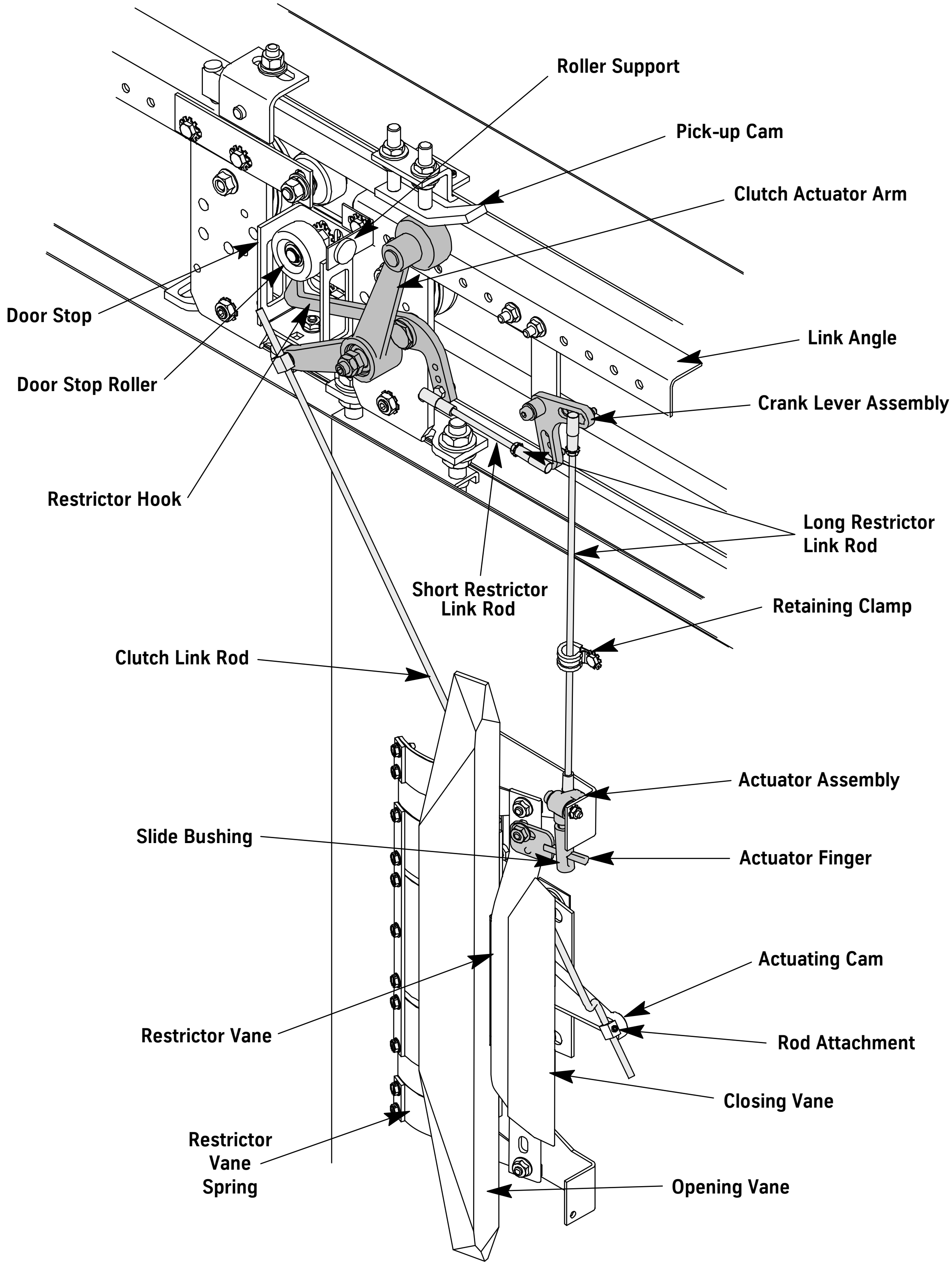

Figure 1 - Door Restrictor Assembly

Specifications

- Use Restrictor Angles with two-speed door widths of less than 46 inches.
- Use Restrictor Angles with two-speed center opening door widths of less than 72 inches.
- The pre-opening of doors should not start until reaching 3 inches from landing.

CAUTION **Use of this door restrictor with narrow doors could cause interference with the Door Operation Drive Arm.**

Installation

Note: To prevent unnecessary car movement at the clutch and the pick-up roller, the guide shoes and cab steady brackets must be tight.

1. Compare the height of the clutch with the shims, to the distance from the back of the door to the hoistway sill line. Leave 1/4" running clearance (remove shim, if necessary). Then attach the clutch to the door. See Figure 2.

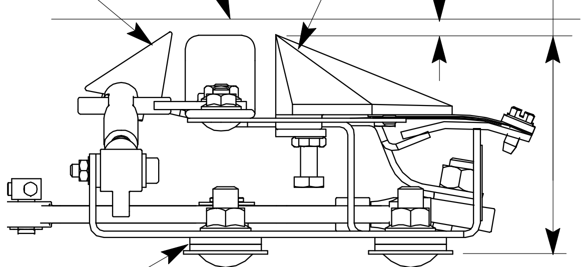

Figure 2 - Clutch Height

2. Attach the clutch actuating arm and roller support to the door hanger. See Figure 3.

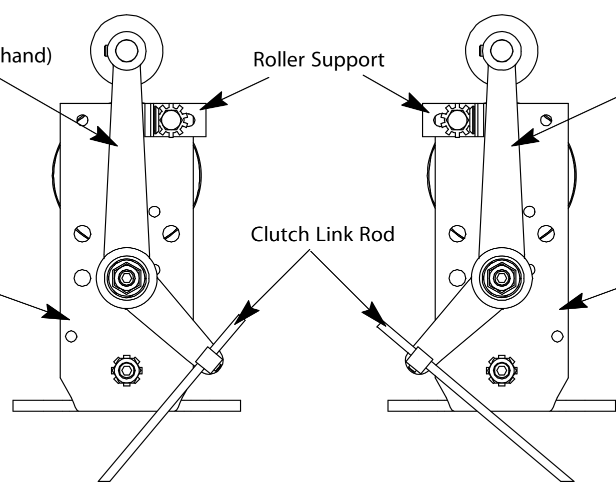

Figure 3 - Clutch Arm and Roller Support to Door Hanger

Installation

(continued)

3. Attach the clutch link rod, with the formed end of the rod at the clutch, to the actuating arm. See Figure 4.

Note: Depending on the distance of the clutch from the top of the door, the offset of the formed end may be either turned out, away from the clutch, or in toward the clutch.

4. Position the door so that the clutch actuating arm roller is off of the clutch pick-up cam. Adjust the roller support and the clutch link rod to retract the clutch closing vane to be even with the clutch opening vane.

5. Close the car door. Adjust the clutch pick-up cam to retract the clutch closing vane just short of striking the clutch actuating cam.

Note: If necessary, rotate the clutch link rod for clearance.

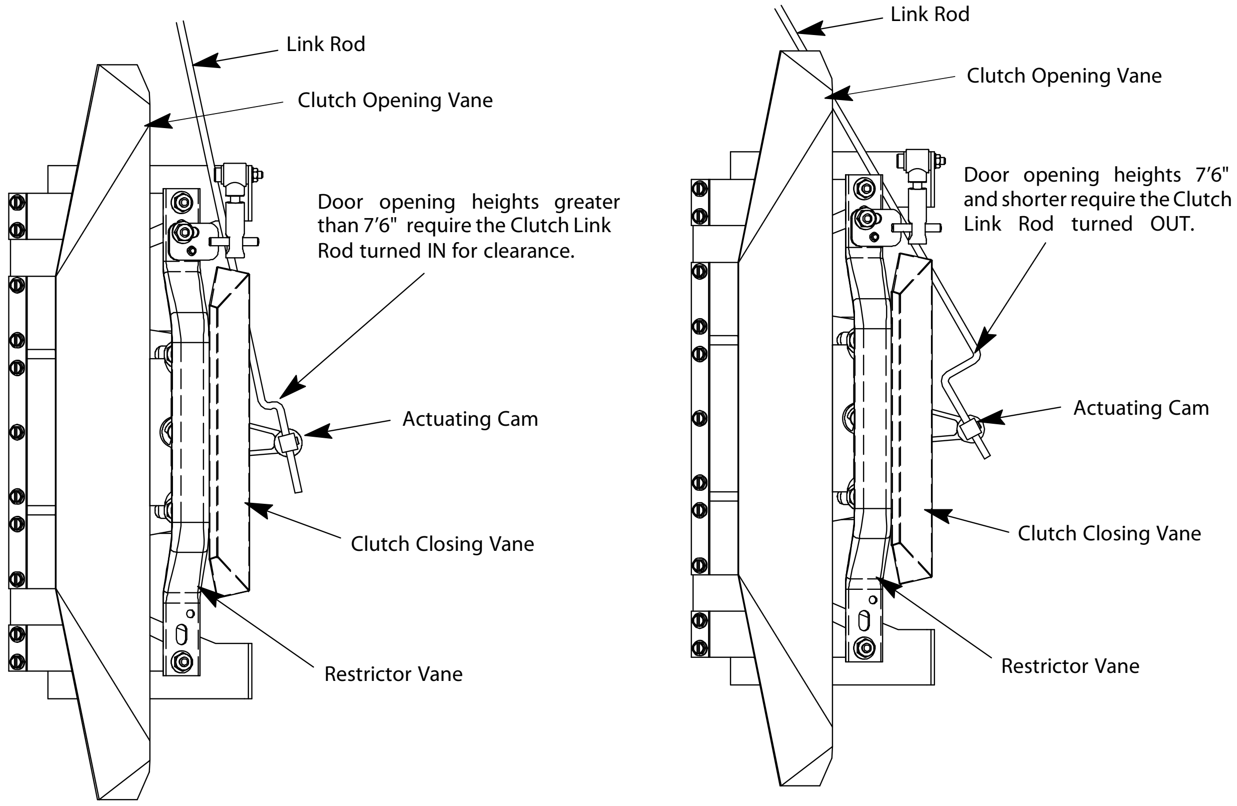

Figure 4 - Clutch Link Rod to Actuating Arm

Installation
(continued)

6. Use #10 nuts and lockwashers to attach the short and long link rods to the ball joints. See Figure 5.

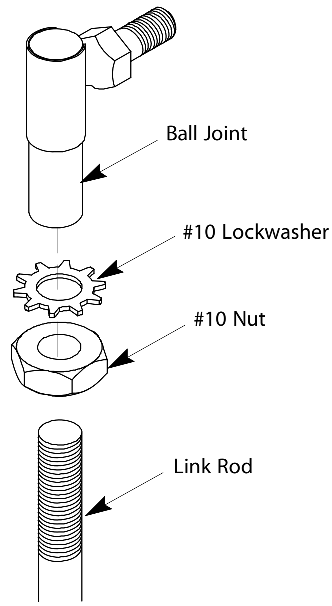

Figure 5 - Attach Link Rods to Ball Joints

7. Use #10 nuts and lockwashers to attach the short and long link rods to the crank lever. See Figure 6 on page 5.

8. Use the crank mounting bracket to attach the crank lever assembly to the door link angle.

Note: If necessary, add 9/32” diameter holes to the link angle.

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Installation
(continued)

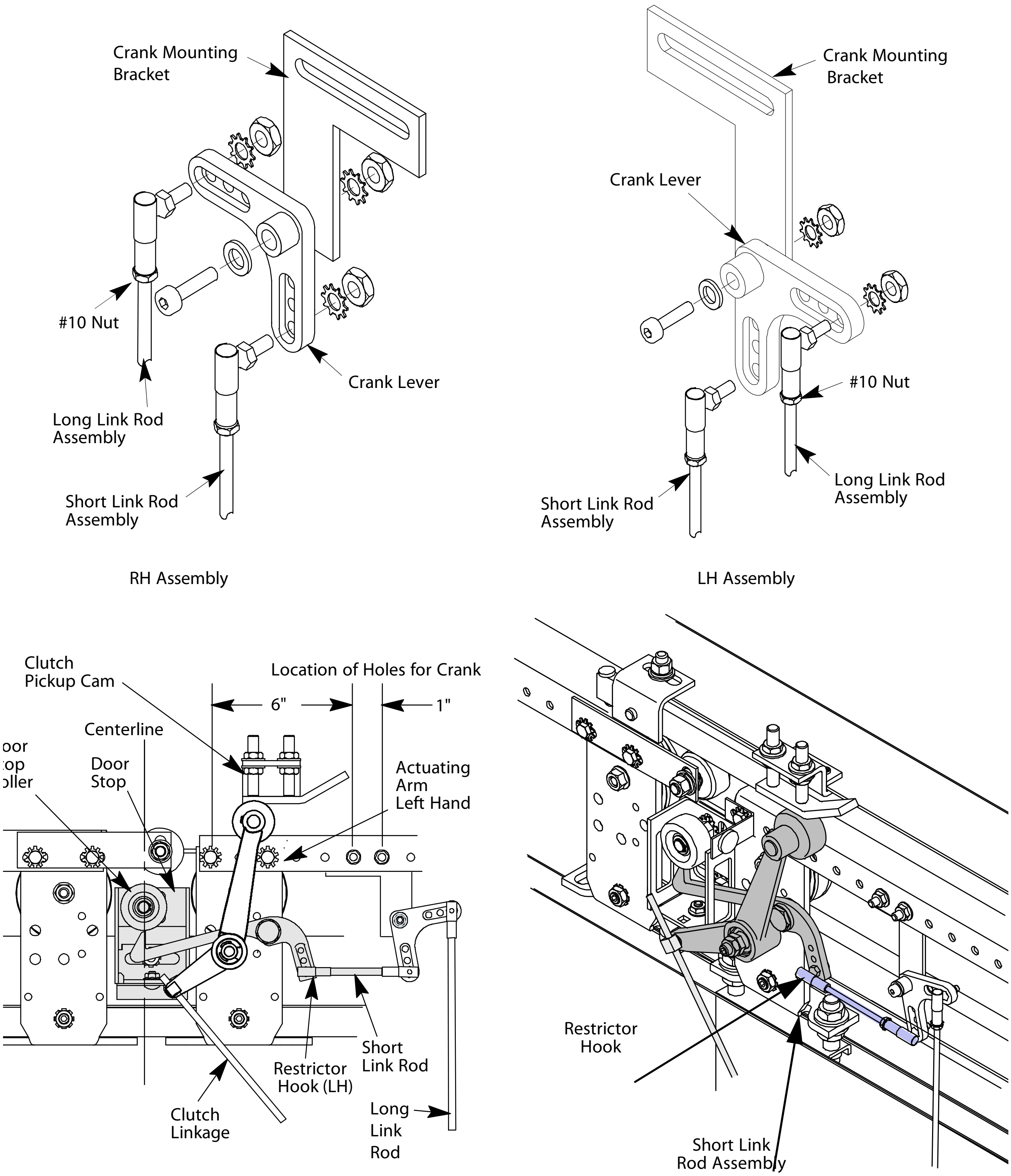


Figure 6 - Attach Crank Lever Assembly to Door Link Angle

Installation
(continued)

9. Use a shoulder bolt and nylon washer to attach the restrictor hook to the door hanger. See Figure 7.

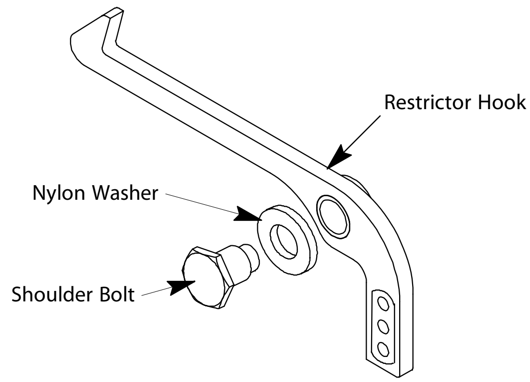


Figure 7 - Attach Restrictor Hook to Door Hanger

10. Use a #10 nut and lockwasher to attach the short link rod assembly to the restrictor hook. See Figure 8.

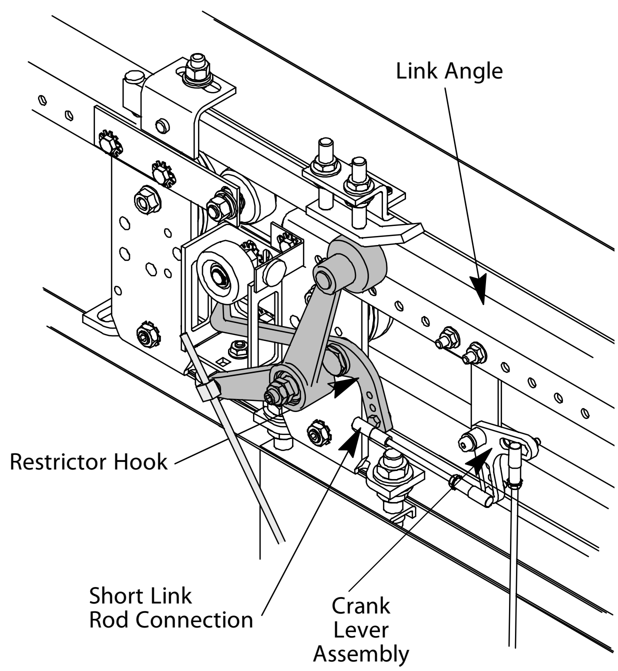


Figure 8 - Attach Short Link Rod Assembly to Restrictor Hook

11. Attach the long link rod to the clutch. The link rod should be vertically level, but a slight angle does not affect the operation.
12. With the door partially open, adjust—not tighten—the hook so it is horizontal to the link nuts.
13. Move, by hand, the restrictor vane in and out to check for binding.
14. Remove the door track bolt (if one is installed) from where the door stop must be placed.

Adjustment

1. Loosen the fasteners that are holding the door stop retaining clip on the door stop. See Figure 9.

Note: For center opening doors, remove the guard on the door stops.

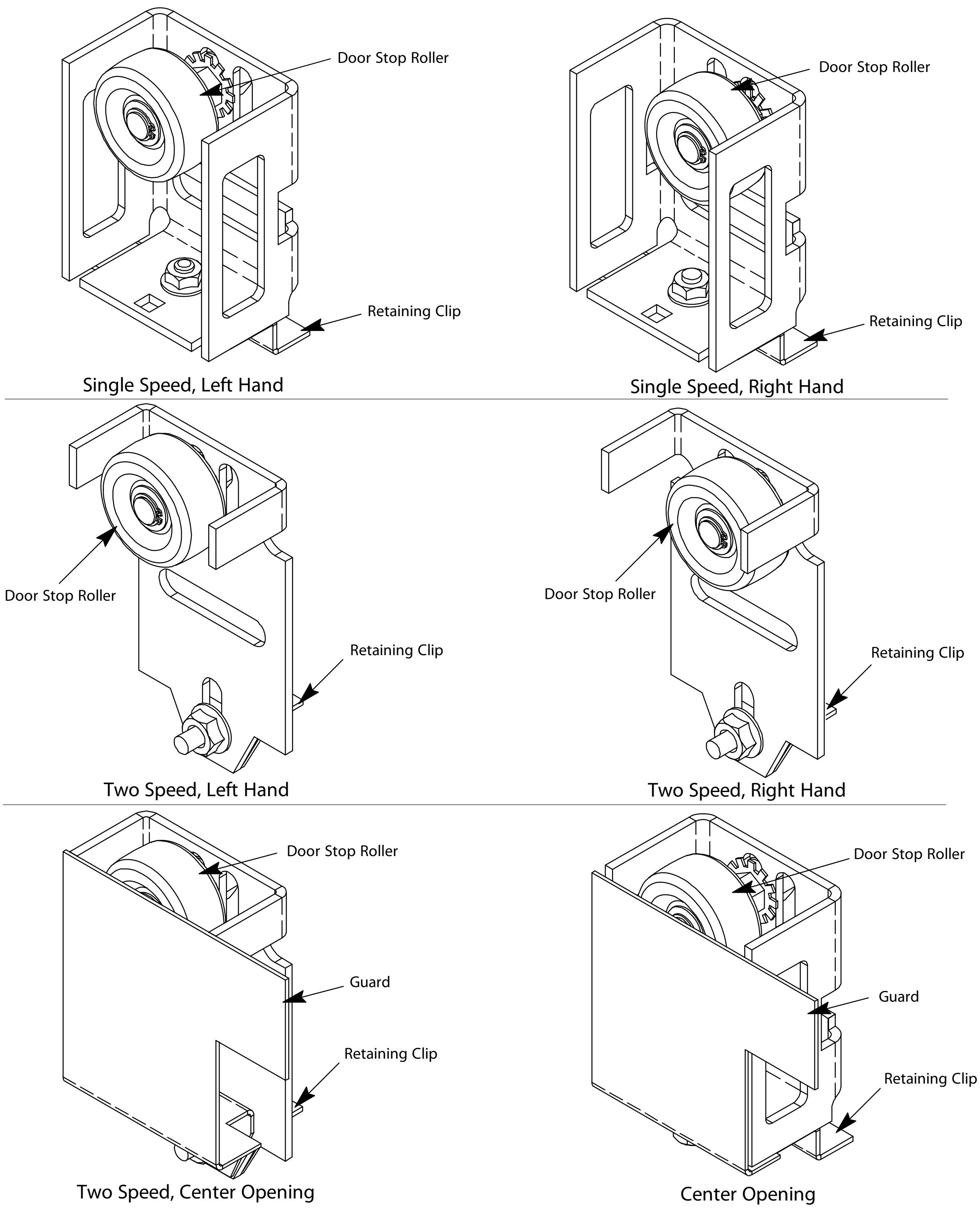


Figure 9 - Loosen Door Stop Retaining Clip Fasteners

Adjustment
(continued)

2. With the door stop roller in the highest position, use a 3/8" bolt and lockwasher to attach the door stop to the door track. See Figure 10.

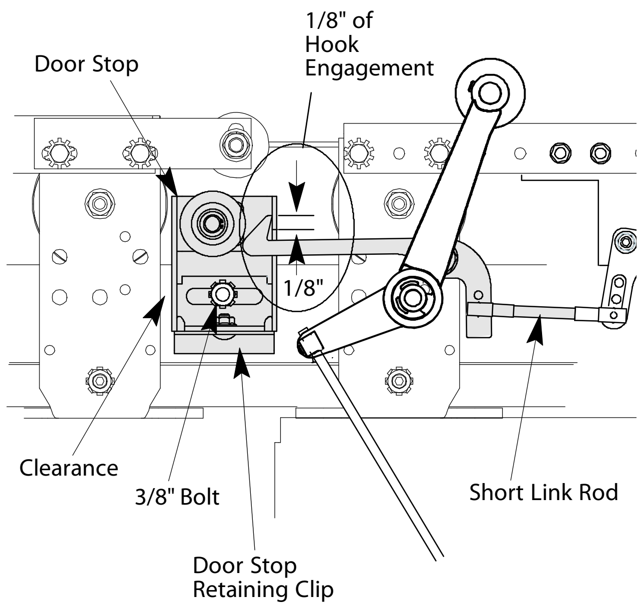


Figure 10 - Attach Door Stop To Door Track

3. With the door closed, center the doorstop roller over the hook.

4. Leave clearance between the doorstop and the hanger, and tighten the retainer clip and the doorstop to the track.

5. Open the car door so the hook is just inside the stop. Use the link rods for adjustment, and raise the hook to about 1/8" of engagement. Tighten the link rod nuts to secure the adjustment.

Note: For any necessary adjustment, slightly move the crank assembly from side-to-side on the link angle.

6. With the car door closed and the clutch closing vane retracted, lower the doorstop roller until the restrictor vane is retracted fully. Tighten the doorstop roller.

7. With the hoistway door open, open the car door (by hand) to check for locking. The door should be unlocked.

8. Open the car door (by hand) with the restrictor vane pushed into the clutch at least 1/4 unlocked. The door should be unlocked.

9. With car and hatch doors closed at this landing, try—by hand—to open the doors to be sure that the doors are not locked.

Adjustment
(continued)

10. Measure the running clearance between the pick-up rollers and the car sill at this landing. Use the running clearance dimension to adjust the remaining pick-up rollers.

11. Check at each landing (during normal operation) to verify that the doors do not lock.

12. Install the door stop guard (center opening doors only).

Note: Restrictor link rods longer than 24" that are close to the door panel can vibrate during fast door stops or reversals. A provided retainer clamp will contain the rod. Bend the clamp to leave a clearance between the rod and the clamp. See Figure 11.

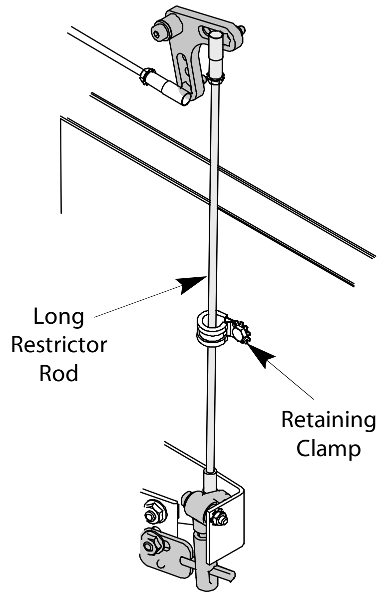
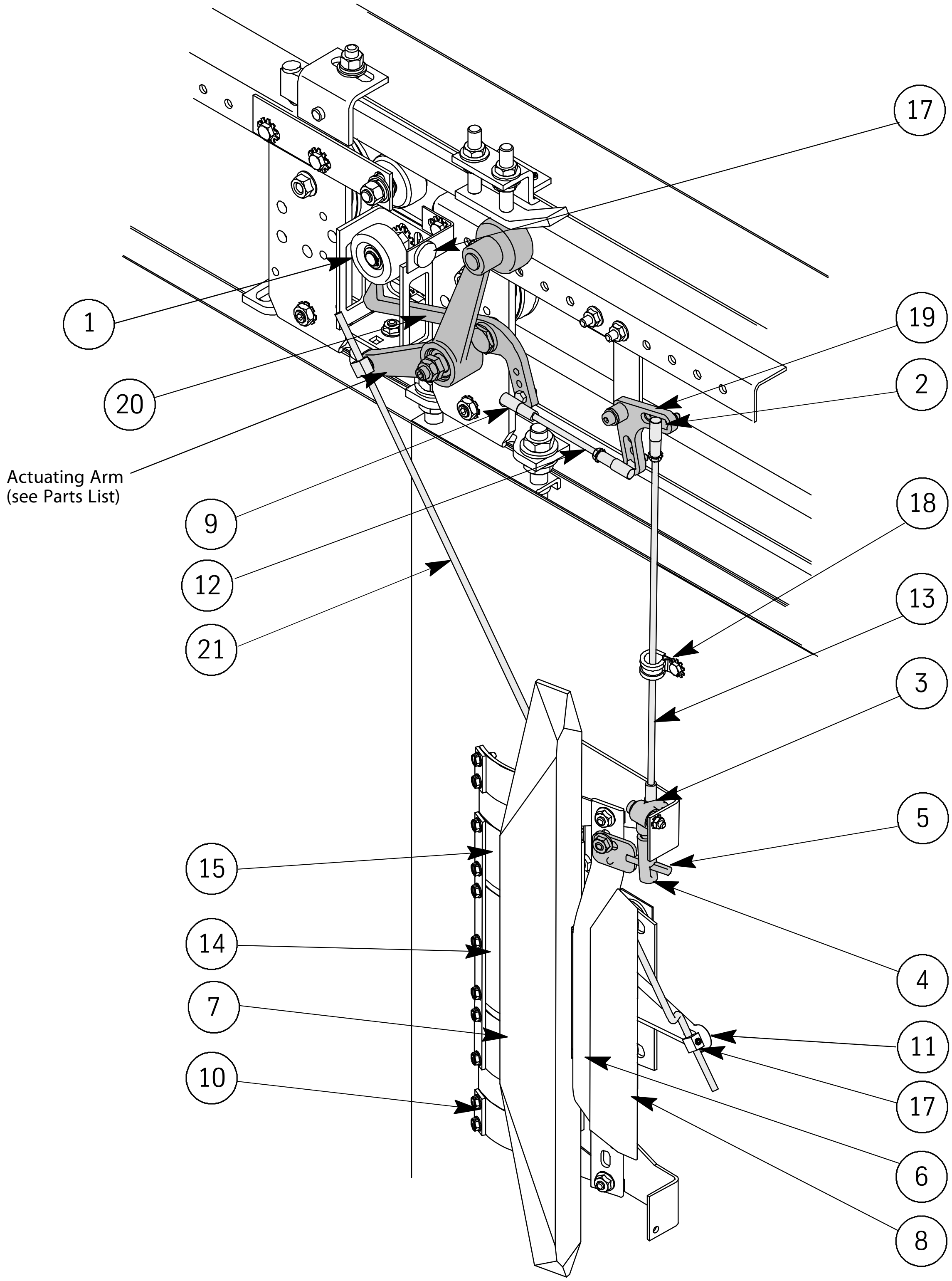


Figure 11 - Retaining Clamp

Replacement Parts

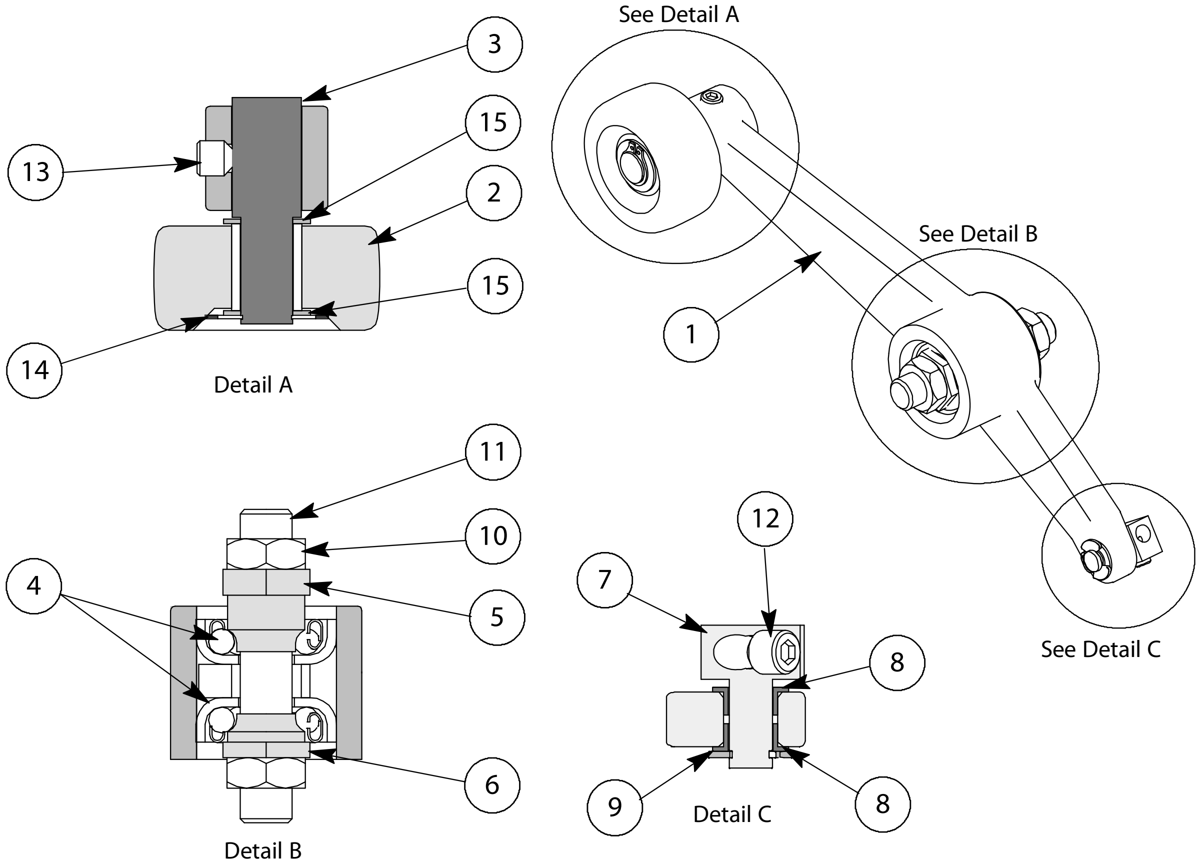
Door Restrictor



Replacement Parts
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9838351	63835	Roller, Door Stop
		196ADT2	Bracket, Door Stop, Single Speed
		196ADV2	Bracket. Door Stop, 2-Speed (not shown)
2	9802400	47530	Ball Joint, Right Hand
3	9725461	558BN1	Restrictor Actuator Lever Assembly
4	9852410	208BF2	Bushing, Slide
5	9784695	256GP1	Finger, Casting
6	9709287	888AT1	Vane, Restrictor
7		888AY1	Vane, Opening
8		888AX1	Vane, Closing
9	9802411	145793	Ball Joint, Left Hand
10	9898989	888AR1	Spring Assembly
		888AR2	Spring Assembly
11	9800888	228CF2	Cam, Clutch Actuator
12	9834214	718CH3	Link Rod, Short, 3 5/16"
13		718CH4	Link Rod, Long, 10 11/16"
		718CH2	Link Rod, Long, Contract (length must be specified)
14	9838806	40133	Spring, Closing Vane
15	9739180	40106	Spring, Opening Vane
16	9747035	44703	Rod Attachment
17	9841265	196ACV1	Bracket Assembly, Header Roller Support
18	9875391	274CD1	Clamp, Link Rod Retainer
19	9802415	558BK1	Crank, Restrictor
20		166AL1	Catch, Restrictor, Left Hand
		166AL2	Catch, Restrictor, Right Hand
21		718CP3	Rod, Clutch Link (standard length for 7' doors)
		718CP4	Rod, Clutch Link (length must be specified)

Actuating Arm Assembly



ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9739427	558BH1	Arm, Clutch Actuating, RH
	9739439	558BH2	Arm, Clutch Actuating, LH
2	9845781	64578	Roller with Bushing
3		638CB1	Shaft, Roller
4	9774087	47408	Ball Bearing
5	9874392	47439	Race, Bearing, (outer)
6	9874045	47404	Race, Bearing, Nut, (inner)
7	9747035	44703	Rod Attachment
8	9758525	75852	Bushing, Flanged, Nylon
9	9777891	77789	Retaining Ring
10	9718296	700584	Nut, .375" Z
11	9723816	47405	Stud, Actuating Arm Mounting
12		123175	Set Screw, .190" x .250"
13		700633	Set Screw, .250" x .250"
14	9736141	70115	Retaining Ring
15	9759256	75925	Washer, Nylon

SAFETY EDGES

(5) Safety Edge

Cedes Microlight Mini 32 Edge with Power Supply
Part Number 9831770

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DOOR OPERATORS

DOOR OPERATORS

(6) Door Operators Contents

HD-11 Door Operator

LD-03 Door Operator

HD-LM Door Operator

Printed in USA January, 2015

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HD-11 Door Operator

HD-11 Door Operator

Overview

The following is a list of the major components of a door operator including a description of their functions, an overview of some of the critical adjustments, and maintenance information. See Figure 1 on page 6-2.

- Adjustable Arm - The arm mounted to the drive wheel is used to change the amount of linear door movement or stroke.
- Connecting Arm - Connects the drive arm to the door panel.
- Door Operator Support - A metal plate welded to the header. The door operator is mounted to the door operator support with four bolts through the four mounting slots of the door operator.
- Drive Arm - The linkage connected between the drive arm support and the connecting arm.
- Drive Arm Support - The bracket containing two holes is located on top of the door operator. The drive arm should be connected to the right-hand hole, looking from the hatch, at the front of the door operator.
- Drive Wheel - A metal sheave containing a slotted cam surface. The adjustable arm mounts to the drive wheel and is adjusted in the slotted cam surface. The drive wheel is driven by the jack shaft sheave using 3 V belts.

  To change the linear door travel or stroke, move the adjustable arm:
  - Closer to the center of the drive wheel = less door travel for the same amount of wheel rotation.
  - Further from the center of the drive wheel = more door travel for the same amount of wheel rotation.

- Idler Arm - An adjustable arm mounted to the front of the door operator which controls the tension of the 3 V belts between the jack shaft sheave and the drive wheel.
- Intermediate Arm - Adjustable linkage connected between the drive wheel adjustable arm and the pivot arm. The connection at the pivot arm is adjustable to control the length of the intermediate arm.
- Mechanical Stops - Metal L brackets mounted to the front of the door operator. The stops have slots to adjust the amount of drive wheel rotation and, once positioned, they limit the physical rotation of the drive wheel.
- Motor - 115V or 230V DC Motor
- Pivot Arm - Connects the drive arm to the intermediate arm and provides an adjustment for the length of the intermediate arm.
- Sheave, Jack Shaft - A spoked sheave driven by the door operator motor with a single V belt. The motor sheave drives the jack shaft sheave which drives the drive wheel.
- Sheave, Motor - A sheave attached directly to the door operator motor shaft.
- Support Strut - Unistrut legs on the rear of the door operator which are used to secure the rear of the operator to the car top, and also to plumb the face of the drive wheel.

Overview
(continued)

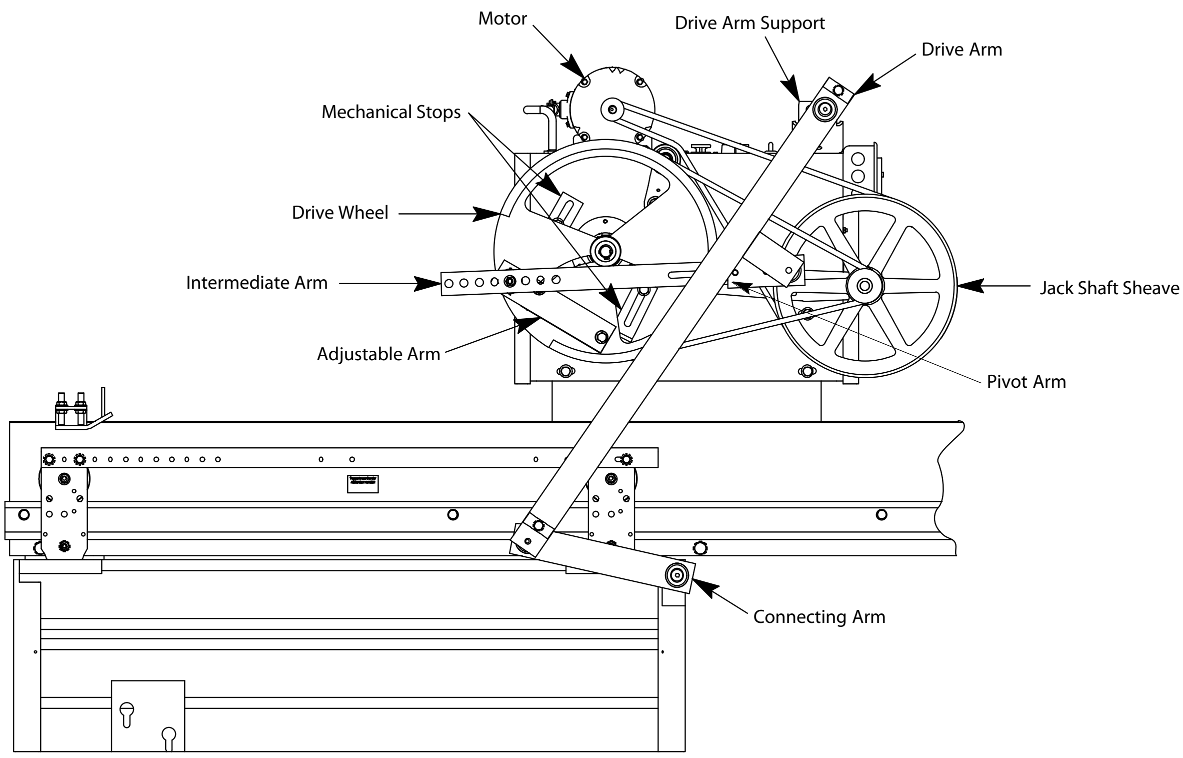


Figure 1 - Single Speed Door Operator

Mechanical Installation and Adjustment

Prepare the Door Operator

Note: Installation and adjustment of the door operator is best accomplished from an upper landing. Place the car top at a comfortable working height, and use the landing as a working platform.

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Remove the door operator from the shipping carton and crate. Locate and store the bag of parts.

3. Remove the cover from the rear of the operator by loosening the two top screws and the two lower rear screws.

4. Inspect the wiring. Make sure all connections are secure.

5. Loosen the bolts holding the mechanical stops.

6. While observing the shaft containing the cams (inside the operator), rotate the drive wheel.

Mechanical Installation and Adjustment
(continued)

7. Check and adjust, as necessary, the tension of the 3 Vee belts between the drive wheel and the jack shaft sheave. See Figure 2.

   a. Loosen the two bolts on the idler arm, and turn the locknut on the adjustment screw (located at the end of the idler arm).

   b. Securely tighten the idler arm bolts and the locknut.

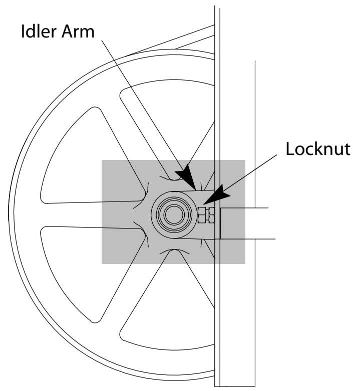


Figure 2 - Locknut Adjustment Screw

8. Check and adjust as necessary the tension on the single V belt between the motor sheave and jack shaft sheave:

   a. Loosen the four motor mounting bolts and position the motor.

   b. Securely tighten the motor mounting bolts.

Mounting the Door Operator - See Figure 3.

1. Lift the door operator to the car top. Center the operator in the slots of the door operator support. Install the four bolts and tighten. See Detail A.

Note: The operator may require repositioning within the slots to achieve the correct drive arm-to-connecting arm relationship with the doors fully open. The hole in the drive arm support bracket may also be used to achieve this relationship. For more details, see Figure 5 on page 7.

2. Attach the drive arm to the right hand hole in the drive arm support, as you look at the front of the operator, in the drive arm support. See Detail B.
3. Attach the connecting arm to the door panel. See Detail C.
4. Install the rear support. See Detail D.

   a. Attach the rear foot mount to the car top. Use the support clips to attach the strut to the mount.

   b. With a level, plumb the face of the drive wheel. Loosen the cap screws inside the door operator frame and adjust the strut nuts up or down in the support struts (as needed).

   c. Tighten all bolts securely.

Mounting the Door Operator
(continued)

5. With a level, check the drive arm for plumb. If necessary, position the drive arm from the door with no more than 3/8" (10mm) flat washers.

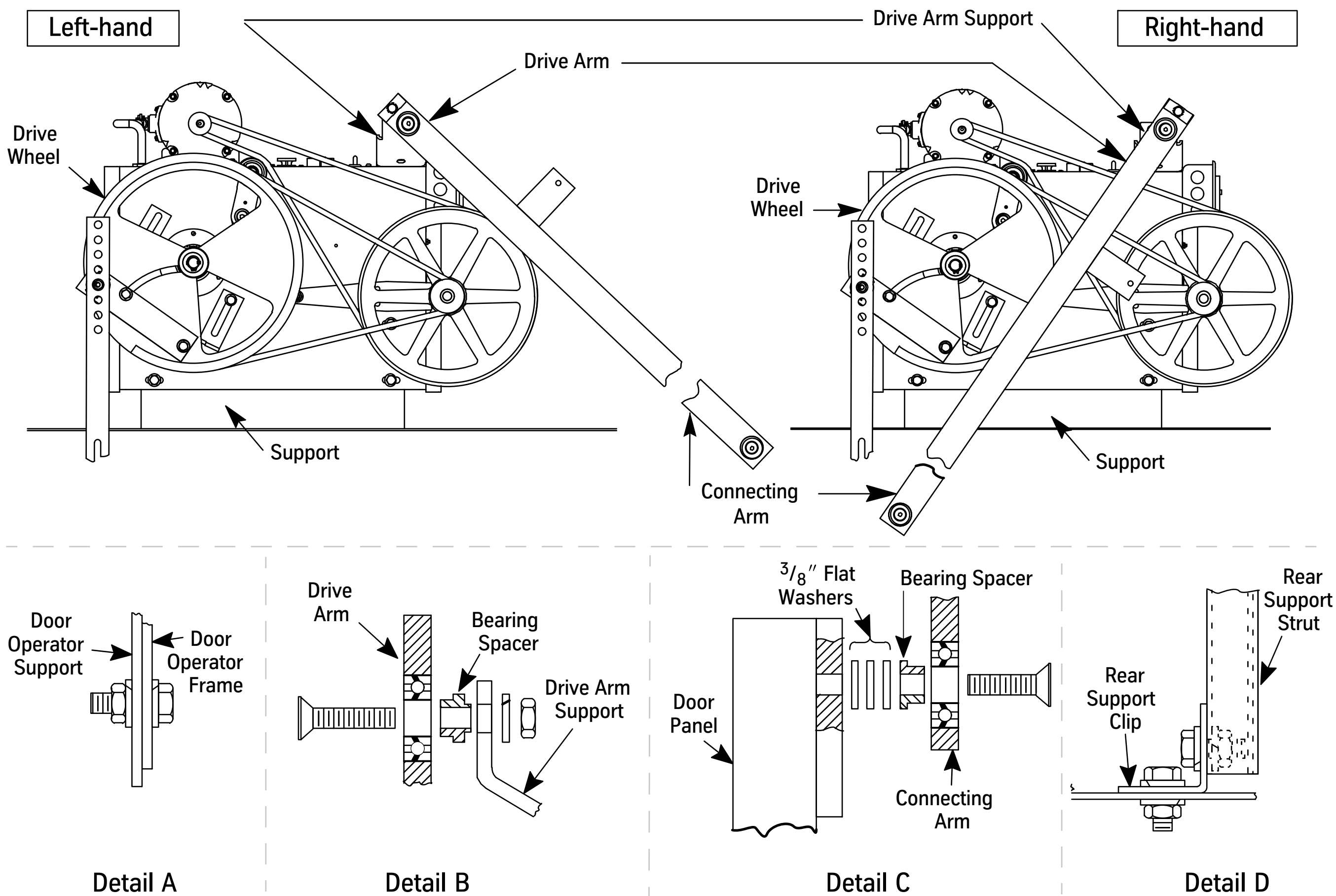


Figure 3 - Mounting the Door Operator

Setting the Stroke

Notes:

- The two cap screws securing the intermediate arm to the pivot arm should be loose when setting the stroke.
- Fully Open Position - The point where the doors are flush with or slightly recessed behind the open door jamb.
- Fully Closed Position - The point where the leading edge of the door contacts the door jamb, or in the case of center opening doors, the point where the two leading edges of the doors contact.

Setting the Stroke
(continued)

1. Place the doors in the fully open position.

2. Measure the distance from B to C and record this measurement as Door Open (DO). See Figure 4.

3. Place the doors in the fully closed position.

4. Measure the distance from B to C and record this measurement as Door Closed (DC). See Figure 4.

5. Calculate the stroke using the following formula:

   STROKE = $\frac{DO - DC}{2} + \frac{1}{8}$ "

6. Loosen the two cap screws in the adjustable arm.

7. Move the adjustable arm in the circular slot of the drive wheel so that the distance from A to B is equal to the calculated stroke length. See Figure 4.

8. Tighten the two cap screws in the adjustable arm.

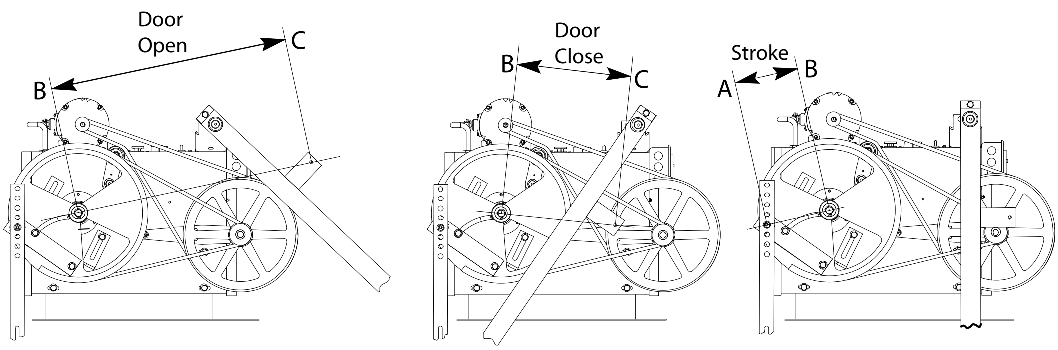


Figure 4 - Door Operator Stroke

Adjusting the Drive Arms
See Figure 5 on page 7 for all steps in this procedure.

1. Place the doors in the fully open position.

2. Slide the pivot arm to the end of the slot in the intermediate arm so that the hole in the bearing is exposed.

3. Attach the pivot arm to the intermediate arm through the bearing with a 3/8" (10mm) flathead socket cap screw.

Note: Ensure that the spacer plate is between the two arms, the bearing spacer is installed, and that the doors are still in the fully open position.

Adjusting the Drive Arms
(continued)

4. Align the drive arm and connecting arm in a straight line. Vice grips may be used to hold these two arms in alignment.

5. Maintain the doors in fully open position, and rotate the drive wheel until all three points A, B, and C are in a straight line.

6. Tighten the two cap screws attaching the pivot arm to the intermediate arm.

7. Use a pencil to trace a line along both sides of the adjustable arm on the drive wheel.

Note: This will be the reference mark in the event that the stroke requires further adjustment.

8. Remove the vice grips and move the doors to the fully closed position.

Note: If the doors will not fully close: loosen the two cap screws in the adjustable arm, and reposition the arm toward the outside of the drive wheel in small increments of 1/8" (3mm).

9. Measure the distance from the top of the intermediate arm to the center of the drive wheel. The correct distance for this measurement is 1/2" (13mm) to 1 1/2" (38mm). Ensure that the doors can be opened from the inside per local code. The smaller this diameter, the more difficult it will be to pull the car doors open manually.

   If the measurement is correct - Securely tighten the cap screws in the adjustable arm and the cap screws connecting the intermediate arm to the pivot arm. Proceed to Setting the Mechanical Stops.

   If the measurement is less than 1/2" (13mm) - Loosen the two cap screws in the adjustable arm. Reposition the arm toward the outside of the drive wheel and tighten the two cap screws.

   If the measurement is more than 1 1/2" (38mm) - Loosen the two cap screws in the adjustable arm. Reposition toward the center of the drive wheel and tighten the two cap screws.

   a. Move the doors to the fully open position, and check the alignment of the connecting arm and the three points A, B, and C.

   b. Move the doors to the fully closed position, and measure the distance from the top of the intermediate arm to the center of the drive wheel.

   c. If these measurements are not correct, repeat the adjustment of the arm until the correct operation and measurement is obtained.

Note: Once the stroke has been properly adjusted, check to ensure that the two cap screws in the adjustable arm and the two cap screws holding the pivot arm to the intermediate arm are securely tightened.

Adjusting the Drive Arms
(continued)

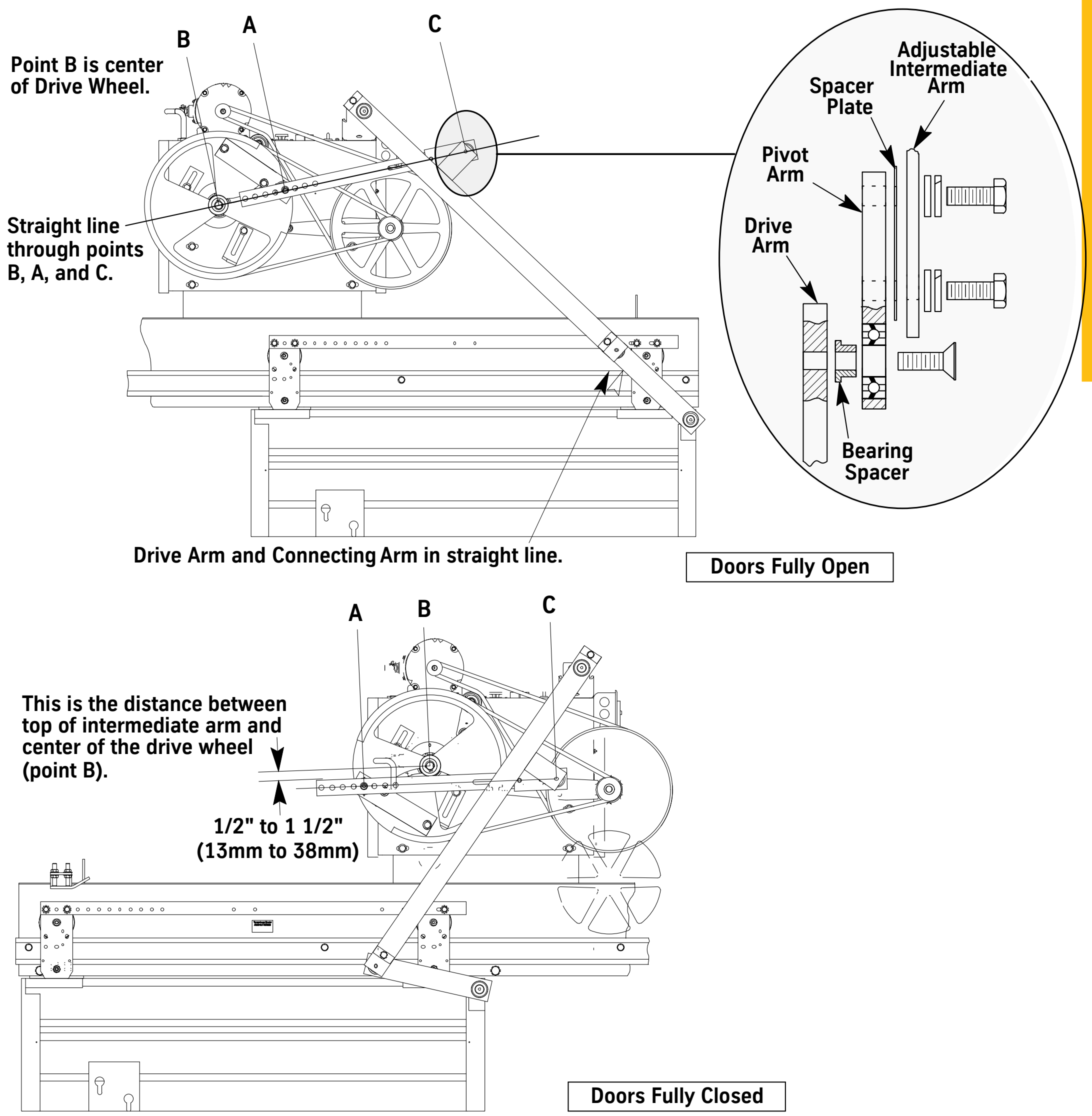


Figure 5 - Adjusting the Drive Arms

Setting the Mechanical Stops

1. Move the doors to the fully open position.
2. Position the open mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.
3. Move the doors to the fully closed position.
4. Position the closed mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.

Electronic Setup and Adjustment

CAUTION **The configuration done by manufacturing uses adjustment and parameter values that are different from the default values shown in the Diagnostics section.**

Preparation

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Route the door operator harness to the swing return, and connect the harness connectors to the appropriate connectors on the car wiring interface card.
3. If required, connect the safety edge cables to the safety edge box.

Note: On jobs with both front and rear doors, adjust front and rear door operators separately.

4. Turn ON the mainline disconnect.
5. Verify that the VBUS and WD LEDs on the door card are ON.

Note: If LEDs are not ON, refer to the Troubleshooting section.

Limit Setting

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Manually move the door to the fully closed position, noting which direction the cam shaft rotates. See Figure 6.
3. Loosen DCL and DOL cams, and rotate them until their magnets face the door card.
4. Loosen the door card mounting bracket screws.
5. Slide the door card and bracket toward or away from the DCL and DOL cams until there is 1/8" between the card and the cams. The card MUST be square with the DCL and DOL cams.

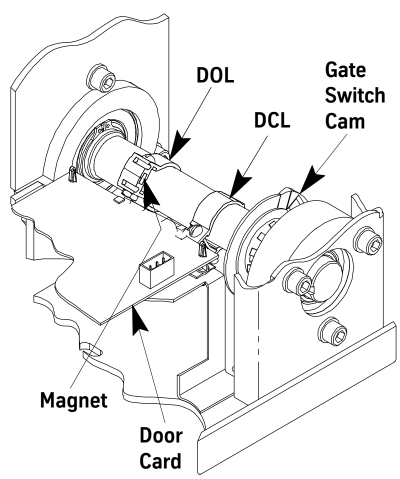


Figure 6 - Door Operator Cams

6. Tighten the door card mounting bracket screws.
7. Slide the DCL and DOL cams to align the center of their magnets with the center of their respective magnetic sensors at the edge of the door card.

Limit Setting
(continued)

8. Ensure that the door configuration jumpers on the door card are installed per Table 1. See Figure 7 on page 10 for locations.

9. Turn ON the mainline disconnect.

WARNING

To prevent automatic movement of the door while adjusting limit switches, place the elevator on Inspection Operation.

10. Rotate the DCL cam in the same direction that the cam shaft rotated in Step 3 until the DCL LED just turns ON. Tighten the set screw.

11. Move the door to the fully open position, noting which direction the cam shaft rotates.

12. Rotate the DOL cam in the same direction the cam shaft rotated in the previous step until the DOL LED just turns ON. Tighten the set screw.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3*	On	Selects Zmodem Mode for uploading new s/w. Field Selectable.
	Off (default)	Selects Normal Mode for running. Field Selectable.
JP4*	On (default)	Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off	Selects Front Door Mode for receiving front door commands. Field Selectable.
JP5*	On	Selects RS485 Communication Link Mode. (Door Parameters D12 and D13=8) Field Selectable.
	Off	Selects CAN Communication Link Mode. (Door Parameters D12 and D13=7 or 9) Field Selectable.
JP6*	On	Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) (Door Parameters D12 and D13=9) Field Selectable.
	Off (default)	Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50/03 and TAC 50/04) (Door Parameters D12 and D13=7) Field Selectable.
* Must push reset to take effect.		

Table 1 - 6300PA4 Door Operator Card Configuration Jumpers

Limit Setting
(continued)

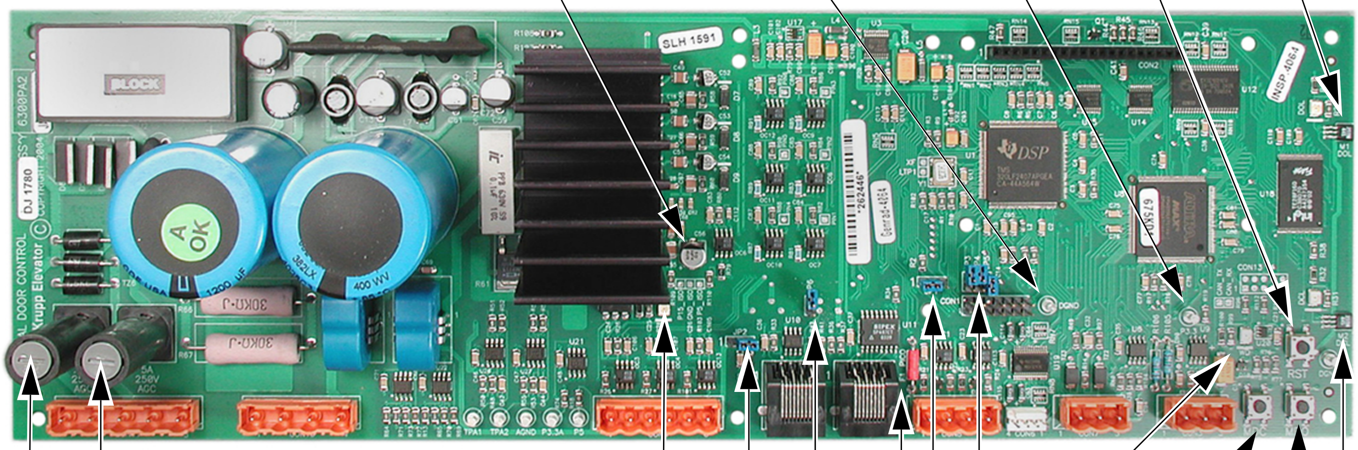


Figure 7 - 6300PA2 Door Operator Card

Direction Check

1. Check the Door Open Limit (DOL) and the Door Close Limit (DCL).

   a. Place car on Inspection Operation.

   b. Press MDO on the door card to open the door. Verify that the door opens fully, and that the DOL LED turns ON.

   - If the doors move in the open direction, continue with this procedure.
   - If the doors do NOT move in the open direction, use the UIT and scroll to MAIN->SYSTEM->ADJ->LHO to change the value. (LHO = 1 for left hand, and LHO = 0 for right hand). Repeat Step 1b.

Auto Null

1. Begin with the doors fully closed.
2. Use the UIT and scroll to MAIN->DOOR->CMD->AUTONULL.
3. Press Enter and the UIT displays: Nulling ADC offsets

Note: When complete, the UIT displays: Null complete

4. Save the autonull parameters to FLASH by selecting Save.

Door Scan

1. Place the car on Inspection Operation.

2. Make sure that the door is fully closed or fully open.

3. On the UIT, scroll to MAIN->PROFILE1->CMD->LEARN TRAVEL.

4. Press Enter and the UIT displays:

   Travel = (some number)

   Ent to Re-Learn

5. Press Enter and the UIT displays:

   Travel = 0.000

   Move Doors Now

6. Press MDO until the DOL LED turns ON and the UIT displays:

   Travel = (learned value)

   Save to Flash

7. Save the door scan to FLASH.

   a. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays:

      ENT to save

      ESC to exit

   b. Press ENTER, and the UIT displays: Adj's have been saved to FLASH

Profile Adjustments

The doors should perform well with default settings. However, if changes to the performance are required, see the Diagnostics section.

1. Place the car at the appropriate landing of the profile that is to be adjusted.

2. Use the UIT, scroll to MAIN->CONTROL->CMD->CYCLE MODE, and press ENTER to place the door in cycle mode.

Note: Some adjustments can not be changed with the door in motion. If the cycle mode does not have a delay, make adjustment changes only when the door is at rest on either limit.

3. Scroll to MAIN>CONTROL>ADJ>CDT to adjust the delay time at each limit. Some delay at the door close limit is necessary to allow other adjustments to be changed.

CAUTION **To avoid mechanical damage to the doors when increasing open and close high speed, do NOT make drastic changes.**

4. On the UIT, scroll to MAIN->PROFILE#->ADJ-> and make the necessary door open and door close adjustments. See - Door Closing Profile on page 12 and - Door Opening Profile on page 13.

5. Save any adjustment changes to FLASH.

IMPORTANT! **Save changes to FLASH when the door is on DCL or the changes may not be accepted.**

Profile Adjustments
(continued)

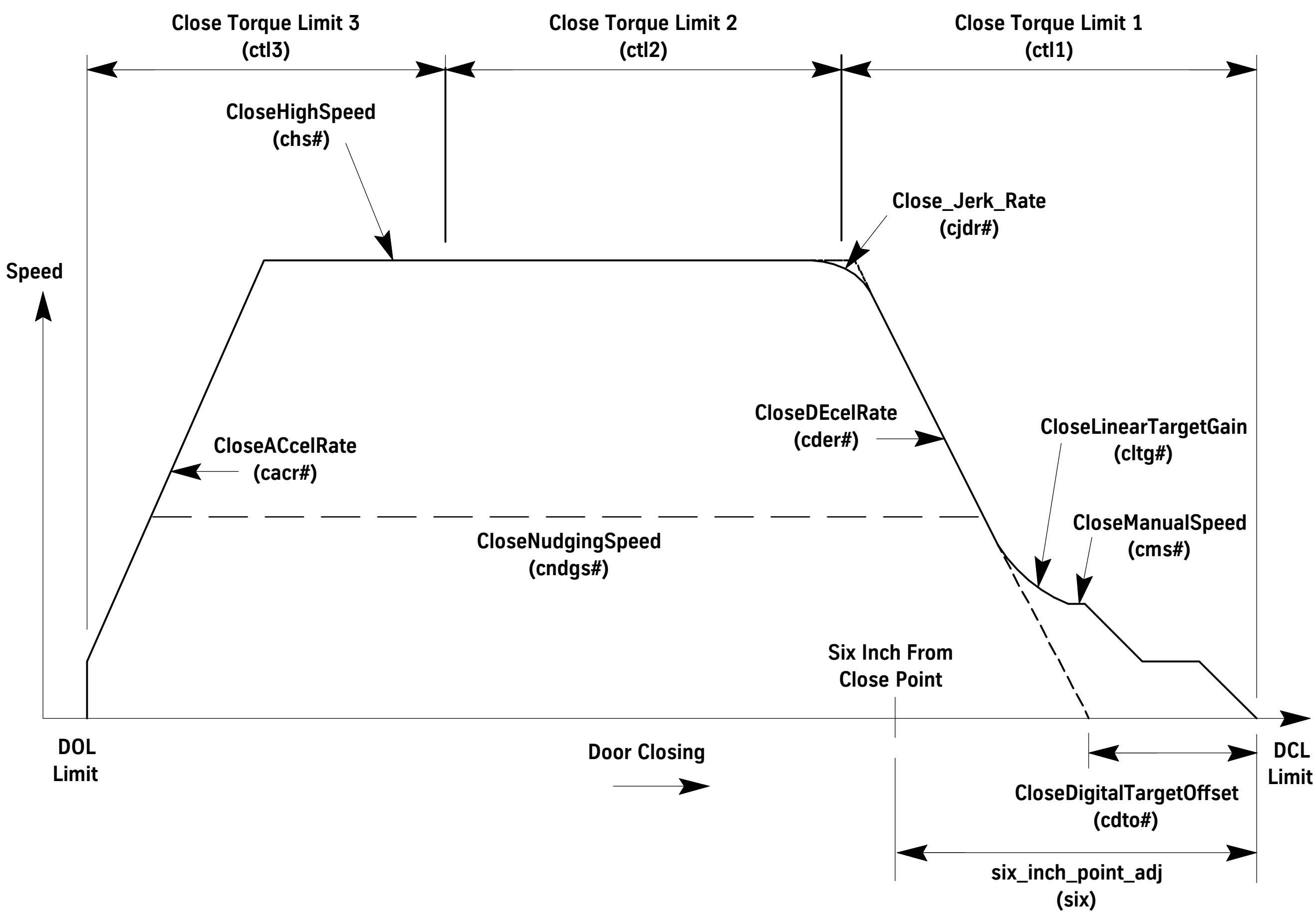


Figure 8 - Door Closing Profile

Profile Adjustments
(continued)

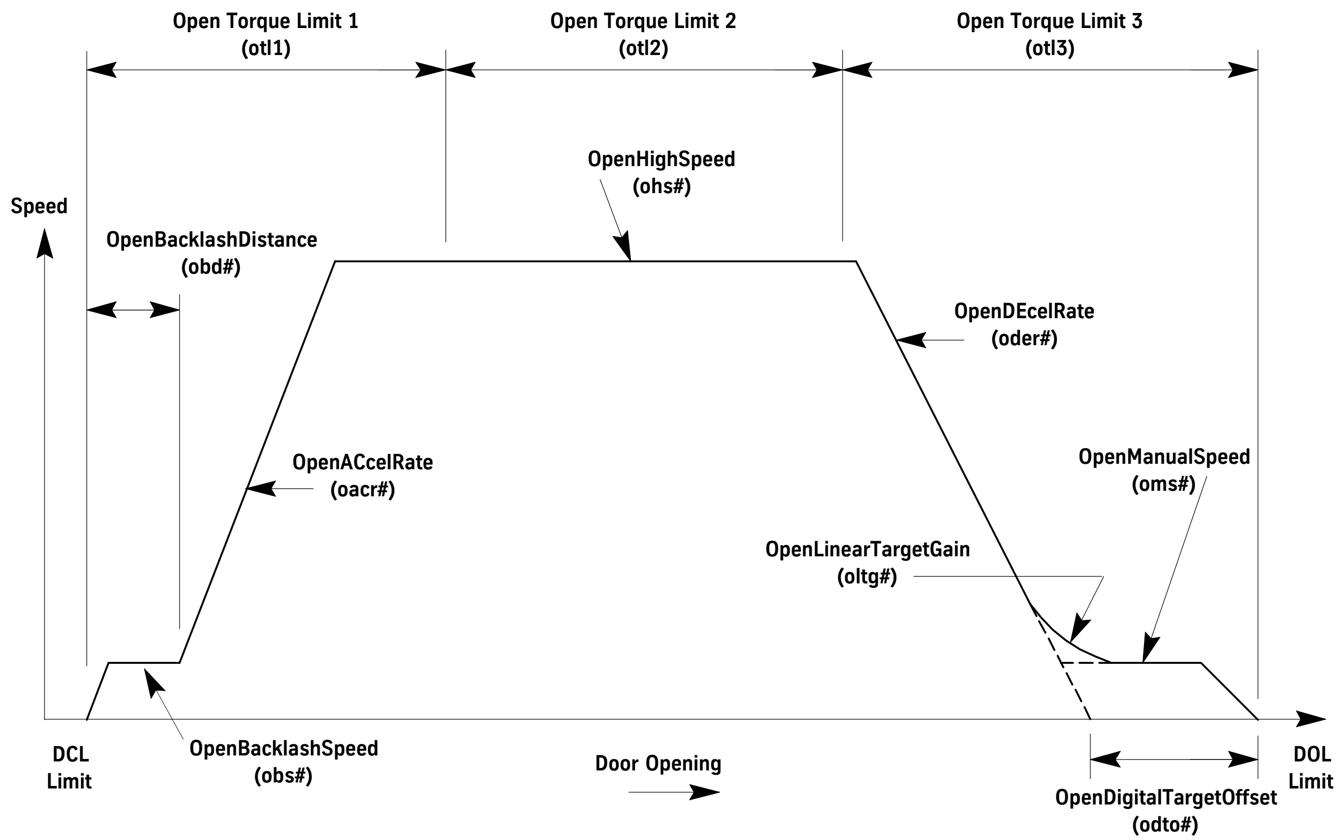


Figure 9 - Door Opening Profile

Closing Force

1. Use the UIT, scroll to MAIN->DOOR->ADJ->STALL, and note the value so that it can be set back later.
2. Press ENTER, scroll to 0 (zero), and press ENTER again. This sets the value of STALL to 0.
3. Use a force gauge to measure the closing force. See Figure 10.

Notes:

- The closing force should be less than 30 lbf. in the middle 1/3 of travel.
- If the closing force is too high: Scroll to MAIN->DOOR->ADJ->CTL2, reduce the value, re-measure and repeat until the closing force is within limits.

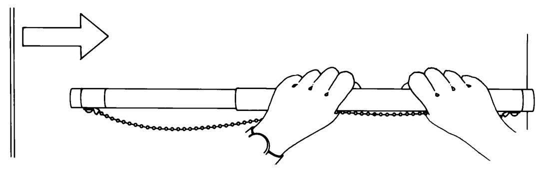


Figure 10 - Safe Use of the Door Gauge

4. Scroll to MAIN->DOOR->ADJ->STALL, and set STALL back to its original value.
5. Save the values to FLASH.
6. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays:

   ENT to save
   ESC to exit

7. Press ENTER, and the UIT displays: Adj's have been saved to FLASH.

Closing Kinetic Energy

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Use the UIT, scroll to MAIN->DOOR->MON->DOOR_trav, and record the value.
4. Use either MDC or MDO to move the doors to one of the following positions:
   - Center Opening Doors: 1" from fully open
   - Single Speed Doors: 2" from fully open
5. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
6. Subtract the DOOR_pos value from the DOOR_trav value.
7. Scroll to MAIN->DOOR->MON->ADJ->SWM1, and enter the value from the previous step.
8. Use either MDC or MDO to move the doors to one of the following positions:
   - Center Opening Doors: 1" from fully closed
   - Single Speed Doors: 2" from the face of the strike column
9. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
10. Scroll to MAIN->DOOR->MON->ADJ->SWM2, and enter the value from the previous step.

Closing Kinetic Energy
(continued)

11. Determine the minimum allowable closing time from the door operator nameplate.

12. Place the car on Automatic Operation.

13. Scroll to MAIN->DOOR->CMD->STOPWATCH, and press ENTER.

14. Choose the close time, press ENTER, and the UIT displays: POS Mark 1 n.nnn (value from SWM1).

15. Press ENTER, and the UIT displays: POS Mark 2 n.nnn (value from SWM2).

16. Press DOOR OPEN, and when door is fully open, press ENTER and the UIT displays: Stopwatch armed.

17. When the door closes, the UIT displays the closing time. If the closing time is less than the minimum allowable closing time specified, reduce the value of the close high speed (CHS#) adjustment and repeat until the closing time is greater than or equal to the minimum.

18. Save any adjustment changes to FLASH.

Set the Gate Switch

1. Position the door 1 1/2" from fully closed.

2. Rotate the disk in the CLOSE direction until the shorting bar just touches the two leaf contacts. See Figure 11.

3. Locate a tab on the locking ring that lines up with a notch in the contact disk.

4. Rotate the drive wheel until the door is fully closed and ensure that the shorting bar has not run past the leaf contacts.

5. Open and close the door to verify that the gate switch shorting bar enters the leaf contacts at 1 1/2" from fully closed.

Note: Verify that the shorting bar remains between the leaf contacts in the fully closed position. Be sure that the gate switch leaf contacts do not rub on the thin portion of the plastic disk during normal operation.

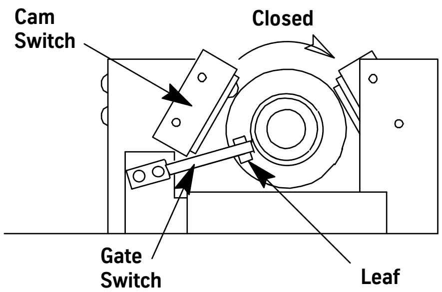


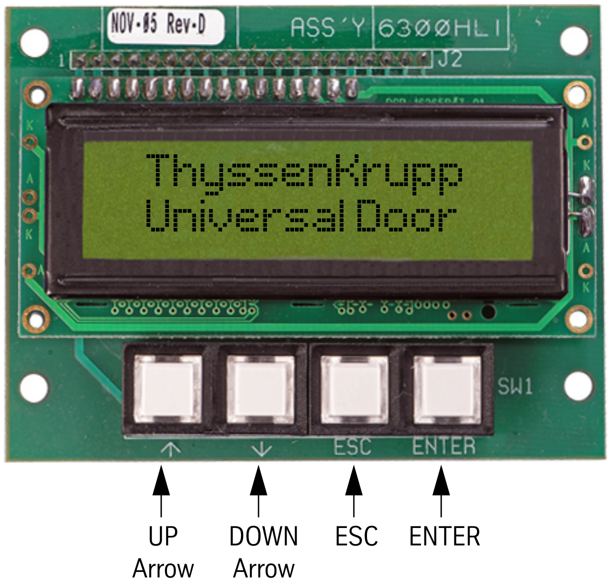
Figure 11 - Gate Switch

Final Security

Recheck all bolts, cap screws, cam hex screws, and belt tensions for proper tightness.

Diagnostics

The User Interface Tool (UIT)



UP or DOWN Arrow - Scrolls through menus, adjustments, and displays.

ESC - Exits the current level of a menu, adjustment, or display.

ENTER - Selects a menu, adjustment, or display.

Overview of Adjustments, Parameters, and Commands

- All adjustments must be made when the doors are idle.
- Before the card is reset or powered down, save any adjustment changes to FLASH.
- When the adjustment is a speed value:

  Increase the value = The door runs at a faster speed.
  Decrease the value = The door runs at a slower speed.
- When the adjustment is an acceleration or deceleration rate value:

  Increase the value = The door accelerates or decelerates faster.
  Decrease the value = The door accelerates or decelerates slower.
- When the adjustment is a distance or point value:

  Increase the value = The distance or point is further from either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.

  Decrease the value = The distance or point is closer to either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.

  - Door position is stored at 0 on DCL and at Travel (TRV) on DOL.
  - Speeds are (+) in the opening direction, and (–) in the closing direction.

The UIT Menu Tree

Main Menu

- **Profile_#**
  - **Adjustment**
    - OHS#
    - OMS#
    - OACR#
    - ODER#
    - ODTO#
    - OBS#
    - OBD
    - OLTG#
    - CHS#
    - CMS#
    - CACR#
    - CDER#
    - CDTO#
    - CJDR#
    - CLTG#
    - CNDGS#
    - KPCMD#
    - KICMD#
    - KDCMD#
    - KPFB#
    - KDFB#
    - LAG (Profile 1 only)
    - RSC (Profile 1 only)
    - # = profile number
  - **Command**
    - Learn Travel
- **Door**
  - **Adjustment**
    - OTL1
    - OTL2
    - OTL3
    - CTL1
    - CTL2
    - CTL3
    - CLT
    - SIX
    - DIREV
    - STALL
    - ADP
    - PPR
    - IFB
    - RPM
    - LPTC
    - ADZ1
    - MDC
    - MNC
    - IKP
    - IKI
    - IVL
    - SWM1
    - SWM2
  - **Monitor**
    - DOOR_trav
    - DOOR_pos
    - upid_cmd_vel
    - upid_torque
    - upid_mtr_vel
    - upid_vel_err
    - upid_pos_err
    - adc_1
    - slip_comp_op
    - slip_comp_cl
    - DTG_open
    - DTG_close
    - profile_ID
  - **Command**
    - IGBT Err Rst
    - Shutdown
    - Stopwatch
    - Autonull
- **System**
  - **Adjustment**
    - LHO
    - DCM
    - DCI
    - DOI
    - ELI
    - MAL
    - LDO
    - FSP
    - UPM
    - DRM
  - **Monitor**
    - SW_v_r
  - **Command**
    - PASSWORD CONTROL
    - SAVE TO FLASH
    - STACK USAGE
    - FACTORY DEFAULTS
- **Control**
  - **Adjustment**
    - IBM0
    - DBM0
    - IBM1
    - DBM1
    - IBM4
    - DBM4
    - IBM5
    - DBM5
    - IIM
    - OIM
    - CDT
  - **Command**
    - Cycle Mode
  - **Monitor**
    - mcss_cmd_num
    - P_in_0
    - P_in_1
    - P_in_4
    - P_in_5
    - P_out_0
    - P_out_1
    - P_out_4
    - P_out_5
    - Exp_in
- **Diagnostics**
  - **Adjustment**
    - TPA1
    - TPA2
    - TPM1
    - TPD1
    - TPM2
    - TPD2
    - DM0
    - DZ0
    - DM1
    - DZ1
    - TPL1
    - TPL2
    - HEX
  - **Monitor**
    - TP1_out
    - TP2_out
    - TP1s_in
    - TP2s_in
    - TP1l_IN
    - TP2l_in
  - **Command**
    - DISPLAY FAULTS
    - CLEAR FAULTS

= Available Only if Main->System->Adj->MAL = 1

Adjustments

Control Adjustments

Mnemonic	Adjustment		Definition				
CDT	Cycle Delay Time		The time (in seconds) that the door control will delay at each limit when the doors are on continuous cycle mode Min: 0 Default: 32 Max: 255				
DBM0	De-Bounce Bit Mask 0		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	X	X	X	X
X	Electronic DCL	Encoder Phase B	Encoder Phase A	X	X	X	X
DBM1	De-Bounce Bit Mask 1		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input	Input	X	X	X	X	X	X
Hall Limit DOL	Hall Limit DCL	X	X	X	X	X	X
DBM4	De-Bounce Bit Mask 4		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	X	X	X	X
X	X	VBUS	SE	X	X	X	X
DBM5	De-Bounce Bit Mask 5		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	Input	Input	Input	Input
X	X	Electronic DOL	X	F/Rn	CAN/485n	MDC	MDO

Control Adjustments (Continued)

Mnemonic	Adjustment		Definition				
IBM0	Invert Bit Mask 0		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Encoder Phase B and Encoder Phase A signals are inverted. Min: 0 Default: 32 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	X	X	X	X
X	Electronic DCL	Encoder Phase B	Encoder Phase A	X	X	X	X
IBM1	Invert Bit Mask 1		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Hall Limit DOL and Hall Limit DCL signals are inverted. Min: 0 Default: 192 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input	Input	X	X	X	X	X	X
Hall Limit DOL	Hall Limit DCL	X	X	X	X	X	X
IBM4	Invert Bit Mask 4		The signals shown in the table can be inverted by setting the corresponding bit. The default value indicates that the SE signal should be high when not obstructed. If the value is set to 0, then SE signal should be low when not obstructed. Min: 0 Default: 0				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	X	X	X	X
X	X	VBUS	SE	X	X	X	X
IBM5	Invert Bit Mask 5		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Electronic DOL, MDC, and MDO signals are inverted. Min: 0 Default: 35 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	X	Input	Input	Input	Input
X	X	Electronic DOL	X	F/Rn	CAN/485n	MDC	MDO

Control Adjustments (Continued)

Mnemonic	Adjustment		Definition				
IIM	Input Invert Mask		This is the input invert mask for the I/O Expansion. The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that all of the input signals are inverted. Min: 0 Default: 95 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	Input	Input	Input	Input
X	DCL	DOL	HDI2	HDI1	NDG	CD	OD
OIM	Output Invert Mask		This is the output invert mask for the I/O Expansion. The output signals shown in the table can be inverted by setting the corresponding bit. The default indicates that none of the signals are inverted. Min: 0 Default: 0 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	Output	Output	Output	Output
X	X	X	X	DRL	DL6	DCL	DOL

Diagnostic Adjustments

Notes:

- These values are for diagnostic purposes and cannot be changed using the UIT.
- The test points have a range of 0V minimum to +3V maximum.
- The test point outputs are based on Equation 1 and Equation 2.

Equation 1= TP1out = ((TP1in * TPM1) / TPD1) * 0.73mV + 1.5V

Equation 2 = TP2out = ((TP2in * TPM2) / TPD2) * 0.73mV + 1.5V

Diagnostic Adjustments

Adjustment	Minimum	Default	Maximum	Definition
DM0	0	2048	4095	DAC 0 Multiplier - Multiplier for DAC0; 2048 = 1.000. Do not use DM0, use TPM1 instead.
DM1	0	2048	4095	DAC 1 Multiplier - Multiplier for DAC1; 2048 = 1.000. Do not use DM1, use TPM2 instead.
DZ0	-1228	0	1228	DAC 0 Offset - Zero offset for DAC0. Adjust for 1.500V output when input to DAC0 = 0.
DZ1	-1228	0	1228	DAC 1 Offset - Zero offset for DAC1. Adjust for 1.500V output when input to DAC1 = 0.
HEX	–	0	–	Values in Hex - Set to 1 to display numerical values in hexadecimal format. Set to 0 to display numerical values in decimal format.

Diagnostic Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
TPA1	0	2048	32767	Test Point 1 Address - Address for the variable information to be output at Test Point1.
TPA2	0	2048	32767	Test Point 2 Address - Address for the variable information to be output at Test Point 2.
TPD1	0	0	32767	Test Point 1 Divider - Divider for Test Point 1. Used to facilitate viewing signals on Test Point 1. Refer to Equation 1.
TPD2	0	0	32767	Test Point 2 Divider - Divider for Test Point2. Used to facilitate viewing signals on Test Point 2. Refer to Equation 2.
TPL1	–	0	–	Test Point 1 Length - Length of variable for Test Point 1. Set to 0 for short and set to 1 for long.
TPL2	–	0	–	Test Point 2 Length - Length of variable for Test Point 2. Set to 0 for short and set to 1 for long.
TPM1	1	1	32767	Test Point 1 Multiplier - Multiplier for Test Point 1. Used to facilitate viewing signals on Test Point 1. See Equation 1.
TPM2	1	1	32767	Test Point 2 Multiplier - Multiplier for Test Point 2. Used to facilitate viewing signals on Test Point 2. See Equation 2.

Door Adjustments

Adjustment	Minimum	Default	Maximum	Definition
ADP*	1	1	DPL	Active Door Profile - Manually selects which door profile to use.
ADZ0*	-8192	0	8192	A/D Digital Zero0 - The digital zero value for the analog to digital input number 0. This is on the W phase.
ADZ1*	-8192	0	8192	A/D Digital Zero1 - The digital zero value for the analog to digital input number 1. This is on the U phase.
CLT	0	10	25	Closing Torque (%) - This adjustment sets the closing torque limit. This adjustment is a percent of Maximum Drive Current.
CTL1	0	20	100	Close Torque Limit 1 (%) - An adjustment value that represents the maximum allowable door motor current during the last third of close cycle.
CTL2	0	20	100	Close Torque Limit 2 (%) - An adjustment value that represents the maximum allowable door motor current during the middle third of close cycle.
CTL3	0	40	100	Close Torque Limit 3 (%) - An adjustment value that represents the maximum allowable door motor current during the first third of close cycle.
DIREV	0	100	500	Smooth Turnaround (RPM) - This is the speed of the motor that must be reached before reversing the door motor to re-open the doors after a safety edge has been activated.
IFB*	0	0	1	Invert Feedback - Do Not Change.
IKI*	0	807	6400	Current Loop Integral Gain - Do Not Change.

Door Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
IKP*	0	1.25	8.0	Current Loop Proportional Gain - Do Not Change.
IVL*	10	95	100	Current Loop Voltage Limit - Do Not Change.
LPTC*	0	.015	.050	Low Pass Time Constant - This value is used as the time constant for the low pass filter. This adjustment is in milli-seconds.
MDC*	MNC	6.79	6.8	Maximum Drive Current - The maximum drive current in Amps rms. Do Not Change.
MFC*	0	1.0	MNC	Motor Field Current - Motor field current in Amps rms. Do Not Change.
MNC*	MFC	1.4	MDC	Motor Nameplate Current - Motor nameplate current in Amps rms. Do Not Change.
MTP*	2.0	6.0	8.0	Motor Poles - The number of poles of the AC door motor. Do Not Change.
OTL1	0	50	100	Open Torque Limit 1 (%) - An adjustment value that represents the maximum allowable door motor current during the first third of open cycle. This is a percentage of the maximum drive current.
OTL2	0	45	100	Open Torque Limit 2 (%) - An adjustment value that represents the maximum allowable door motor current during the during the middle third of open cycle.
OTL3	0	20	100	Open Torque Limit 3 (%) - An adjustment value that represents the maximum allowable door motor current during the last third of open cycle.
PPR*	64	500	2048	Encoder Resolution - This is the pulses per revolution of the door operator motor encoder.
RPM*	500	1150	2048	Motor RPM - This is the nameplate door operator motor RPM.
RSF*	.10	3.1	6.0	Rated Slip Frequency - The rated slip frequency of the AC motor in Hertz. Do Not Change.
SIX	0	1.0	15.9	Six Inch Point (rev)- This is the point at which the six inch from close signal will be sent to the controller. This adjustment is in tenths of motor revolutions. Note: To determine the relationship of travel distance to motor RPM, see Door Parameter POS.
STALL	0	50	300	Stall Velocity - This sets the motor RPM that is used to determine when the door motor is stalled and the reduced stall torque adjustment value is applied to the door motor. This adjustment is in RPM.
SWM1	0	0	32.767	Stop Watch Mark 1 (Rev) - Used in conjunction with the Stopwatch feature. SWM1 is Mark 1.
SWM2				Stop Watch Mark 2 (Rev) - Used in conjunction with the Stopwatch feature. SWM2 is Mark 2.
*System Adjustment MAL must equal 1 for the availability of the adjustment.				

Profile Adjustments

Notes:

- # = Profile Number
- Several different door operation profiles are available.
- Each profile has adjustments for both Open and Close; The profile adjustments have the same minimum, default, and maximum values.
- Each value may be adjusted for a different purpose.
- Adjustment values can relate to one another only within the same door operation profile.

Profile Adjustments

Adjustment	Minimum	Default	Maximum	Definition
CACR#	0	1200	3600	Close Acceleration Rate (RPM/sec) - Close acceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from zero speed and the door open limit to top speed.
CDER#	0	900	1919	Close Deceleration Rate (RPM/sec) - Close deceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from top speed to manual close speed.
CDTO#	-2.0	0	2.0	Close Digital Target Offset (Rev) - This adjustment shifts the deceleration portion of the opening cycle away from the door close limit. Increasing this value will cause the doors to begin deceleration further from the close limit.
CHS#	Close manual speed adjust-ment value.	300	Rated RPM of motor in RPM adjustment.	Close High Speed (RPM) - Maximum close speed of the door motor in rpm. This is the speed of the motor that the control system will attain during a close door cycle.
CJDR#	0	3100	8192	Close Jerk Rate (RPM/sec^2) - This is the jerk rate in the close direction when transitioning from top close speed to decel-eration. This controls the amount of rounding/ smoothing that occurs during the transition. Units are RPM/sec/sec.
CLTG#	60	120	3000	Close Linear Target Gain - 1/min
CMS#	0	40	Close high speed adjustment value.	Close Manual Speed (RPM) - Manual close speed of door motor in rpm. This is the speed of the motor when the doors are closed with the manual push buttons or during the last portion of a close cycle.
CNDGS#	0	125	Close high speed adjustment	Nudge Close Speed (RPM) - This is the speed of the door motor when nudging operation is activated.
KDCMD#	0	0	327.67	Speed Control Derivative Gain - Do Not Change.
KDFB#	0	0	327.67	Speed Feedback Derivative Gain - Do Not Change.
KICMD#	0	22.2	3276.7	Speed Control Integral Gain - Do Not Change.
KPCMD#	0	0	327.67	Speed Command Proportional Gain - Do Not Change.
KPFB#	0	3.33	327.67	Speed Feedback Proportional Gain - Do Not Change.

Profile Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
LAG	0	0.150	0.250	Profile Lag Compensation (sec) - Adjusts the compensation in the profile that accounts for the delay between the demand and the motor response. Units are in seconds. Available only in Profile1. Do Not Change.
OACR#	0	1200	3600	Open Acceleration Rate (RPM/sec) - Open acceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from backlash speed to top speed.
OBD	0	1.0	10	Open Backlash Distance (Rev) - Sets the distance that the doors will move at open backlash speed (OBS#) at the beginning of an open cycle. The backlash distance begins just after the doors leave the door close limit and is in motor revolutions. This distance is used to allow the hoistway door to be picked up by the car door interlock rollers, and is effective in the opening cycle only. Note: To determine the relationship of travel distance to motor RPM, see Door Parameter POS.
OBS#	0	60	Open high speed adjustment value.	Open Backlash Speed (RPM) - This is the speed of the door motor in rpm during the open backlash distance (OBD#). This speed is used to keep the door speed low until the car door interlock rollers pick up the hoistway door.
ODER#	0	1200	3839	Open Deceleration Rate (RPM/sec) - Open deceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from top speed to manual open speed.
ODTO#	-2.0	0	2.0	Open Digital Target Offset (Rev)- This adjustment shifts the deceleration portion of the opening cycle away from the door open limit. Increasing this value will cause the doors to begin deceleration further from the open limit.
OHS#	Open manual speed adjustment value.	400	Rated RPM of motor in RPM adjustment.	Open High Speed (RPM) - Maximum open speed of the door motor in rpm. This is the speed of the motor that the control system will attain during an open door cycle.
OLTG#	60	150	3000	Open Linear Target Gain (Rev) - 1/min.
OMS#	0	40	Open high speed adjustment value.	Open Manual Speed (RPM) - Manual open speed of door motor in rpm. This is the speed of the motor when the doors are opened with the manual push buttons or during the last portion of an open cycle.
RSC	0	0	2000	Re-open Slip Compensation - This is the slip compensation factor used during a re-open. Available only in Profile 1. Do Not Change.

System Adjustments

These adjustments will not take effect until the new value is saved to FLASH and the door operator card is reset.

System Adjustments

Adjustment	Minimum	Default	Maximum	Definition
DCI	–	0	–	Discrete Controller Interface - • Set to 1 for relay controller or discrete signal interface (modernization jobs). • Set to 0 for serial controller interface; DCL and DOL can be selected to input through hall effect or through the I/O Expansion card. See Electronic Limit Interface (System Adjustment ELI).
DCM	–	1	–	DC Motor Control Selection - Set to 1 to select DC motor control, 0 to select AC motor control.
DOI	–	0	–	Discrete Operator Interface - Set to 1 to allow door operator card to accept signals from the expansion interface card. Set to 0, and the door operator card does not accept signals from the expansion interface card.
DPL	1	5	5	Door Profile Limit - Number of active profiles.
DRM	1	4	50	Multiple for Slow Clock - Do Not Change.
ELI	–	0	–	Electronic Limit Interface - • Set to 1 for DCL and DOL signal inputs from header hall effect sensors. • Set to 1 to use UDC card with Linear Door Operator. • If set to 0 and discrete controller interface (System Adjustment DCI) is set to 1, then DCL and DOL are input through the hall effect sensors on the UDC card (harmonic operator). • If set to 1 and DCI is set to 1, then DCL and DOL are input through the I/O Expansion Card.
FSP	250	1000	2500	Sample Frequency - Do Not Change.
LDO	–	0	–	Linear Door Operator - Set to 1 to select the linear door operator application, 0 for harmonic application.
LHO	–	1	–	Left Hand Operation - Set to 1 for left hand operation, 0 for right hand operation
MAL	–	0	–	Menu Access Level - Set to 1 for full menu access, 0 for restricted or limited menu access.
UPM	1	2	50	Multiple for Medium Clock - Do Not Change.

Parameters

CAN Parameters

These values are viewable only to aid in factory-level diagnostics. Not for field use.

Mnemonic	Command	Definition
CEC	Transmit and Receive Error Counters	Displays the value of the transmit and receive error counters.
ESR	Error Status Register	Displays the value of the error status register.
GSR	Global Status Register	Displays the value of the global status register.
MDER	Mailbox Direction/ Enable Register	Displays the value of the mailbox direction/enable register.
RCR	Receive Control Register	Displays short test point 1 input variable.
TCR	Transmission Control Register	Displays the value of the transmission control register.

Control Parameters

These values are viewable only to aid in diagnostic purposes.
MCS = Motion Control State Number - Indicates current motion control state shown below.

Motion Control State Number	Description
4	Direction Reversal
8	Stop Door
9	Hold Closed
10	Nudge Close
11	Manual Open
12	Manual Close
13	Open Door
14	Close Door

Control Parameters

(continued)

For the availability of the following parameters, System Adjustment MAL must equal 1.

Mnemonic	Command		Definition				
PIN0	Input Parameter 0		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Electronic	Encoder	Encoder	X	X	X	X
PIN1	Input Parameter 1		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Hall Limit	Hall Limit	X	X	X	X	X	X
PIN4	Input Parameter 4		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LCD Back	X	VBUS	SE	X	X	X	X
PIN5	Input Parameter 5		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	FTP	Electronic	VF/PWMn	F/Rn	CAN/485n	MDC	MDO
POUT0	Output Parameter 0		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	X	X	X	X
POUT1	Output Parameter 1		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	X	X	X	X
POUT4	Output Parameter 4		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LCD Back	X	X	X	X	X	X	X
POUT5	Output Parameter 5		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	FTP	X	VF/PWMn	X	X	X	X

Diagnostic Parameters

These values are viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
TPL1	Test Point 1 Long In	Displays long test point 1 input variable.
TPL2	Test Point 2 Long In	Displays long test point 2 input variable.
TPO1	Test Point 1 Out	Displays test point 1 voltage out (above and below 1.5V nominal).
TPO2	Test Point 2 Out	Displays test point 2 voltage out (above and below 1.5V nominal).
TPS1	Test Point 1 Short In	Displays short test point 1 input variable.
TPS2	Test Point 2 Short In	Displays short test point 2 input variable.

Door Parameters

These values are viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
ADC0	Analog to Digital Converter 0	Displays the value of analog to digital converter number 0, which is the lwfbk signal (W phase current feedback).
ADC1	Analog to Digital Converter 1	Displays the value of analog to digital converter number 1, which is the lufbk signal (U phase current feedback).
CSC	Close Slip Compensation	This value is automatically set. It indicates the amount of belt slip during a close door cycle. This value is in motor revolutions. Do Not Change.
DPID	Profile ID	Displays current profile.
DTGC	Distance To Go Close	Calculated value based on travel and close slip compensation.
DTGO	Distance To Go Open	Calculated value based on travel and open slip compensation.
OSC	Open Slip Compensation	This value is automatically set. It indicates the amount of belt slip during an open door cycle. This value is in motor revolutions. Do Not Change.
POS	Door Position	This parameter displays the position of the door in motor revolutions from the door close limit (DCL). To use this feature, move the doors to the desired position and read the number displayed. Used for setting OBD and SIX. Minimum = 0 Default = 0 Maximum = TRV
TRV	Door Travel	This is the travel value learned when a door scan is performed. The value is in motor revolutions
UCV	UPID Command Velocity	Displays the dictated or commanded velocity.
UMV	UPID Motor Velocity	Displays the dictated or commanded motor velocity.
UPE	UPID Position Error	Displays the difference between calculated position and actual position.
UTQ	UPID Torque	Displays the dictated or commanded torque.
UVE	UPID Velocity Error	Displays the difference between dictated or commanded velocity and actual velocity.

System Parameters

This value is viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
VER	Software Version/Revision	Displays version/revision of door operator software.

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Fault Codes

- 2000 Series Fault Code = Front Door Operator
- 3000 Series Fault Code = Rear Door Operator

Fault Codes

Fault Code	Description / Causes / Solutions
2036 / 3036	IGBT FAULT - A defective IGBT. Possible Causes • This can be caused by an over current condition. Possible Solutions • Try to restart the power module. See Restart IGBT Power Module. • If the fault can not be cleared, verify that the doors are free of binds. If the doors bind, correct the cause of the bind and restart the power module. See Restart IGBT Power Module. • Check for wiring shorts. • If the fault remains, replace the door card or motor, or check for shorts.
2050 / 3050	ENCODER FAULT - An invalid encoder count. Possible Causes • This can be caused by an over current condition. Possible Solutions 1. Verify that the encoder wiring is correct (e.g. phase A and phase B are not swapped). 2. Verify that encoder is working properly. See Checking Encoder. 3. Make sure the magnetic limits are fastened securely on the cam shaft. CAUTION Do not overtighten, the cams are plastic and can be damaged rather easily. 4. Verify that all of the belts are in good shape and replace (if necessary). 5. Check the belt tension. Note: Tighten the belt (if necessary). Do not overtighten the drive belt because it can cause premature motor bearing failure. 6. Verify that the DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan. 7. If the fault remains, replace the door card.
2051 / 3051	XS BELT SLIP FLT - Excessive Belt Slip. Possible Solutions 1. Make sure the magnetic limits are fastened securely on the cam shaft. CAUTION Do not overtighten, the cams are plastic and can be damaged rather easily. 2. Verify that all of the belts are in good shape and replace (if necessary). 3. Check the belt tension. Note: Tighten the belt (if necessary). Do not overtighten the drive belt because it can cause premature motor bearing failure. 4. Verify that the DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan. 5. If the fault remains, replace the door card.

Fault Codes (Continued)

Fault Code	Description / Causes / Solutions
2053 / 3053	MOTOR WIRE WRONG - The door timed out, more than 14 seconds, while trying to power off a limit during scan. Possible Solutions 1. Verify that the motor is wired properly. 2. Verify that Left Hand Operation (LHO) is set correctly. 3. Perform a new door scan. 4. If the fault remains, replace the door card.
2054 / 3054	REV ENCODER FLT Possible Solutions 1. Verify that the encoder wiring is correct (e.g., phase A and phase B are not swapped). 2. Verify that the encoder is working properly. 3. Perform a new door scan. 4. If the fault remains, replace the door car.
2055 / 3055	TRAVEL FAULT - An invalid door travel value. Possible Solutions 1. Verify that the motor is wired properly. 2. Verify that the system adjustments are set correctly. 3. Perform a new door scan. 4. Verify that the encoder wiring is correct (e.g. phase A and phase B are not swapped). 5. Verify that encoder is working properly. 6. Verify that the DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan. 7. If the fault remains, replace the door card.
2056 / 3056	OPEN OS FAULT - Door overspeed in open direction with Open Command. Possible Solutions • Verify that the RPM adjustment is set correctly.
2057 / 3057	CLOSE OS FAULT - Door overspeed in close direction with Close Command. Possible Solutions • Verify that the RPM adjustment is set correctly.
2058 / 3058	CL RUNAWAY FAULT - Door over speed in close direction with no Close Command.
2059 / 3059	BUS POWER FAULT - Loss of BUS supply. Possible Solutions • Check fuse F2 on the door card and replace (if necessary). • Verify the wires for power (wires going to CON11) are securely fastened and in the correct place. • If the fault remains, replace the door card.
2060 / 3060	OP RUNAWAY FAULT - Doors overspeed in open direction with no Open Command.
2061 / 3061	OP OV DRIVE FAULT - Doors overdriven in open direction with Open Command.
2062 / 3062	CL OV DRIVE FAULT - Doors overdriven in close direction with Close Command.

Fault Codes (Continued)

Fault Code	Description / Causes / Solutions
2063 / 3063	IFBK FAULT - Failure to regulate the DC current (only) on DCL. Possible Causes • An open motor armature circuit. • A defective board, replace the board.
2064 / 3064	I SERIAL COM FAULT - Failure to receive data from the controller within 5 seconds. Possible Solutions • Check for a defective door board. • Check for a defective controller board. • Check the wiring.
2065 / 3065	I SCALE FAULT - Current adjustments are out of range. Possible Solutions 1. Correct the Maximum Drive Current (MDC) and/or the Motor Nameplate Current (MNC). 2. After making corrections, save and reset the board.
2066 / 3066	DOL DCL FAULT - Both DOL and DCL are on at the same time. Possible Solutions 1. Adjust the cam and/or magnet. 2. Replace the switch. 3. Replace the board.
2067 / 3067	DOL FAILURE - The Door Open Limit (DOL) sensor failed to operate after 60 seconds. Possible Solutions • Adjust the cam and/or magnet. • Perform a door scan. • Replace the reed switch. • Replace the board.
2068 / 3068	DCL FAILURE - The Door Close Limit (DCL) sensor failed to operate after 60 seconds. Possible Solutions • Adjust the cam and/or magnet. • Perform a door scan. • Replace the reed switch. • Replace the board.
2069 / 3069	MAX TORQUE FAULT - One or more torque limit adjustments are greater than the maximum allowed torque. Possible Solutions 1. Adjust the Open Torque Limit (OTL#) and/or the Close Torque Limit (CTL#). 2. Correct the Maximum Drive Current (MDC) and/or the Motor Nameplate Current (MNC). 3. After making corrections, save and reset the board.

Technical Information

Record Flight Time

This procedure requires two people - one in the car, and one on top of the car.

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Use the UIT, scroll to MAIN->DOOR->ADJ->SWM1, and enter 0 (zero).
4. Scroll to MAIN->DOOR->MON->DOOR_trav, and record the value.
5. Use MDC or MDO to move the doors to 3/4 fully open position.
6. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
7. Subtract the POS value from the TRV value, and enter this value in door adjustment SWM2.
8. Place the car on Automatic Operation. The doors will close.
9. Scroll to MAIN->DOOR->CMD->STOPWATCH, and press ENTER.
10. Choose the flight time, press ENTER, and the UIT displays: POS Mark 1 n.nnn (value from SWM1).
11. Press ENTER, and the UIT displays: POS Mark 2 n.nnn (value from SWM2).
12. Press and hold Door Open (to open doors), enter a car call for next landing - Up/ Down.
13. Release Door Open. The doors will close, and the car will run to the selected car call. When the car makes its run and the doors open, the flight time is displayed.

Note: SWM1 and SWM2 values are retained, without saving, until the Door Operator Power is cycled or the Door Card is reset.

Jumper Settings

If the card is not communicating with IMS, verify that jumpers are set as shown in Table 2. If not, power down the card, set jumper(s) to the proper setting, and power up the card.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2 (default)	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3 (default)	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3	On	*Selects Zmodem Mode for uploading new software. Field Selectable.
	Off (default)	*Selects Normal Mode for running. Field Selectable.
JP4	On	*Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off (default)	*Selects Front door mode for receiving front door commands. Field Selectable.
JP5	On (default)	*Selects RS485 communication link mode. Field Selectable. (Door Parameters D12 and D13=8).
	Off	*Selects CAN communication link mode. Field Selectable. (Door Parameters D12 and D13=7 or
JP6	On	*Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) Field Selectable. (Door
	Off (default)	*Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50-03 and TAC 50-04) Field
*Reset must be pressed for changes to take effect.		

Table 2 - Jumper Settings

Upload FLASH Program Software

If the FLASH code becomes corrupted, the FLASH code can be reinstalled.

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Install a UIT (User Interface Tool) on CON2.

3. Use a serial cable with a 4-pin connector adapter to connect a laptop with the HyperTerminal software to the UDC Card at CON6.

4. Click Start.

5. Select Programs -> Accessories -> HyperTerminal. The Connection Description window opens.

6. Type in a name, such as "FLASH COMM", select an Icon, and then click OK. The Connect To window opens.

7. Select the arrow beside Connect Using:, then select COM1 (or the port that will be used) from the list and click OK. The COM1 Properties window opens.

8. Type in the following properties:
    - Bits per second: 38400
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow Control: Hardware

9. Click OK. This session will be activated.

10. Select File -> Save.

11. Select File -> Properties. The Properties dialog box opens.

12. Select Settings. Verify the following:
    - The function, arrow, and ctrl keys act as terminal keys
    - The backspace key sends: Ctrl+H
    - Emulation: Auto detect
    - Telnet terminal ID: ANSI
    - Back scroll buffer lines: 500

13. Click ASCII Setup, and verify the following:
    - Line delay: 0 milliseconds
    - Character delay: 0 milliseconds
    - Wrap lines that exceed terminal width is the only item checked

Upload FLASH Program Software
(continued)

14. Click OK on both dialog boxes.

15. Select the Transfer pull-down menu, then select Send File.

16. Use the Browse Command to find the correct file, click the filename, and then click Open.

17. Install jumper JP3, and press Reset (on the door card).

18. Turn ON the mainline disconnect.

Note: The UIT displays the status message "ZMODEM READY." If this message is not shown, replace the door card.

19. To start the software upload, click Send in the HyperTerminal screen.

20. When the upload is complete, the UIT displays:

    ThyssenKrupp
    Universal Door

21. Remove jumper JP3, press Reset, and the UIT displays:

    ThyssenKrupp
    Universal Door

22. Turn OFF, Lock, and Tag out the mainline disconnect.

23. Remove the cable from CON6.

Determine the Software Version/Revision

1. Begin with the doors fully closed.
2. Scroll to MAIN->SYSTEM->MON->SW_v_r and press ENTER.

Note: The UIT will display the software version and revision. The first two digits are the version, and the second two digits are the revision.

2. Press ESC until the main menu displays.

Cycle Mode

The cycle command (CYC), when activated, will cause the doors to continuously cycle. The delay at the DOL and the DCL is controlled by the cycle delay time (CDT) adjustment.

Activate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays:

    ENT to ENABLE
    CYCLE Mode

2. Press ENTER, and the UIT displays:

    Control/Cmd
    Cycle Mode

Note: The doors will start cycling.

Cycle Mode
(continued)

Deactivate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays:

   ENT to ENABLE
   CYCLE Mode

2. Press ENTER, and the UIT displays:

   Control/Cmd
   Cycle Mode

Note: The doors will stop cycling.

Restart the IGBT Power Module

The power module may be reset if an overcurrent circuit condition has caused the power module to send a shutdown signal to the DSP. The power module can only be reset after the fault condition has been cleared.

1. Scroll to MAIN->DOOR->CMD->IGBT ERR Rst, press ENTER, and the UIT displays:

   ENT to Proceed
   ESC to Exit

2. To reset the power module, press ENTER, and the UIT displays:

   PWM Reenabled

Note: The power module has now been reset.

3. Press ESC until the main menu displays.

Shut Down the IGBT Power Module

This command prevents any motor operation including the Manual Door Open (MDO) and Manual Door Close (MDO) functions.

1. Scroll to MAIN->DOOR->CMD->Shutdown, and press ENTER.

Note: The UIT display will not change, and the power module has now been shutdown.

2. Press ESC until the main menu displays.

Restore Factory Defaults

Each HD-11 Door Operator is shipped with certain parameters and adjustments modified to match the job condition. The defaults, however, remain the same for all units.

CAUTION

The supplied configuration of the door operator uses adjustment and parameter values that are different from the default values shown in the Diagnostics Section. Using the Factory Defaults Command (FDF) could result in a maladjusted or non-functioning door operator.

1. Begin with the doors fully closed.
2. Scroll to MAIN->SYSTEM->CMD->FACTORY DEFAULTS, press ENTER, and UIT displays:

   ENT to Restore
   ESC to Exit

3. Press ENTER, and the UIT displays:

   Values Restored

Note: All adjustments, parameters and commands are now set to the factory defaults.

4. Press ESC until the main menu displays.

Troubleshooting

Power Up Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Unplug the connectors from the door card.
3. Turn ON the mainline disconnect.
4. Measure AC voltage on the door operator terminal strip across AC1S and AC2. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
    - The power switch in the door control box is ON.
    - The AC1S switch is ON in the swing return.
    - The connections in the swing return are good.
    - The power is ON at the elevator controller.
    - The fuses in the elevator controller are good.
    - The connections in elevator controller are good.
5. Measure the AC voltage across AC1S and ACG.
    a. If the voltage is in range of 0 and 80 VAC, measure AC2 to ACG.
    b. If AC2 to ACG is in range of 103 and 126 VAC, AC1S and AC2 have been reversed; Reverse AC1S and AC2.
6. With the system still powered Up, measure the DC voltages on the door operator terminal strip across P24 and G24. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
    - The P24 switch in the swing return is ON.
    - The connections in the swing return are good.
    - The power is ON at the elevator controller.
    - The fuses in the elevator controller are good.
    - The connections in the elevator controller are good.

Voltage	Meter Set-ting	Positive Meter Probe	Negative Meter Probe	Voltage Measured
AC1S	Volts AC	AC1S terminal 6	AC2 terminal 5	103 - 126 VAC
AC1S	Volts AC	AC1S terminal 6	ACG terminal 4	103 - 126 VAC
AC2	Volts AC	AC2 terminal 5	ACG terminal 4	0 - 80 VAC
P24	Volts DC	P24 terminal 17	G24 terminal 20	22 - 26 VDC

Table 3 - Voltage Settings

LED Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect. Reconnect the connectors on the door card (located inside the door operator).
2. Make sure the doors are in the fully closed position.
3. Turn ON the mainline disconnect.
4. Verify that the VBUS and WD LEDs are ON. See Figure 12 on page 38.

Note: If the VBUS or the WD LED does not come ON, see Troubleshooting Guide on page 40.

5. Verify that the door is still in the fully closed position, and that the DCL LED is ON. If the LED does not come ON, see Troubleshooting Guide on page 40.
6. Turn OFF the toggle switch (located in the door operator).
7. Manually move the doors to the fully open position.
8. Turn ON the toggle switch.
9. With the door in the fully open position, verify that the DOL LED is ON. If the LED does NOT come ON, see Troubleshooting Guide on page 40.

Power Supplies Check

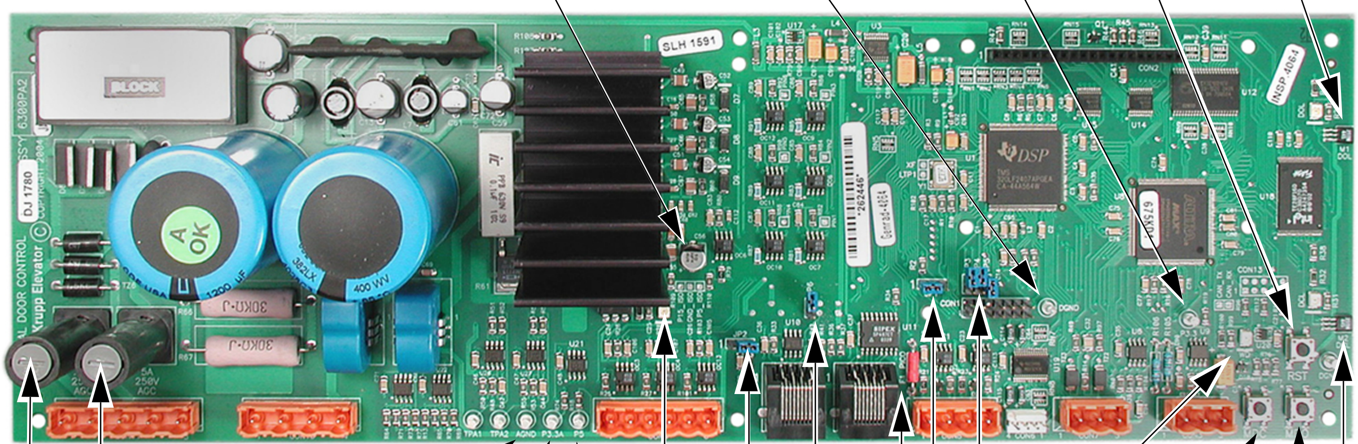
1. Turn the door card ON and measure the voltages at the specified points on the door card. The voltage for each measurement should be in the range noted.

WARNING **When checking door card power supplies, take great care to avoid electrical shock and/or damage to the door card.**

The power supply for the door motor is named V-Buss. The voltage for this power rail is generated from the incoming 115 VAC, and the 115 VAC is rectified and filtered to produce the DC power supply. A VBUS indicator LED is provided on the card.

2. The VBUS LED will indicate whether this power supply is good.
   - If the VBUS LED is not ON, see Troubleshooting Guide on page 40.
   - If 115 VAC is available at CON11, pins 1 and 2, and the VBUS LED is not ON, replace the door operator card.

LED Verification and Power Supplies Check
(continued)



Power Supply	Measurement Locations	Acceptable Voltage Range (VDC)
P5	P5 Test Point to DGND Test Point	4.875 to 5.125
P3.3	P3.3 Test Point to DGND Test Point	3.2 to 3.37
P3.3A	P3.3A Test Point to AGND Test Point	3.2 to 3.4
P5_ISO	P5_ISO Test Point to GND_ISO Test Point	4.5 to 5.5
P15_ISO	P15_ISO Test Point to GND_ISO Test Point	14.625 to 15.375

Figure 12 - Door Card Power Supply Check

Check the Encoder

Perform this check to ensure that the encoder signals are working properly.

1. Before conducting this test, verify that fuse F1 on the door card is good.
2. Use a digital multimeter, and measure the voltage across fuse F1.
   - If the voltage reads higher than 1.5 volts, replace the fuse.
   - If the voltage reads below 1.5 volts, the fuse is good.

The best way to check the encoder signals is with an oscilloscope. If an oscilloscope is not available, use the digital multimeter method.

Oscilloscope Method

Required tool: An oscilloscope with two working channels.

1. Set the vertical channel to 5V/div.
2. Set the horizontal channel to 1uS/div.
3. Connect the ground leads for both channels to the GND test point.
4. Connect the channel A probe to CON8-2 (PHA).
5. Connect the channel B probe to CON8-3 (PHB).
6. Slowly rotate, by hand, the door motor.

Note: PHA and PHB should be 90 degrees out-of-phase, and toggle between 0 to 1 and 4.5 to 5 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Digital Multimeter Method

Required tool: A digital multimeter set to measure DC volts.

1. Connect the negative lead to the GND test point, and the positive lead to CON8-2 (PHA).
2. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

3. Connect the negative lead to the GND test point, and the positive lead to CON8-3 (PHB).
4. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Troubleshooting Guide

<table>
<tr><th>Problem</th><th>Possible Causes or Solutions</th></tr>
<tr><td>Doors Run the Opposite Direction When First Powered Up</td><td>1. Change the hand of the operator by changing the LHO adjustment.
2. To verify that the change corrected the problem, press MDO to verify that the doors move in the open direction.
3. Press MDC to verify that the doors move in the close direction.
4. Save this adjustment change to FLASH.</td></tr>
<tr><td>Door Motor Vibrates When Trying to Move the Door</td><td>1. Verify that the proper motor type is selected in the DCM adjustment.
2. Verify that motor leads are connected per the Motor Connections Chart below.
Note: The motor and encoder connections must match what is shown in the charts below. If any of these connections are not correct, unstable operation will result.

CAUTION
Do not change motor or encoder connections to change door direction. To change door direction, use the LHO Adjustment.

3. Verify that the encoder is connected per the Encoder Connections Chart below.
4. Verify 5 VDC to encoder connector.
• Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1 and the black probe on CON8-4.
• If the voltage reads less than 4.5 volts, check the fuse.
• If the voltage reads above 4.5 volts, check the encoder signals.
5. Verify that the encoder power fuse F1 on the door card is good.
6. Verify that the encoder works.

Motor Connections
<table>
<tr><th>Connector-Pin</th><th>VFD Cable Wire No.</th><th>AC Motor Leads</th><th>DC Motor Leads</th></tr>
<tr><td>CON10-2</td><td>1</td><td>1</td><td>no connect</td></tr>
<tr><td>CON10-4</td><td>2</td><td>2</td><td>Red</td></tr>
<tr><td>CON10-3</td><td>3</td><td>3</td><td>Black</td></tr>
<tr><td>GND Screw</td><td>Green</td><td>Green</td><td>no connect</td></tr>
</table>
Encoder Connections
<table>
<tr><th>Connector-Pin</th><th>Wire Color</th><th>Signal</th></tr>
<tr><td>CON8-1</td><td>Red</td><td>P5</td></tr>
<tr><td>CON8-2</td><td>White</td><td>PHA</td></tr>
<tr><td>CON8-3</td><td>Green</td><td>PHB</td></tr>
<tr><td>CON8-4</td><td>Black</td><td>GND</td></tr>
</table>
</td></tr>
</table>

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Open to Fully Open Position	1. Verify that the DOL limit is adjusted properly, and that the DOL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the open cycle. 3. Verify that the drive arms are setup and aligned properly.
Doors Will Not Close to Fully Closed Position	1. Verify that the DCL limit is adjusted properly, and that the DCL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the close cycle. 3. Verify that the drive arms are setup and aligned properly.
VBUS LED Will Not Light	1. Verify that the power switch in the operator is in the ON position. 2. Check for 115VAC across pins 1 and 2 of CON11. 3. Check fuse F2 on the door card; Replace if necessary. 4. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
WD LED Will Not Light	1. Verify that power switch in operator that is located on the PC card shelf is in the ON position. 2. Check fuse F3 on the door card; Replace if necessary. 3. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
DCL or DOL LED Will Not Light	Note: The DCL or DOL LEDs will not light unless the magnet cam is aligned with the hall- effect sensor on the end of the card. 1. Verify proper alignment of the magnetic limit cam with the hall-effect sensor. If not aligned properly, adjust the magnetic limit cam on the door operator cam shaft. 2. Verify that the DCI, ELI, and LDO adjustments are all set to 0 (zero). 3. Verify that the power switch in the operator is in the ON position. 4. Check fuse F3 on the door card; Replace if necessary. 5. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
Doors Will Not Reverse on Safety Edge Activation	1. Verify that the wires for safety edge signal are securely fastened and in the correct connector. The safety edge signal wire goes to CON9-5 on the UDC. 2. Verify that the SE signal return wire (G24) is connected to CON9-6. 3. Verify that the signal is getting to the UDC card. a. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. b. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. The safety edge input is active low. • If the voltage at CON9 is greater than 2 volts, then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the doorway. • Setting IBM4 to 0 will invert the active state for the SE Input.
MDO Starts to Open Doors, But Doors Reclose	Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller.
MDC Starts to Close Doors, But Doors Reopen	Verify that the car is on Inspection Operation. The MDC is overridden by a open door command from the elevator controller, or by an active SE signal.

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Set Up	1. Verify that the motor moves the door in the correct direction when MDC or MDO are pushed. 2. Verify that the encoder is connected properly. 3. Verify 5 VDC to the encoder connector. 4. Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1, and the black probe on CON8-4. • If the voltage reads less than 4.5 volts, check the fuse. • If the voltage reads above 4.5 volts, check the encoder signals. 5. Verify that the encoder power fuse F1 on the door card is good. 6. Verify that the encoder works.
Doors Will Not Close After Opening, or Doors Open Without Command and Will Not Close	1. Verify that the SE signal is not active; The SE signal is active low. 2. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. 3. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. Note: If the voltage at the CON9 is greater than 2 volts then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the door way.
Doors Will Not Move When MDO or MDC Is Pushed	1. Verify that there are no mechanical restrictions or binds. 2. Verify that the IGBT has not been shut down due to a fault. Check faults and follow the instructions for the particular faults that are listed. If the fault listed is the IGBT_FAULT, reset the IGBT power module. 3. If MDO does not work: a. Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller. b. Verify that the DOL limit is not active. If it is active, the doors will not open. If on the DOL limit, move the doors off of the open limit and verify that MDO does cause the doors to open. 4. Verify that the car is on Inspection Operation. The MDC is overridden by an open door command from the elevator controller, or by an active SE signal. 5. If MDC does not work: a. Verify that the DCL limit is not active. If it is active, the doors will not close. If on the DCL limit, move the doors off of the close limit and verify that MDC does cause the doors to open. 6. Verify that VBUS LED is ON. 7. Verify that WD LED is ON. 8. Power down the card, remove the connector to the motor, and power up the card. 9. Connect a voltmeter to the motor output pins; be very careful not to short the pins together. 10. Press MDO or MDC, and verify that there is voltage on the motor output pins. a. If voltage is present, check the motor wiring. If wiring is good, the motor may be bad. b. If no voltage is present, verify that the correct door operator profile is loaded for the type of door and motor being used. If the correct door operator profile is loaded and the IGBT is not faulted out, the card may be damaged.

Maintenance

1. Check that the motor mounting bolts are tight.

2. Remove the brush covers (where applicable), blow out the brush holders, check the brushes for wear, and reinstall the covers.

3. Inspect the operator belts for the following:
   a. Cracks or glazing
   b. Even wear on both sides of the belt
   c. The belts are not bottomed out in the grooves
   d. Proper tension (belt slippage).

The following guidelines apply when testing, adjusting, or replacing belts:

- Ideal tension is the lowest tension at which the belt will not slip at peak load.
- All belts in the set should be tested for equal tension by pushing each belt down at the midpoint between the pulleys (typical deflection is 3/8" with 10 lbf applied).
- If belts require tensioning, check the sheave alignment with a straight edge.
- If belts are replaced on multi-groove sheaves, change the belts as a matched set.

4. Check that all of the linkage bolts are tight.

5. Remove the door operator cover, rotate the door operator by hand, and check the operation of the DOL and DCL sensors.

6. Check the operation of the gate switch, and make sure that it is adjusted per code.

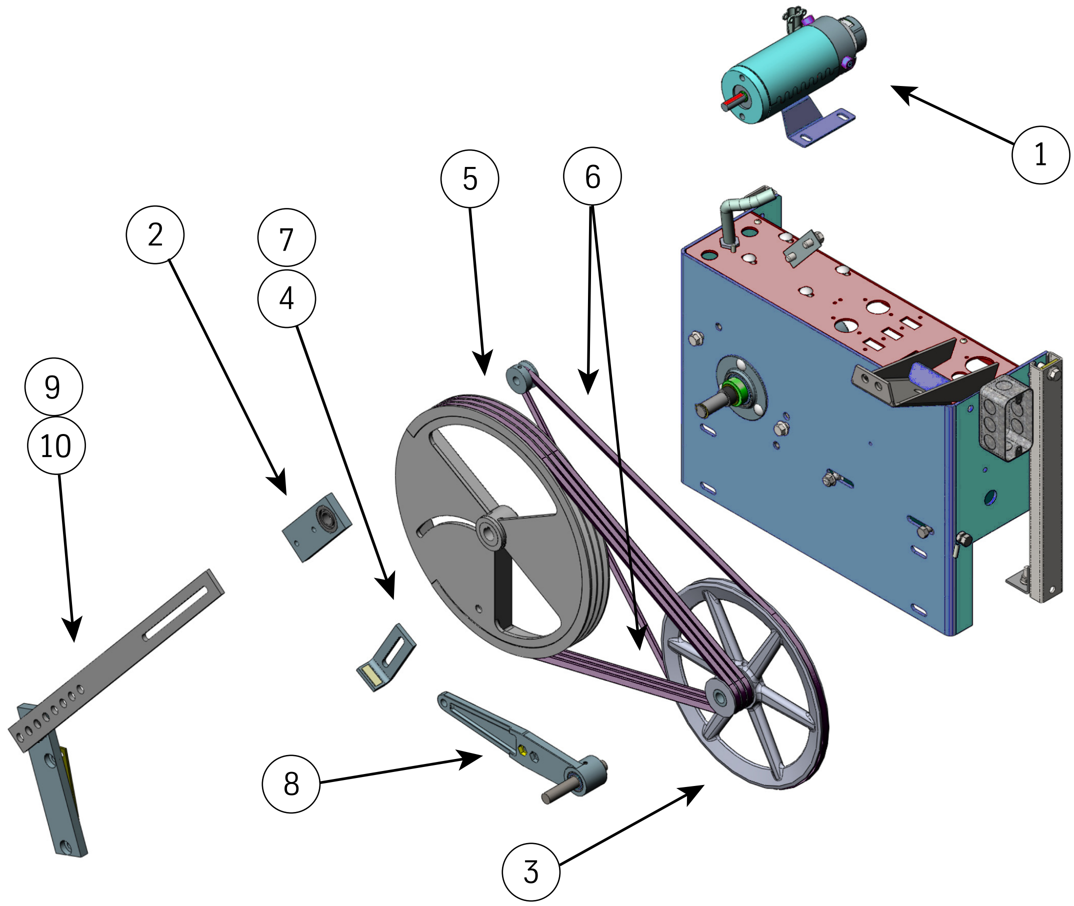
7. Use a burnishing tool or clean rough paper, and clean the gate switch contacts (if necessary).

8. Replace the door operator cover.

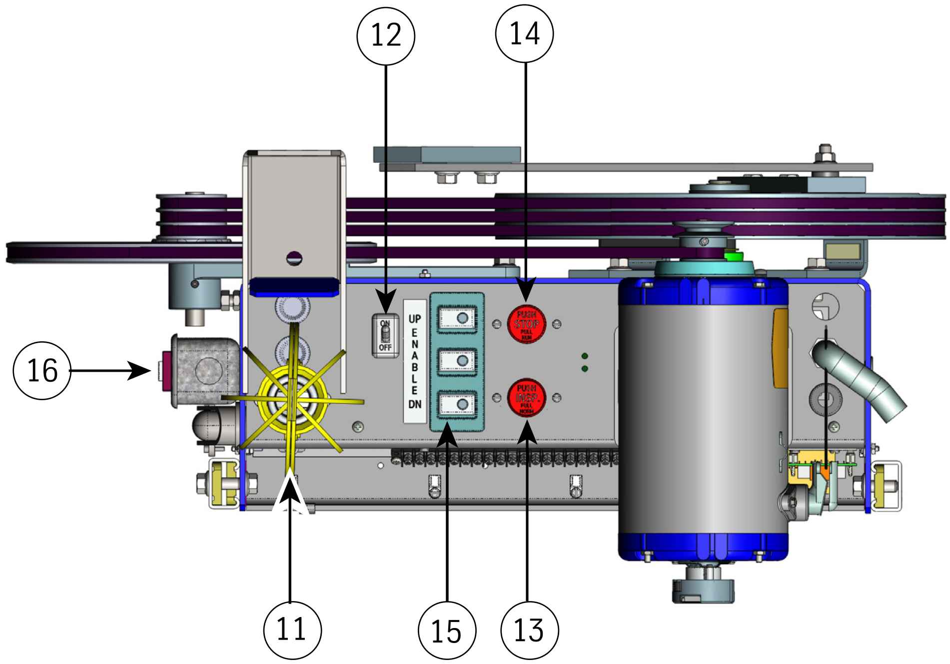
9. Check for excessive bearing wear.

Replacement Parts

3001AY_ HD-11 Door Operator



3001AY_ HD-11 Door Operator
(continued)



3001AY_ HD-11 Door Operator
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9779504	591BF1	Motor Assy Door Operator Closed Loop, 115V
	9739593	591BJ1	Motor Assy Door Operator Closed Loop, 115V, 1/2 HP
2	9723985	123990	Pivot Arm Assy
3	9876686	67668	Jack Sheave Machining V Groove
4	9814656	114653	Stop Door Operator
5	9842214	750CV1	Sheave Drive Door Operator
6	9749470	77920	Belt Vee 3V 630 Door Operator
7		40148	Bumper Closing Vane Clutch
8	9838820	63882	Idler Arm Assy Adjustable
9		103268	Adjustable Arm (Intermediate)
10	9723997	123992	Adjustable Arm Assy
11		109789	Guard, Lamp
12	9743637	76703	Switch, Light
13	9739555	127196	Switch, Pushbutton
14	9810985	109888	Switch Assy, Inspection
15	9810857	108150	Switch Assy, Run-Stop, Horizontal
16		687BR1	Receptacle, Ground Fault Circuit Interrupter
17	9736254	177AM1	Audible, Signal, Alarm
18	9765841	6300WK1	PCB Assy, SE-Interface
19	9803889	6300PA4	PCB Assy, Universal Door Control
20	9876954	6300HL1	PCB Assy User Interface

(Parts not shown/not labeled in drawing)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
21	9875412	850RW1	Tools, Light, Magnetic-Based Trouble Light
22	9781821	78182	Light Socket
23		196ADY1	Bracket, Mounting, PC Board
24		378AW1	Fan Assy, Door Operator
25		286AH37	Connector, Nm, Zinc-Die Cast
26		196ALW1	Bracket, Extender, UIT
27		296KM20	Connector, PCB, Header
28	9863295	220EK1	Cable, Extender, UIT/UDC
29		196AEP1	Bracket, Safety Edge Interface Board
30			

LD-03 Door Operator

Specifications

- Maximum Door Opening Speed: 2 ft/s
- Maximum Combined Door Weight: 450 lbs.
  (weight is the combined car and hoistway door assemblies and components)
- Motor Horsepower: 1/6 HP
- Motor Voltage: 120 VDC
- Encoder: 500 pulses per revolution (built into motor gearbox)
- Drive Belt: 1/2” pitch, 3/4” wide, H series, trapezoidal timing belt
- Door Card: Universal Door Controller (UDC), closed-loop

Installation

Mechanical Installation

1. Place and fasten the operator. See Figure 1.
2. Install the door(s).
3. Install the clutch and pickup linkage.

Wiring

1. Route the door operator harness to the swing return, and connect the harness connectors to the appropriate connectors on the Car Wiring Interface Card (CWID).
2. Connect the safety edge cables to the safety edge box.

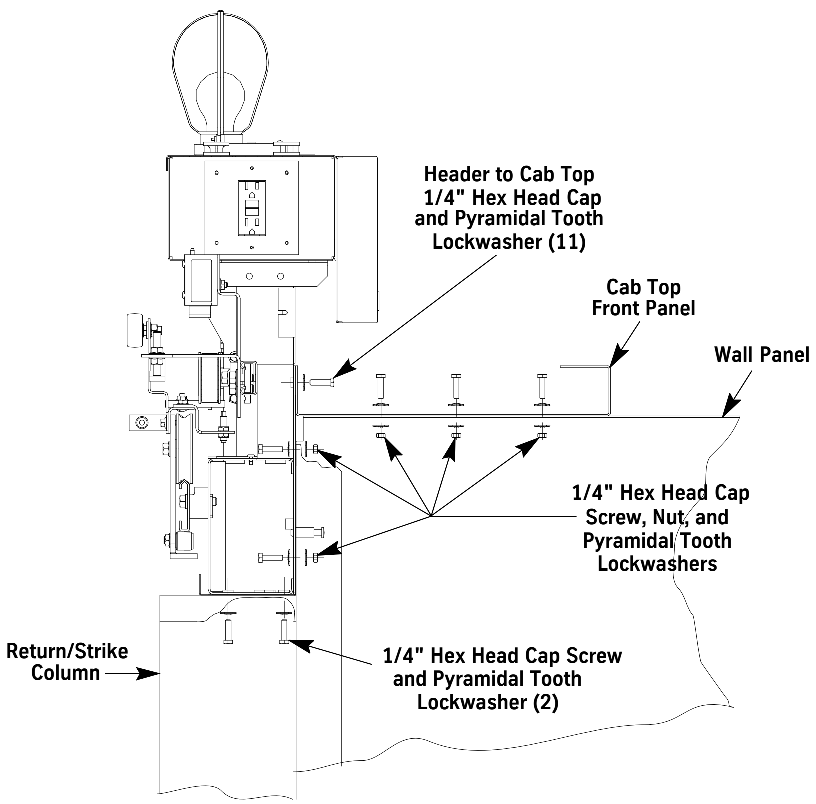


Figure 1 - Mount the Door Operator and Header Assembly to the Cab

Setup and Adjustment

Setup using the UIT

The Linear Door Operator (LD-03) is adjusted and configured by manufacturing. Only minor adjustments, if any, should be required at the job site.

CAUTION **The supplied configuration of the door operator uses adjustment and parameter values that are different from the default values shown in the Diagnostics Section. Using the Factory Defaults Command (FDF) could result in a maladjusted or non-functioning door operator.**

Power-up

1. Place the car on Inspection Operation.
2. Verify that the following jumper settings and positions are correct. See Figure 2.
   - JP1 is ON 1 and 2.
   - JP2 is ON 2 and 3.
   - JP3 is OFF.
   - JP4 is Set (OFF = Front, ON = Rear).
   - JP5 is ON.

   Note: JP5 ON forces RS485 communications mode, and must have matching CPU Adjustments D12/D13=8.

   - JP6 is OFF.

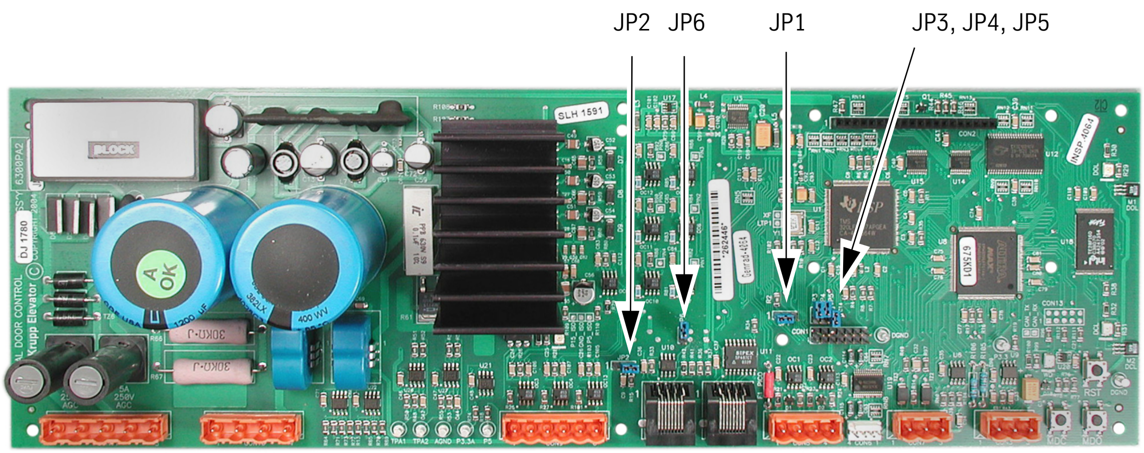


Figure 2 - Door Operator Card with Jumper Settings and Positions

3. Turn ON the mainline disconnect.
4. Verify that the VBUS and WD LEDs on the door card are ON.
5. Verify that the Harness Comm plug is on CON7.

Direction Check

CAUTION **To prevent automatic movement of the door while adjusting limit switches, place elevator on Inspection Operation.**

1. Check the DOL and DCL limits.

   a. Place the car on Inspection Operation.

   b. Press and hold MDO on the door card to open the door(s). Verify that the door opens fully and the DOL LED turns ON. If DOL/DCL do not appear to work, verify that the door adjustments ELI and LDO are set to 1,

      - If doors move in the open direction, continue with Step 1c.
      - If doors do not move in the open direction, use the UIT to change the value of LHO. See LHO on page 63, and cycle power must be completed.
      - Repeat Step 1b.

   c. Press MDC on the door card to close the door(s). Verify that the door closes fully, and that the DCL LED turns ON. If DOL/DCL do not appear to work, verify that the door adjustments ELI and LDO are set to 1.

   d. If the value for LHO was changed, save the change.

   e. Adjust the limit switch actuators (if necessary).

Auto Null

1. Start this procedure with the car on Inspection Operation and the doors FULLY CLOSED.

2. On the UIT, scroll to MAIN->DOOR->CMD->ANL (Autonull).

3. Press ENTER, and the UIT displays,

   ENT to AUTONULL
   ESC to exit

4. Press ENTER and, after autonull is complete, the UIT displays,

   AUTONULL COMPLETE
   Save to Flash

5. Save the autonull parameters to FLASH.

   a. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays,

      ENT to save
      ESC to exit

   b. Press ENTER, and the UIT displays,

      Adjs have been saved to FLASH

Door Scan

1. Place the car on Inspection Operation.
2. Make sure the door(s) is FULLY CLOSED.
3. On the UIT, scroll to MAIN->PROFILE1->CMD->LEARN TRAVEL.
4. Press ENTER, and the UIT displays,

   TRAVEL = (######)
   Ent to Re-Learn
5. Press ENTER, and the UIT displays,

   TRAVEL = 000
   Move Doors Now
6. Press and hold the MDO button until the DOL LED turns ON and the UIT displays,

   TRAVEL = (learned value)
   Save to Flash
7. Save the Door Scan to Flash.
   a. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and UIT displays,

      ENT to save
      ESC to exit

   b. Press ENTER, and the UIT displays,

      Adjs have been saved to FLASH

Profile Adjustments

1. Place the car at the appropriate landing of the profile that is to be adjusted.
2. Scroll to MAIN->PROFILE#->ADJ-> and make the necessary door open and close adjustments.

Notes: For adjustment parameters,

- See “Door Closing Profile” and “Door Open Profile” on the right side of the label in the door card cover, or,
- See “Door Closing Profile” on page1 - 52, and “Door Open Profile” on page 1 - 53.

CAUTION **To avoid mechanical damage to the elevator, DO NOT make drastic changes in Open and Close high speeds.**

3. Save any adjustment changes to Flash.
   a. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and UIT displays,

      ENT to save
      ESC to exit

   b. Press ENTER, and the UIT displays,

      Adjs have been saved to FLASH

IMPORTANT! **Save changes to FLASH when the door is on DCL, or the changes may not be accepted.**

Closing Force

1. Use the UIT, scroll to MAIN->DOOR->ADJ->STALL, and note the value so that it can be set back later.
2. Press ENTER, scroll to 0 (zero), and press ENTER again. This sets value of STALL to 0.
3. Use a force gauge to measure the closing force. See Figure 10.

Notes:

- The closing force should be less than 30 lbf. in the middle 1/3 of travel.
- If the closing force is too high: Scroll to MAIN->DOOR->ADJ->CTL2, reduce the value, re-measure and repeat until the closing force is within limits.

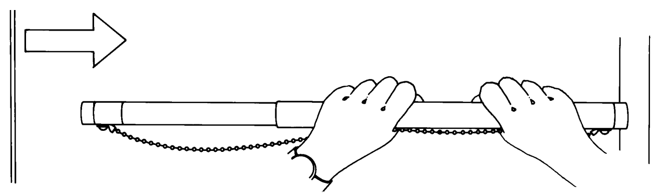


Figure 3 - Safe Use of the Door Gauge

4. Scroll to MAIN->DOOR->ADJ->STALL, and set STALL back to its original value.
5. Save the values to FLASH.
6. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays,
   ENT to save
   ESC to exit
7. Press ENTER, and the UIT displays, Adj's have been saved to FLASH.

Closing Kinetic Energy

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Determine the minimum allowable closing time from the door operator nameplate.

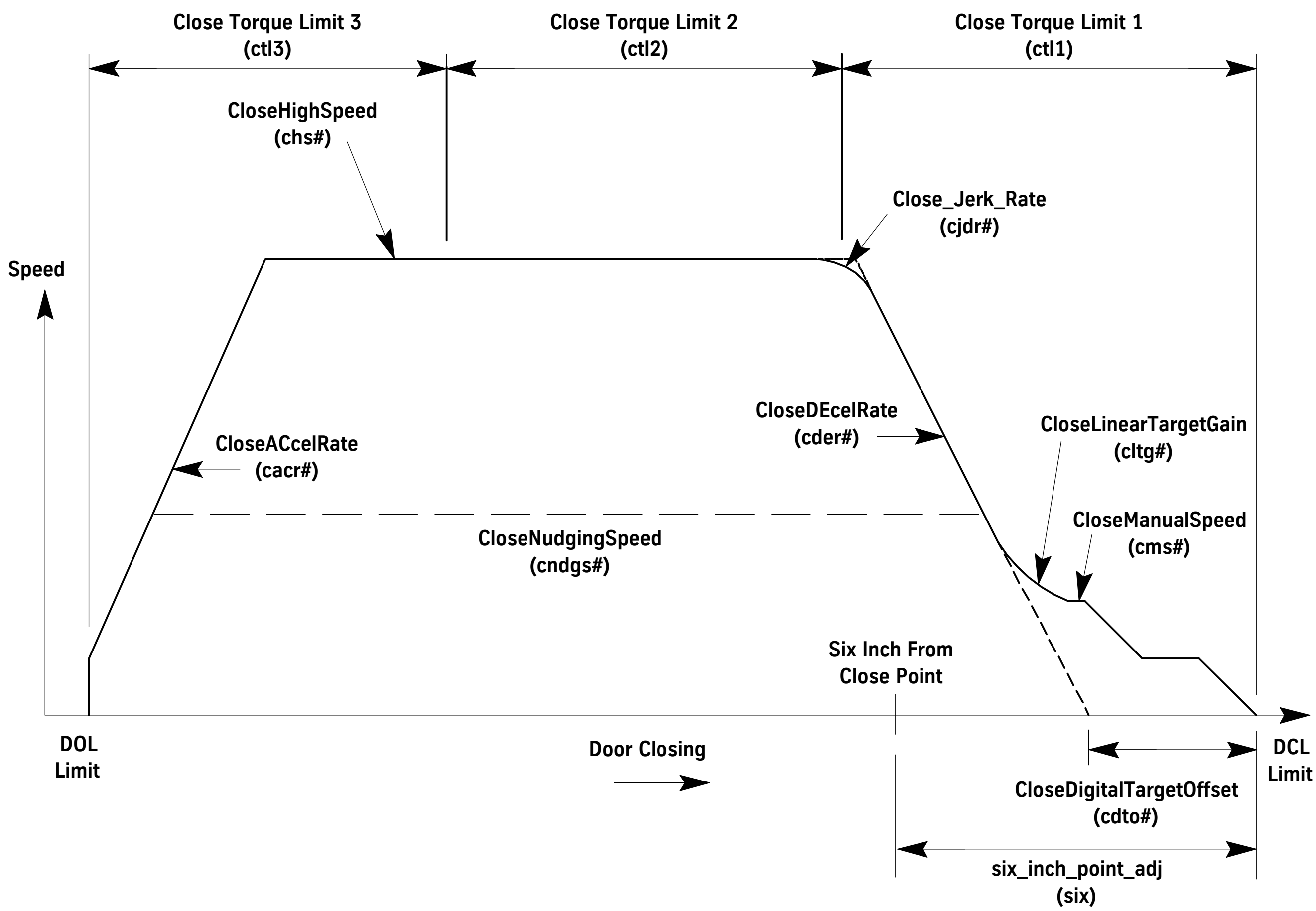
Code Distance For the Time Measurement,

- Center Opening Doors: 1" from FULLY OPEN to 1" from FULLY CLOSED.
- Single Speed Doors: 2" from FULLY OPEN to 2" from the face of the strike column.
- For the LD-03 Operator: 2 inches = 4.286 revolutions and 1 inch = 2.143 revolutions.

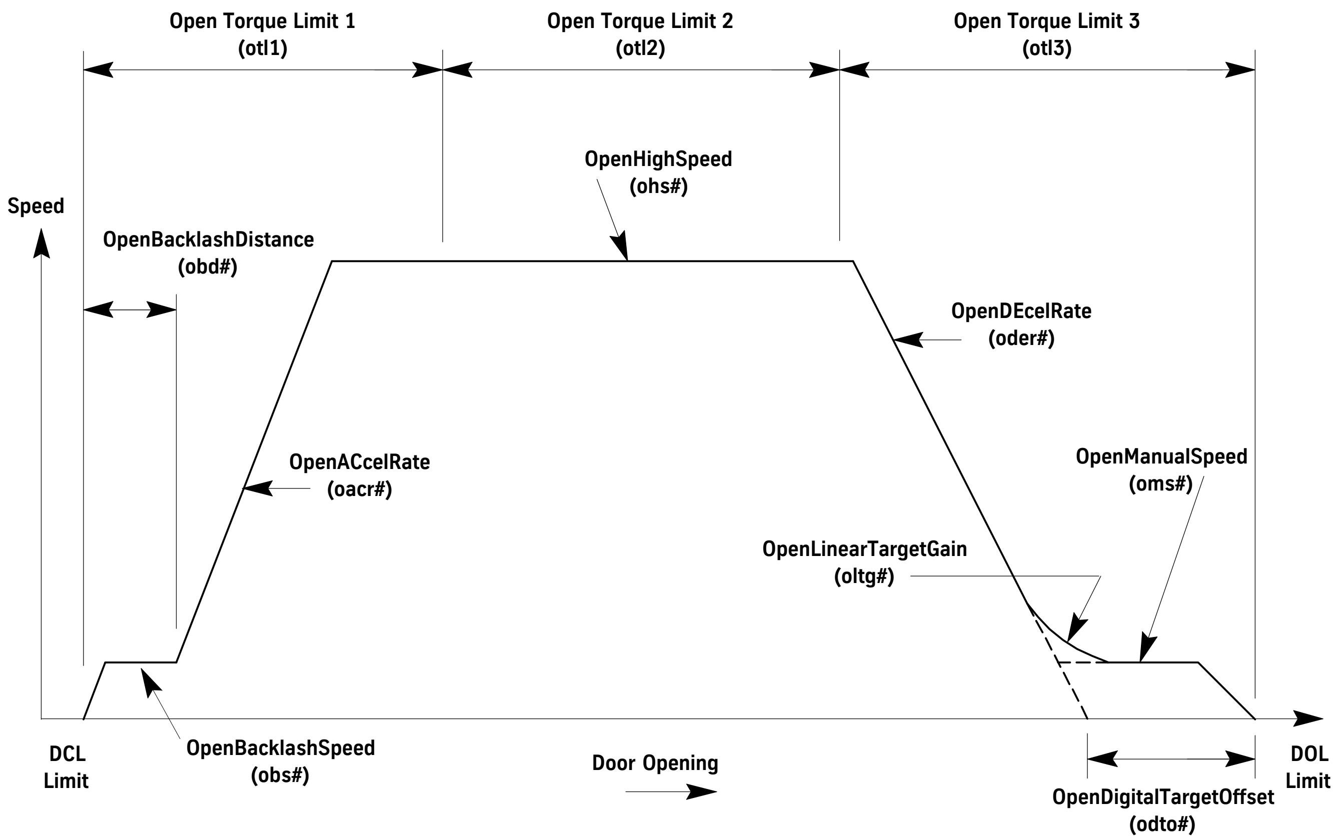
Note: Each door operator is programmed with the correct stopwatch starting and stopping points (used for measuring closing time with the stopwatch feature).

4. Place the car on Automatic Operation.
5. Scroll to MAIN->DOOR->CMD->STOPWATCH, and press ENTER.
6. Choose the close time, press ENTER, and the UIT displays, POS Mark 1 n.nnn (value from SWM1).
7. Press ENTER, and the UIT displays, POS Mark 2 n.nnn (value from SWM2).
8. Press DOOR OPEN. When door is FULLY OPEN, press ENTER and UIT displays, Stop-watch armed.
9. When the door closes, the UIT displays the closing time. If the closing time is less than minimum allowable closing time specified, reduce the value of close high speed (CHS#) adjustment and repeat until the closing time is greater than or equal to the minimum.
10. Save any adjustment changes to FLASH.

Door Closing Profile

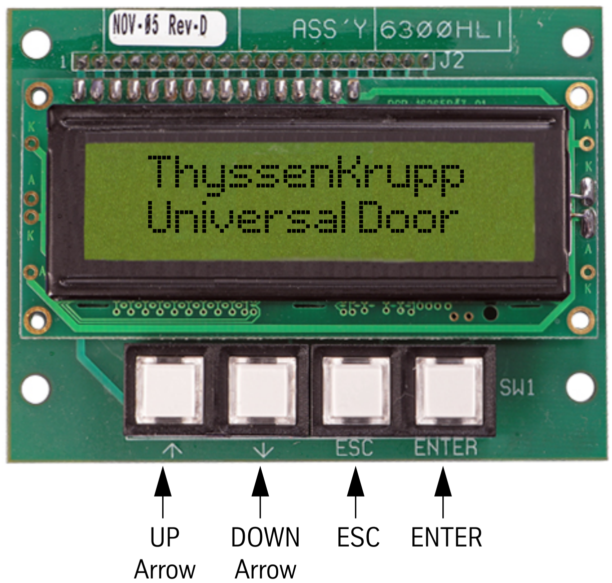


Door Opening Profile



Diagnostics

The User Interface Tool (UIT)



UP or DOWN Arrow - Scrolls through menus, adjustments, and displays.

ESC - Exits the current level of a menu, adjustment, or display.

ENTER - Selects a menu, adjustment, or display.

Overview of Adjustments, Parameters, and Commands

- All adjustments must be made when the doors are idle.
- Before the card is reset or powered down, save any adjustment changes to FLASH.
- When the adjustment is a speed value:

  Increase the value = The door runs at a faster speed.

  Decrease the value = The door runs at a slower speed.
- When the adjustment is an acceleration or deceleration rate value:

  Increase the value = The door accelerates or decelerates faster.

  Decrease the value = The door accelerates or decelerates slower.
- When the adjustment is a distance or point value:

  Increase the value = The distance or point is further from either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.

  Decrease the value = The distance or point is closer to either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.
- Door position is stored at 0 on DCL and at Travel (TRV) on DOL.
- Speeds are (+) in the opening direction, and (–) in the closing direction.

The UIT Menu Tree

Main Menu

- **Door**
  - **Adjustment**
    - OTL1
    - OTL2
    - OTL3
    - CTL1
    - CTL2
    - CTL3
    - CLT
    - SIX
    - DIREV
    - STALL
    - ADP
    - PPR
    - IFB
    - RPM
    - LPTC
    - ADZ1
    - MDC
    - MNC
    - IKP
    - IKI
    - IVL
    - SWM1
    - SWM2
  - **Monitor**
    - DOOR_trav
    - DOOR_pos
    - upid_cmd_vel
    - upid_torque
    - upid_mtr_vel
    - upid_vel_err
    - upid_pos_err
    - adc_1
    - slip_comp_op
    - slip_comp_cl
    - DTG_open
    - DTG_close
    - profile_ID
  - **Command**
    - IGBT Err Rst
    - Shutdown
    - Stopwatch
    - Autonull
- **Profile_#**
  - **Adjustment**
    - OHS#
    - OMS#
    - OACR#
    - ODER#
    - ODTO#
    - OBS#
    - OBD
    - OLTG#
    - CHS#
    - CMS#
    - CACR#
    - CDER#
    - CDTO#
    - CJDR#
    - CLTG#
    - CNDGS#
    - KPCMD#
    - KICMD#
    - KDCMD#
    - KPFB#
    - KDFB#
    - LAG (Profile 1 only)
    - RSC (Profile 1 only)
    - # = profile number
  - **Command**
    - Learn Travel
- **CAN**
  - **Monitor**
    - CAN_esr
    - CAN_gsr
    - CAN_mder
    - CAN_tcr
    - CAN_rcr
    - CAN_cec
  - **Command**
    - CAN Err Rst
- **Control**
  - **Adjustment**
    - IBM0
    - DBM0
    - IBM1
    - DBM1
    - IBM4
    - DBM4
    - IBM5
    - DBM5
    - IIM
    - OIM
    - CDT
  - **Command**
    - Cycle Mode
  - **Monitor**
    - mcss_cmd_num
    - P_in_0
    - P_in_1
    - P_in_4
    - P_in_5
    - P_out_0
    - P_out_1
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    - Exp_in
- **System**
  - **Adjustment**
    - LHO
    - DCM
    - DCI
    - DOI
    - ELI
    - MAL
    - LDO
    - FSP
    - UPM
    - DRM
  - **Monitor**
    - SW_v_r
  - **Command**
    - PASSWORD CONTROL
    - SAVE TO FLASH
    - STACK USAGE
    - FACTORY DEFAULTS
- **Diagnostics**
  - **Adjustment**
    - TPA1
    - TPA2
    - TPM1
    - TPD1
    - TPM2
    - TPD2
    - DM0
    - DZ0
    - DM1
    - DZ1
    - TPL1
    - TPL2
    - HEX
  - **Monitor**
    - TP1_out
    - TP2_out
    - TP1s_in
    - TP2s_in
    - TP1l_IN
    - TP2l_in
  - **Command**
    - DISPLAY FAULTS
    - CLEAR FAULTS

(shaded) = Available Only if Main->System->Adj->MAL = 1

Adjustments

Control Adjustments

Mnemonic	Adjustment		Definition				
CDT	Cycle Delay Time		The time (in seconds) that the door control will delay at each limit when the doors are on continuous cycle mode Min: 0 Default: 32 Max: 255				
DBM0	De-Bounce Bit Mask 0		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	X	X	X	X
X	Electronic DCL	Encoder Phase B	Encoder Phase A	X	X	X	X
DBM1	De-Bounce Bit Mask 1		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input	Input	X	X	X	X	X	X
Hall Limit DOL	Hall Limit DCL	X	X	X	X	X	X
DBM4	De-Bounce Bit Mask 4		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	X	X	X	X
X	X	VBUS	SE	X	X	X	X
DBM5	De-Bounce Bit Mask 5		The signals shown in the table can have additional de-bouncing by setting the corresponding bit. The default indicates that all these signals are de-bounced. Min: 0 Default: 255 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	Input	Input	Input	Input

VERTICAL EXPRESS

Control Adjustments (Continued)

Mnemonic	Adjustment		Definition				
X	X	Electronic DOL	X	F/Rn	CAN/485n	MDC	MDO
IBM0	Invert Bit Mask 0		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Encoder Phase B and Encoder Phase A signals are inverted. Min: 0 Default: 32 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	X	X	X	X
X	Electronic DCL	Encoder Phase B	Encoder Phase A	X	X	X	X
IBM1	Invert Bit Mask 1		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Hall Limit DOL and Hall Limit DCL signals are inverted. Min: 0 Default: 192 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input	Input	X	X	X	X	X	X
Hall Limit DOL	Hall Limit DCL	X	X	X	X	X	X
IBM4	Invert Bit Mask 4		The signals shown in the table can be inverted by setting the corresponding bit. The default value indicates that the SE signal should be high when not obstructed. If the value is set to 0, then SE signal should be low when not obstructed. Min: 0 Default: 0				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	Input	X	X	X	X
X	X	VBUS	SE	X	X	X	X
IBM5	Invert Bit Mask 5		The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that the Electronic DOL, MDC, and MDO signals are inverted. Min: 0 Default: 35 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	Input	X	Input	Input	Input	Input

Control Adjustments (Continued)

Mnemonic	Adjustment		Definition				
X	X	Electronic DOL	X	F/Rn	CAN/485n	MDC	MDO
IIM	Input Invert Mask		This is the input invert mask for the I/O Expansion. The signals shown in the table can be inverted by setting the corresponding bit. The default indicates that all of the input signals are inverted. Min: 0 Default: 95 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Input	Input	Input	Input	Input	Input	Input
X	DCL	DOL	HDI2	HDI1	NDG	CD	OD
OIM	Output Invert Mask		This is the output invert mask for the I/O Expansion. The output signals shown in the table can be inverted by setting the corresponding bit. The default indicates that none of the signals are inverted. Min: 0 Default: 0 Max: 255				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	Output	Output	Output	Output
X	X	X	X	DRL	DL6	DCL	DOL

Diagnostic Adjustments

Notes:

- These values are for diagnostic purposes and cannot be changed using the UIT.
- The test points have a range of 0V minimum to +3V maximum.
- The test point outputs are based on Equation 1 and Equation 2.

  Equation 1= TP1out = ((TP1in * TPM1) / TPD1) * 0.73mV + 1.5V

  Equation 2 = TP2out = ((TP2in * TPM2) / TPD2) * 0.73mV + 1.5V

Diagnostic Adjustments

Adjustment	Minimum	Default	Maximum	Definition
DM0	0	2048	4095	DAC 0 Multiplier - Multiplier for DAC0; 2048 = 1.000. Do not use DM0, use TPM1 instead.
DM1	0	2048	4095	DAC 1 Multiplier - Multiplier for DAC1; 2048 = 1.000. Do not use DM1, use TPM2 instead.
DZ0	-1228	0	1228	DAC 0 Offset - Zero offset for DAC0. Adjust for 1.500V output when input to DAC0 = 0.
DZ1	-1228	0	1228	DAC 1 Offset - Zero offset for DAC1. Adjust for 1.500V output when input to DAC1 = 0.
HEX	–	0	–	Values in Hex - Set to 1 to display numerical values in hexadecimal format. Set to 0 to display numerical values in decimal format.

Diagnostic Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
TPA1	0	2048	32767	Test Point 1 Address - Address for the variable information to be output at Test Point1.
TPA2	0	2048	32767	Test Point 2 Address - Address for the variable information to be output at Test Point 2.
TPD1	0	0	32767	Test Point 1 Divider - Divider for Test Point 1. Used to facilitate viewing signals on Test Point 1. Refer to Equation 1.
TPD2	0	0	32767	Test Point 2 Divider - Divider for Test Point2. Used to facilitate viewing signals on Test Point 2. Refer to Equation 2.
TPL1	–	0	–	Test Point 1 Length - Length of variable for Test Point 1. Set to 0 for short and set to 1 for long.
TPL2	–	0	–	Test Point 2 Length - Length of variable for Test Point 2. Set to 0 for short and set to 1 for long.
TPM1	1	1	32767	Test Point 1 Multiplier - Multiplier for Test Point 1. Used to facilitate viewing signals on Test Point 1. See Equation 1.
TPM2	1	1	32767	Test Point 2 Multiplier - Multiplier for Test Point 2. Used to facilitate viewing signals on Test Point 2. See Equation 2.

Door Adjustments

Adjustment	Minimum	Default	Maximum	Definition
ADP	1	1	DPL Adj	Active Door Profile - Use to manually select the door profile.
ADZ0*	-8192	0	8192	A/D Digital Zero0 - The digital zero value for the analog to digital input number 0. This is on the W phase.
ADZ1*	-8192	0	8192	A/D Digital Zero1 - The digital zero value for the analog to digital input number 1. This is on the U phase.
CLT	0	10	25	Closing Torque (%) - This adjustment sets the closing torque limit. This adjustment is a percent of Maximum Drive Current.
CTL1	0	20	100	Close Torque Limit 1 (%) - An adjustment value that represents the maximum allowable door motor current during the last third of close cycle.
CTL2	0	20	100	Close Torque Limit 2 (%) - An adjustment value that represents the maximum allowable door motor current during the middle third of close cycle.
CTL3	0	40	100	Close Torque Limit 3 (%) - An adjustment value that represents the maximum allowable door motor current during the first third of close cycle.
DIREV	0	100	500	Smooth Turnaround (RPM) - This is the speed of the motor that must be reached before reversing the door motor to re-open the doors after a safety edge has been activated.
IFB*	0	0	1	Invert Feedback - Do Not Change.
IKI*	0	807	6400	Current Loop Integral Gain - Do Not Change.
IKP*	0	1.25	8.0	Current Loop Proportional Gain - Do Not Change.

VERTICAL EXPRESS

Door Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
IVL*	10	95	100	Current Loop Voltage Limit - Do Not Change.
LPTC*	0	.015	.050	Low Pass Time Constant - This value is used as the time constant for the low pass filter. This adjustment is in milliseconds.
MDC*	MNC	6.79	6.8	Maximum Drive Current - The maximum drive current in Amps rms. Do Not Change.
MFC*	0	1.0	MNC	Motor Field Current - Motor field current in Amps rms. Do Not Change.
MNC*	MFC	1.4	MDC	Motor Nameplate Current - Motor nameplate current in Amps rms. Do Not Change.
MTP*	2.0	6.0	8.0	Motor Poles - The number of poles of the AC door motor. Do Not Change.
OTL1	0	50	100	Open Torque Limit 1 (%) - An adjustment value that represents the maximum allowable door motor current during the first third of open cycle. This is a percentage of the maximum drive current.
OTL2	0	45	100	Open Torque Limit 2 (%) - An adjustment value that represents the maximum allowable door motor current during the during the middle third of open cycle.
OTL3	0	20	100	Open Torque Limit 3 (%) - An adjustment value that represents the maximum allowable door motor current during the last third of open cycle.
PPR*	64	500	2048	Encoder Resolution - This is the pulses per revolution of the door operator motor encoder.
RPM*	500	1150	2048	Motor RPM - This is the nameplate door operator motor RPM.
RSF*	.10	3.1	6.0	Rated Slip Frequency - The rated slip frequency of the AC motor in Hertz. Do Not Change.
SIX	0	1.0	15.9	Six Inch Point (rev)- This is the point at which the six inch from close signal will be sent to the controller. This adjustment is in tenths of motor revolutions. Note: To determine the relationship of travel distance to motor RPM, see Door Parameter POS.
STALL	0	50	300	Stall Velocity - This sets the motor RPM that is used to determine when the door motor is stalled and the reduced stall torque adjustment value is applied to the door motor. This adjustment is in RPM.
SWM1	0	0	32.767	Stop Watch Mark 1 (Rev) - Used in conjunction with the Stopwatch feature. SWM1 is Mark 1.
SWM2				Stop Watch Mark 2 (Rev) - Used in conjunction with the Stopwatch feature. SWM2 is Mark 2.
*System Adjustment MAL must equal 1 for the availability of the adjustment.				

Profile Adjustments

Notes:

- # = Profile Number
- Several different door operation profiles are available.
- Each profile has adjustments for both Open and Close; The profile adjustments have the same minimum, default, and maximum values.
- Each value may be adjusted for a different purpose.
- Adjustment values can relate to one another only within the same door operation profile.

Profile Adjustments

Adjustment	Minimum	Default	Maximum	Definition
CACR#	0	1200	3600	Close Acceleration Rate (RPM/sec) - Close acceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from zero speed and the door open limit to top speed.
CDER#	0	900	1919	Close Deceleration Rate (RPM/sec) - Close deceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from top speed to manual close speed.
CDTO#	-2.0	0	2.0	Close Digital Target Offset (Rev) - This adjustment shifts the deceleration portion of the opening cycle away from the door close limit. Increasing this value will cause the doors to begin deceleration further from the close limit.
CHS#	Close manual speed adjust-ment value.	300	Rated RPM of motor in RPM adjustment.	Close High Speed (RPM) - Maximum close speed of the door motor in rpm. This is the speed of the motor that the control system will attain during a close door cycle.
CJDR#	0	3100	8192	Close Jerk Rate (RPM/sec^2) - This is the jerk rate in the close direction when transitioning from top close speed to deceleration. This controls the amount of rounding/ smoothing that occurs during the transition. Units are RPM/sec/sec.
CLTG#	60	120	3000	Close Linear Target Gain - 1/min
CMS#	0	40	Close high speed adjustment value.	Close Manual Speed (RPM) - Manual close speed of door motor in rpm. This is the speed of the motor when the doors are closed with the manual push buttons or during the last portion of a close cycle.
CNDGS#	0	125	Close high speed adjustment	Nudge Close Speed (RPM) - This is the speed of the door motor when nudging operation is activated.
KDCMD#	0	0	327.67	Speed Control Derivative Gain - Do Not Change.
KDFB#	0	0	327.67	Speed Feedback Derivative Gain - Do Not Change.
KICMD#	0	22.2	3276.7	Speed Control Integral Gain - Do Not Change.
KPCMD#	0	0	327.67	Speed Command Proportional Gain - Do Not Change.
KPFB#	0	3.33	327.67	Speed Feedback Proportional Gain - Do Not Change.

Profile Adjustments (Continued)

Adjustment	Minimum	Default	Maximum	Definition
LAG	0	0.150	0.250	Profile Lag Compensation (sec) - Adjusts the compensation in the profile that accounts for the delay between the demand and the motor response. Units are in seconds. Available only in Profile1. Do Not Change.
OACR#	0	1200	3600	Open Acceleration Rate (RPM/sec) - Open acceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from backlash speed to top speed.
OBD	0	1.0	10	Open Backlash Distance (Rev) - Sets the distance that the doors will move at open backlash speed (OBS#) at the beginning of an open cycle. The backlash distance begins just after the doors leave the door close limit and is in motor revolutions. This distance is used to allow the hoistway door to be picked up by the car door interlock rollers, and is effective in the opening cycle only. Note: To determine the relationship of travel distance to mo- tor RPM, see Door Parameter POS.
OBS#	0	60	Open high speed adjustment value.	Open Backlash Speed (RPM) - This is the speed of the door motor in rpm during the open backlash distance (OBD#). This speed is used to keep the door speed low until the car door interlock rollers pick up the hoistway door.
ODER#	0	1200	3839	Open Deceleration Rate (RPM/sec) - Open deceleration rate of door motor in rpm/sec. This is the rate the motor speed changes when transitioning from top speed to manual open speed.
ODTO#	-2.0	0	2.0	Open Digital Target Offset (Rev)- This adjustment shifts the deceleration portion of the opening cycle away from the door open limit. Increasing this value will cause the doors to begin deceleration further from the open limit.
OHS#	Open manual speed adjustment value.	400	Rated RPM of motor in RPM adjustment.	Open High Speed (RPM) - Maximum open speed of the door motor in rpm. This is the speed of the motor that the control system will attain during an open door cycle.
OLTG#	60	150	3000	Open Linear Target Gain (Rev) - 1/min.
OMS#	0	40	Open high speed adjustment value.	Open Manual Speed (RPM) - Manual open speed of door motor in rpm. This is the speed of the motor when the doors are opened with the manual push buttons or during the last portion of an open cycle.
RSC	0	0	2000	Re-open Slip Compensation - This is the slip compensation factor used during a re-open. Available only in Profile 1. Do Not Change.

System Adjustments

These adjustments will not take effect until the new value is saved to FLASH and the door operator card is reset.

System Adjustments

Adjustment	Minimum	Default	Maximum	Definition
DCI	–	0	–	Discrete Controller Interface - • Set to 1 for relay controller or discrete signal interface (modernization jobs). • Set to 0 for serial controller interface; DCL and DOL can be selected to input through hall effect or through the I/O Expansion card. See Electronic Limit Interface (System Adjustment ELI).
DCM	–	1	–	DC Motor Control Selection - Set to 1 to select DC motor control, 0 to select AC motor control.
DOI	–	0	–	Discrete Operator Interface - Set to 1 to allow door operator card to accept signals from the expansion interface card. Set to 0, and the door operator card does not accept signals from the expansion interface card.
DPL	1	5	5	Door Profile Limit - Number of active profiles.
DRM	1	4	50	Multiple for Slow Clock - Do Not Change.
ELI	–	0	–	Electronic Limit Interface - • Set to 1 for DCL and DOL signal inputs from header hall effect sensors. • Set to 1 to use UDC card with Linear Door Operator. • If set to 0 and discrete controller interface (System Adjustment DCI) is set to 1, then DCL and DOL are input through the hall effect sensors on the UDC card (harmonic operator). • If set to 1 and DCI is set to 1, then DCL and DOL are input through the I/O Expansion Card.
FSP	250	1000	2500	Sample Frequency - Do Not Change.
LDO	–	0	–	Linear Door Operator - Set to 1 to select the linear door operator application, 0 for harmonic application. Must Cycle Power.
LHO	–	1	–	Left Hand Operation - Set to 1 for left hand operation, 0 for right hand operation. Must Cycle Power.
MAL	–	0	–	Menu Access Level - Set to 1 for full menu access, 0 for restricted or limited menu access.
UPM	1	2	50	Multiple for Medium Clock - Do Not Change.

Parameters

CAN Parameters

These values are viewable only to aid in factory-level diagnostics. Not for field use.

Mnemonic	Command	Definition
CEC	Transmit and Receive Error Counters	Displays the value of the transmit and receive error counters.
ESR	Error Status Register	Displays the value of the error status register.
GSR	Global Status Register	Displays the value of the global status register.
MDER	Mailbox Direction/ Enable Register	Displays the value of the mailbox direction/enable register.
RCR	Receive Control Register	Displays short test point 1 input variable.
TCR	Transmission Control Register	Displays the value of the transmission control register.

Control Parameters

These values are viewable only to aid in diagnostic purposes.
MCS = Motion Control State Number - Indicates the current motion control state shown below.

Motion Control State Number	Description
4	Direction Reversal
8	Stop Door
9	Hold Closed
10	Nudge Close
11	Manual Open
12	Manual Close
13	Open Door
14	Close Door

Control Parameters

(continued)

For the availability of the following parameters, System Adjustment MAL must equal 1.

Mnemonic	Command		Definition				
PIN0	Input Parameter 0		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	Electronic	Encoder	Encoder	X	X	X	X
PIN1	Input Parameter 1		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Hall Limit	Hall Limit	X	X	X	X	X	X
PIN4	Input Parameter 4		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LCD Back	X	VBUS	SE	X	X	X	X
PIN5	Input Parameter 5		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	FTP	Electronic	VF/PWMn	F/Rn	CAN/485n	MDC	MDO
POUT0	Output Parameter 0		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	X	X	X	X
POUT1	Output Parameter 1		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	X	X	X	X
POUT4	Output Parameter 4		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
LCD Back	X	X	X	X	X	X	X
POUT5	Output Parameter 5		Use to view the status of the parameters shown in the table.				
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	FTP	X	VF/PWMn	X	X	X	X

Diagnostic Parameters

These values are viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
TPL1	Test Point 1 Long In	Displays long test point 1 input variable.
TPL2	Test Point 2 Long In	Displays long test point 2 input variable.
TPO1	Test Point 1 Out	Displays test point 1 voltage out (above and below 1.5V nominal).
TPO2	Test Point 2 Out	Displays test point 2 voltage out (above and below 1.5V nominal).
TPS1	Test Point 1 Short In	Displays short test point 1 input variable.
TPS2	Test Point 2 Short In	Displays short test point 2 input variable.

Door Parameters

These values are viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
ADC0	Analog to Digital Converter 0	Displays the value of analog to digital converter number 0, which is the lwfbk signal (W phase current feedback).
ADC1	Analog to Digital Converter 1	Displays the value of analog to digital converter number 1, which is the lufbk signal (U phase current feedback).
CSC	Close Slip Compensation	This value is automatically set. It indicates the amount of belt slip during a close door cycle. This value is in motor revolutions. Do Not Change.
DPID	Profile ID	Displays current profile.
DTGC	Distance To Go Close	Calculated value based on travel and close slip compensation.
DTGO	Distance To Go Open	Calculated value based on travel and open slip compensation.
OSC	Open Slip Compensation	This value is automatically set. It indicates the amount of belt slip during an open door cycle. This value is in motor revolutions. Do Not Change.
POS	Door Position	This parameter displays the position of the door in motor revolutions from the door close limit (DCL). To use this feature, move the doors to the desired position and read the number displayed. Used for setting OBD and SIX. Minimum = 0 Default = 0 Maximum = TRV
TRV	Door Travel	This is the travel value learned when a door scan is performed. The value is in motor revolutions
UCV	UPID Command Velocity	Displays the dictated or commanded velocity.
UMV	UPID Motor Velocity	Displays the dictated or commanded motor velocity.
UPE	UPID Position Error	Displays the difference between calculated position and actual position.
UTQ	UPID Torque	Displays the dictated or commanded torque.
UVE	UPID Velocity Error	Displays the difference between dictated or commanded velocity and actual velocity.

System Parameters

This value is viewable only to aid in diagnostic purposes.

Mnemonic	Command	Definition
VER	Software Version/Revision	Displays the version/revision of door operator software.

Fault Codes

Notes:

- IMS 2.2 or greater is required to adjust the LD-03 Door Operator.
- IMS 2.2.0.3 or greater is required to upload door profiles.
- A UDC Door FAST IMS application is available. This application allows communication with the door operator at the door operator car top box using the orange cable and the 485 communication link.
- 2000 Series Fault Code = Front Door Operator
3000 Series Fault Code = Rear Door Operator

Fault Codes

<table>
<tr><th>Fault Code</th><th>Description / Causes / Solutions</th></tr>
<tr><td>2036 / 3036</td><td>IGBT FAULT - A defective IGBT.
Possible Causes
• This can be caused by an over current condition.
Possible Solutions
• Try to restart the power module. See Restart IGBT Power Module.
• If the fault can not be cleared, verify that the doors are free of binds. If the doors bind, correct the cause of the bind and restart the power module. See Restart IGBT Power Module.
• Check for wiring shorts.
• If the fault remains, replace the door card or motor, or check for shorts.</td></tr>
<tr><td>2050 / 3050</td><td>ENCODER FAULT - An invalid encoder count.
Possible Causes
• This can be caused by an over current condition.
Possible Solutions
1. Verify that the encoder wiring is correct (e.g. phase A and phase B are not swapped).
2. Verify that encoder is working properly. See Checking Encoder.
3. Make sure the magnetic limits are fastened securely on the cam shaft.
CAUTION Do not overtighten, the cams are plastic and can be damaged rather easily.
4. Verify that all of the belts are in good shape and replace (if necessary).
5. Check the belt tension.
Note: Tighten the belt (if necessary). Do not overtighten the drive belt because it can cause premature motor bearing failure.
6. Verify that DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan.
7. If the fault remains, replace the door card.</td></tr>
</table>

Fault Codes (Continued)

Fault Code	Description / Causes / Solutions
2051 / 3051	XS BELT SLIP FLT - Excessive Belt Slip. Possible Solutions 1. Make sure the magnetic limits are fastened securely on the cam shaft. CAUTION Do not overtighten, the cams are plastic and can be damaged rather easily. 2. Verify that all of the belts are in good shape and replace (if necessary). 3. Check the belt tension. Note: Tighten the belt (if necessary). Do not overtighten the drive belt because it can cause premature motor bearing failure. 4. Verify that DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan. 5. If the fault remains, replace the door card.
2053 / 3053	MOTOR WIRE WRONG - The door timed out, more than 14 seconds, while trying to power off a limit during scan. Possible Solutions 1. Verify that the motor is wired properly. 2. Verify that Left Hand Operation (LHO) is set correctly. 3. Perform a new door scan. 4. If the fault remains, replace the door card.
2054 / 3054	REV ENCODER FLT Possible Solutions 1. Verify that the encoder wiring is correct (e.g., phase A and phase B are not swapped). 2. Verify that the encoder is working properly. 3. Perform a new door scan. 4. If the fault remains, replace the door car.
2055 / 3055	TRAVEL FAULT - An invalid door travel value. Possible Solutions 1. Verify that the motor is wired properly. 2. Verify that the system adjustments are set correctly. 3. Perform a new door scan. 4. Verify that the encoder wiring is correct (e.g. phase A and phase B are not swapped). 5. Verify that encoder is working properly. 6. Verify that the DCL and DOL limits activate at the proper time. If necessary, readjust the limits and perform a new door scan. 7. If the fault remains, replace the door card.
2056 / 3056	OPEN OS FAULT - Door overspeed in open direction with Open Command. Possible Solutions • Verify that the RPM adjustment is set correctly.
2057 / 3057	CLOSE OS FAULT - Door overspeed in close direction with Close Command. Possible Solutions • Verify that the RPM adjustment is set correctly.
2058 / 3058	CL RUNAWAY FAULT - Door over speed in close direction with no Close Command.

Fault Codes (Continued)

Fault Code	Description / Causes / Solutions
2059 / 3059	BUS POWER FAULT - Loss of BUS supply. Possible Solutions • Check fuse F2 on the door card and replace (if necessary). • Verify the wires for power (wires going to CON11) are securely fastened and in the correct place. • If the fault remains, replace the door card.
2060 / 3060	OP RUNAWAY FAULT - Doors overspeed in open direction with no Open Command.
2061 / 3061	OP OV DRIVE FAULT - Doors overdriven in open direction with Open Command.
2062 / 3062	CL OV DRIVE FAULT - Doors overdriven in close direction with Close Command.
2063 / 3063	IFBK FAULT - Failure to regulate the DC current (only) on DCL. Possible Causes • An open motor armature circuit. • A defective board, replace the board.
2064 / 3064	I SERIAL COM FAULT - Failure to receive data from the controller within 5 seconds. Possible Solutions • Check for a defective door board. • Check for a defective controller board. • Check the wiring.
2065 / 3065	I SCALE FAULT - Current adjustments are out of range. Possible Solutions 1. Correct the Maximum Drive Current (MDC) and/or the Motor Nameplate Current (MNC). 2. After making corrections, save and reset the board.
2066 / 3066	DOL DCL FAULT - Both DOL and DCL are on at the same time. Possible Solutions 1. Adjust the cam and/or magnet. 2. Replace the switch. 3. Replace the board.
2067 / 3067	DOL FAILURE - The Door Open Limit (DOL) sensor failed to operate after 60 seconds. Possible Solutions • Adjust the cam and/or magnet. • Perform a door scan. • Replace the reed switch. • Replace the board.
2068 / 3068	DCL FAILURE - The Door Close Limit (DCL) sensor failed to operate after 60 seconds. Possible Solutions • Adjust the cam and/or magnet. • Perform a door scan. • Replace the reed switch. • Replace the board.
2069 / 3069	MAX TORQUE FAULT - One or more torque limit adjustments are greater than maximum allowed torque. Possible Solutions 1. Adjust the Open Torque Limit (OTL#) and/or the Close Torque Limit (CTL#). 2. Correct the Maximum Drive Current (MDC) and/or the Motor Nameplate Current (MNC). 3. After making corrections, save and reset the board.

Technical Information

Record Flight Time

This procedure requires two people - one in the car, and one on top of the car.

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Change the value of door adjustment SWM1 to 0 (zero).
4. Record the value of door parameter TRV.
5. Use MDC or MDO to move the doors to 3/4 FULLY OPEN position.
6. Record the value of door parameter POS.
7. Subtract the POS value from the TRV value, and enter this value in door adjustment SWM2.
8. Place the car on Automatic Operation. The doors will close.
9. Select the stopwatch flight (SWF) command from the command pull-down menu.
10. Press and hold Door Open (located in the car) to open the doors.
11. Enter a car call for the next landing - Up or Down.
12. Release Door Open. The doors will close, and the car will run to the selected car call. When the car makes its run and the doors open, the flight time is displayed.

Note: SWM1 and SWM2 values are retained, without saving, until the door operator power is cycled or the door card is reset.

Upload FLASH Program Software
Upload Generic Software

If the "CHECKSUM FAILURE" Fault has been displayed, the generic software has been corrupted and must be reloaded. In addition, the door operator profile must be reloaded.

CAUTION **Before uploading a new door profile, Turn OFF, Lock, and Tag out the mainline disconnect. Disconnect the motor leads. If the door profile is loaded with the motor connected, damage to the board or motor may result.**

1. Upload the latest generic software. Contact Field Engineering to obtain the latest software.

Note: If the door card has been replaced, the latest generic software is already uploaded.

2. Upload the appropriate door operator profile (available in IMS).
3. Turn OFF, Lock, and Tag out the mainline disconnect.
4. Remove CON10 from the UDC card to disconnect the door motor leads.
5. Install a UIT (User Interface Tool) on CON2.
6. Use a serial cable with a 4-pin connector adapter to connect a laptop with the HyperTerminal software to the UDC card at CON6.

Upload Generic Software
(continued)

7. Click Start, and select Programs > Accessories > HyperTerminal. The Connection Description window opens.

8. Type in a name, such as "FLASH COMM", select an Icon, and then click OK. The Connect To window opens.

9. Select the arrow beside Connect Using:, then select COM1 (or the port that will be used) from the list and click OK. The COM1 Properties window opens.

10. Type in the following properties:
    - Bits per second: 38400
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow Control: Hardware

11. Click OK. This session will be activated.

12. Select File -> Save.

13. Select File -> Properties. The Properties dialog box opens.

14. Select Settings. Verify the following:
    - The function, arrow, and ctrl keys act as terminal keys
    - The backspace key sends: Ctrl+H
    - Emulation: Auto detect
    - Telnet terminal ID: ANSI
    - Back scroll buffer lines: 500

15. Click ASCII Setup, and verify the following:
    - Line delay: 0 milliseconds
    - Character delay: 0 milliseconds
    - Wrap lines that exceed terminal width is the only item checked

16. Click OK on both dialog boxes.

17. Select the Transfer pull-down menu, then select Send File.

18. Use the Browse Command to find the correct file, click the filename, and then click Open.

19. Install jumper JP3.

20. Turn ON the mainline disconnect.

Note: The HyperTerminal displays the status message "ZMODEM READY." If this message is not shown, replace the door card.

Upload Generic Software
(continued)

21. To start the software upload, click Send in the HyperTerminal screen.

22. When the upload is complete, the UIT displays,

    ThyssenKrupp
    Universal Door

21. Remove jumper JP3, press Reset, and the UIT displays,

    ThyssenKrupp
    Universal Door

22. Turn OFF, Lock, and Tag out the mainline disconnect.

23. Remove the cable from CON6.

24. Reconnect CON10.

Upload the Door Operator Profile

Obtain the Correct Door Operator Profile from TKE Manufacturing

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Remove CON10 from the UDC card to disconnect door motor leads.

3. Use a serial cable with a 4-pin connector adapter to connect a laptop with the HyperTerminal software to the UDC card at CON6.

4. Turn ON the mainline disconnect, and the HyperTerminal window displays,

   ZMODEM READY
   Version 1.04

   a. If this message is not shown, check the following,

      - The JP3 jumper is installed properly.
      - The cables are installed properly.
      - The HyperTerminal settings are correct.

   b. If these check out, replace the door card.

Note: If more than one minute goes by after turning ON the mainline disconnect before the transfer starts, the door card and the HyperTerminal will time out and the HyperTerminal window displays,

ZMODEM FAILED
No Files Recvd

   c. If this occurs, press the reset button on the door card, and the HyperTerminal displays,

      ZMODEM READY
      Version 1.04

Upload the Door Operator Profile
(continued)

d. If this message is not shown, check the following,
   - The JP3 jumper is installed properly.
   - The cables are installed properly.
   - The HyperTerminal settings are correct.

e. If these check out, replace the door card.

CAUTION **Improper DCM setting can cause damage to the door card and/or motor.**

5. Verify the proper DCM setting: Scroll to MAIN->SYSTEM->ADJ->DCM (1 = DC Motor and 0 = AC Motor).
6. Turn OFF, Lock, and TAG out the mainline disconnect.
7. Remove the cable from CON6.
8. Re-connect CON10.
9. Turn ON the mainline disconnect.
10. Verify proper door operation.

Determine the Software Version/Revision

1. Begin with the doors FULLY CLOSED.
2. Scroll to MAIN->SYSTEM->MON->SW_v_r and press ENTER.

Note: The UIT will display the software version and revision. The first two digits are the version, and the second two digits are the revision.

2. Press ESC until the main menu displays.

Cycle Mode

The Cycle Command (CYC), when activated, will cause the doors to continuously cycle. The delay at the DOL and the DCL is controlled by the Cycle Delay Time (CDT) Adjustment.

Activate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays,

   ENT to ENABLE
   CYCLE Mode

2. Press ENTER, and the UIT displays,

   Control/Cmd
   Cycle Mode

Note: The doors will start cycling.

Deactivate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays,

   ENT to ENABLE
   CYCLE Mode

2. Press ENTER, and the UIT displays,

   Control/Cmd
   Cycle Mode

Note: The doors will stop cycling.

Restart the IGBT Power Module

The power module may be reset if an overcurrent circuit condition has caused the power module to send a shutdown signal to the DSP. The power module can only be reset after the fault condition has been cleared.

1. Scroll to MAIN->DOOR->CMD->IGBT ERR Rst, press ENTER, and the UIT displays,

   ENT to Proceed
   ESC to Exit

2. To reset the power module, press ENTER, and the UIT displays,

   PWM Reenabled

Note: The power module has now been reset.

3. Press ESC until the main menu displays.

Shut Down the IGBT Power Module

This command prevents any motor operation including the Manual Door Open (MDO) and Manual Door Close (MDO) functions.

1. Scroll to MAIN->DOOR->CMD->Shutdown, and press ENTER.

Note: The UIT display will not change, and the power module has now been shutdown.

2. Press ESC until the main menu displays.

Restore Factory Defaults

Each LD-03 Door Operator is shipped with certain parameters and adjustments modified to match the job condition. The defaults, however, remain the same for all units.

CAUTION **The supplied configuration of the door operator uses adjustment and parameter values that are different from the default values shown in the Diagnostics Section. Using the Factory Defaults Command (FDF) could result in a maladjusted or non-functioning door operator.**

1. Begin with the doors FULLY CLOSED.

2. Scroll to MAIN->SYSTEM->CMD->FACTORY DEFAULTS, press ENTER, and the UIT displays,

   ENT to Restore
   ESC to Exit

3. Press ENTER, and the UIT displays,

   Values Restored

Note: All adjustments, parameters and commands are now set to the factory defaults.

4. Press ESC until the main menu displays.

Troubleshooting

Power Up Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Unplug the connectors from the door card.

3. Turn ON the mainline disconnect.

4. Measure AC voltage on the door operator terminal strip across AC1S and AC2. The voltages should match the voltages in Table 3 (below). If the voltage measured is zero (0), verify the following:
   - The power switch in the door control box is ON.
   - The AC1S switch is ON in the swing return.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in elevator controller are good.

5. Measure the AC voltage across AC1S and ACG.
   a. If the voltage is in range of 0 and 80 VAC, measure AC2 to ACG.
   b. If AC2 to ACG is in range of 103 and 126 VAC, AC1S and AC2 have been reversed; Reverse AC1S and AC2.

6. With the system still powered up, measure the DC voltages on the door operator terminal strip across P24 and G24. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
   - The P24 switch in the swing return is ON.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in the elevator controller are good.

Voltage	Meter Set-ting	Positive Meter Probe	Negative Meter Probe	Voltage Measured
AC1S	Volts AC	AC1S terminal 6	AC2 terminal 5	120 VAC
AC1S	Volts AC	AC1S terminal 6	ACG terminal 4	120 VAC
AC2	Volts AC	AC2 terminal 5	ACG terminal 4	0 VAC
P24	Volts DC	P24 terminal 17	G24 terminal 20	24 VDC

Table 4 - Voltage Settings

LED Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect. Reconnect the connectors on the door card (located inside the door operator).
2. Make sure the doors are in the FULLY CLOSED position.
3. Turn ON the mainline disconnect.
4. Verify that the VBUS and WD LEDs are ON. See Figure 4 on page 77.

Note: If the VBUS or the WD LED does not come ON, see Troubleshooting Guide on page 40.

5. Verify that the doors are still in the FULLY CLOSED position, and that the DCL LED is ON.
6. Turn OFF the toggle switch (located in the door operator).
7. Manually move the doors to the FULLY OPEN position.
8. Turn ON the toggle switch.
9. With the doors in the FULLY OPEN position, verify that the DOL LED is ON.

Power Supplies Check

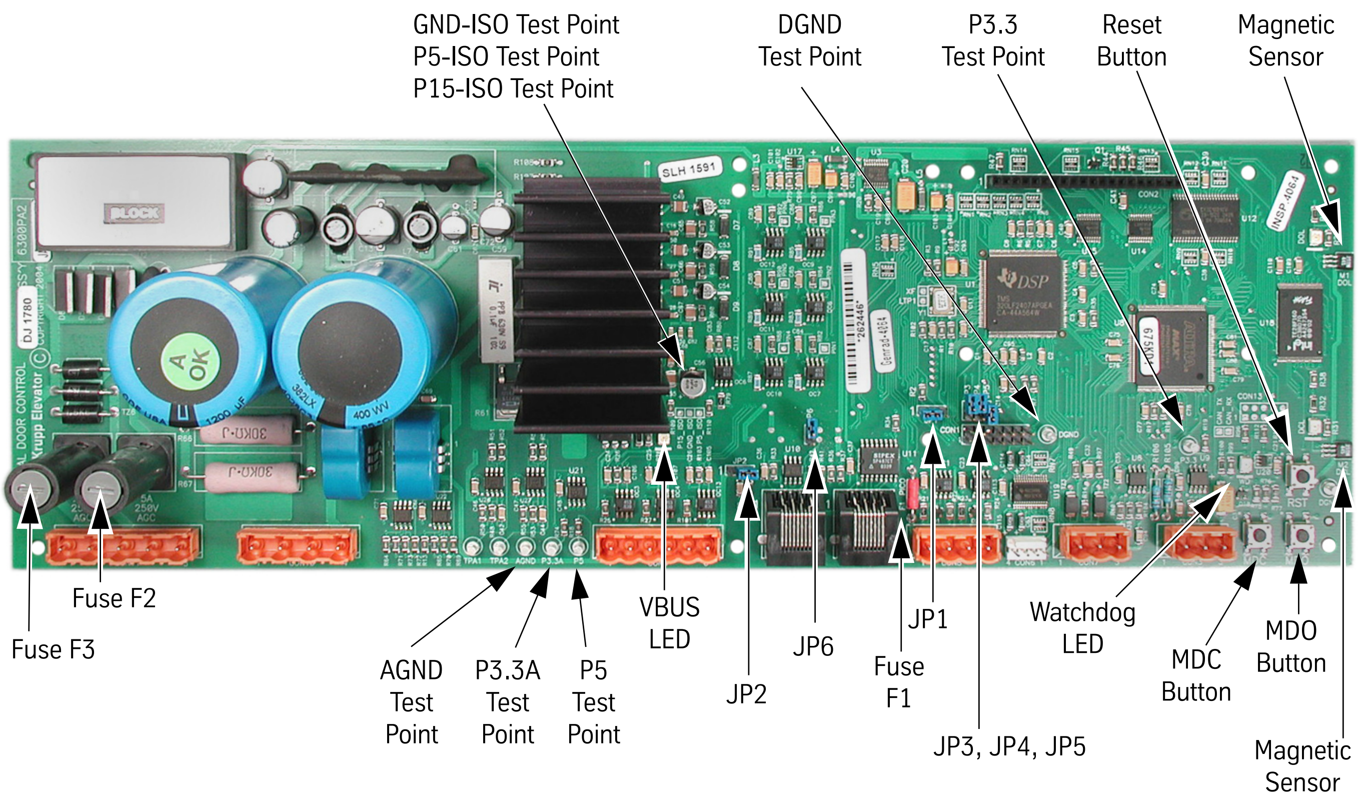
1. Turn the UDC card ON and measure the voltages (from the table, Figure 4 on page 77) at the specified points on the door card. The voltage for each measurement should be in the range noted.

WARNING **When checking door card power supplies, take great care to avoid electrical shock and/or damage to the door card.**

The power supply for the door motor is named V-Buss. The voltage for this power rail is generated from the incoming 115 VAC, and the 115 VAC is rectified and filtered to produce the DC power supply. A VBUS LED is on the card.

2. The VBUS LED will indicate whether this power supply is good,
   - If the VBUS LED is not ON, see Troubleshooting Guide on page 40.
   - If 115 VAC is available at CON11, pins 1 and 2, and the VBUS LED is not ON, replace the door operator card.

LED Verification and Power Supplies Check
(continued)



Power Supply	Measurement Locations	Acceptable Voltage Range (VDC)
P5	P5 Test Point to DGND Test Point	4.875 to 5.125
P3.3	P3.3 Test Point to DGND Test Point	3.2 to 3.37
P3.3A	P3.3A Test Point to AGND Test Point	3.2 to 3.4
P5_ISO	P5_ISO Test Point to GND_ISO Test Point	4.5 to 5.5
P15_ISO	P15_ISO Test Point to GND_ISO Test Point	14.625 to 15.375

Figure 4 - Door Card Power Supply Check

Checking the Encoder

Perform this check to ensure that the encoder signals are working properly.

1. Before conducting this test, verify that fuse F1 on the door card is good.
2. Use a digital multimeter, and measure the voltage across fuse F1,
   - If the voltage reads higher than 1.5 volts, replace the fuse.
   - If the voltage reads below 1.5 volts, the fuse is good.

The best way to check the encoder signals is with an oscilloscope. If an oscilloscope is not available, use the digital multimeter method.

Oscilloscope Method

Required tool: An oscilloscope with two working channels.

1. Set the vertical channel to 5V/div.
2. Set the horizontal channel to 1uS/div.
3. Connect the ground leads for both channels to the GND test point.
4. Connect the channel A probe to CON8-2 (PHA).
5. Connect the channel B probe to CON8-3 (PHB).
6. Slowly rotate, by hand, the door motor.

Note: PHA and PHB should be 90 degrees out-of-phase, and toggle between 0 to 1 and 4.5 to 5 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Digital Multimeter Method

Required tool: A digital multimeter set to measure DC volts.

1. Connect the negative lead to the GND test point, and the positive lead to CON8-2 (PHA).
2. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

3. Connect the negative lead to the GND test point, and the positive lead to CON8-3 (PHB).
4. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Troubleshooting Guide

For assistance, please call 1-866-HELP-TKE.

Problem	Possible Causes or Solutions
Doors Run the Opposite Direction When First Powered Up	1. Change the hand of the operator by changing the LHO adjustment. 2. To verify that the change corrected the problem, press MDO to verify that the doors move in the open direction. 3. Press MDC to verify that the doors move in the close direction. 4. Save this adjustment change to FLASH.
Doors Will Not Reverse on Safety Edge Activation	1. Verify that the wires for safety edge signal are securely fastened and in the correct connector. The safety edge signal wire goes to CON9-5 on the UDC. 2. Verify that the SE signal return wire (G24) is connected to CON9-6. 3. Verify that the signal is getting to the UDC card. a. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. b. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. The safety edge input is active low. • If the voltage at CON9 is greater than 2 volts, then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the doorway. • Setting IBM4 to 0 will invert the active state for the SE Input.
Doors Will Not Set Up	1. Verify that the motor moves the door in the correct direction when MDC or MDO are pushed. 2. Verify that the encoder is connected properly. 3. Verify 5 VDC to the encoder connector. 4. Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1, and the black probe on CON8-4. • If the voltage reads less than 4.5 volts, check the fuse. • If the voltage reads above 4.5 volts, check the encoder signals. 5. Verify that the encoder power fuse F1 on the door card is good. 6. Verify that the encoder works.
Doors Will Not Close to FULLY CLOSED Position	1. Verify that the DCL limit is adjusted properly, and that the DCL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the close cycle. 3. Verify that the drive arms are setup and aligned properly.

<table>
<tr><th>Problem (Continued)</th><th>Possible Causes or Solutions</th></tr>
<tr><td>Door Motor Vibrates When Trying to Move the Door</td><td>1. Verify that the proper motor type is selected in the DCM adjustment.
2. Verify that the motor leads are connected per the Motor Connections Chart below.
Note: The motor and encoder connections must match what is shown in the charts below. If any of these connections are not correct, unstable operation will result.
CAUTION
Do not change motor or encoder connections to change door direction. To change door direction, use the LHO Adjustment.
3. Verify that the encoder is connected per the Encoder Connections Chart below.
4. Verify 5 VDC to encoder connector.
• Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1 and the black probe on CON8-4.
• If the voltage reads less than 4.5 volts, check the fuse.
• If the voltage reads above 4.5 volts, check the encoder signals.
5. Verify that the encoder power fuse F1 on the door card is good.
6. Verify that the encoder works.

otor Connections
<table>
<tr><th>Connector-Pin</th><th>VFD Cable Wire No.</th><th>AC Motor Leads</th><th>DC Motor Leads</th></tr>
<tr><td>CON10-2</td><td>1</td><td>1</td><td>no connect</td></tr>
<tr><td>CON10-4</td><td>2</td><td>2</td><td>Black</td></tr>
<tr><td>CON10-3</td><td>3</td><td>3</td><td>Red</td></tr>
<tr><td>GND Screw</td><td>Green</td><td>Green</td><td>no connect</td></tr>
</table>
ncoder Connections
<table>
<tr><th>Connector-Pin</th><th>Wire Color</th><th>Signal</th></tr>
<tr><td>CON8-1</td><td>Red</td><td>P5</td></tr>
<tr><td>CON8-2</td><td>White</td><td>PHA</td></tr>
<tr><td>CON8-3</td><td>Green</td><td>PHB</td></tr>
<tr><td>CON8-4</td><td>Black</td><td>GND</td></tr>
</table>
</td></tr>
<tr><td>Doors Will Not Open to FULLY OPEN Position</td><td>1. Verify that the DOL limit is adjusted properly, and that the DOL LED comes ON when the magnet is aligned with the hall-effect sensor.
2. Verify that the mechanical stop is set properly and is not interfering with the open cycle.
3. Verify that the drive arms are setup and aligned properly.</td></tr>
</table>

Problem (Continued)	Possible Causes or Solutions
VBUS LED Will Not Light	1. Verify that the power switch in the operator is in the ON position. 2. Check for 115VAC across pins 1 and 2 of CON11. 3. Check fuse F2 on the door card; Replace if necessary. 4. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
WD LED Will Not Light	1. Verify that power switch in operator that is located on the PC card shelf is in the ON position. 2. Check fuse F3 on the door card; Replace if necessary. 3. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
DCL or DOL LED Will Not Light	Note: The DCL or DOL LEDs will not light unless the magnet cam is aligned with the hall- effect sensor on the end of the card. 1. Verify proper alignment of the magnetic limit cam with the hall-effect sensor. If not aligned properly, adjust the magnetic limit cam on the door operator cam shaft. 2. Verify that the DCI, ELI, and LDO adjustments are all set to 0 (zero). 3. Verify that the power switch in the operator is in the ON position. 4. Check fuse F3 on the door card; Replace if necessary. 5. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
MDO Starts to Open Doors, But Doors Reclose	Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller.
MDC Starts to Close Doors, But Doors Reopen	Verify that the car is on Inspection Operation. The MDC is overridden by a open door command from the elevator controller, or by an active SE signal.
Doors Will Not Close After Opening, or Doors Open Without Command and Will Not Close	1. Verify that the SE signal is not active; The SE signal is active low. 2. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. 3. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. Note: If the voltage at the CON9 is greater than 2 volts then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the door way.

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Move When MDO or MDC Is Pushed	1. Verify that there are no mechanical restrictions or binds. 2. Verify that the IGBT has not been shut down due to a fault. Check faults and follow the instructions for the particular faults that are listed. If the fault listed is the IGBT_FAULT, reset the IGBT power module. 3. If MDO does not work: a. Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller. b. Verify that the DOL limit is not active. If it is active, the doors will not open. If on the DOL limit, move the doors off of the open limit and verify that MDO does cause the doors to open. 4. Verify that the car is on Inspection Operation. The MDC is overridden by an open door command from the elevator controller, or by an active SE signal. 5. If MDC does not work: a. Verify that the DCL limit is not active. If it is active, the doors will not close. If on the DCL limit, move the doors off of the close limit and verify that MDC does cause the doors to open. 6. Verify that VBUS LED is ON. 7. Verify that WD LED is ON. 8. Power down the card, remove the connector to the motor, and power up the card. 9. Connect a voltmeter to the motor output pins; be very careful not to short the pins together. 10. Press MDO or MDC, and verify that there is voltage on the motor output pins. a. If voltage is present, check the motor wiring. If wiring is good, the motor may be bad. b. If no voltage is present, verify that the correct door operator profile is loaded for the type of door and motor being used. If the correct door operator profile is loaded and the IGBT is not faulted out, the card may be damaged.

Maintenance

Change the Door Operator Belt (Single Speed)

1. Turn the 3/8” adjustment screw (located between the idler base and the push bar) clockwise into the idler base to loosen it. See Figure 5 for all steps in this procedure.
2. Loosen the idler base by loosening the two 3/8” bolts on either end of the idler base.
3. Push the idler base toward the push bar.
4. Remove the two #10 hex socket cap screws in the top belt clamp, and remove the top belt clamp.
5. Remove the door operator belt.
6. Measure and cut the new belt to the proper length (if required).

Opening Width	Belt
36 inches	98 inches
42 inches	110

7. Use the top belt clamp as a template and match drill two 3/16” holes, one in each end of the belt.
8. Place the belt into position and use the two #10 hex socket cap screws to reinstall the top belt clamp.
9. Turn the adjustment screw counterclockwise from the idler base to tighten the belt for acceptable belt tension.
10. Tighten the two 3/8" bolts on either end of the idler base.

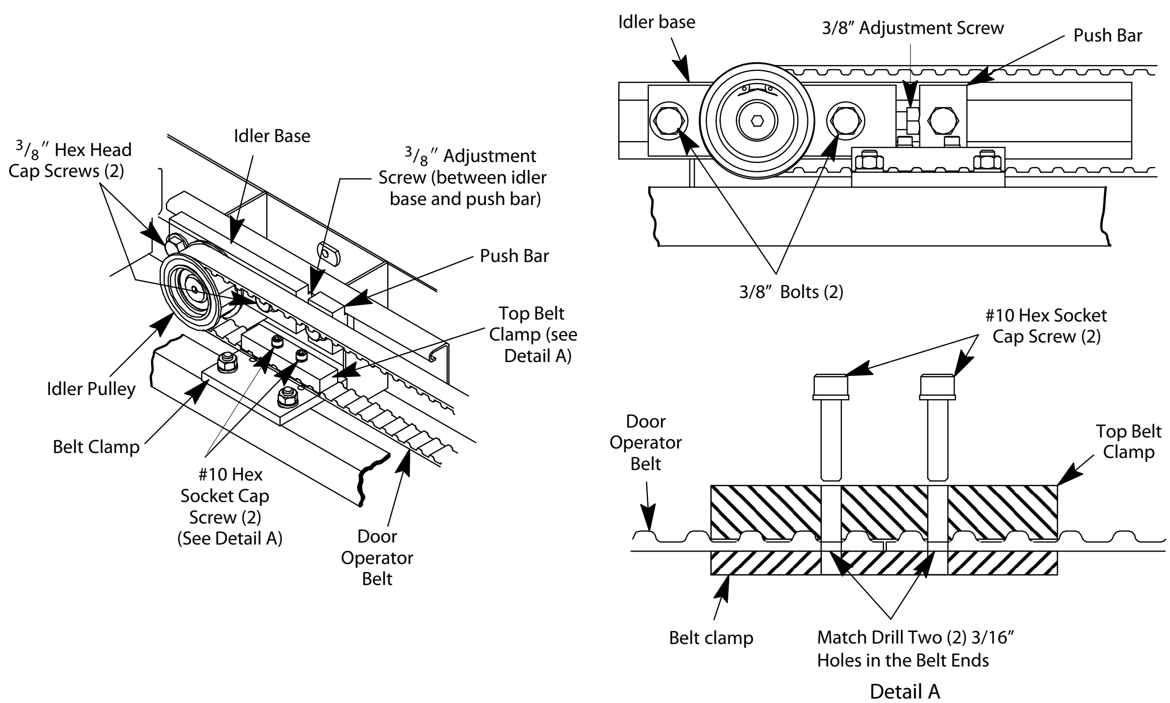


Figure 5 - Change Single Speed Door Operator Belt

Change the Door Operator Belt (Center Opening)

1. Turn the 3/8” adjustment screw (located between the idler base and the push bar) clockwise into the idler base to loosen it. See Figure 6 for all steps in this procedure.
2. Loosen the idler base by loosening the two 3/8” bolts on either end of the idler base.
3. Push the idler base toward the push bar.
4. Remove the two #10 hex socket cap screws in the top belt clamp, and remove the top belt clamp.
5. Remove the door operator belt.
6. Measure and cut the new belt to the proper length (if required).

Opening Width	Belt
42 inches	151

7. Use top belt clamp as a template and match drill two 3/16” holes, one in each end of belt.
8. Place belt into position, and use two #10 hex socket cap screws to reinstall top belt clamp.
9. Use four #10 hex socket cap screws to reinstall the center opening belt clamp on the belt brace clamp.
10. Turn the adjustment screw counterclockwise from the idler base to tighten the belt for acceptable belt tension.
11. Tighten the two 3/8" bolts on either end of the idler base.

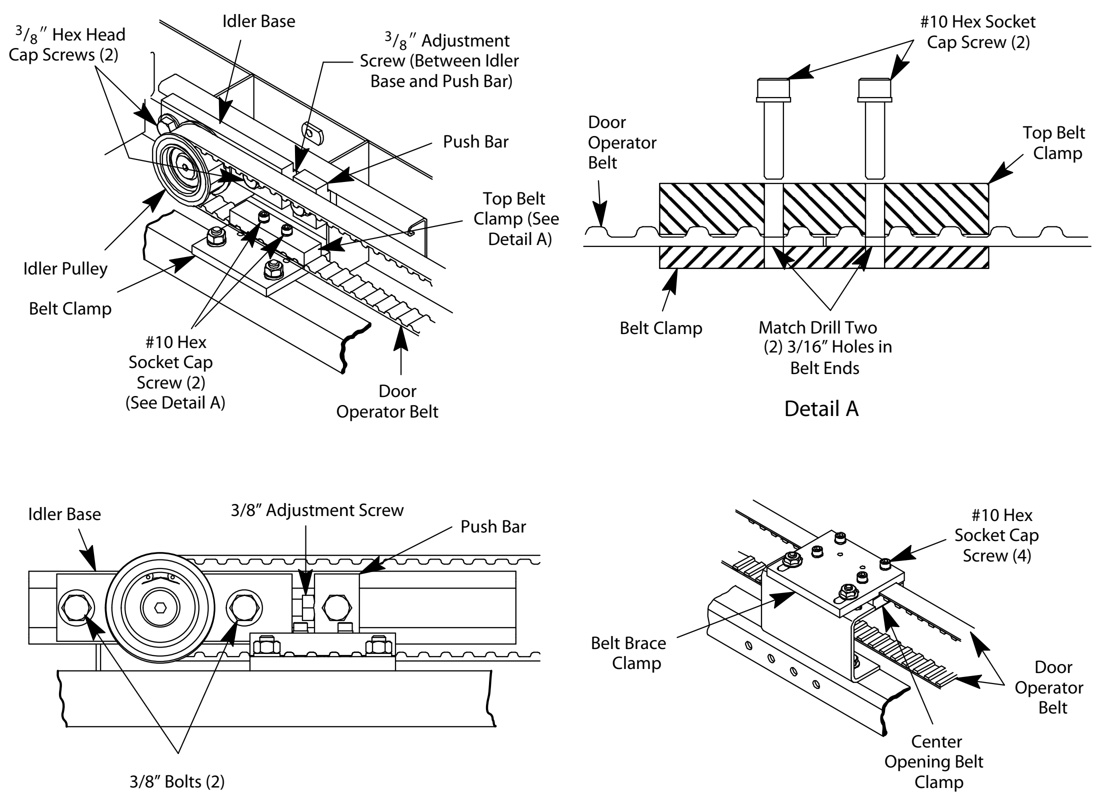
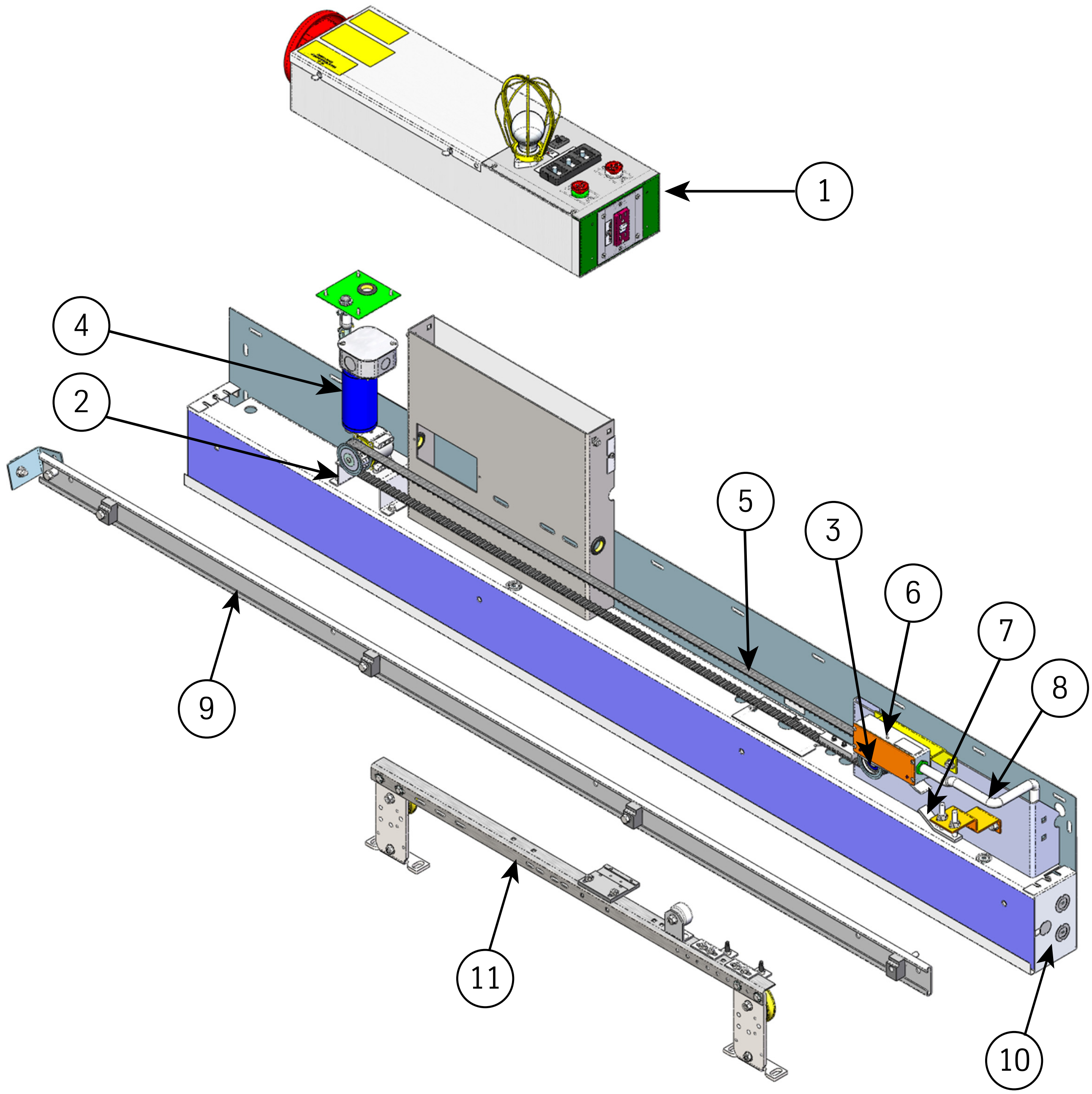


Figure 6 - Change Center Opening Door Operator Belt

Replacement Parts

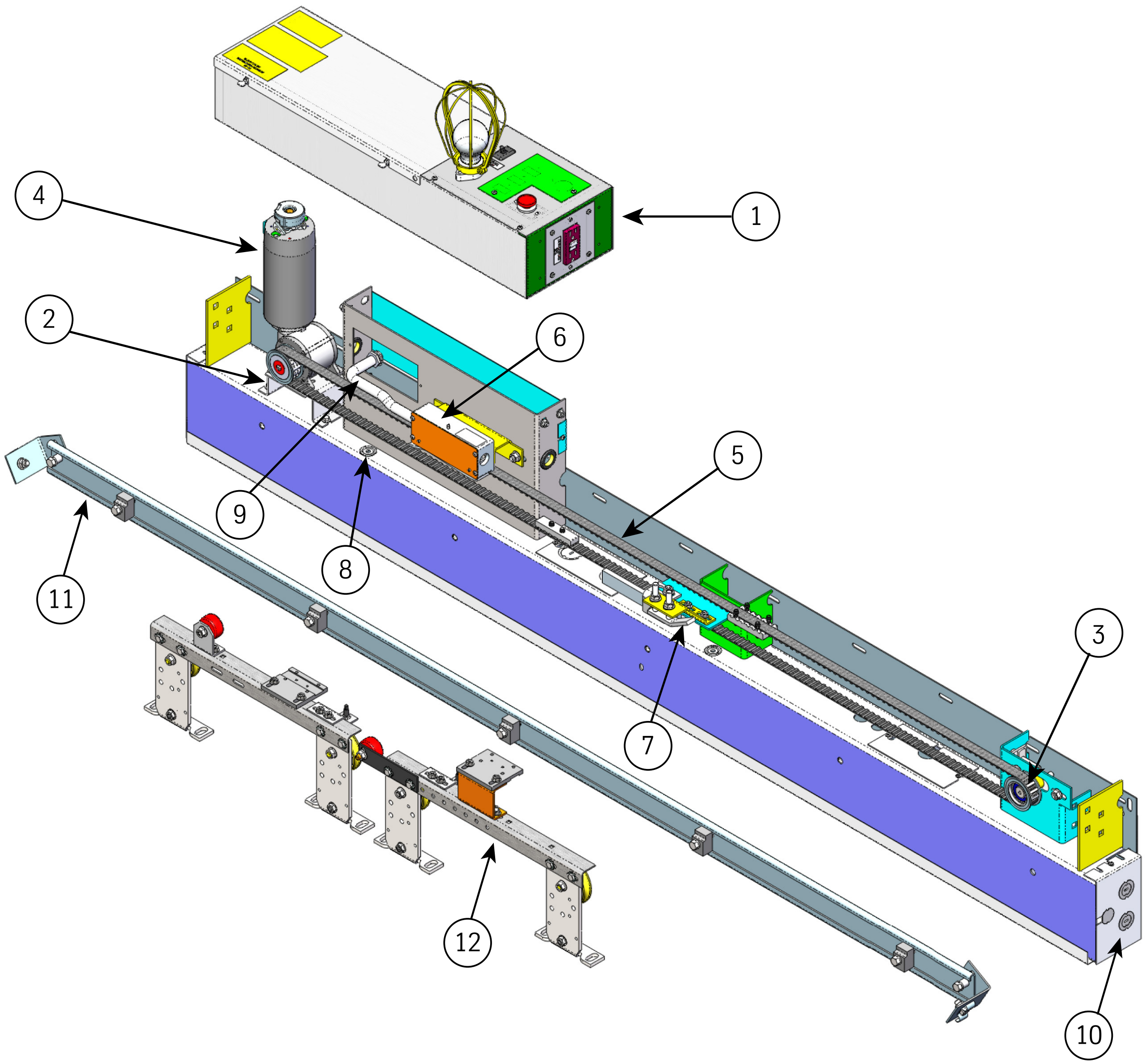
1504BK Single Speed Left and Right Hand Assemblies



1504BK Single Speed Left and Right Hand Assemblies
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		186CP	Box Assembly, Car Top
2		596DB2	Mount, Motor
3		677AG1	Pulley, Assembly, Idler
4	9817920	590DA2	Motor, Assembly, Belt Pulley
5		125AD2	Belt, Drive, 36" Opening
		125AD3	Belt, Drive, 42" Opening
6		171EP3	Switch Assembly, Gate, Single Speed
7		69865	Cam Assembly, Safety Edge Pickup
8	9834526	596CP1	Mount, Magnetic Sensor
9		286AT1	Conduit, Flexible, Aluminum, .375 x 15.00
10		232DC001	Cap, Header, End
11		860AD1	Track, Door, Car
12		461CJ1	Hanger Assembly, Car, LH, 36" Opening
		461CJ2	Hanger Assembly, Car, LH, 42" Opening
		461CJ4	Hanger Assembly, Car, RH, 36" Opening
		461CJ5	Hanger Assembly, Car, RH, 42" Opening
(Parts not shown/not labeled in drawing)			
13		461AJ1	Hanger, Pad Button, #4 Stainless Steel
		461AJ4	Hanger, Pad Button, #8 Stainless Steel
		461AJ3	Hanger, Pad Button, #4 Bronze
		461AJ5	Hanger, Pad Button, #8 Bronze
14		320JP3	Cover, Support, Car Top Box
15		717CJ2	O-Ring, 0.062" x 0.750" (ID) x 0.875" (OD)
16		448AB1	Grommet, Rubber, 1.062 Hole, .875 (ID)
17	9952172	146693	Spacer, Track
18	9801121	40114	Spacer, Interlock
19		123794	Support, Cord, Safety Edge
20	9811291	41129	Clip, Cable, Electrical
21		274CF1	Clamp, Belt
22		196ALE1	Bracket, Cam Pickup
23		196ALH2	Bracket, Weldment, Idler Pulley Adjustment
24		286AG6	Conduit, Connector, Screw-in, .375 Zinc, Flex

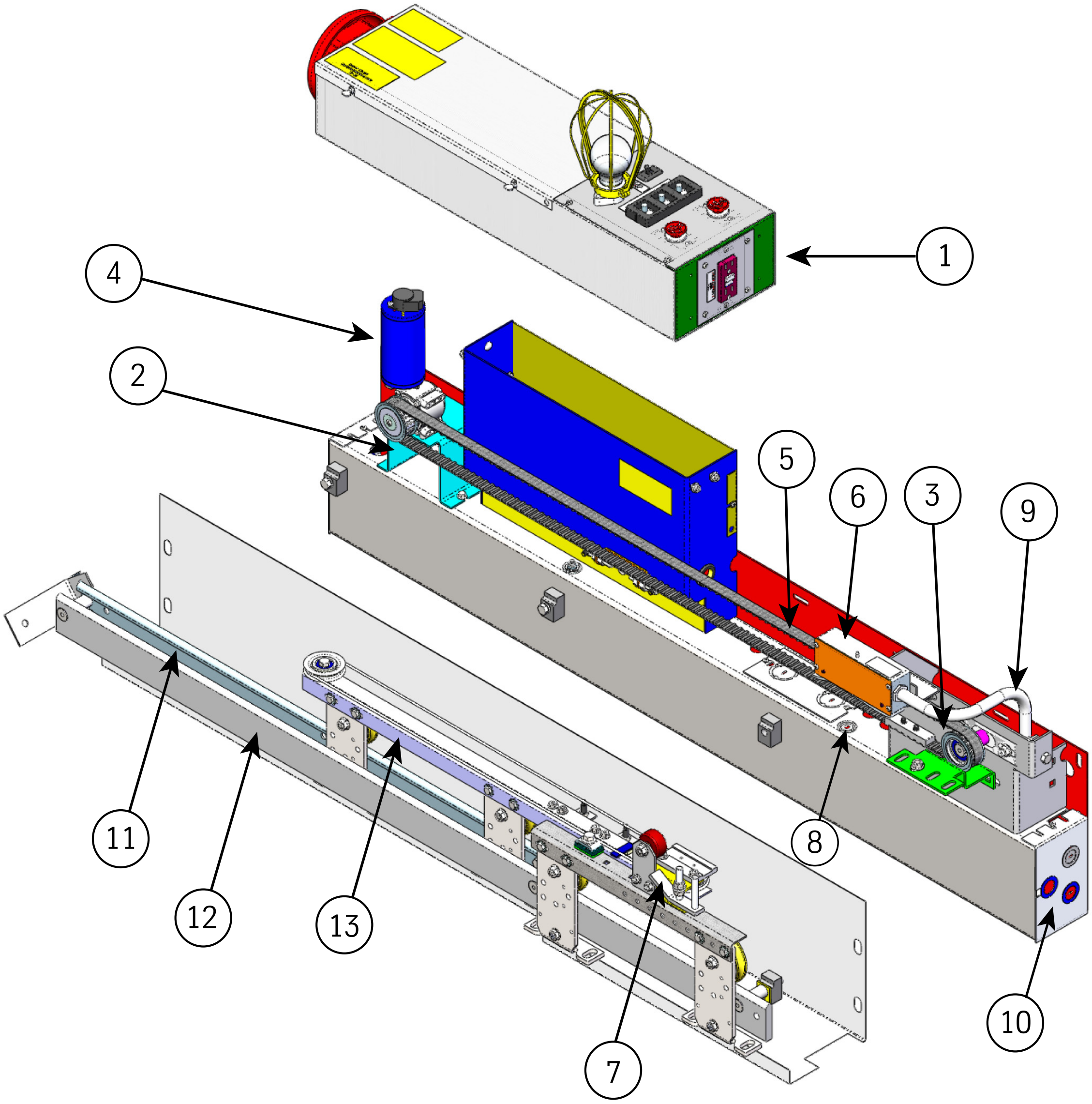
1504BL Center Opening Assemblies



1504BL Center Opening Assemblies
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		186CP	Box Assembly, Car Top
2		596DB2	Mount, Motor
3		677AG1	Pulley, Assembly, Idler
4	9817920	590DA2	Motor Assembly, Belt Pulley
5		125AD10	Belt, Drive, 36" Opening
		125AD11	Belt, Drive, 42" Opening
		125AD12	Belt, Drive, 48" Opening
6		171EP3	Switch Assembly, Gate
7		69865	Cam Assembly, Safety Edge Pickup
8	9834526	596CP1	Mount, Magnetic Sensor
9		286AT1	Conduit, Flexible, Aluminum, .375 x 15.00
10		232DC001	Cap, Header, End
11		127035	Track, Door, Car
12		461CK1	Hanger Assembly, Car, LH, 36" Opening
		461CK2	Hanger Assembly, Car, LH, 42" Opening
		461CK4	Hanger Assembly, Car, LH, 48" Opening
		461CL1	Hanger Assembly, Car, RH, 36" Opening
		461CL2	Hanger Assembly, Car, RH, 42" Opening
		461CL4	Hanger Assembly, Car, RH, 48" Opening
(Parts not shown/not labeled in drawing)			
13		461AJ1	Hanger, Pad Button, #4 Stainless Steel
		461AJ4	Hanger, Pad Button, #8 Stainless Steel
		461AJ3	Hanger, Pad Button, #4 Bronze
		461AJ5	Hanger, Pad Button, #8 Bronze
14		274CF1	Clamp, Belt
15		274CH1	Clamp, Belt, CO
16		196AJT1	Bracket, Cam Pickup Mounting
17		166AP1	Catch Assembly, Safety
18		717CJ2	O-Ring, 0.062" x 0.750" (ID) x 0.875" (OD)
19		448AB1	Grommet, Rubber, 1.062 Hole, .875 (ID)
20	9952172	146693	Spacer, Track
21	9801121	40114	Spacer, Interlock
22		123794	Support, Cord, Safety Edge
23	9811291	41129	Clip, Cable, Electrical
24		196ALH2	Bracket, Weldment, Idler Pulley Adjustment
25		286AG6	Conduit, Connector, Screw-in, .375 Zinc, Flex

1504BV 2-Speed Left and Right Hand Assemblies



1504BV 2-Speed Left and Right Hand Assemblies

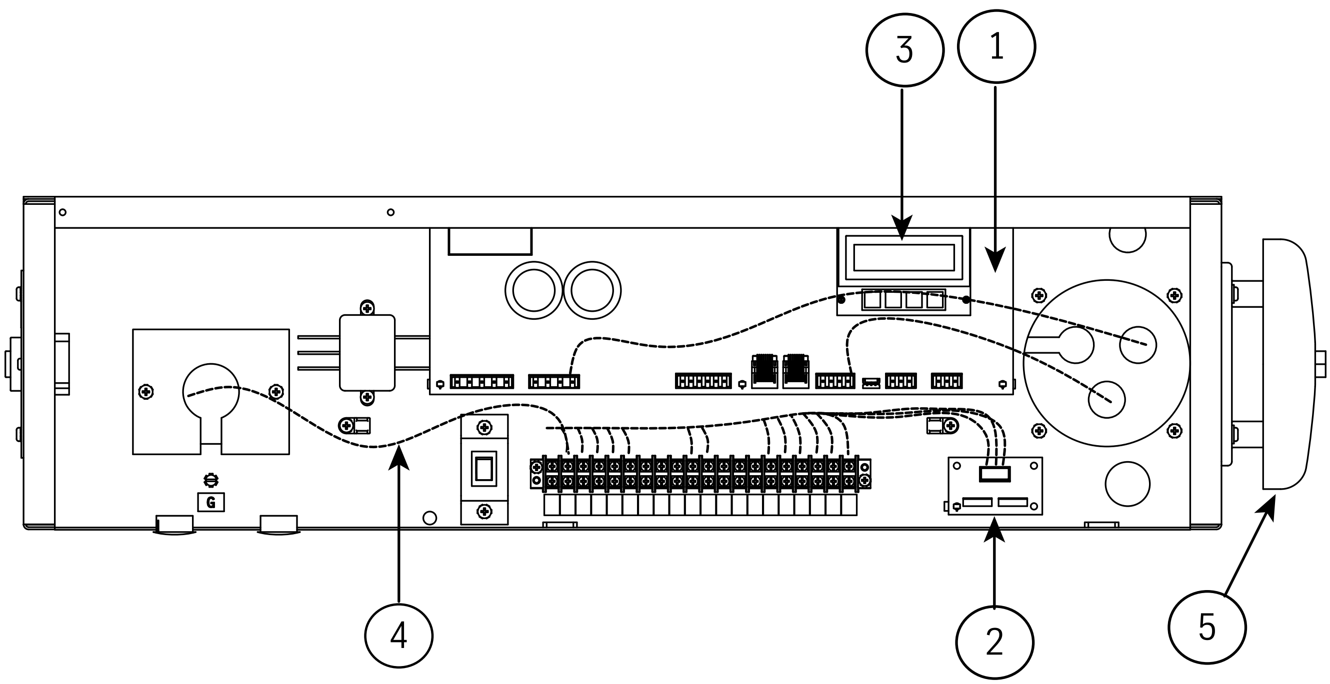
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		186CP	Box Assembly, Car Top
2		596FE001	Mount, Motor
3		677AG1	Pulley, Assembly, Idler
4	9817920	590DA2	Motor Assembly, Belt Pulley
5		125AD7	Belt, Drive, 36" Opening
		125AD8	Belt, Drive, 48" Opening
		125AD9	Belt, Drive, 54" Opening
6		171EP3	Switch Assembly, Gate
7		69865	Cam Assembly, Safety Edge Pickup
8	9834526	596CP1	Mount, Magnetic Sensor
9		286AT1	Conduit, Flexible, Aluminum, .375 x 15.00
10		232DC001	Cap, Header, End
11		125908	Track, Door, Rolled, Formed
12		860AF1	Track Door, Solid
13		461CE1	Hanger Assembly, Car, Fast Door, RH, 36" Opening
		461CE2	Hanger Assembly, Car, Fast Door, RH, 48" Opening
		461CE3	Hanger Assembly, Car, Fast Door, RH, 54" Opening
		461CE5	Hanger Assembly, Car, Fast Door, LH, 36" Opening
		461CE6	Hanger Assembly, Car, Fast Door, LH, 48" Opening
		461CE7	Hanger Assembly, Car, Fast Door, LH, 54" Opening
		461CF1	Hanger Assembly, Car, Slow Door, RH, 36" Opening
		461CF2	Hanger Assembly, Car, Slow Door, RH, 48" Opening
		461CF3	Hanger Assembly, Car, Slow Door, RH, 54" Opening
		461CF5	Hanger Assembly, Car, Slow Door, LH, 36" Opening
		461CF6	Hanger Assembly, Car, Slow Door, LH, 48" Opening
		461CF7	Hanger Assembly, Car, Slow Door, LH, 54" Opening

(Parts not shown/not labeled in drawing)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
14		461AJ1	Hanger, Pad Button, #4 Stainless Steel
		461AJ4	Hanger, Pad Button, #8 Stainless Steel
		461AJ3	Hanger, Pad Button, #4 Bronze
		461AJ5	Hanger, Pad Button, #8 Bronze
15		274CF1	Clamp, Belt
16		196AJB3	Bracket, Cam Pickup
17		717CJ2	O-Ring, 0.062" x 0.750" (ID) x 0.875" (OD)
18		448AB1	Grommet, Rubber, 1.062 Hole, .875 (ID)
19	9952172	146693	Spacer, Track
20		123794	Support, Cord, Safety Edge
21	9811291	41129	Clip, Cable, Electrical
22		196ALH2	Bracket, Weldment, Idler Pulley Adjustment
23		286AG6	Conduit, Connector, Screw-in, .375 Zinc, Flex

186CP Car Top Box



Right Hand View, Top Cover Removed

186CP Car Top Box
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9863877	6300PA3	PCB Assy, Universal Door Controller (UDC)
2	9765841	6300WK1	PCB Assembly, SE Interface
3	9876954	6300HL1	PCB Assembly, VVVF User Interface Tool (UIT)
4		462LD1	Harness Assy, Linear Door Operator, Front
		462LD2	Harness Assy, Linear Door Operator, Rear
		462MG1	Harness Assy, Linear Door Operator, Cimarron
		462LE1	Harness Assy, DK Encoder, LD-03
		462LD3	Harness Assy, Linear Door Operator, Front, Extended
		462LD4	Harness Assy, Linear Door Operator, Rear, Extended
5	9782527	108252	Audible, Emergency Alarm Bell
	9736254	177AM1	Audible, Signal Alarm Horn, 12V
6		687BR1	Receptacle, Ground Fault Circuit Interrupter
7	9781821	78182	Socket, Light
8		109789	Guard, Lamp
9	9875412	850RW1	Tools, Magnetic-Based Trouble Light
(Parts not shown/not labeled in drawing)			
10	9743637	76703	Switch, Light, Snap-in
11	9748632	127195	Guard, Pushbutton
12	9739555	127196	Switch, Pushbutton
13	9810985	109888	Switch Assembly, Inspection
	9810857	108150	Switch Assembly, Run-Stop
14		286AH37	NM Connector, Zinc Die Cast, .500

Overview

The following is a list of the major components of a door operator including a description of their functions, an overview of some of the critical adjustments, and maintenance information. See Figure 1 on page 2.

- Adjustable Arm - The arm mounted to the drive wheel is used to change the amount of linear door movement or stroke.
- Connecting Arm - Connects the drive arm to the door panel.
- Door Operator Support - A metal plate welded to the header. The door operator is mounted to the door operator support with four bolts through the four mounting slots of the door operator.
- Drive Arm - The linkage connected between the drive arm support and the connecting arm.
- Drive Arm Support - The bracket containing two holes is located on top of the door operator. The drive arm should be connected to the right-hand hole, looking from the hatch, at the front of the door operator.
- Drive Wheel - A metal sheave containing a slotted cam surface. The adjustable arm mounts to the drive wheel and is adjusted in the slotted cam surface. The drive wheel is driven by the jack shaft sheave using 3 V belts.

  To change the linear door travel or stroke, move the adjustable arm:
  - Closer to the center of the drive wheel = less door travel for the same amount of wheel rotation.
  - Further from the center of the drive wheel = more door travel for the same amount of wheel rotation.
- Idler Arm - An adjustable arm mounted to the front of the door operator which controls the tension of the 3 V belts between the jack shaft sheave and the drive wheel.
- Intermediate Arm - Adjustable linkage connected between the drive wheel adjustable arm and the pivot arm. The connection at the pivot arm is adjustable to control the length of the intermediate arm.
- Mechanical Stops - Metal L brackets mounted to the front of the door operator. The stops have slots to adjust the amount of drive wheel rotation and, once positioned, they limit the physical rotation of the drive wheel.
- Motor - 115V or 230V DC Motor
- Pivot Arm - Connects the drive arm to the intermediate arm and provides an adjustment for the length of the intermediate arm.
- Sheave, Jack Shaft - A spoked sheave driven by the door operator motor with a single V belt. The motor sheave drives the jack shaft sheave which drives the drive wheel.
- Sheave, Motor - A sheave attached directly to the door operator motor shaft.
- Support Strut - Unistrut legs on the rear of the door operator which are used to secure the rear of the operator to the car top, and also to plumb the face of the drive wheel.

Overview
(continued)

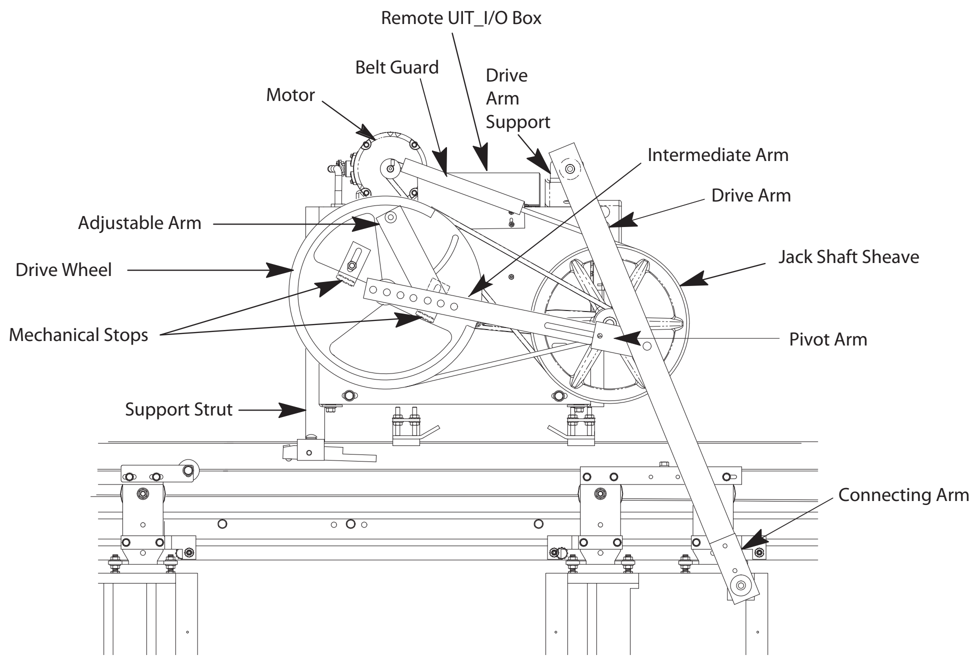


Figure 1 - Single Speed Door Operator

Specifications

Operator Power: 115 VAC at 5 Amps

Maximum Door Opening Speed: 2 ft/s

Maximum Combined Door Weight: 1500 lbs. (weight is combined car and hoistway door assemblies and components)

Motor Horsepower: 1/2 hp

Motor Voltage: 1/2 hp, 115 VAC

Encoder: 500 pulses per revolution

Drive Belts: Wedge V Belt

Door Card: Universal Door Controller (UDC), closed loop motion control (Position, Speed, Current)

Input or Output: 24/48 VDC or 115 VAC

Communication: Discrete Control Interface, CAN Serial, RS485 Serial

Diagnostic Tool: 4 button, 2 line LCD User Interface provides advanced diagnostics for tuning and adjustment.

Two independent Door Profiles. The second profile is activated when Heavy Door Input (HDI) becomes active.

Meets opening and closing specifications while maintaining ANSI Code compliance.

Provides maximum jerk rates to minimize door vibration.

Automatically adapts and compensates for belt slip.

Protects against lost encoder and overspeed conditions.

Overcurrent protection of power IGBTs.

Mechanical Installation

Prepare the Door Operator

Note: Installation and adjustment of the door operator is best accomplished from an upper landing. Place the car top at a comfortable working height, and use the landing as a working platform.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Remove the door operator from the shipping carton and crate. Locate and store the bag of parts.
3. Remove the cover from the rear of the operator: Loosen the two top screws and the two lower rear screws.
4. Inspect the wiring. Make sure all connections are secure.
5. Loosen the bolts holding the mechanical stops. See Figure 2.
6. While observing the shaft containing the cams (inside the operator), rotate the drive wheel.

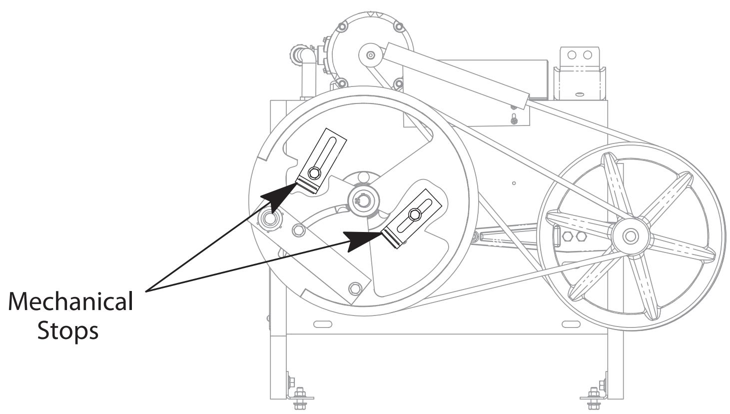


Figure 2 - Drive Sheave Mechanical Stops

Measure the V Belt Tension

Notes:

- Proper tension for a V belt - The lowest tension that will operate the machine, under peak load conditions, without belt slip.
- Acceptable belt deflection (tension) = 0.25" to 0.30" at 7.5 to 8.5 force (lbs).
- The tension must be adjusted again after 24 hours of initial operation, with a belt deflection of 0.25" to 0.30" at 5.5 to 7.5 force (lbs).

Three V Belts (located between the drive wheel and the small sheave on the jack sheave)

1. Place a V belt tension gauge in the center of the belt span between the drive sheave and the jack sheave.
2. Measure for an acceptable belt deflection (tension).

   If the tension is incorrect:

   a. Loosen the three (3) bolts on the idler arm, and loosen the lock nut on the adjustment screw. See Figure 2.

   b. Turn the adjustment screw to attain the correct measurement.

   c. When the V belts are correctly tensioned, securely tighten the idler arm bolts and the lock nut on the adjustment screw.

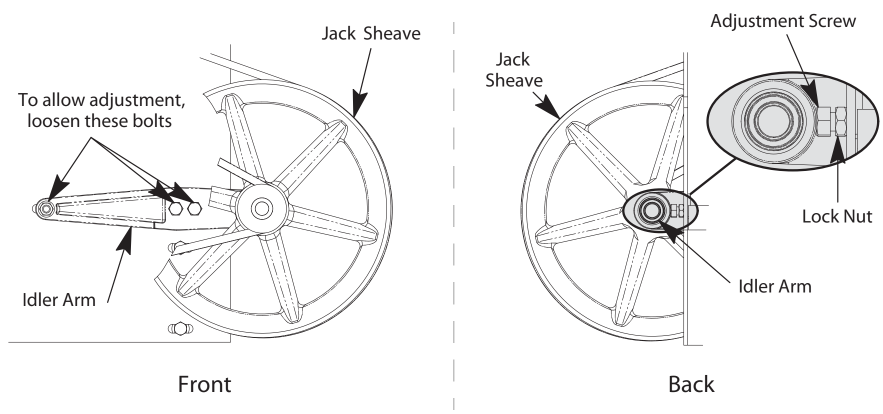


Figure 3 - V Belt Adjustment

Single V Belt (located between the motor sheave and jack shaft sheave)

1. Place a V belt tension gauge in the center of the belt span between the jack sheave and the motor pulley.
2. Measure for an acceptable belt deflection (tension).

   If the tension is incorrect:

   a. Loosen the four motor mounting bolts and reposition the motor.

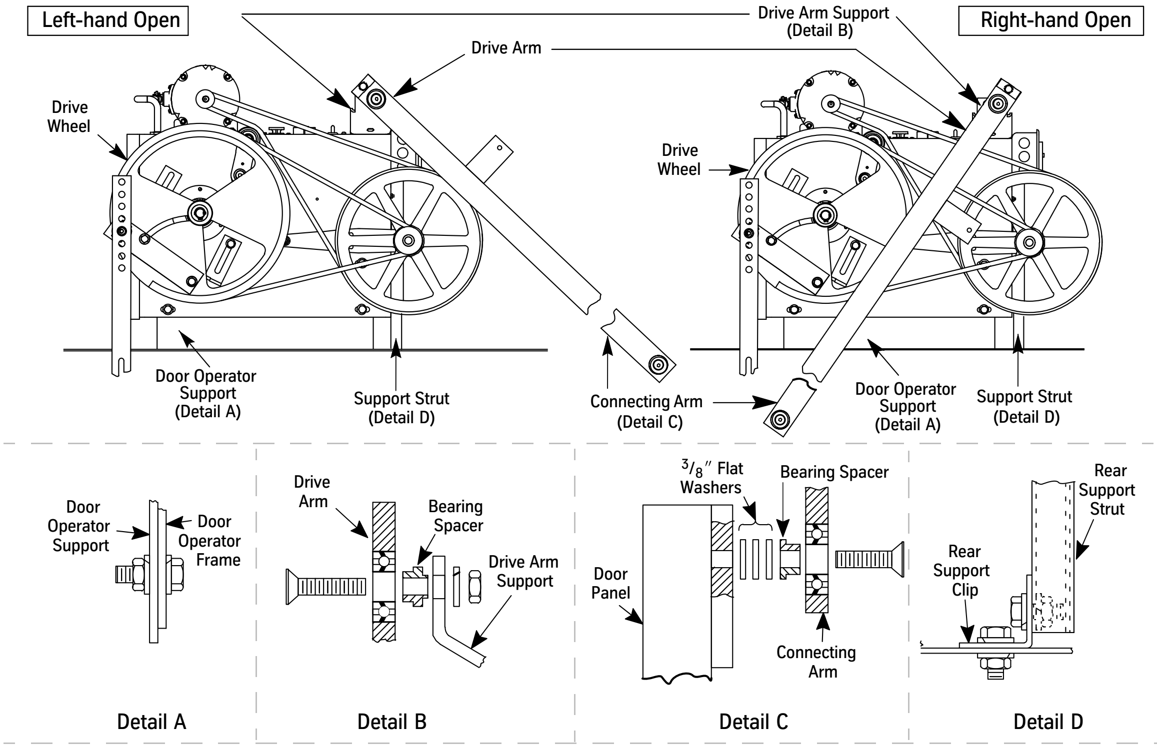
   b. Ensure that the alignment between the sheaves and the belt is correct, and securely tighten the motor mounting bolts.

Mounting the Door Operator

1. Use the supplied drilling template as a reference to mount the door operator base on the car top. See Figure 3 on page 4 for all steps in this procedure.
2. Lift the door operator to the car top.
3. Remove the rear support clips from the door operator’s rear support struts. Keep the unistrut nut and one screw, and discard the rest.
4. Match four (4) slots in the door operator frame to four (4) holes in the door operator base, and install a hex head screw, a flat washer, a lock washer, and a hex nut in each.
5. Use the unistrut nut and one screw (from Step 3) to loosely attach the rear support struts to the clips on the door operator base.
6. Plumb the face of the drive wheel: Tilt the door operator backward or forward, and then tighten the hardware on each rear support.
7. Attach the drive arm to the right hand hole of the drive arm support (as viewed from the front of the operator).
8. Check the drive arm for plumb, and then attach the connecting arm to the car door.

Note: Use no more than three (3) 3/8" flat washers for spacing.

9. Place the door(s) in the Fully Open position.
10. Loosen the hardware holding the door operator base to the car top, and move the door operator until the drive arm is as straight as possible.
11. Tighten the hardware that is holding the door operator base to the car top.



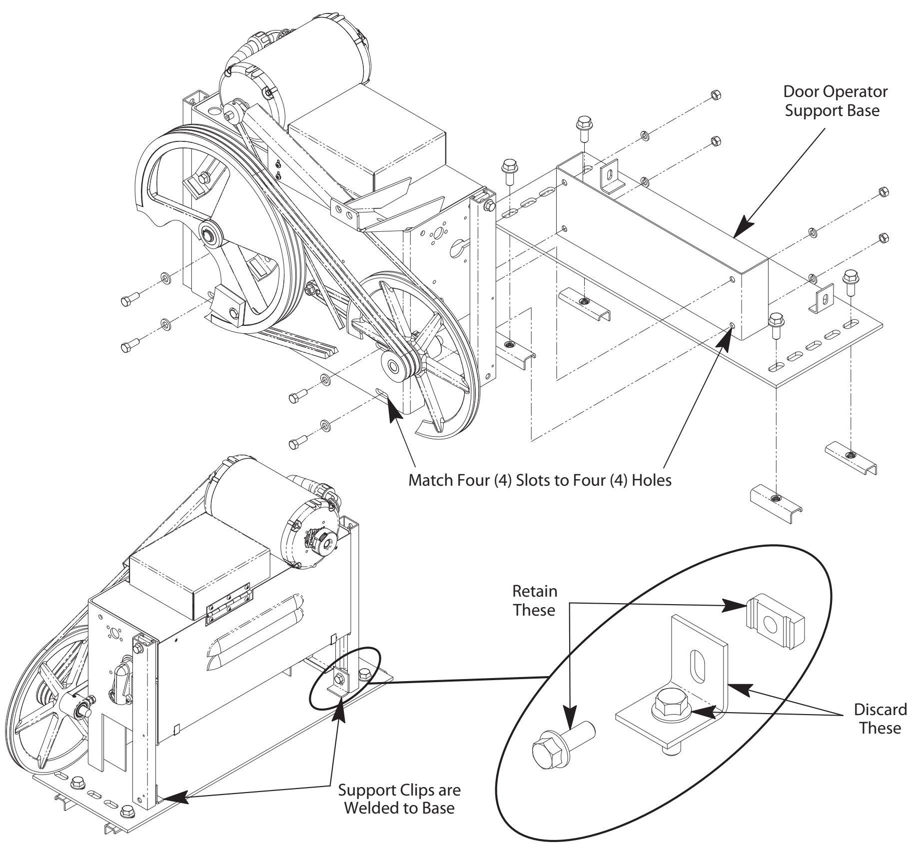


Figure 4 - Door Operator Mounted on the Door Operator Base

Setting the Stroke

- Fully Open Door Position - The point where the doors are flush with or slightly recessed behind the open door jamb.
- Fully Closed Door Position - The point where the leading edge of the door contacts the door jamb, or, in the case of center opening doors, the point where the two leading edges of the doors contact.

1. Place the doors in the Fully Open position.
2. Measure the distance from point **B** to point **C** and record this measurement as Door Open (DO). See Figure 4 for all steps in this procedure.
3. Place the doors in the Fully Closed position.
4. Measure the distance from point **B** to point **C** and record this measurement as Door Closed (DC).
5. Use the following formula to calculate the stroke:

$$\text{STROKE} = \frac{DO - DC}{2} + 1/8"$$

6. Loosen the two cap screws in the adjustable arm.
7. Move the adjustable arm in the circular slot of the drive wheel so that the distance from point **A** to point **B** is equal to the calculated stroke length.
8. Tighten the two cap screws in the adjustable arm.

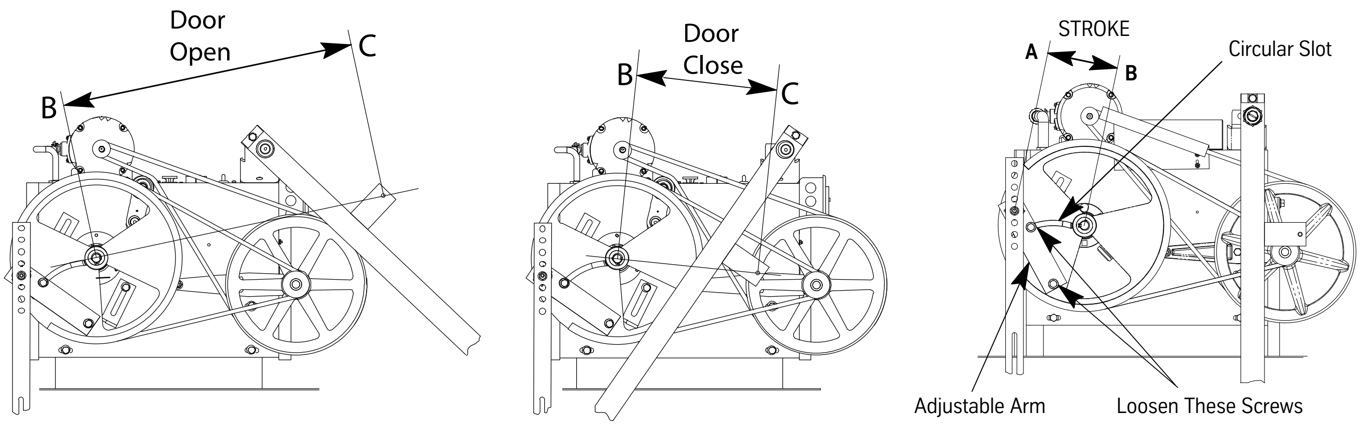


Figure 5 - Calculate the Door Operator Stroke

Adjusting the Drive Arms

Note: See Figure 5 on page 7 for all steps in this procedure.

1. Place the doors in the Fully Open position.

2. Slide the pivot arm to the end of the slot in the intermediate arm so that the hole in the bearing is exposed.

3. Use a 3/8" (10mm) flathead socket cap screw to attach the pivot arm to the intermediate arm through the bearing and a bearing spacer.

Note: Ensure that the spacer plate is between the two arms, the bearing spacer is installed, and that the doors are still in the Fully Open position.

4. Maintain the doors in the Fully Open position, and rotate the drive wheel until all three points A, B, and C are in a straight line.

5. Tighten the two cap screws attaching the pivot arm to the intermediate arm.

6. Use a pencil to trace a line along both sides of the adjustable arm on the drive wheel.

Note: This will be the reference mark in the event that the stroke requires further adjustment.

7. Move the doors to the Fully Closed position.

Note: If the doors will not fully close: Loosen the two cap screws in the drive wheel adjustable arm, and move the arm toward the outside of the drive wheel in small increments of 1/8" (3mm) until the doors close.

8. Measure the distance from the top of the intermediate arm to the center of the drive wheel. The correct distance for this measurement is 1/2" (13mm) to 1 1/2" (38mm).

9. Ensure that the doors can be opened from the inside per local code. The smaller this diameter, the more difficult it will be to pull the car doors open manually.

   If the measurement is correct - Securely tighten the cap screws in the adjustable arm, and the cap screws connecting the intermediate arm to the pivot arm. Continue to the next procedure.

   If the measurement is less than 1/2" (13mm) - Loosen the two cap screws in the adjustable arm. Reposition the arm toward the outside of the drive wheel and tighten the two cap screws.

   If the measurement is more than 1 1/2" (38mm) - Loosen the two cap screws in the adjustable arm. Reposition toward the center of the drive wheel and tighten the two cap screws.

   a. Move the doors to the Fully Open position, and check the alignment of the connecting arm and the three points A, B, and C.

   b. Move the doors to the Fully Closed position, and measure the distance from the top of the intermediate arm to the center of the drive wheel.

   c. If these measurements are not correct, repeat the adjustment of the arm until the correct operation and measurement is obtained.

Note: Once the stroke has been properly adjusted, check to ensure that the two cap screws in the adjustable arm and the two cap screws holding the pivot arm to the intermediate arm are securely tightened.

Adjusting the Drive Arms
(continued)

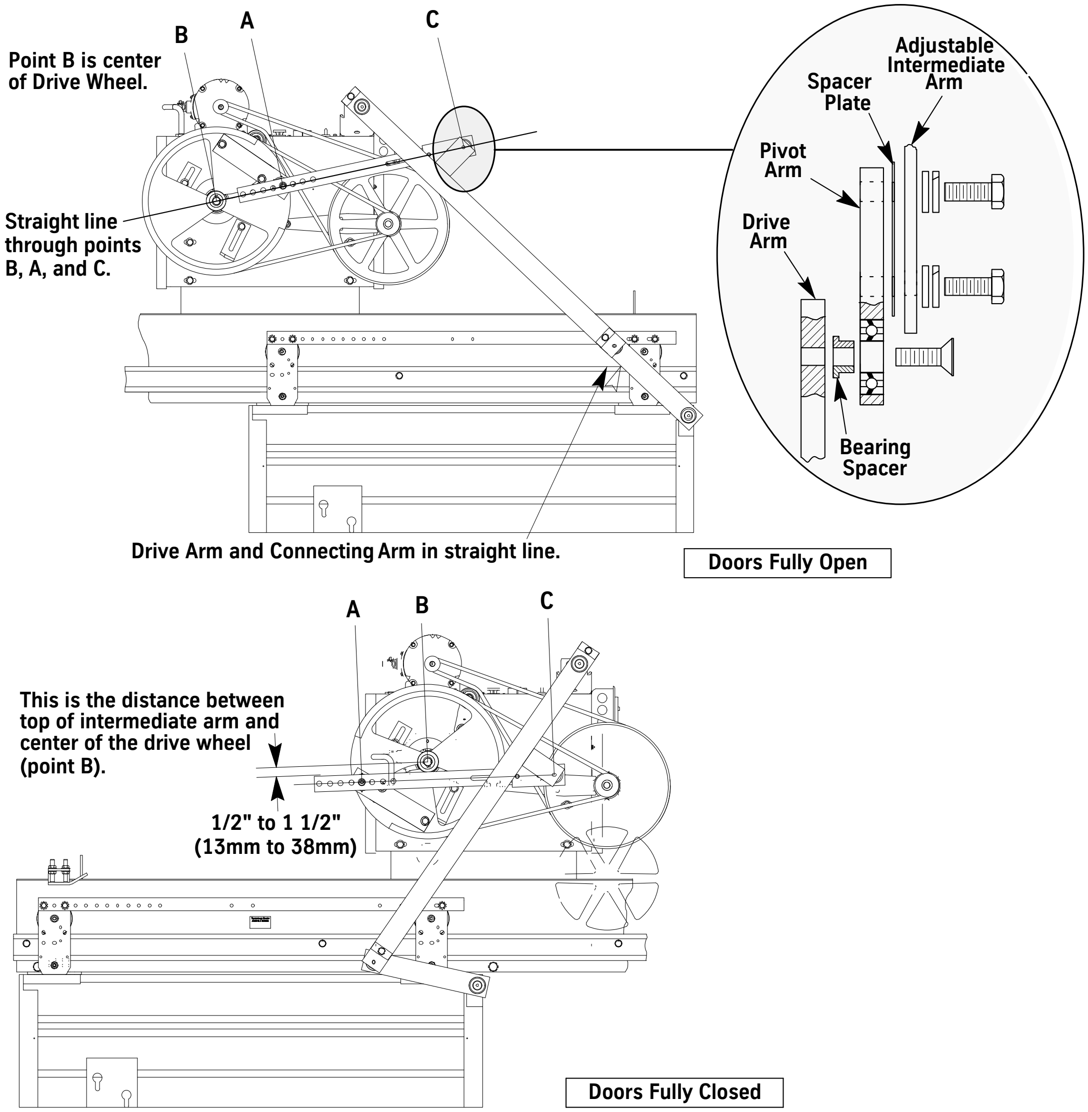


Figure 6 - Adjusting the Drive Arms

Setting the Mechanical Stops

1. Move the doors to the Fully Open position.
2. Position the open mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.
3. Move the doors to the Fully Closed position.
4. Position the closed mechanical stop 1/8" (3mm) from the inside surface of the drive wheel, and tighten the bolt securely.

Dual Drive Arm Door Operation
(Center Opening Only)

Prepare Door Operator

Note: Installation and adjustment of the door operator is best accomplished from an upper landing. Place the car top at a comfortable working height, and use the landing as a working platform.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Remove door operator from the shipping carton and crate. Locate and store the bag of parts.
3. Remove cover from rear of operator by loosening two top screws and two lower rear screws.
4. Inspect the wiring. Make sure all connections are secure.
5. Loosen the bolts holding the mechanical stops. See Figure 7.

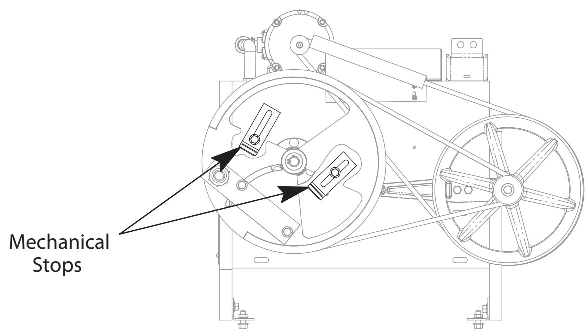


Figure 7 - Drive Sheave Mechanical Stops

While observing the shaft containing the cams (inside the operator), rotate the drive wheel.

6. Check and adjust, as necessary, the tension of the 3 V belts between the drive wheel and the jack shaft sheave. See Figure 8.
   a. Loosen the two bolts on the idler arm, and turn the locknut on the adjustment screw (located at the end of the idler arm).
   b. Securely tighten the idler arm bolts and the locknut.

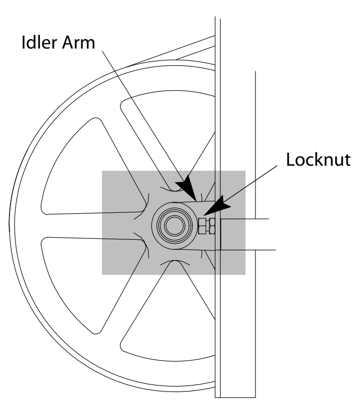


Figure 8 - Locknut Adjustment Screw

Dual Drive Arm Door Operation (Center Opening Only)

(continued)

7. Check and adjust as necessary the tension on the single V belt between the motor sheave and jack shaft sheave:
    a. Loosen the four motor mounting bolts, and position the motor.
    b. Securely tighten the motor mounting bolts.

Mounting The Door Operator

1. Lift the door operator to the car top.
2. Remove the mounting hardware from the base of the door operator, and set aside.
3. Center the front slots of the mounting base with the slots in the middle of the car header. Install two sets of mounting hardware, and loosely tighten. See Figure 9 on page 104.
4. Use a level to plumb the face of the drive wheel.
5. Match the vertical center line of the drive shaft with the center line of the door opening by adjusting the door operator sideways. Tighten the front mounting hardware. See Figure 9 on page 104 and Figure 11 on page 106.
6. Place the doors in the Fully Closed Position.
7. Check all dimensions shown in Figure 11. Adjust dimensions M, N, and P as necessary.
8. Attach the drive arm assembly to the pivot bearing (located on the car header). See Figure 10 on page 105.
9. Position the connecting arm to point away from the door operator, and attach the door tap plate to the door panel. See Figure 10 and Figure 11.
10. Attach the adjustable arm to the drive wheel bar. See Figure 10.
11. Connect the adjustable arm to the drive arm. See Figure 10.
12. With a level, check the drive arm for plumb. If necessary, space the drive arm from the car header with 5/8" (10mm) flat washers. See Figure 10.
13. Repeat Step 2 through Step 12 on the other arm.
14. Match drill 9/16 holes in the car top with the slots in the door operator mounting base. See Figure 9.
15. Install two other sets of mounting hardware and tighten.

Setting the Mechanical Stop

1. Move the doors to the Fully Open Position.
2. Position the open mechanical stop 1/8" from the inside surface of the drive wheel, and securely tighten the bolt.

Dual Drive Arm Door Operation (Center Opening Only)

(continued)

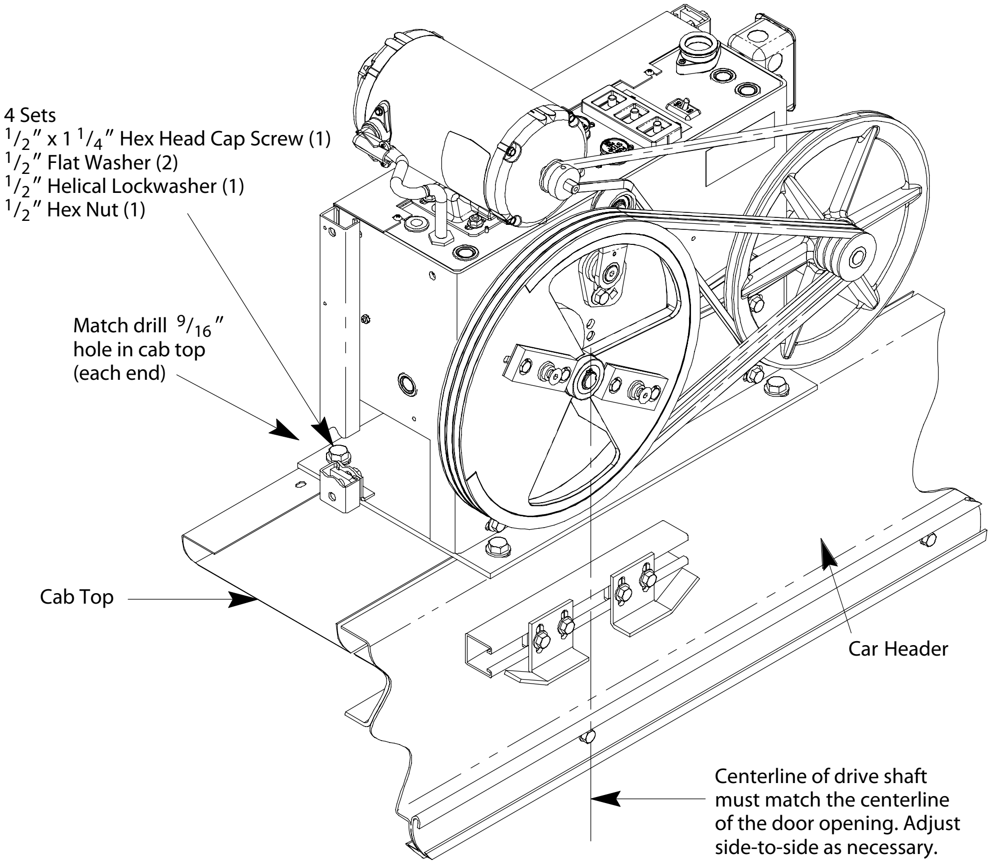


Figure 9 - Mounting the Door Operator (1 of 3)

Dual Drive Arm Door Operation (Center Opening Only)
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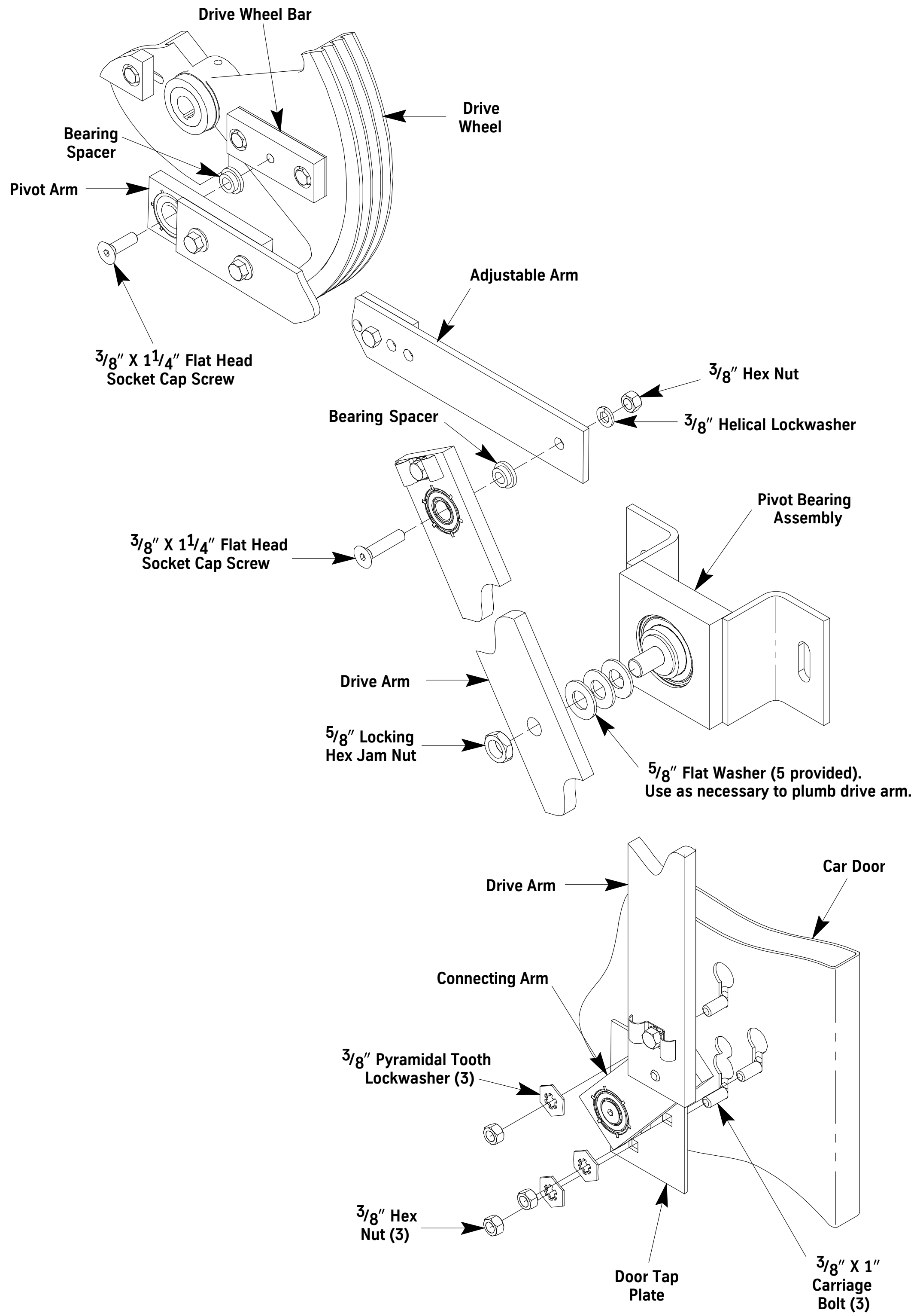
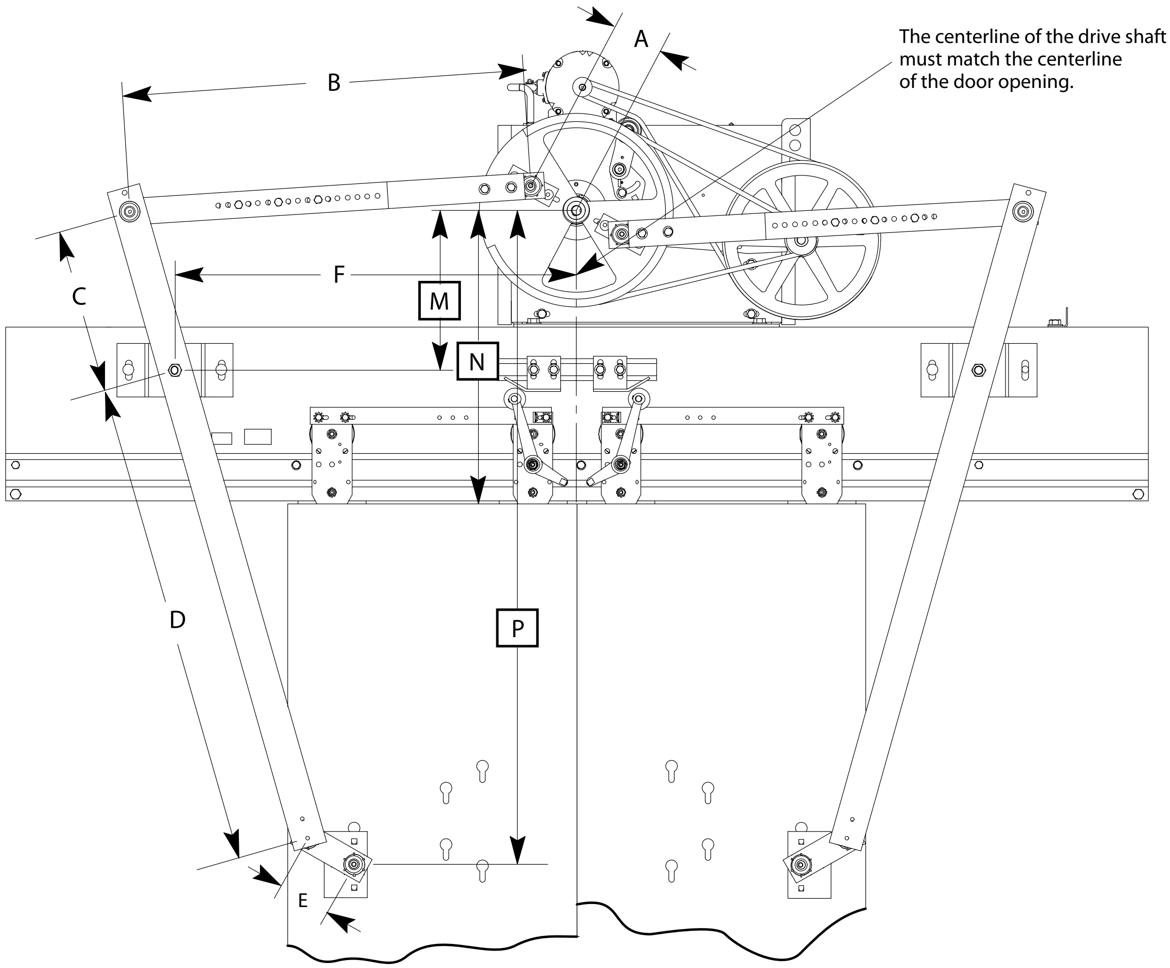


Figure 10 - Mounting the Door Operator (2 of 3)

Dual Drive Arm Door Operation (Center Opening Only)
(continued)



Note: Corresponding dimensions on each side are equal.

Door Opening	Cab Height	Set at Factory						Field Adjusted		
		A	B	C	D	E	F	M	N	P
7′ 0″ x 42″	8′ 0″	3.875	30.250	12.375	41.250	4.0	30.250	12.0	23.0	52.750
7′ 6″ x 42″	8′ 6″	3.875	30.250	12.375	41.250	4.0	30.250	12.0	23.0	52.750
8′ 0″ x 42″	10′ 6″	3.875	30.250	15.0	50.0	4.0	30.250	14.625	35.0	64.750
8′ 0″ x 42″	10′ 8″	3.875	30.250	16.875	56.250	4.0	30.250	16.625	43.0	72.750
8′ 0″ x 48″	9′ 6″	4.250	31.750	13.875	46.250	4.0	31.750	13.375	29.0	58.750
8′ 0″ x 48″	9′ 8″	4.250	31.750	14.250	47.50	4.0	31.750	13.750	31.0	60.750
9′ 0″ x 48″	10′ 0″	4.250	31.750	12.750	42.50	4.0	31.750	12.250	23.0	53.750
9′ 0″ x 48″	10′ 2″	4.250	31.750	13.50	45.0	4.0	31.750	13.0	25.0	56.750
NOTE: For combinations of door sizes and cab heights not shown, please see job specific drilling templates.										

Figure 11 - Mounting the Door Operator (3 of 3)

Electrical Installation

Wire the door operator system. See Figure 12 on page 107, Figure 13 on page 108, Figure 14 on page 109, and the job wiring diagrams.

Signal Name	Wire Color/ Number	6300TX_ Card Connection	Signal Description
AC1S or P24	Orange 11	CON6-1	I/O Signal Power
AC2 or G24	Orange 12	CON6-5	I/O Signal Common
AC1S	Orange 13	n/a	Hot 115 VAC power to door operator
AC2	Orange 14	n/a	Neutral 115 VAC power to door operator
GS1	Orange 17	n/a	115 VAC gate switch
GS2	Orange 18	n/a	115 VAC gate switch
OD – IN	YELLOW–1	CON5–5	Open Door Input Signal
CD – IN	YELLOW–2	CON5–6	Close Door Input Signal
NDG – IN	YELLOW–3	CON5–7	Nudging Input Signal
HDI1 – IN	YELLOW–4	CON5–8	Heavy Door Input Signal
DOL – OUT	YELLOW–5	CON5–1	Door Open Limit Output
DCL – OUT	YELLOW–6	CON5–2	Door Close Limit Output
DL6 – OUT	YELLOW–7	CON5–3	Door Close 6 Inches Output
DRL – OUT	YELLOW–8	CON5–4	Door Reversal Limit Output
SE	ORANGE–19	n/a	Safety Edge (Can be used if the safety edge controller is on or in the door operator)Not required for door control card.
V+	Orange 20	n/a	Positive 24 VDC. Part of inspection circuit, see controller wiring diagrams.
TI	Tan 21	n/a	Part of inspection circuit, see controller wiring diagrams.
UIN	Tan 22	n/a	Part of inspection circuit, see controller wiring diagrams.
DIN	Tan 23	n/a	Part of inspection circuit, see controller wiring diagrams.
TIM	Tan 24	n/a	Part of inspection circuit, see controller wiring diagrams.
H7	Tan 25	n/a	Part of inspection circuit, see controller wiring diagrams.
CS	Tan 26	n/a	Part of inspection circuit, see controller wiring diagrams.
L10	BLACK	n/a	Car Lighting 115 VAC Hot
GND	GREEN	n/a	Ground
L20	WHITE	n/a	Car Lighting 115 VAC Neutral
L10GF	BLACK	n/a	Car Lighting 115 VAC GFCI Protected Hot
L20GF	WHITE	n/a	Car Lighting 115 VAC GFCI Protected Neutral

Figure 12 - Front Door Operator Wiring Chart

Electrical Installation
(continued)

Signal Name	Wire Color/ Number	6300TX_ Card Connection	Signal Description
AC1S or P24	Orange 11	CON6-1	I/O Signal Power
AC2 or G24	Orange 12	CON6-5	I/O Signal Common
AC1S	Orange 13	n/a	Hot 115 VAC power to door operator
AC2	Orange 14	n/a	Neutral 115 VAC power to door operator
GS1	Orange 17	n/a	115 VAC gate switch
GS2	Orange 18	n/a	115 VAC gate switch
OD – IN	YELLOW–1	CON5–5	Open Door Input Signal
CD – IN	YELLOW–2	CON5–6	Close Door Input Signal
NDG – IN	YELLOW–3	CON5–7	Nudging Input Signal
HDI1 – IN	YELLOW–4	CON5–8	Heavy Door Input Signal
DOL – OUT	YELLOW–5	CON5–1	Door Open Limit Output
DCL – OUT	YELLOW–6	CON5–2	Door Close Limit Output
DL6 – OUT	YELLOW–7	CON5–3	Door Close 6 Inches Output
DRL – OUT	YELLOW–8	CON5–4	Door Reversal Limit Output
SE	ORANGE–19	n/a	Safety Edge (Can be used if the safety edge controller is on or in the door operator)Not required for door control card.
L10	BLACK	n/a	Car Lighting 115 VAC Hot
GND	GREEN	n/a	Ground
L20	WHITE	n/a	Car Lighting 115 VAC Neutral

Figure 13 - Rear Door Operator Wiring Chart

Electrical Installation
(continued)

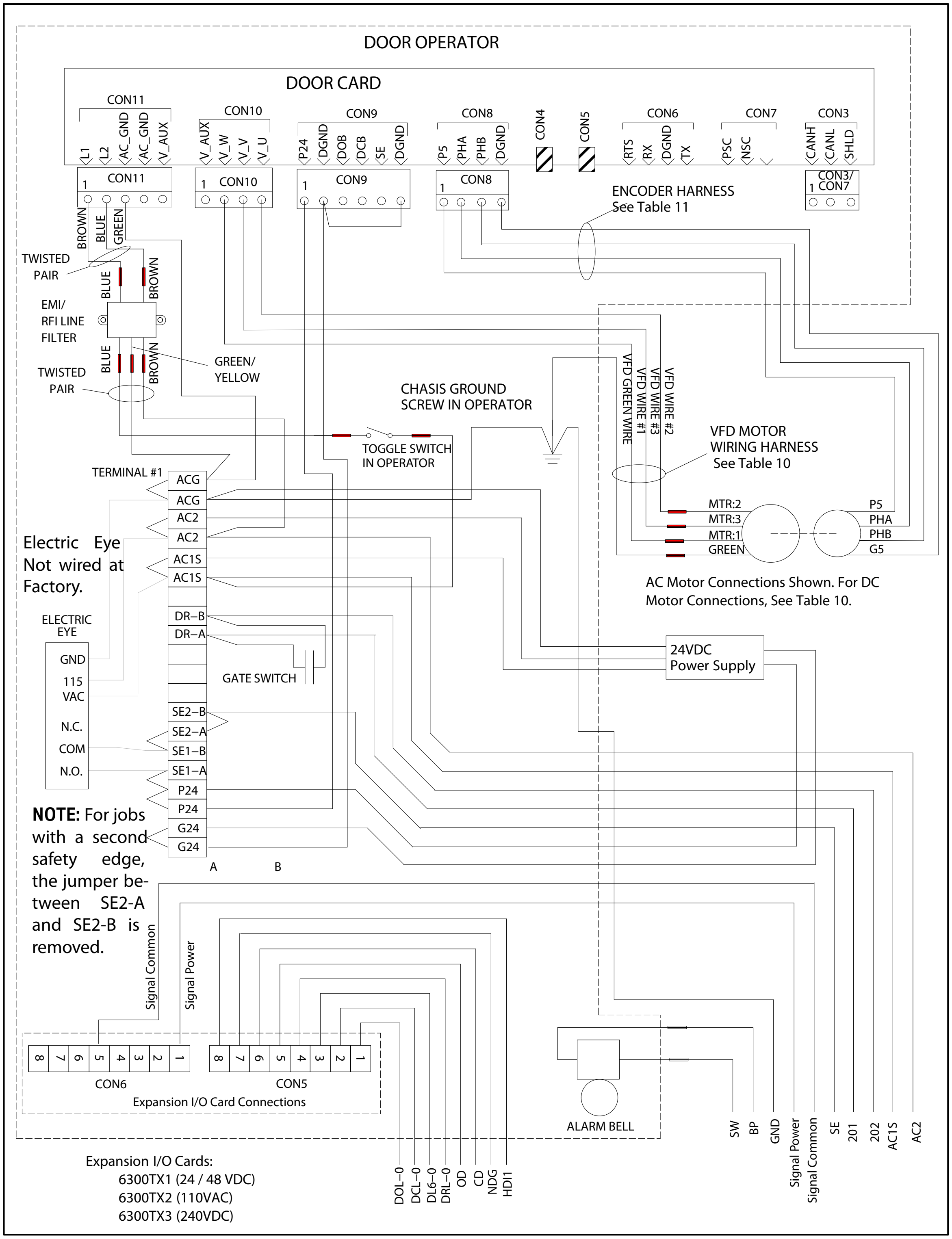


Figure 14 - HD-03/M Wiring Diagram

Electronic Setup and Adjustment

CAUTION **The configuration done by manufacturing uses adjustment and parameter values that are different from the default values shown in the Diagnostics section.**

Preparation

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Route the door operator harness to the swing return, and connect the harness connectors to the appropriate connectors on the car wiring interface card.

3. If required, connect the safety edge cables to the safety edge box.

Note: On jobs with both front and rear doors, adjust front and rear door operators separately.

4. Turn ON the mainline disconnect.

5. Verify that the VBUS and WD LEDs on the door card are ON.

Note: If LEDs are not ON, refer to the *Troubleshooting* section.

Limit Setting

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Manually move the door to the fully closed position, noting which direction the cam shaft rotates. See Figure 6.

3. Loosen DCL and DOL cams, and rotate them until their magnets face the door card.

4. Loosen the door card mounting bracket screws.

5. Slide the door card and bracket toward or away from the DCL and DOL cams until there is 1/8" between the card and the cams. The card MUST be square with the DCL and DOL cams.

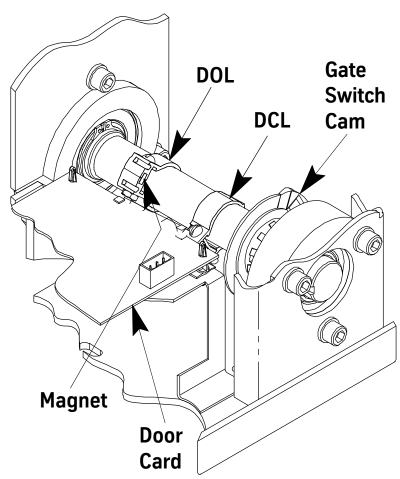


Figure 15 - Door Operator Cams

6. Tighten the door card mounting bracket screws.

7. Slide the DCL and DOL cams to align the center of their magnets with the center of their respective magnetic sensors at the edge of the door card.

Limit Setting
(continued)

8. Ensure that the door configuration jumpers on the door card are installed per Table 1. See Figure 7 on page 10 for locations.

9. Turn ON the mainline disconnect.

WARNING **To prevent automatic movement of the door while adjusting limit switches, place the elevator on Inspection Operation.**

10. Rotate the DCL cam in the same direction that the cam shaft rotated in Step 3 until the DCL LED just turns ON. Tighten the set screw.

11. Move the door to the fully open position, noting which direction the cam shaft rotates.

12. Rotate the DOL cam in the same direction the cam shaft rotated in the previous step until the DOL LED just turns ON. Tighten the set screw.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3*	On	Selects Zmodem Mode for uploading new s/w. Field Selectable.
	Off (default)	Selects Normal Mode for running. Field Selectable.
JP4*	On (default)	Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off	Selects Front Door Mode for receiving front door commands. Field Selectable.
JP5*	On	Selects RS485 Communication Link Mode. (Door Parameters D12 and D13=8) Field Selectable.
	Off	Selects CAN Communication Link Mode. (Door Parameters D12 and D13=7 or 9) Field Selectable.
JP6*	On	Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) (Door Parameters D12 and D13=9) Field Selectable.
	Off (default)	Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50/03 and TAC 50/04) (Door Parameters D12 and D13=7) Field Selectable.
* Must push reset to take affect.		

Table 1 - 6300PA4 Door Operator Card Configuration Jumpers

Limit Setting
(continued)

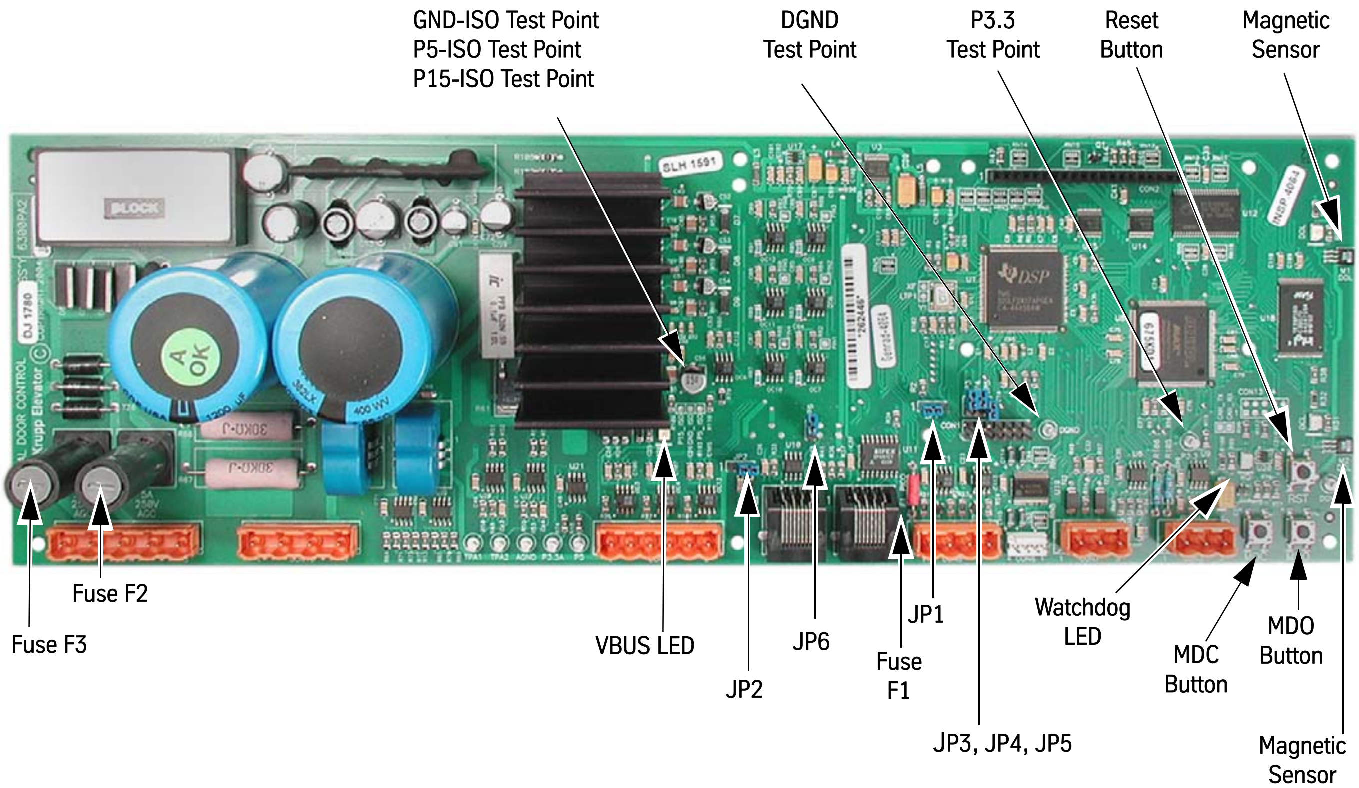


Figure 16 - 6300PA2 Door Operator Card

Direction Check

1. Check the Door Open Limit (DOL) and the Door Close Limit (DCL).
   a. Place car on Inspection Operation.
   b. Press MDO on the door card to open the door. Verify that the door opens fully, and that the DOL LED turns ON.
      - If the doors move in the open direction, continue with this procedure.
      - If the doors do NOT move in the open direction, use the UIT and scroll to MAIN->SYSTEM->ADJ->LHO to change the value. (LHO = 1 for left hand, and LHO = 0 for right hand). Repeat Step 1b.

Auto Null

1. Begin with the doors fully closed.
2. Use the UIT and scroll to MAIN->DOOR->CMD->AUTONULL.
3. Press Enter and the UIT displays: Nulling ADC offsets

Note: When complete, the UIT displays: Null complete

4. Save the autonull parameters to FLASH by selecting Save.

Door Scan

1. Place the car on Inspection Operation.
2. Make sure that the door is fully closed or fully open.
3. On the UIT, scroll to MAIN->PROFILE1->CMD->LEARN TRAVEL.
4. Press Enter and the UIT displays:

   Travel = (some number)

   Ent to Re-Learn
5. Press Enter and the UIT displays:

   Travel = 0.000

   Move Doors Now
6. Press MDO until the DOL LED turns ON and the UIT displays:

   Travel = (learned value)

   Save to Flash
7. Save the door scan to FLASH.
   a. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays:

      ENT to save

      ESC to exit

   b. Press ENTER, and the UIT displays: Adj's have been saved to FLASH

Profile Adjustments

The doors should perform well with default settings. However, if changes to the performance are required, see the *Diagnostics* section.

1. Place the car at the appropriate landing of the profile that is to be adjusted.
2. Use the UIT, scroll to MAIN->CONTROL->CMD->CYCLE MODE, and press ENTER to place the door in cycle mode.

Note: Some adjustments can not be changed with the door in motion. If the cycle mode does not have a delay, make adjustment changes only when the door is at rest on either limit.

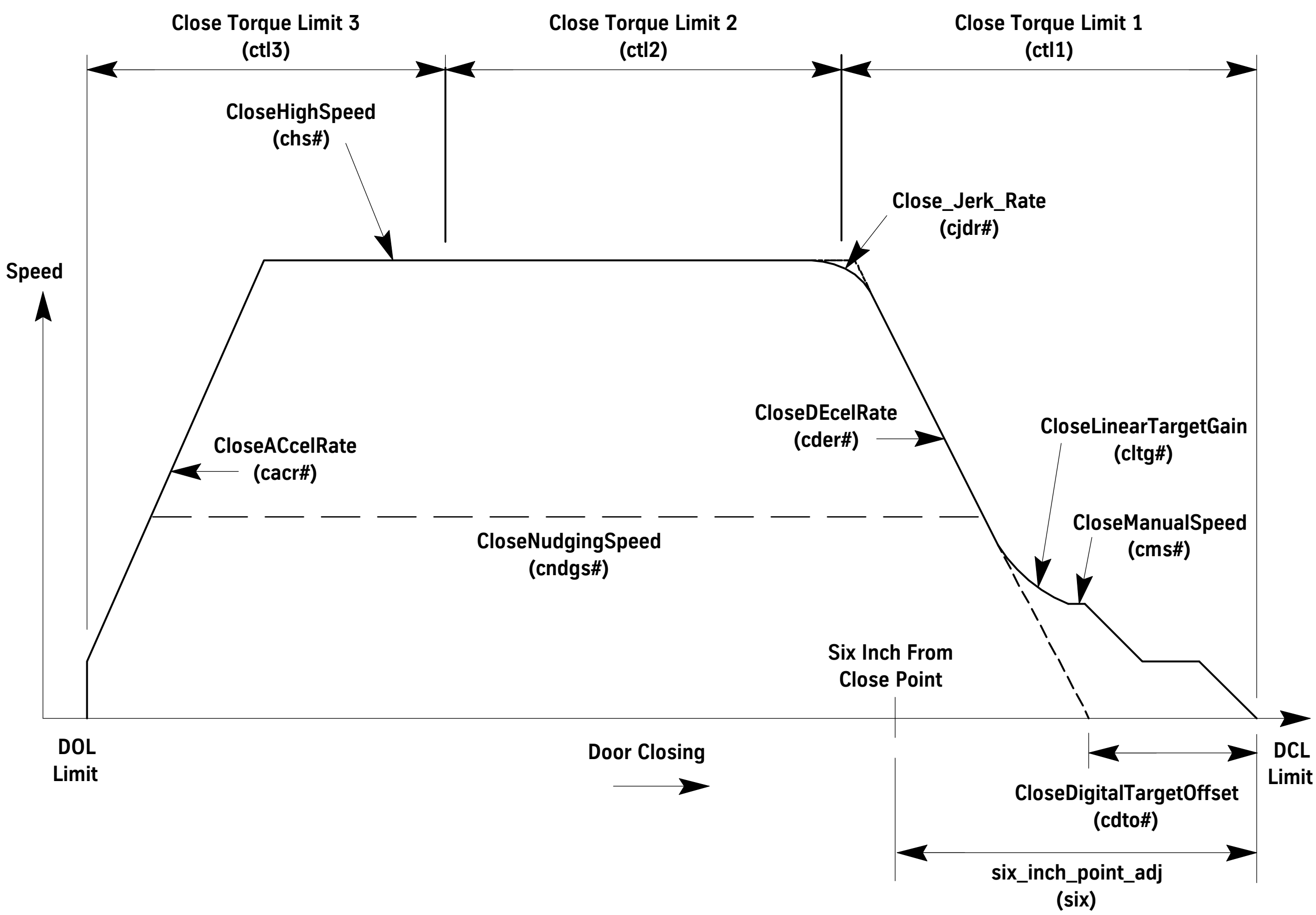
3. Scroll to MAIN>CONTROL>ADJ>CDT to adjust the delay time at each limit. Some delay at the door close limit is necessary to allow other adjustments to be changed.

CAUTION **To avoid mechanical damage to the doors when increasing open and close high speed, do NOT make drastic changes.**

4. On the UIT, scroll to MAIN->PROFILE#->ADJ-> and make the necessary door open and door close adjustments. See - Door Closing Profile on page 12 and - Door Opening Profile on page 13.
5. Save any adjustment changes to FLASH.

IMPORTANT! **Save changes to FLASH when the door is on DCL or the changes may not be accepted.**

Profile Adjustments
(continued)

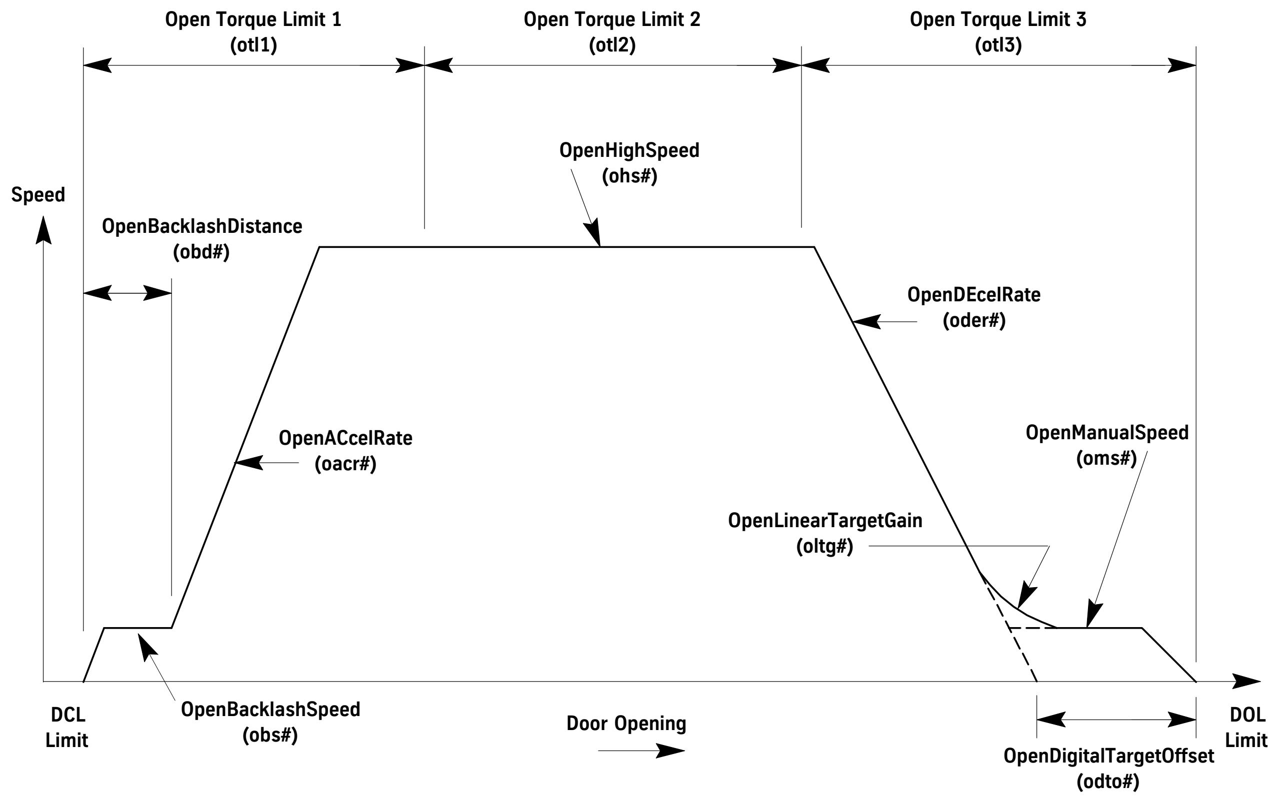


Profile#	Adjustment	Door Adjustment	
cacr#	CloseACcelRate	ctl1	Close Torque Limit
cbs#	CloseBacklashSpeed	ctl2	Close Torque Limit
cbt#	CloseBacklashTime	ctl3	Close Torque Limit
chs#	CloseHighSpeed		
cder#	CloseDEcelRate		
cms#	CloseManualSpeed		
cltg#	CloseLinearTargetGain		
cdto#	CloseDigitalTargetOff-		
cndgs#	CloseNudgingSpeed		

Note: # = Profile Number

Figure 17 - Door Closing Profile

Profile Adjustments
(continued)



Profile#	**Adjustment**	**Door Adjustment**	
oacr#	OpenACcelRate	otl1	Open Torque Limit
obs#	OpenBacklashSpeed	otl2	Open Torque Limit
obd#	OpenBacklashDistance	otl3	Open Torque Limit
ohs#	OpenHighSpeed		
oder#	OpenDEcelRate		
oms#	OpenManualSpeed		
oltg#	OpenLinearTargetGain		
odto#	OpenDigitalTargetOff-		

Note: # = Profile Number

Figure 18 - Door Opening Profile

Closing Force

1. Use the UIT, scroll to MAIN >DOOR >ADJ >STALL, and note the value so that it can be set back later.
2. Press ENTER, scroll to 0 (zero), and press ENTER again. This sets the value of STALL to 0.
3. Use a force gauge to measure the closing force. See Figure 10.

Notes:

- The closing force should be less than 30 lbf. in the middle 1/3 of travel.
- If the closing force is too high: Scroll to MAIN->DOOR->ADJ->CTL2, reduce the value, re-measure and repeat until the closing force is within limits.

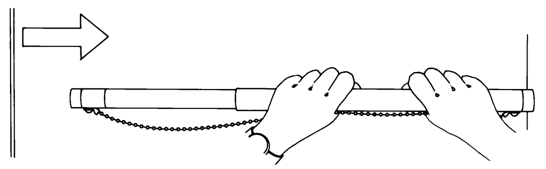


Figure 19 - Safe Use of the Door Gauge

4. Scroll to MAIN->DOOR->ADJ->STALL, and set STALL back to its original value.
5. Save the values to FLASH.
6. Scroll to MAIN->SYSTEM->CMD->SAVETOFLASH, press ENTER, and the UIT displays:

   ENT to save
   ESC to exit
7. Press ENTER, and the UIT displays: Adj's have been saved to FLASH.

Closing Kinetic Energy

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Use the UIT, scroll to MAIN->DOOR->MON->DOOR_trav, and record the value.
4. Use either MDC or MDO to move the doors to one of the following positions:

- Center Opening Doors: 1" from fully open
- Single Speed Doors: 2" from fully open

5. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
6. Subtract the DOOR_*pos* value from the DOOR_trav value.
7. Scroll to MAIN->DOOR->MON->ADJ->SWM1, and enter the value from the previous step.
8. Use either MDC or MDO to move the doors to one of the following positions:

- Center Opening Doors: 1" from fully closed
- Single Speed Doors: 2" from the face of the strike column

9. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
10. Scroll to MAIN->DOOR->MON->ADJ->SWM2, and enter the value from the previous step.

Closing Kinetic Energy
(continued)

11. Determine the minimum allowable closing time from the door operator nameplate.

12. Place the car on Automatic Operation.

13. Scroll to MAIN->DOOR->CMD->STOPWATCH, and press ENTER.

14. Choose the close time, press ENTER, and the UIT displays: POS Mark 1 n.nnn (value from SWM1).

15. Press ENTER, and the UIT displays: POS Mark 2 n.nnn (value from SWM2).

16. Press DOOR OPEN, and when door is fully open, press ENTER and the UIT displays: Stopwatch armed.

17. When the door closes, the UIT displays the closing time. If the closing time is less than the minimum allowable closing time specified, reduce the value of the close high speed (CHS#) adjustment and repeat until the closing time is greater than or equal to the minimum.

18. Save any adjustment changes to FLASH.

Set the Gate Switch

1. Position the door 1 1/2" from fully closed.

2. Rotate the disk in the CLOSE direction until the shorting bar just touches the two leaf contacts. See Figure 11.

3. Locate a tab on the locking ring that lines up with a notch in the contact disk.

4. Rotate the drive wheel until the door is fully closed and ensure that the shorting bar has not run past the leaf contacts.

5. Open and close the door to verify that the gate switch shorting bar enters the leaf contacts at 1 1/2" from fully closed.

Note: Verify that the shorting bar remains between the leaf contacts in the fully closed position. Be sure that the gate switch leaf contacts do not rub on the thin portion of the plastic disk during normal operation.

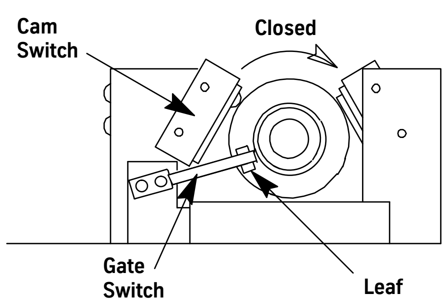


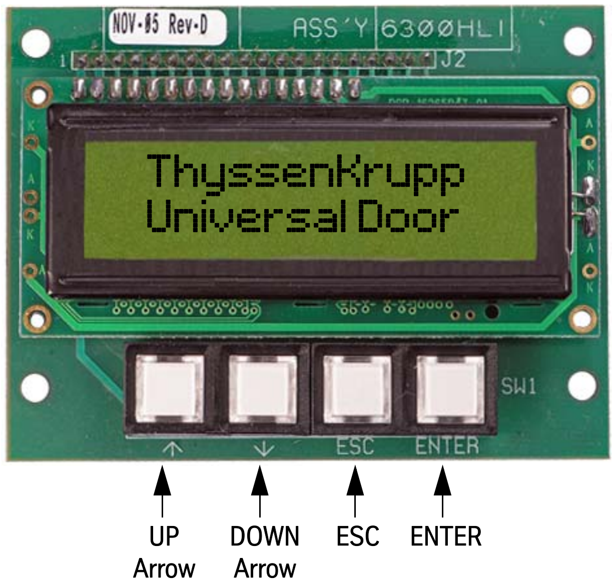
Figure 20 - Gate Switch

Final Security

Recheck all bolts, cap screws, cam hex screws, and belt tensions for proper tightness.

Diagnostics

The User Interface Tool (UIT)



UP or DOWN Arrow - Scrolls through menus, adjustments, and displays.

ESC - Exits the current level of a menu, adjustment, or display.

ENTER - Selects a menu, adjustment, or display.

Overview of Adjustments, Parameters, and Commands

- All adjustments must be made when the doors are idle.
- Before the card is reset or powered down, save any adjustment changes to FLASH.
- When the adjustment is a speed value:

  Increase the value = The door runs at a faster speed.

  Decrease the value = The door runs at a slower speed.
- When the adjustment is an acceleration or deceleration rate value:

  Increase the value = The door accelerates or decelerates faster.

  Decrease the value = The door accelerates or decelerates slower.
- When the adjustment is a distance or point value:

  Increase the value = The distance or point is further from either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.

  Decrease the value = The distance or point is closer to either the door open limit (DOL) or door close limit (DCL), depending on whether the door is opening or closing.
- Door position is stored at 0 on DCL and at Travel (TRV) on DOL.
- Speeds are (+) in the opening direction, and (–) in the closing direction.

The UIT Menu Tree

Main Menu

- Profile_#
  - Adjustment
    - OHS#
    - OMS#
    - OACR#
    - ODER#
    - ODTO#
    - OBS#
    - OBD
    - OLTG#
    - CHS#
    - CMS#
    - CACR#
    - CDER#
    - CDTO#
    - CJDR#
    - CLTG#
    - CNDGS#
    - KPCMD#
    - KICMD#
    - KDCMD#
    - KPFB#
    - KDFB#
    - LAG (Profile 1 only)
    - RSC (Profile 1 only)

    # = profile number
  - Command
    - Learn Travel
- Door
  - Adjustment
    - OTL1
    - OTL2
    - OTL3
    - CTL1
    - CTL2
    - CTL3
    - CLT
    - SIX
    - DIREV
    - STALL
    - ADP
    - PPR
    - IFB
    - RPM
    - LPTC
    - ADZ1
    - MDC
    - MNC
    - IKP
    - IKI
    - IVL
    - SWM1
    - SWM2
  - Monitor
    - DOOR_trav
    - DOOR_pos
    - upid_cmd_vel
    - upid_torque
    - upid_mtr_vel
    - upid_vel_err
    - upid_pos_err
    - adc_1
    - slip_comp_op
    - slip_comp_cl
    - DTG_open
    - DTG_close
    - profile_ID
  - Command
    - IGBT Err Rst
    - Shutdown
    - Stopwatch
    - Autonull
- System
  - Adjustment
    - LHO
    - DCM
    - DCI
    - DOI
    - ELI
    - MAL
    - LDO
    - FSP
    - UPM
    - DRM
  - Monitor
    - SW_v_r
  - Command
    - PASSWORD CONTROL
    - SAVE TO FLASH
    - STACK USAGE
    - FACTORY DEFAULTS
- Control
  - Adjustment
    - IBM0
    - DBM0
    - IBM1
    - DBM1
    - IBM4
    - DBM4
    - IBM5
    - DBM5
    - IIM
    - OIM
    - CDT
  - Command
    - Cycle Mode
  - Monitor
    - mcss_cmd_num
    - P_in_0
    - P_in_1
    - P_in_4
    - P_in_5
    - P_out_0
    - P_out_1
    - P_out_4
    - P_out_5
    - Exp_in
- Diagnostics
  - Adjustment
    - TPA1
    - TPA2
    - TPM1
    - TPD1
    - TPM2
    - TPD2
    - DM0
    - DZ0
    - DM1
    - DZ1
    - TPL1
    - TPL2
    - HEX
  - Monitor
    - TP1_out
    - TP2_out
    - TP1s_in
    - TP2s_in
    - TP1l_IN
    - TP2l_in
  - Command
    - DISPLAY FAULTS
    - CLEAR FAULTS

= Available Only if Main->System->Adj->MAL = 1

Adjustments

Control Adjustments

Name	Adjustment	Definition
CDT	Cycle Delay Time	The time the door control delays at each limit when doors are on continuous cycle mode.
DBM0	De-Bounce Bit Mask 0	The signals can have additional de-bouncing - set the corresponding bit.
DBM1	De-Bounce Bit Mask 1	The signals can have additional de-bouncing - set the corresponding bit.
DBM4	De-Bounce Bit Mask 4	The signals can have additional de-bouncing - set the corresponding bit.
DBM5	De-Bounce Bit Mask 5	The signals can have additional de-bouncing - set the corresponding bit.
IBM0	Invert Bit Mask 0	The signals can be inverted - set the corresponding bit.
IBM1	Invert Bit Mask 1	The signals can be inverted - set the corresponding bit.
IBM4	Invert Bit Mask 4	The signals can be inverted - set the corresponding bit.
IBM5	Invert Bit Mask 5	The signals can be inverted - set the corresponding bit.
IIM	Input Invert Mask	This is the input invert mask for the I/O Expansion.
OIM	Output Invert Mask	This is the output invert mask for the I/O Expansion.

Diagnostic Adjustments

Notes:
- These values are for diagnostic purposes and cannot be changed using the UIT.
- The test points have a range of 0V minimum to +3V maximum.
- The test point outputs are based on Equation 1 and Equation 2.
  Equation 1= TP1out = ((TP1in * TPM1) / TPD1) * 0.73mV + 1.5V
  Equation 2 = TP2out = ((TP2in * TPM2) / TPD2) * 0.73mV + 1.5V

Adjustment	Minimum	Default	Maximum	Definition
DM0	0	2048	4095	DAC 0 Multiplier.
DM1	0	2048	4095	DAC 1 Multiplier.
DZ0	-1228	0	1228	DAC 0 Offset.
DZ1	-1228	0	1228	DAC 1 Offset.
HEX	–	0	–	Values in Hex.
TPA1	0	2048	32767	Test Point 1 Address.
TPA2	0	2048	32767	Test Point 2 Address.
TPD1	0	0	32767	Test Point 1 Divider.
TPD2	0	0	32767	Test Point 2 Divider.
TPL1	–	0	–	Test Point 1 Length.
TPL2	–	0	–	Test Point 2 Length.
TPM1	1	1	32767	Test Point 1 Multiplier.
TPM2	1	1	32767	Test Point 2 Multiplier.

VERTICAL EXPRESS

Door Adjustments

Adjustment	Minimum	Default	Maximum	Definition
ADP*	1	1	DPL	Active Door Profile.
ADZ0*	-8192	0	8192	A/D Digital Zero 0.
ADZ1*	-8192	0	8192	A/D Digital Zero 1.
CLT	0	10	25	Closing Torque.
CTL1	0	20	100	Close Torque Limit 1.
CTL2	0	20	100	Close Torque Limit 2.
CTL3	0	40	100	Close Torque Limit 3.
DIREV	0	100	500	Smooth Turnaround.
IFB*	0	0	1	Invert Feedback - Do Not Change.
IKI*	0	807	6400	Current Loop Integral Gain - Do Not Change.
IKP*	0	1.25	8.0	Current Loop Proportional Gain - Do Not Change.
IVL*	10	95	100	Current Loop Voltage Limit - Do Not Change.
LPTC*	0	.015	.050	Low Pass Time Constant.
MDC*	MNC	6.79	6.8	Maximum Drive Current.
MFC*	0	1.0	MNC	Motor Field Current.
MNC*	MFC	1.4	MDC	Motor Nameplate Current - Do Not Change.
MTP*	2.0	6.0	8.0	Motor Poles - Do Not Change.
OTL1	0	50	100	Open Torque Limit 1.
OTL2	0	45	100	Open Torque Limit 2.
OTL3	0	20	100	Open Torque Limit 3.
PPR*	64	500	2048	Encoder Resolution.
RPM*	500	1150	2048	Motor RPM.
RSF*	.10	3.1	6.0	Rated Slip Frequency - Do Not Change.
SIX	0	1.0	15.9	Six Inch Point.
STALL	0	50	300	Stall Velocity.
SWM1	0	0	32.767	Stop Watch Mark 1.
SWM2				Stop Watch Mark 2.
*System Adjustment MAL must equal 1 for the availability of the adjustment.				

Profile Adjustments

Notes:
- # = Profile Number
- Several different door operation profiles are available.
- Each profile has adjustments for both Open and Close; The profile adjustments have the same minimum, default, and maximum values.
- Each value may be adjusted for a different purpose.
- Adjustment values can relate to one another only within the same door operation profile.

Adjustment	Minimum	Default	Maximum	Definition
CACR#	0	1200	3600	Close Acceleration Rate.
CDER#	0	900	1919	Close Deceleration Rate.
CDTO#	-2.0	0	2.0	Close Digital Target Offset.
CHS#	Close manual speed adjustment value.	300	Rated RPM of motor in RPM adjustment.	Close High Speed.
CJDR#	0	3100	8192	Close Jerk Rate.
CLTG#	60	120	3000	Close Linear Target Gain.
CMS#	0	40	Close high speed adjustment value.	Close Manual Speed.
CNDGS#	0	125	Close high speed adjustment value.	Nudge Close Speed.
KDCMD#	0	0	327.67	Speed Control Derivative Gain - Do Not Change.
KDFB#	0	0	327.67	Speed Feedback Derivative Gain - Do Not Change.
KICMD#	0	22.2	3276.7	Speed Control Integral Gain - Do Not Change.
KPCMD#	0	0	327.67	Speed Command Proportional Gain - Do Not Change.
KPFB#	0	3.33	327.67	Speed Feedback Proportional Gain - Do Not Change.
LAG	0	0.150	0.250	Profile Lag Compensation - Do Not Change.
OACR#	0	1200	3600	Open Acceleration Rate.
OBD	0	1.0	10	Open Backlash Distance.
OBS#	0	60	Open high speed adjustment value.	Open Backlash Speed.
ODER#	0	1200	3839	Open Deceleration Rate.
ODTO#	-2.0	0	2.0	Open Digital Target Offset.
OHS#	Open manual speed adjustment value.	400	Rated RPM of motor in RPM adjustment.	Open High Speed.
OLTG#	60	150	3000	Open Linear Target Gain.
OMS#	0	40	Open high speed adjustment value.	Open Manual Speed.
RSC	0	0	2000	Re-open Slip Compensation - Do Not Change.

VERTICAL EXPRESS

System Adjustments

These adjustments will not take effect until the new value is saved to FLASH and the door operator card is reset.

Adjustment	Minimum	Default	Maximum	Definition
DCI	–	0	–	Discrete Controller Interface.
DCM	–	1	–	DC Motor Control Selection.
DOI	–	0	–	Discrete Operator Interface.
DPL	1	5	5	Door Profile Limit.
DRM	1	4	50	Multiple for Slow Clock - Do Not Change.
ELI	–	0	–	Electronic Limit Interface.
FSP	250	1000	2500	Sample Frequency - Do Not Change.
LDO	–	0	–	Linear Door Operator.
LHO	–	1	–	Left Hand Operation.
MAL	–	0	–	Menu Access Level.
UPM	1	2	50	Multiple for Medium Clock - Do Not Change.

Parameters

CAN Parameters

These values are viewable only to aid in factory-level diagnostics. Not for field use.

Name	Command	Definition
CEC	Transmit and Receive Error Counters	Displays value of transmit and receive error counters.
ESR	Error Status Register	Displays value of error status register.
GSR	Global Status Register	Displays value of global status register.
MDER	Mailbox Direction/Enable Register	Displays value of mailbox direction/enable register.
RCR	Receive Control Register	Displays short test point 1 input variable.
TCR	Transmission Control Register	Displays value of transmission control register.

Parameters
(continued)

Control Parameters

These values are viewable only to aid in diagnostic purposes.
MCS = Motion Control State Number - Indicates the current motion control state shown below.

Motion Control State Number	Description
4	Direction Reversal
8	Stop Door
9	Hold Closed
10	Nudge Close
11	Manual Open
12	Manual Close
13	Open Door
14	Close Door

For the availability of the following parameters, System Adjustment MAL must equal 1.

Name	Command	Definition
PIN0	Input Parameter 0	Use to view the status of the parameters shown in the table.
PIN1	Input Parameter 1	
PIN4	Input Parameter 4	
PIN5	Input Parameter 5	
POUT0	Output Parameter 0	
POUT1	Output Parameter 1	
POUT4	Output Parameter 4	
POUT5	Output Parameter 5	

Diagnostic Parameters

These values are viewable only to aid in diagnostic purposes.

Name	Command	Definition
TPL1	Test Point 1 Long In	Displays long test point 1 input variable.
TPL2	Test Point 2 Long In	Displays long test point 2 input variable.
TPO1	Test Point 1 Out	Displays test point 1 voltage out (above and below 1.5V nominal).
TPO2	Test Point 2 Out	Displays test point 2 voltage out (above and below 1.5V nominal).
TPS1	Test Point 1 Short In	Displays short test point 1 input variable.
TPS2	Test Point 2 Short In	Displays short test point 2 input variable.

Door Parameters

Name	Command	Definition
ADC0	Analog to Digital Converter 0	Displays the value of analog to digital converter number 0.
ADC1	Analog to Digital Converter 1	Displays the value of analog to digital converter number 1.
CSC	Close Slip Compensation	This value is automatically set - Do Not Change.
DPID	Profile ID	Displays current profile.
DTGC	Distance To Go Close	Calculated value based on travel and close slip compensation.
DTGO	Distance To Go Open	Calculated value based on travel and open slip compensation.
OSC	Open Slip Compensation	This value is automatically set - Do Not Change.
POS	Door Position	Displays position of door in motor revolutions from door close limit (DCL).
TRV	Door Travel	This is the travel value learned when a door scan is performed.
UCV	UPID Command Velocity	Displays the dictated or commanded velocity.
UMV	UPID Motor Velocity	Displays the dictated or commanded motor velocity.
UPE	UPID Position Error	Displays the difference between calculated position and actual position.
UTQ	UPID Torque	Displays the dictated or commanded torque.
UVE	UPID Velocity Error	Displays difference between dictated/commanded velocity and actual velocity.

System Parameters

Name	Command	Definition
VER	Software Version/Revision	Displays the version/revision of door operator software.

Fault Codes

- 2000 Series Fault Code = Front Door Operator
- 3000 Series Fault Code = Rear Door Operator

Fault Code	Description
2036 / 3036	IGBT FAULT.
2050 / 3050	ENCODER FAULT.
2051 / 3051	XS BELT SLIP FLT.
2053 / 3053	MOTOR WIRE WRONG.
2054 / 3054	REV ENCODER FLT.
2055 / 3055	TRAVEL FAULT.
2056 / 3056	OPEN OS FAULT.
2057 / 3057	CLOSE OS FAULT.
2058 / 3058	CL RUNAWAY FAULT.
2059 / 3059	BUS POWER FAULT.
2060 / 3060	OP RUNAWAY FAULT.
2061 / 3061	OP OV DRIVE FAULT.
2062 / 3062	CL OV DRIVE FAULT.
2063 / 3063	IFBK FAULT.
2064 / 3064	I SERIAL COM FAULT.
2065 / 3065	I SCALE FAULT.
2066 / 3066	DOL DCL FAULT.
2067 / 3067	DOL FAILURE.
2068 / 3068	DCL FAILURE.
2069 / 3069	MAX TORQUE FAULT.

Technical Information

Record Flight Time

This procedure requires two people - one in the car, and one on top of the car.

1. Place the car at the landing where the test will be performed.
2. Place car on Inspection Operation.
3. Use the UIT, scroll to MAIN->DOOR->ADJ->SWM1, and enter 0 (zero).
4. Scroll to MAIN->DOOR->MON->DOOR_trav, and record the value.
5. Use MDC or MDO to move the doors to 3/4 fully open position.
6. Scroll to MAIN->DOOR->MON->DOOR_pos, and record the value.
7. Subtract the POS value from the TRV value, and enter this value in door adjustment SWM2.
8. Place the car on Automatic Operation. The doors will close.

Record Flight Time
(continued)

9. Scroll to MAIN->DOOR->CMD->STOPWATCH, and press ENTER.
10. Choose the flight time, press ENTER, and the UIT displays: POS Mark 1 n.nnn (value from SWM1).
11. Press ENTER, and the UIT displays: POS Mark 2 n.nnn (value from SWM2).
12. Press and hold Door Open (to open the doors), enter a car call for the next landing - Up/ Down.
13. Release Door Open. The doors will close, and the car will run to the selected car call. When the car makes its run and the doors open, the flight time is displayed.

Note: SWM1 and SWM2 values are retained, without saving, until the Door Operator Power is cycled or the Door Card is reset.

Jumper Settings

If the card is not communicating with IMS, verify that the jumpers are set as shown in Table 2. If not, power down the card, set the jumper(s) to the proper setting, and power up the card.

Jumper	Jumper Setting/Position	Description
JP1	Jumper on 1 and 2 (default)	Selects the DSP to run as a microcontroller. Factory Use Only.
	Jumper on 2 and 3	Selects the DSP to run as a microprocessor. Factory Use Only.
JP2	Jumper on 1 and 2	Provides +5 VDC programming voltage for the DSP core FLASH. Factory Use Only.
	Jumper on 2 and 3 (default)	Removes +5 VDC programming voltage to the DSP core FLASH. Factory Use Only.
JP3	On	*Selects Zmodem Mode for uploading new software. Field Selectable.
	Off (default)	*Selects Normal Mode for running. Field Selectable.
JP4	On	*Selects Rear Door Mode for receiving rear door commands. Field Selectable.
	Off (default)	*Selects Front door mode for receiving front door commands. Field Selectable.
JP5	On (default)	*Selects RS485 communication link mode. Field Selectable. (Door Parameters D12 and D13=8).
	Off	*Selects CAN communication link mode. Field Selectable. (Door Parameters D12 and D13=7 or 9).
JP6	On	*Selects 100K baud for CAN communication link. (JP6 ON for ISIS 1) Field Selectable. (Door Parameters D12 and D13 = 9).
	Off (default)	*Selects 50K baud for CAN communication link. (JP6 OFF for TAC 50-03 and TAC 50-04) Field Selectable. (Door Parameters D12 and D13=7).
*Reset must be pressed for changes to take effect.		

Table 2 - Jumper Settings

Upload FLASH Program Software

If the FLASH code becomes corrupted, the FLASH code can be reinstalled.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Install a UIT (User Interface Tool) on CON2.
3. Use a serial cable with a 4-pin connector adapter to connect a laptop with the HyperTerminal software to the UDC Card at CON6.
4. Click Start.
5. Select Programs -> Accessories -> HyperTerminal. The Connection Description window opens.
6. Type in a name, such as "FLASH COMM", select an Icon, and then click OK. The Connect To window opens.
7. Select the arrow beside Connect Using:, then select COM1 (or the port that will be used) from the list and click OK. The COM1 Properties window opens.
8. Type in the following properties:
   - Bits per second: 38400
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow Control: Hardware
9. Click OK. This session will be activated.
10. Select File -> Save.
11. Select File -> Properties. The Properties dialog box opens.
12. Select Settings. Verify the following:
    - The function, arrow, and ctrl keys act as terminal keys
    - The backspace key sends: Ctrl+H
    - Emulation: Auto detect
    - Telnet terminal ID: ANSI
    - Back scroll buffer lines: 500
13. Click ASCII Setup, and verify the following:
    - Line delay: 0 milliseconds
    - Character delay: 0 milliseconds
    - *Wrap lines that exceed terminal width* is the only item checked

Upload FLASH Program Software

(continued)

14. Click OK on both dialog boxes.

15. Select the Transfer pull-down menu, then select Send File.

16. Use the Browse Command to find the correct file, click the filename, and then click Open.

17. Install jumper JP3, and press Reset (on the door card).

18. Turn ON the mainline disconnect.

Note: The UIT displays the status message "ZMODEM READY." If this message is not shown, replace the door card.

19. To start the software upload, click Send in the HyperTerminal screen.

20. When the upload is complete, the UIT displays:

    ThyssenKrupp
    Universal Door

21. Remove jumper JP3, press Reset, and the UIT displays:

    ThyssenKrupp
    Universal Door

22. Turn OFF, Lock, and Tag out the mainline disconnect.

23. Remove the cable from CON6.

Determine the Software Version/Revision

1. Begin with the doors fully closed.
2. Scroll to MAIN->SYSTEM->MON->SW_v_r and press ENTER.

Note: The UIT will display the software version and revision. The first two digits are the version, and the second two digits are the revision.

2. Press ESC until the main menu displays.

Cycle Mode

The cycle command (CYC), when activated, will cause the doors to continuously cycle. The delay at the DOL and the DCL is controlled by the cycle delay time (CDT) adjustment.

Activate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays:

   ENT to ENABLE
   CYCLE Mode

2. Press ENTER, and the UIT displays:

   Control/Cmd
   Cycle Mode

Note: The doors will start cycling.

Cycle Mode
(continued)

Deactivate the Cycle Command

1. Scroll to MAIN->CONTROL->CMD->Cycle Mode, press ENTER, and the UIT displays:

   ENT to ENABLE
   CYCLE Mode

2. Press ENTER, and the UIT displays:

   Control/Cmd
   Cycle Mode

Note: The doors will stop cycling.

Restart the IGBT Power Module

The power module may be reset if an overcurrent circuit condition has caused the power module to send a shutdown signal to the DSP. The power module can only be reset after the fault condition has been cleared.

1. Scroll to MAIN->DOOR->CMD->IGBT ERR Rst, press ENTER, and the UIT displays:

   ENT to Proceed
   ESC to Exit

2. To reset the power module, press ENTER, and the UIT displays:

   PWM Reenabled

Note: The power module has now been reset.

3. Press ESC until the main menu displays.

Shut Down the IGBT Power Module

This command prevents any motor operation including the Manual Door Open (MDO) and Manual Door Close (MDO) functions.

1. Scroll to MAIN->DOOR->CMD->Shutdown, and press ENTER.

Note: The UIT display will not change, and the power module has now been shutdown.

2. Press ESC until the main menu displays.

Restore Factory Defaults

Each HD-03 Door Operator is shipped with certain parameters and adjustments modified to match the job condition. The defaults, however, remain the same for all units.

CAUTION **The supplied configuration of the door operator uses adjustment and parameter values that are different from the default values shown in the Diagnostics Section. Using the Factory Defaults Command (FDF) could result in a maladjusted or non-functioning door operator.**

1. Begin with the doors fully closed.
2. Scroll to MAIN->SYSTEM->CMD->FACTORY DEFAULTS, press ENTER, and the UIT displays:

   ENT to Restore
   ESC to Exit

3. Press ENTER, and the UIT displays:

   Values Restored

Note: All adjustments, parameters and commands are now set to the factory defaults.

4. Press ESC until the main menu displays.

Troubleshooting

Power Up Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect.

2. Unplug the connectors from the door card.

3. Turn ON the mainline disconnect.

4. Measure AC voltage on the door operator terminal strip across AC1S and AC2. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
   - The power switch in the door control box is ON.
   - The AC1S switch is ON in the swing return.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in elevator controller are good.

5. Measure the AC voltage across AC1S and ACG.
   a. If the voltage is in range of 0 and 80 VAC, measure AC2 to ACG.
   b. If AC2 to ACG is in range of 103 and 126 VAC, AC1S and AC2 have been reversed; Reverse AC1S and AC2.

6. With the system still powered Up, measure the DC voltages on the door operator terminal strip across P24 and G24. The voltages should match the voltages in Table 3. If the voltage measured is zero (0), verify the following:
   - The P24 switch in the swing return is ON.
   - The connections in the swing return are good.
   - The power is ON at the elevator controller.
   - The fuses in the elevator controller are good.
   - The connections in the elevator controller are good.

Voltage	Meter Set-ting	Positive Meter Probe	Negative Meter Probe	Voltage Measured
AC1S	Volts AC	AC1S terminal 6	AC2 terminal 5	103 - 126 VAC
AC1S	Volts AC	AC1S terminal 6	ACG terminal 4	103 - 126 VAC
AC2	Volts AC	AC2 terminal 5	ACG terminal 4	0 - 80 VAC
P24	Volts DC	P24 terminal 17	G24 terminal 20	22 - 26 VDC

Table 3 - Voltage Settings

LED Verification

1. Turn OFF, Lock, and Tag out the mainline disconnect. Reconnect the connectors on the door card (located inside the door operator).

2. Make sure the doors are in the fully closed position.

3. Turn ON the mainline disconnect.

4. Verify that the VBUS and WD LEDs are ON. See Figure 12 on page 38.

Note: If the VBUS or the WD LED does not come ON, see Troubleshooting Guide on page 40.

5. Verify that the door is still in the fully closed position, and that the DCL LED is ON. If the LED does not come ON, see Troubleshooting Guide on page 40.

6. Turn OFF the toggle switch (located in the door operator).

7. Manually move the doors to the fully open position.

8. Turn ON the toggle switch.

9. With the door in the fully open position, verify that the DOL LED is ON. If the LED does NOT come ON, see Troubleshooting Guide on page 40.

Power Supplies Check

1. Turn the door card ON and measure the voltages at the specified points on the door card. The voltage for each measurement should be in the range noted.

WARNING **When checking door card power supplies, take great care to avoid electrical shock and/or damage to the door card.**

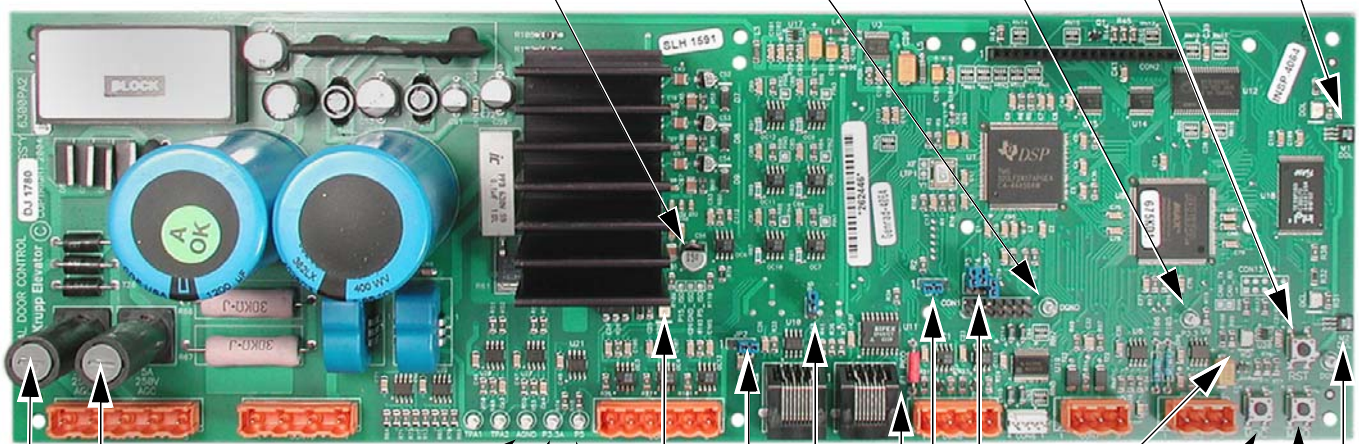
The power supply for the door motor is named V-Buss. The voltage for this power rail is generated from the incoming 115 VAC, and the 115 VAC is rectified and filtered to produce the DC power supply. A VBUS indicator LED is provided on the card.

2. The VBUS LED will indicate whether this power supply is good.

   - If the VBUS LED is not ON, see Troubleshooting Guide on page 40.
   - If 115 VAC is available at CON11, pins 1 and 2, and the VBUS LED is not ON, replace the door operator card.

LED Verification and Power Supplies Check

(continued)



Power Supply	Measurement Locations	Acceptable Voltage Range (VDC)
P5	P5 Test Point to DGND Test Point	4.875 to 5.125
P3.3	P3.3 Test Point to DGND Test Point	3.2 to 3.37
P3.3A	P3.3A Test Point to AGND Test Point	3.2 to 3.4
P5_ISO	P5_ISO Test Point to GND_ISO Test Point	4.5 to 5.5
P15_ISO	P15_ISO Test Point to GND_ISO Test Point	14.625 to 15.375

Figure 21 - Door Card Power Supply Check

Checking the Encoder

Perform this check to ensure that the encoder signals are working properly.

1. Before conducting this test, verify that fuse F1 on the door card is good.
2. Use a digital multimeter, and measure the voltage across fuse F1.
   - If the voltage reads higher than 1.5 volts, replace the fuse.
   - If the voltage reads below 1.5 volts, the fuse is good.

The best way to check the encoder signals is with an oscilloscope. If an oscilloscope is not available, use the digital multimeter method.

Oscilloscope Method

Required tool: An oscilloscope with two working channels.

1. Set the vertical channel to 5V/div.
2. Set the horizontal channel to 1uS/div.
3. Connect the ground leads for both channels to the GND test point.
4. Connect the channel A probe to CON8-2 (PHA).
5. Connect the channel B probe to CON8-3 (PHB).
6. Slowly rotate, by hand, the door motor.

Note: PHA and PHB should be 90 degrees out-of-phase, and toggle between 0 to 1 and 4.5 to 5 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Digital Multimeter Method

Required tool: A digital multimeter set to measure DC volts.

1. Connect the negative lead to the GND test point, and the positive lead to CON8-2 (PHA).
2. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

3. Connect the negative lead to the GND test point, and the positive lead to CON8-3 (PHB).
4. Slowly rotate, by hand, the door motor.

Note: The digital multimeter display should toggle between less than 1 volt and greater than 4 volts.

If both signals, PHA and PHB, toggle as they should then the encoder is working. The door card may need replacing.

Troubleshooting Guide

For assistance, please call 1-866-HELP-TKE.

Problem	Possible Causes or Solutions
Doors Run the Opposite Direction When First Powered Up	1. Change the hand of the operator by changing the LHO adjustment. 2. To verify that the change corrected the problem, press MDO to verify that the doors move in the open direction. 3. Press MDC to verify that the doors move in the close direction. 4. Save this adjustment change to FLASH.
Doors Will Not Close to Fully Closed Position	1. Verify that the DCL limit is adjusted properly, and that the DCL LED comes ON when the magnet is aligned with the hall-effect sensor. 2. Verify that the mechanical stop is set properly and is not interfering with the close cycle. 3. Verify that the drive arms are setup and aligned properly.
VBUS LED Will Not Light	1. Verify that the power switch in the operator is in the ON position. 2. Check for 115VAC across pins 1 and 2 of CON11. 3. Check fuse F2 on the door card; Replace if necessary. 4. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
WD LED Will Not Light	1. Verify that power switch in operator that is located on the PC card shelf is in the ON position. 2. Check fuse F3 on the door card; Replace if necessary. 3. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
DCL or DOL LED Will Not Light	Note: The DCL or DOL LEDs will not light unless the magnet cam is aligned with the hall- effect sensor on the end of the card. 1. Verify proper alignment of the magnetic limit cam with the hall-effect sensor. If not aligned properly, adjust the magnetic limit cam on the door operator cam shaft. 2. Verify that the DCI, ELI, and LDO adjustments are all set to 0 (zero). 3. Verify that the power switch in the operator is in the ON position. 4. Check fuse F3 on the door card; Replace if necessary. 5. Verify that the wires for power (those going to CON11) are securely fastened and in the correct place.
MDO Starts to Open Doors, But Doors Reclose	Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller.
MDC Starts to Close Doors, But Doors Reopen	Verify that the car is on Inspection Operation. The MDC is overridden by a open door command from the elevator controller, or by an active SE signal.

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Close After Opening, or Doors Open Without Command and Will Not Close	1. Verify that the SE signal is not active; The SE signal is active low. 2. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. 3. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. **Note**: If the voltage at the CON9 is greater than 2 volts then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the door way.
Doors Will Not Reverse on Safety Edge Activation	1. Verify that the wires for safety edge signal are securely fastened and in the correct connector. The safety edge signal wire goes to CON9-5 on the UDC. 2. Verify that the SE signal return wire (G24) is connected to CON9-6. 3. Verify that the signal is getting to the UDC card. a. Use a digital multimeter to place the black probe on CON9-6 and the red probe on CON9-5. b. Activate the safety edge, and verify that the digital multimeter reads less than 2 volts. The safety edge input is active low. • If the voltage at CON9 is greater than 2 volts, then the wiring in the safety edge enclosure will have to be changed so that the signal goes low when an obstruction is in the doorway. • Setting IBM4 to 0 will invert the active state for the SE Input.
Doors Will Not Set Up	1. Verify that the motor moves the door in the correct direction when MDC or MDO are pushed. 2. Verify that the encoder is connected properly. 3. Verify 5 VDC to the encoder connector. 4. Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1, and the black probe on CON8-4. • If the voltage reads less than 4.5 volts, check the fuse. • If the voltage reads above 4.5 volts, check the encoder signals. 5. Verify that the encoder power fuse F1 on the door card is good. 6. Verify that the encoder works.

<table>
<tr><th>Problem (Continued)</th><th>Possible Causes or Solutions</th></tr>
<tr><td>Door Motor Vibrates When Trying to Move the Door</td><td>
1. Verify that the proper motor type is selected in the DCM adjustment.
2. Verify that the motor leads are connected per the Motor Connections Chart below.
Note: The motor and encoder connections must match what is shown in the charts below. If any of these connections are not correct, unstable operation will result.
CAUTION
Do not change motor or encoder connections to change door direction. To change door direction, use the LHO Adjustment.
3. Verify that the encoder is connected per the Encoder Connections Chart below.
4. Verify 5 VDC to encoder connector.
• Use a digital multimeter to measure the voltage from CON8-1 to CON8-4. Place the red probe on CON8-1 and the black probe on CON8-4.
• If the voltage reads less than 4.5 volts, check the fuse.
• If the voltage reads above 4.5 volts, check the encoder signals.
5. Verify that the encoder power fuse F1 on the door card is good.
6. Verify that the encoder works.

Motor Connections
<table>
<tr><th>Connector-Pin</th><th>VFD Cable Wire No.</th><th>AC Motor Leads</th><th>DC Motor Leads</th></tr>
<tr><td>CON10-2</td><td>1</td><td>1</td><td>no connect</td></tr>
<tr><td>CON10-4</td><td>2</td><td>2</td><td>Red</td></tr>
<tr><td>CON10-3</td><td>3</td><td>3</td><td>Black</td></tr>
<tr><td>GND Screw</td><td>Green</td><td>Green</td><td>no connect</td></tr>
</table>

Encoder Connections
<table>
<tr><th>Connector-Pin</th><th>Wire Color</th><th>Signal</th></tr>
<tr><td>CON8-1</td><td>Red</td><td>P5</td></tr>
<tr><td>CON8-2</td><td>White</td><td>PHA</td></tr>
<tr><td>CON8-3</td><td>Green</td><td>PHB</td></tr>
<tr><td>CON8-4</td><td>Black</td><td>GND</td></tr>
</table>
</td></tr>
<tr><td>Doors Will Not Open to Fully Open Position</td><td>
1. Verify that the DOL limit is adjusted properly, and that the DOL LED comes ON when the magnet is aligned with the hall-effect sensor.
2. Verify that the mechanical stop is set properly and is not interfering with the open cycle.
3. Verify that the drive arms are setup and aligned properly.
</td></tr>
</table>

Problem (Continued)	Possible Causes or Solutions
Doors Will Not Move When MDO or MDC Is Pushed	1. Verify that there are no mechanical restrictions or binds. 2. Verify that the IGBT has not been shut down due to a fault. Check faults and follow the instructions for the particular faults that are listed. If the fault listed is the IGBT_FAULT, reset the IGBT power module. 3. If MDO does not work: a. Verify that the car is on Inspection Operation. The MDO is overridden by a close door command from the elevator controller. b. Verify that the DOL limit is not active. If it is active, the doors will not open. If on the DOL limit, move the doors off of the open limit and verify that MDO does cause the doors to open. 4. Verify that the car is on Inspection Operation. The MDC is overridden by an open door command from the elevator controller, or by an active SE signal. 5. If MDC does not work: a. Verify that the DCL limit is not active. If it is active, the doors will not close. If on the DCL limit, move the doors off of the close limit and verify that MDC does cause the doors to open. 6. Verify that VBUS LED is ON. 7. Verify that WD LED is ON. 8. Power down the card, remove the connector to the motor, and power up the card. 9. Connect a voltmeter to the motor output pins; be very careful not to short the pins together. 10. Press MDO or MDC, and verify that there is voltage on the motor output pins. a. If voltage is present, check the motor wiring. If wiring is good, the motor may be bad. b. If no voltage is present, verify that the correct door operator profile is loaded for the type of door and motor being used. If the correct door operator profile is loaded and the IGBT is not faulted out, the card may be damaged.

Maintenance

1. Check that the motor mounting bolts are tight.

2. Remove the brush covers (where applicable), blow out the brush holders, check the brushes for wear, and reinstall the covers.

3. Inspect the operator belts for the following:
   a. Cracks or glazing
   b. Even wear on both sides of the belt
   c. The belts are not bottomed out in the grooves
   d. Proper tension (belt slippage).

The following guidelines apply when testing, adjusting, or replacing belts:

- Ideal tension is the lowest tension at which the belt will not slip at peak load.
- All belts in the set should be tested for equal tension by pushing each belt down at the midpoint between the pulleys (typical deflection is 3/8" with 10 lbf applied).
- If belts require tensioning, check the sheave alignment with a straight edge.
- If belts are replaced on multi-groove sheaves, change the belts as a matched set.

4. Check that all of the linkage bolts are tight.

5. Remove the door operator cover, rotate the door operator by hand, and check the operation of the DOL and DCL sensors.

6. Check the operation of the gate switch, and make sure that it is adjusted per code.

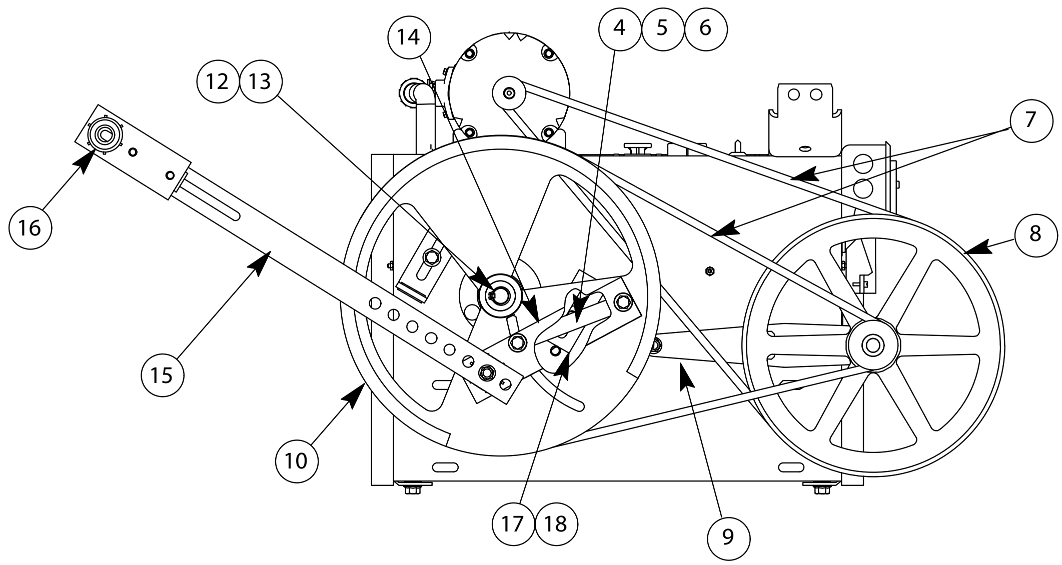
7. Use a burnishing tool or clean rough paper, and clean the gate switch contacts (if necessary).

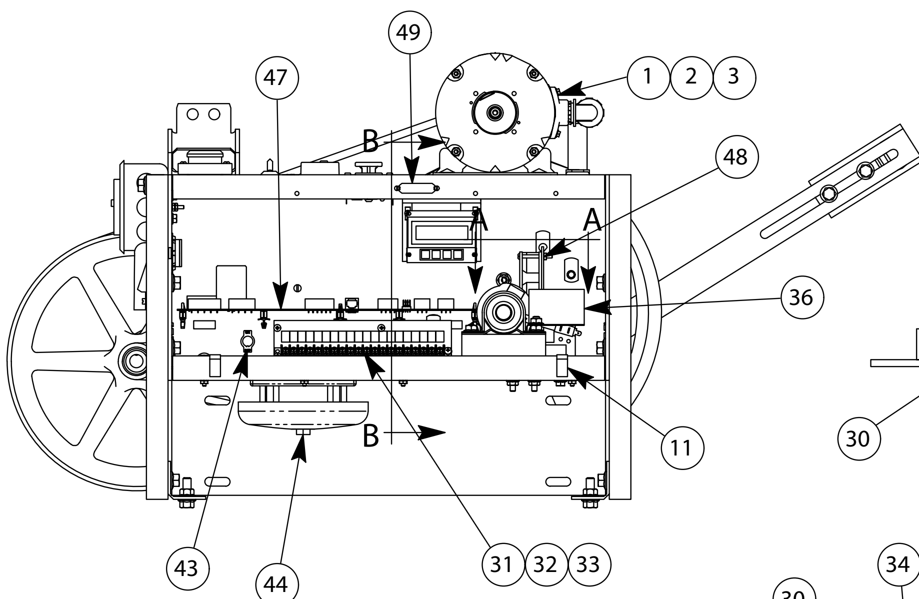
8. Replace the door operator cover.

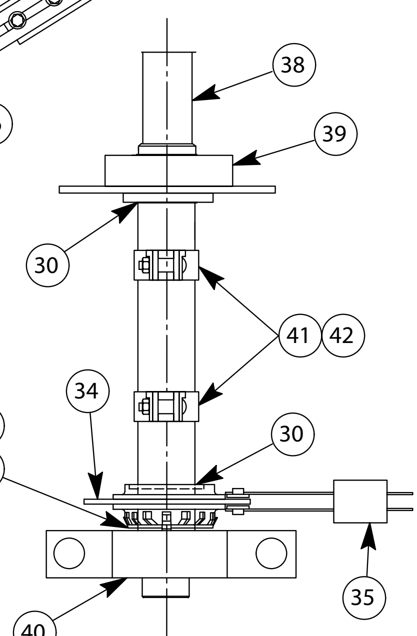
9. Check for excessive bearing wear.

Replacement Parts

3001AL_ HD-03/M Door Operator

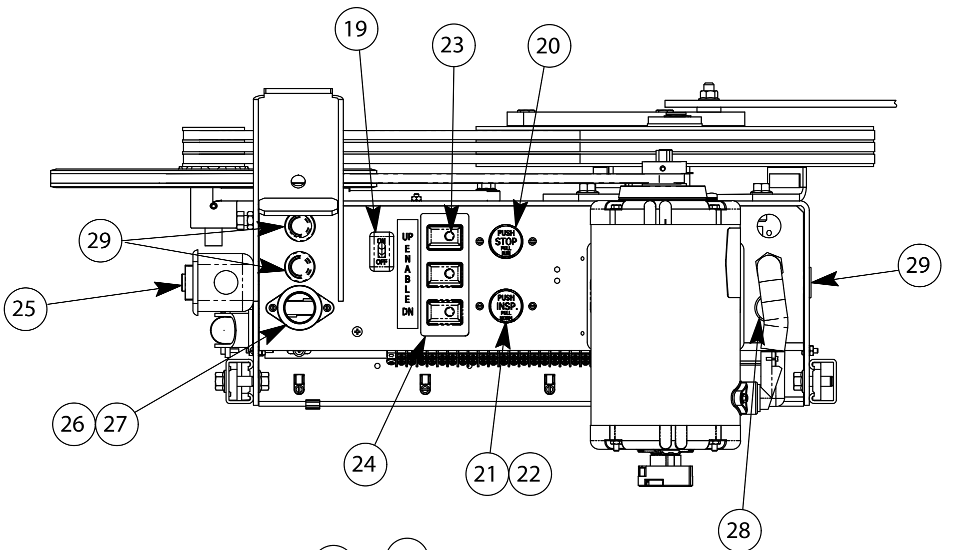


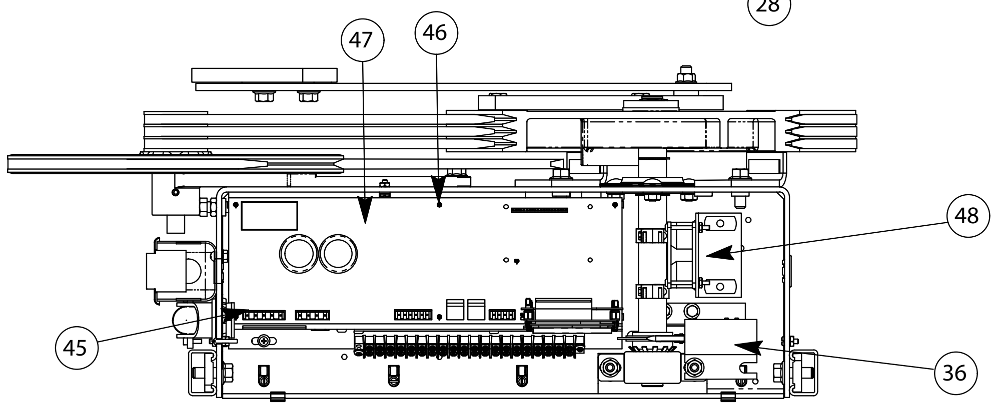


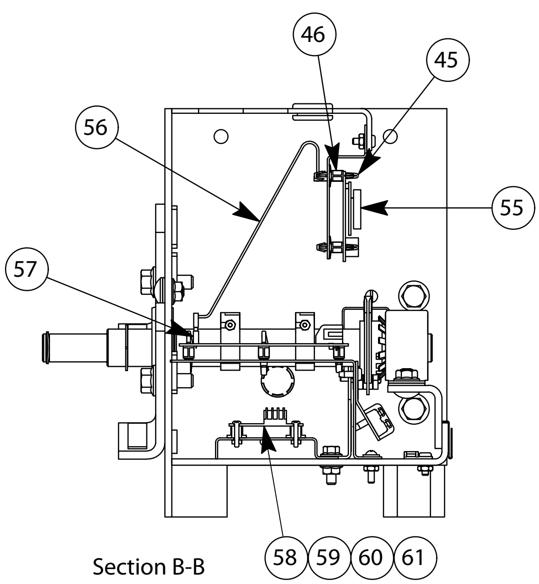


3001AL_ HD-03/M Door Operator

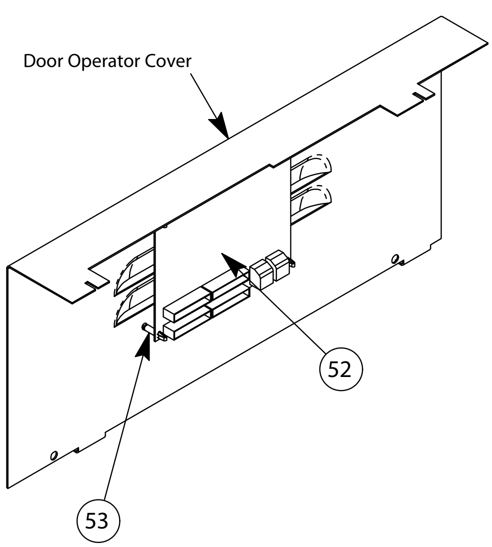
(continued)







Section B-B



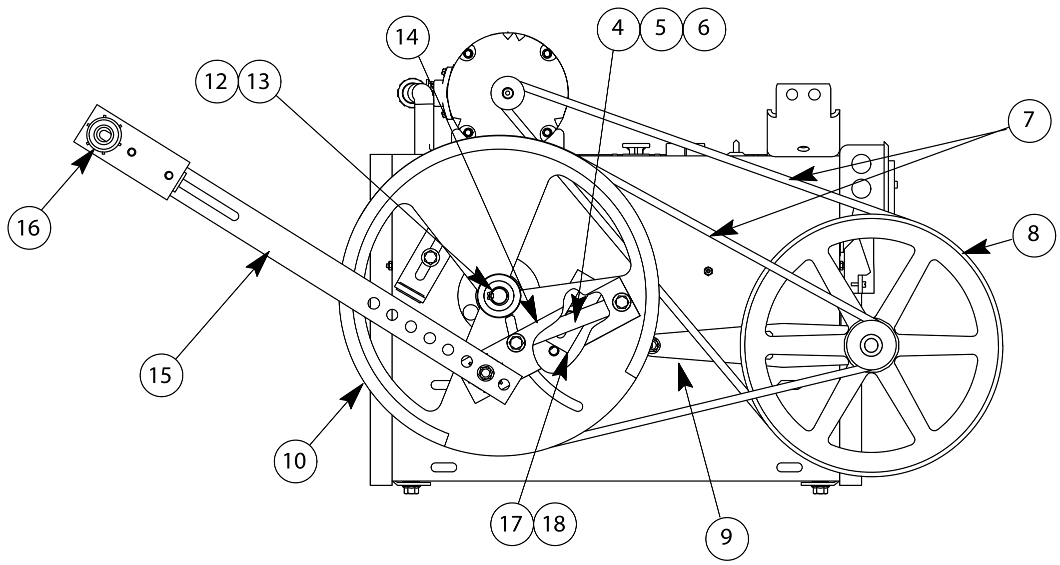
3001AL_ HD-03/M Door Operator
(continued)

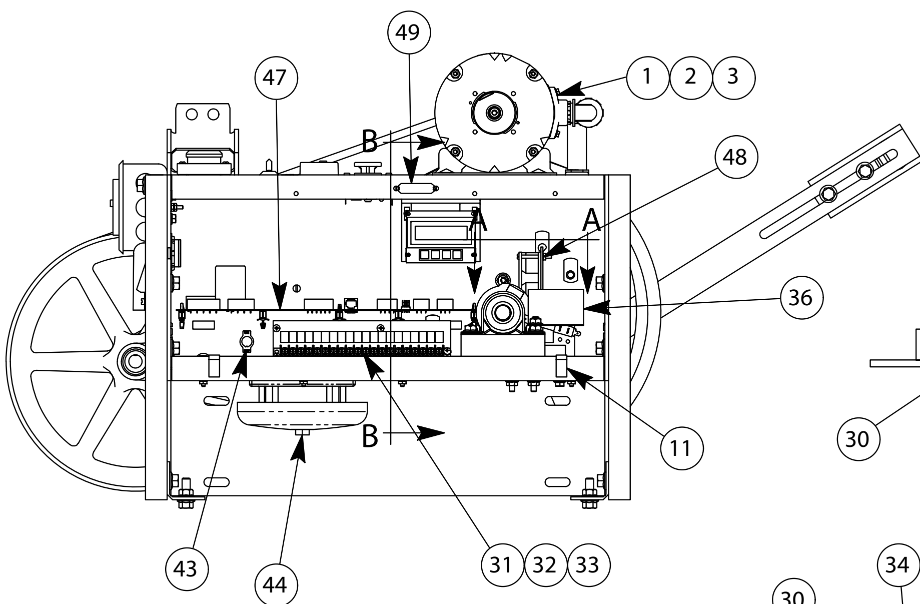
ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9779504	591BF1	Motor Assembly, 115 VDC, 1/6 H.P. w/Encoder
2		591BJ1	Motor Assembly, 115 VAC, 1/2 H.P. w/Encoder
3		373BA1	Encoder, Closed Loop Door Operator
4	9820966	750DB1	Sheave, Motor
5		124050	Tap Bar, Arm
6		123988	Shim, Door Operator
7	9801170	40117	Spacer, Roller
8	9749470	77920	Belts, Drive
9	9876686	67668	Sheave Assembly, Jack Shaft
10	9838820	63882	Arm, Adjustable Idler
11		750CV1	Wheel, Drive
12		277BY1	Clip, S
13		717CV1	Ring, Retaining, Bowed, .750" Dia.
14		44312	Key, .188" x 1.375"
15	9723997	123992	Arm, Adjustable Assembly
16		103268	Arm, Adjustable Assembly (Intermediate)
17	9723985	123990	Arm, Pivot Assembly
18	9814656	114653	Stop, Mechanical
19		40148	Bumper
20	9743637	76703	Switch, Light
21	9810857	108150	Switch, (Run Stop)
22	9810985	109888	Switch, (Inspection)
23		320JX1	Inspection Button Dust Cover (Not Shown)
24		127196	Switch, Push Button
25		127195	Guard, Button
26		687BR1	Receptacle (GFCI)
27	9781821	78182	Socket, Lamp
28		109789	Guard, Lamp (Not Shown)
29		127960	Grommet, Rubber (ATLI2761)

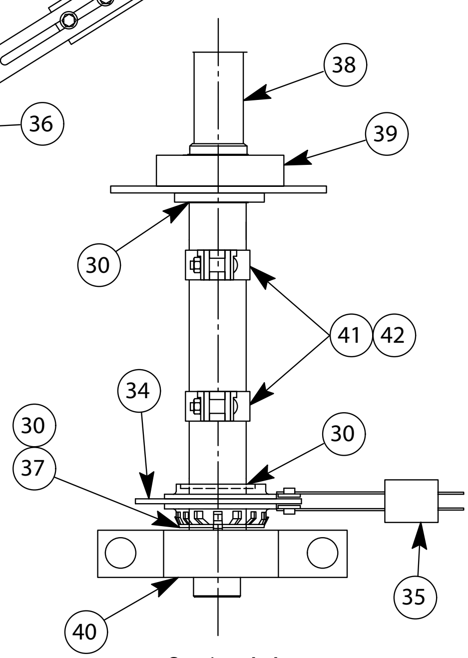
3001AL_ HD-03/M Door Operator
(continued)

30		700201	Snap-In, .500, Blank
31		700626	Snap Ring
32		834AJ5	Block, Terminal
33		141675	Jumper Strip, 2 Position
34		320AF1	Cover, Kit, Terminal Strip (Not Shown)
35	9850909	45090	Disk, Contact, Gate Switch
36		171BJ1	Switch, Leaf, Gate
37		320HJ2	Cover, Gate Switch
38	9726834	700420	Lockwasher, Shaft to Switch Disc
39		744FE1	Shaft, Cam
40	9711715	101171	Bearing, Main
41	9711739	101172	Bearing, Rear
42	9741227	141222	Holder, Magnet
43	9741252	141251	Magnet, Cam
44		171CM1	Switch, Toggle
45	9782527	108252	Bell, Emergency Alarm
46		141787	Standoff, Card, Locking
47		786AJ1	Spacer, Card
48		6300PA3	Card, Universal Door Control (UDC) (1/6 HP Motors)
49		6300PA4	Card, Universal Door Control (UDC) (1/2 HP Motors)
50		378AW1	Fan Assembly, Door Operator (AC Models Only)

3001AV_ HD-03/M
Dual Door Operator
Center Opening Only

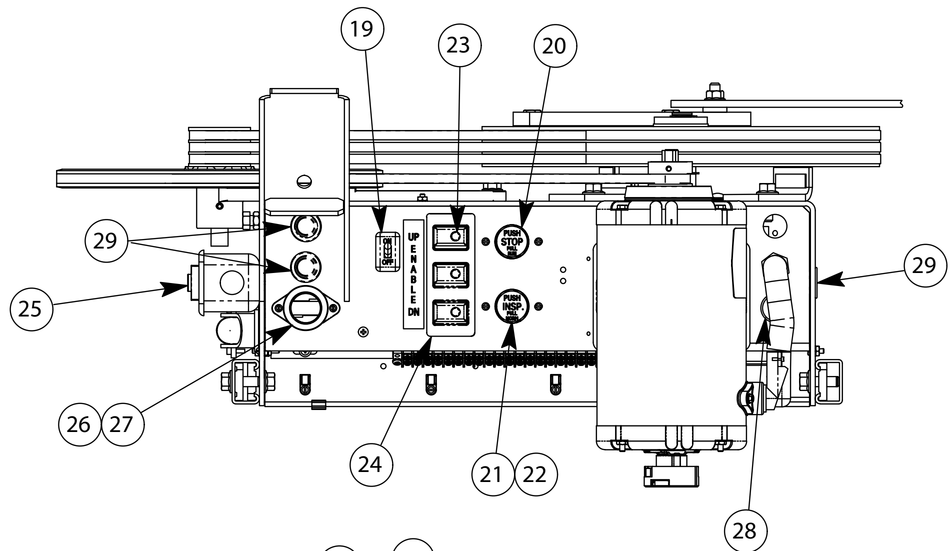


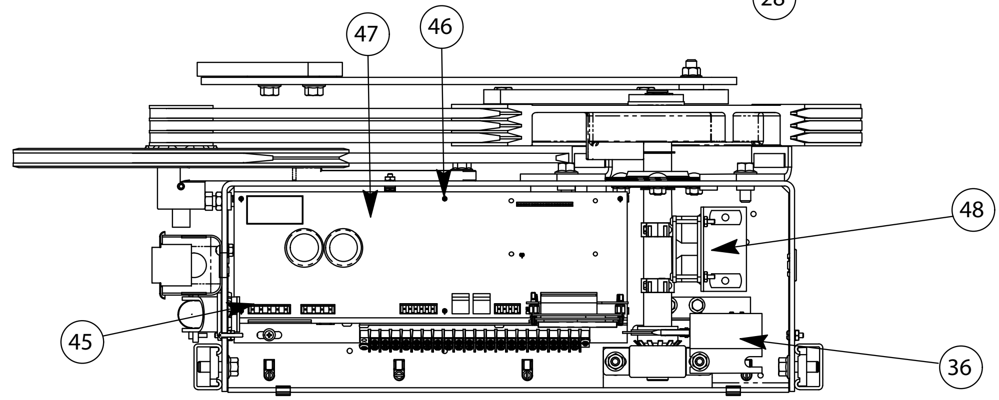


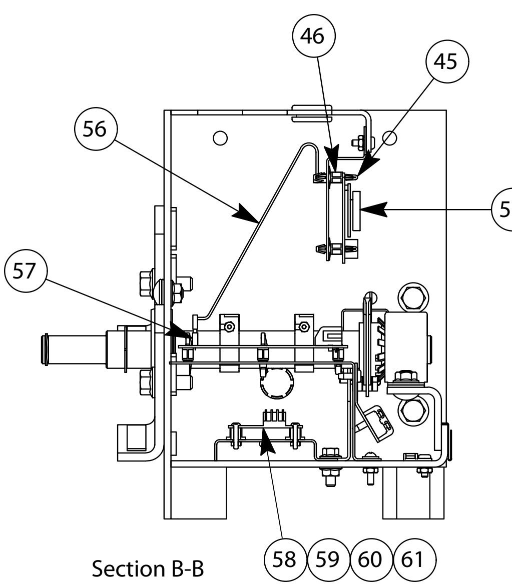


Section A-A

3001AV_ HD-03/M
Dual Door Operator
Center Opening Only
(continued)







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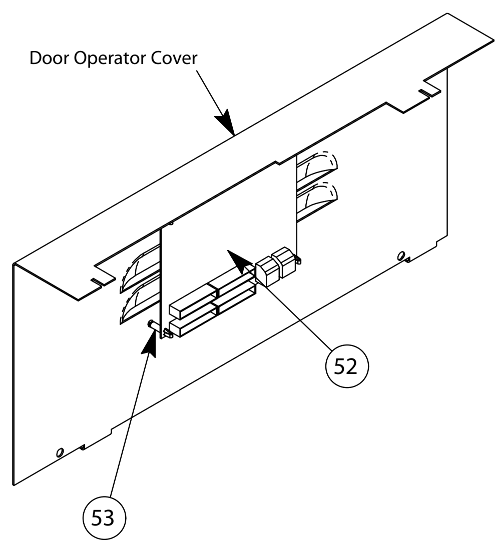

3001AV_ HD-03/M
Dual Door Operator
Center Opening Only
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		591BJ1	Motor Assembly, 115 VAC, 1/2 H.P. w/Encoder
2		373BA1	Encoder, Closed Loop Door Operator
3	9820966	750DB1	Sheave, Motor
4	9801236	40121	Spacer, Roller
5		112HC1	Bar, Drive Wheel
6		112HE1	Bar, Tap, Drive Wheel
7		760BM1	Shim, Drive Wheel
8	9749470	77920	Belts, Drive
9	9876686	67668	Sheave Assembly, Jack Shaft
10	9838820	63882	Arm, Adjustable Idler
11		894AM1	Wheel, Drive
12		277BY1	Clip, S
13		717CV1	Ring, Retaining, Bowed, .750" Dia.
14		44312	Key, .188" x 1.375"
15	9814656	114653	Stop, Mechanical
16		40148	Bumper
17	9743637	76703	Switch, Light
18	9810857	108150	Switch, (Run Stop)
19	9810985	109888	Switch, (Inspection)
20	9804500	320JX1	Inspection Button Dust Cover (Not Shown)
21		127196	Switch, Push Button
22		127195	Guard, Button
23		687BR1	Receptacle (GFCI)
24	9781821	78182	Socket, Lamp
25		109789	Guard, Lamp (Not Shown)
26		127960	Grommet, Rubber (ATLI2761)
27		700201	Snap-In, .500, Blank
28		700626	Snap Ring
29		834AJ5	Block, Terminal
30		141675	Jumper Strip, 2 Position

3001AV_ HD-03/M
Dual Door Operator
Center Opening Only
(continued)

31		320AF1	Cover, Kit, Terminal Strip (Not Shown)
32	9850909	45090	Disk, Contact, Gate Switch
33		171BJ1	Switch, Leaf, Gate
34		320HJ2	Cover, Gate Switch
35	9726834	700420	Lockwasher, Shaft to Switch Disc
36		744FE1	Shaft, Cam
37	9711715	101171	Bearing, Main
38	9711739	101172	Bearing, Rear
39	9741227	141222	Holder, Magnet
40	9741252	141251	Magnet, Cam
41		171CM1	Switch, Toggle
42	9782527	108252	Bell, Emergency Alarm
43		141787	Standoff, Card, Locking
44		786AJ1	Spacer, Card
45		6300PA4	Card, Universal Door Control (UDC) (1/2 HP Motors)
46		378AW1	Fan Assembly, Door Operator (AC Models Only)
47		462KT1	Harness, Diagnostic Tool, Door
48		381AM1	FIlter, EMI/RFI, Door Operator, UDC
49		6300TX1	Card, SPI I/O, 12-I and 14-O (24 V I/O)
50		6300TX2	Card, SPI I/O, 12-I and 14-O (115 V I/O)
51		786BY2	Standoff
52		220DK2	Cable, Modular CAT-5 (Not Shown)
53		6300HL1	Card, User Interface (UIT)
54		220EK1	Cable, Extender, UIT/UDC
55		292KM20	Connector, PCB, Header, Unshrouded, .100 X 20
56	9782722	672BW1	Power Supply, 85-132VAC, 24VDC, 2.5A
57	9768130	76813	Standoff, Nylon
58		462FV1	Harness, Power Supply, 20 Ga.
59		462FT1	Harness, Power Supply, 18 Ga.
60		462KL1	Harness, AC Motor (Not Shown)

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(7) M721 Entrance Contents

Single Speed Installation

Two Speed Installation

Printed in USA January, 2015

Contents
(continued)

Center Opening Installation

Printed in USA January, 2015

Design Overview

- Struts splice together with built-in clips; designed to set once and not move again.
- Hoistway sill is installed and leveled with a leveling tool.
- Header is installed with gauge sticks placed on the sill.
- Etched daylight lines on the sill support and the header align with daylight lines on the car sill; adjust both sill support and header horizontally.
- H-style entrance frame is assembled with built-in clips and bolts; the strike column is pre-assembled on the strike return column.
- Column brackets on the entrance frames have threaded holes; a centering screw on the transom almost eliminates the need to square the entrance.
- Hoistway doors are pre-assembled; place doors on the track and adjust with eccentrics.

Single Speed Installation

Two Speed Installation starts on 7 - 29.
Center Opening Installation starts on 7 - 56.

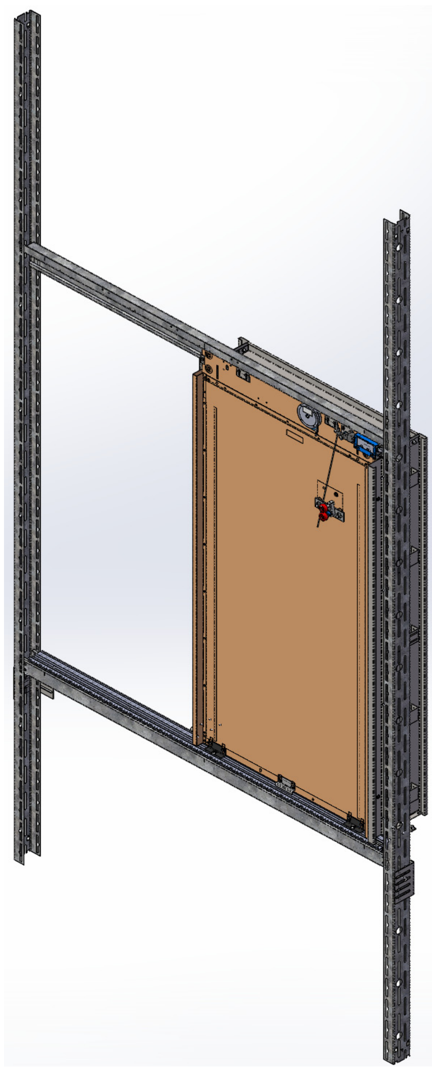


Figure 1 - Single Speed M721 Entrance

Install the Wall Angles

Note: See the job layouts and Figure 2 on page 7-3 for all steps in this procedure.

1. Verify that a running platform with the car sill is installed.

2. Obtain the finished floor height dimension from the contractor.

3. Determine the daylight line location for the strike side.

4. Apply tape to the car sill, and mark the line on the tape.

5. Mark the horizontal position of the inside face of the master (first) wall angle relative to the daylight line nearest the strike column. Extra wall angles are provided if the pit is more than 6’ deep.

6. Install the wall angle.

Notes:

- Where hoistway space allows, turn the wall angles away from the door opening.
- Wall anchors must be located below the sill support assembly.

7. Drop a plumb line in the front of the hoistway to locate the positions of the remaining master wall angles.

8. Install the remaining master wall angles.

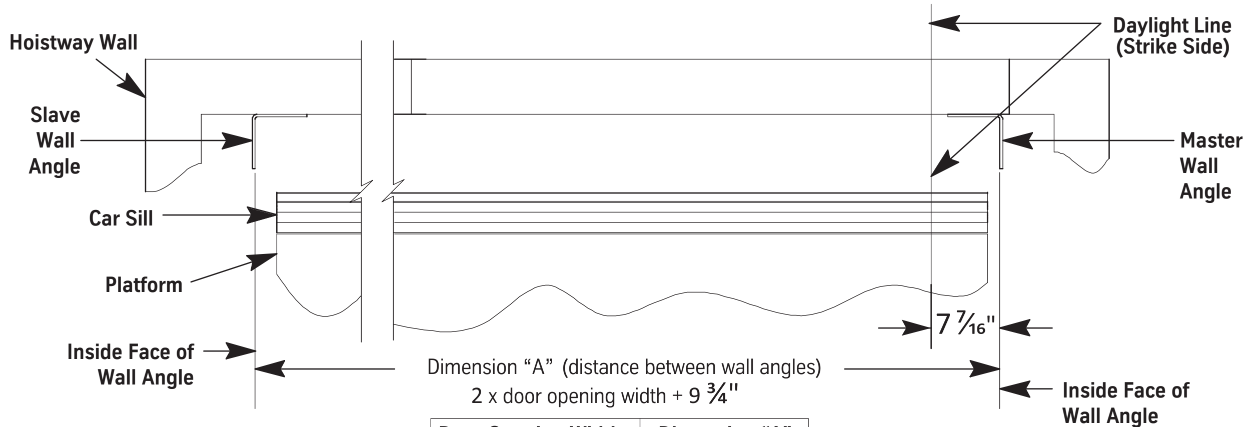
9. Make sure that the master wall angles are square with the platform and plumb with each other. Check the tightness of the wall anchors.

10. Create a gauge stick for the slave wall angle. Cut a piece of light, but stiff material (e.g., 3/4” EMT) for Dimension “A”.

11. Place the gauge stick against the master wall angle and locate, mark, and install the slave wall angles at all floors.

Install the Wall Angles

(continued)



Door Opening Width (inches)	Dimension "A" (inches)
32	73 ¾
36	81 ¾
42	93 ¾
48	105 ¾

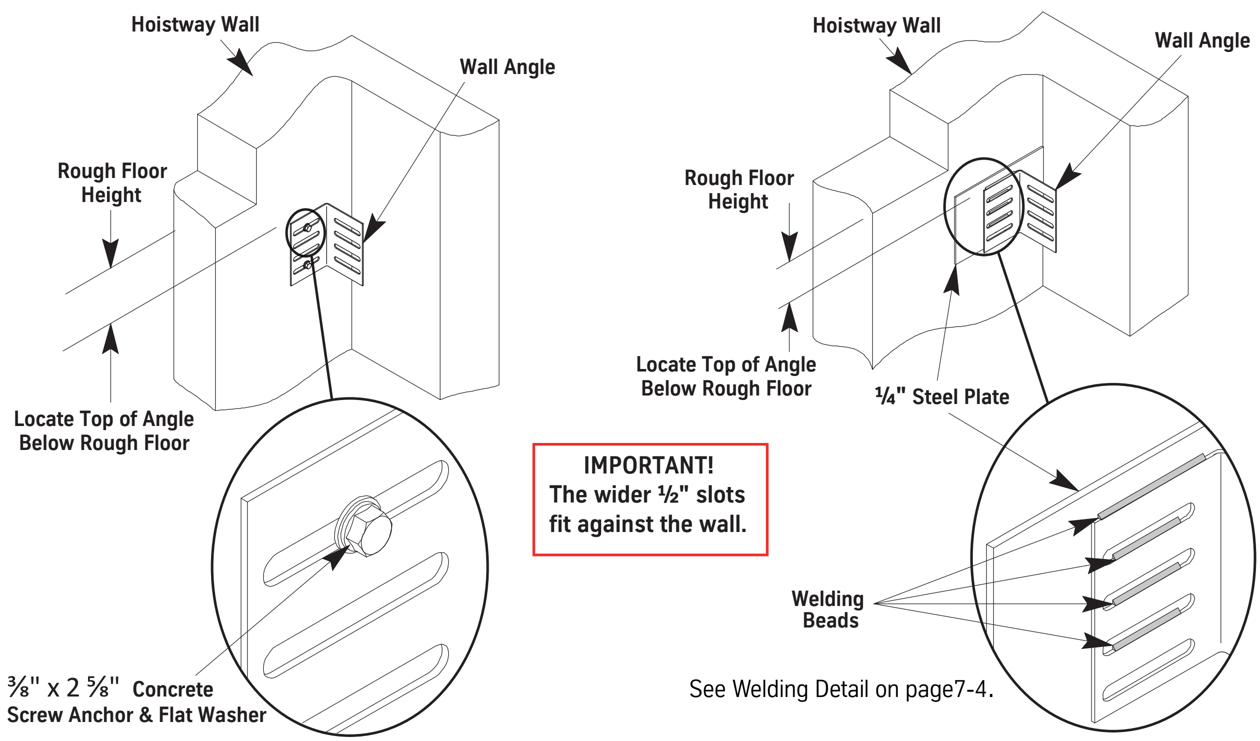


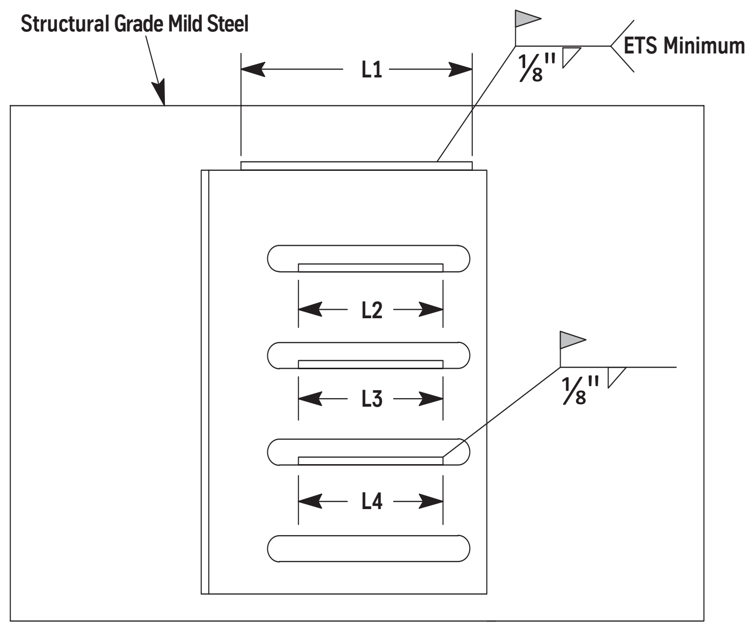
Figure 2 - Wall Angle Placement

Welding Detail

1. Before welding, make sure the steel is clean. Remove burrs, paint, or coating in weld area.
2. Welding of elevator parts that are specified in *ASME A17.1 Safety Code For Elevators And Escalators*, shall conform to *A17.1, Section 8.8, Welding*.
3. Perform all welding in a well ventilated area, *ANSI Z49.1 Safety In Welding, Cutting And Allied Processes*.
4. Weld entrance wall angles to structural mild steel in two or more locations.

   Use horizontal fillet welds on square edges of the wall angle (recommended, but not required). The total effective length of fillet welds should equal or exceed 4 inches.

   Example: (L1 + L2 + L3 + L4 +..... + Ln = 4 inches minimum. The length of each fillet should be a minimum of 3/4 inches.
5. The type of filler metal used will depend on the welding process, but in no case shall the nominal tensile strength of the filler metal be less than 60,000 PSI.
6. For suitable structural mild steel or preheat specifications, refer to *AWS D1.1* or *AWS D1.3* whichever is applicable.



Stack the Struts

Note: See Figure 3 on page 7-5 for all steps in this procedure.

1. Set two struts on the pit floor, and fasten them to the wall angles.

Note: A compression splice is required every 32'.

2. Adjust the struts so that they are 1 1/4" from the car sill. The strut-to-car sill adjustment will set the final sill clearance.
3. Clip a strut splice to the top of the two struts.Triangles in splices must match the direction (up or down) of triangles in the struts.
4. Clip the second set of struts to the splices, use a splice bar and a hammer to drive the upper strut onto the splice, and fasten the struts to the next set of wall angles. At each landing, verify that the struts are 1 1/4" from the car sill.
5. Repeat this procedure until all of the struts are stacked, spliced, and fastened to wall angles.
6. Check all struts for plumb on two sides, and then securely fasten them.

VERTICAL EXPRESS

Stack the Struts
(continued)

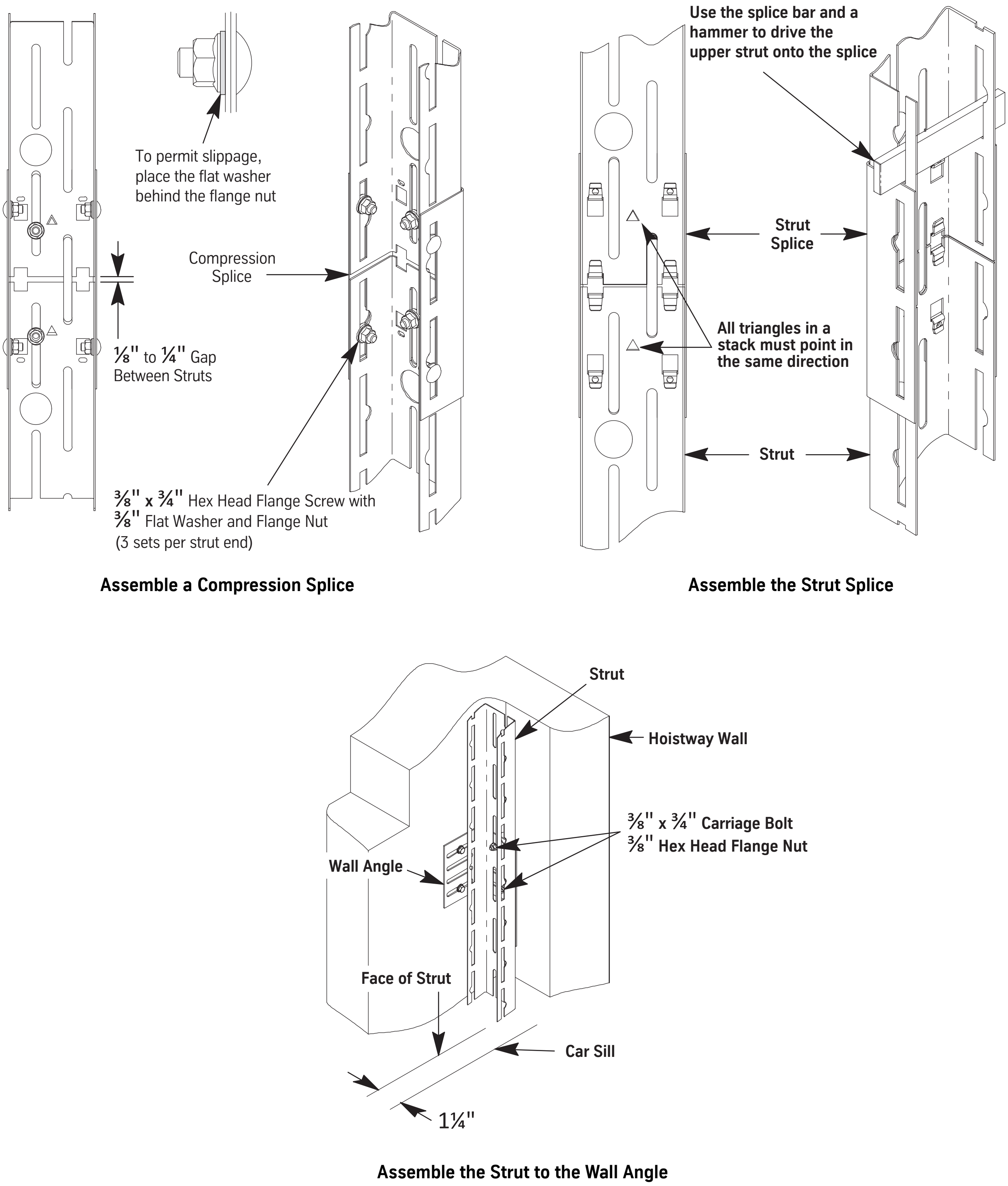


Figure 3 - Stack and Assemble the Struts

Install the Hoistway Sill

1. Determine the strike side of the hoistway sill.

2. Locate the two slots in the sill support.

3. Remove the hex head cap screws from the column mounting brackets, and slip them into the slot on the back side of the sill. See Figure 4.

4. Loosely attach each mounting bracket, and then adjust the bracket's tab to fit into the slot.

5. Tighten the brackets to the sill.

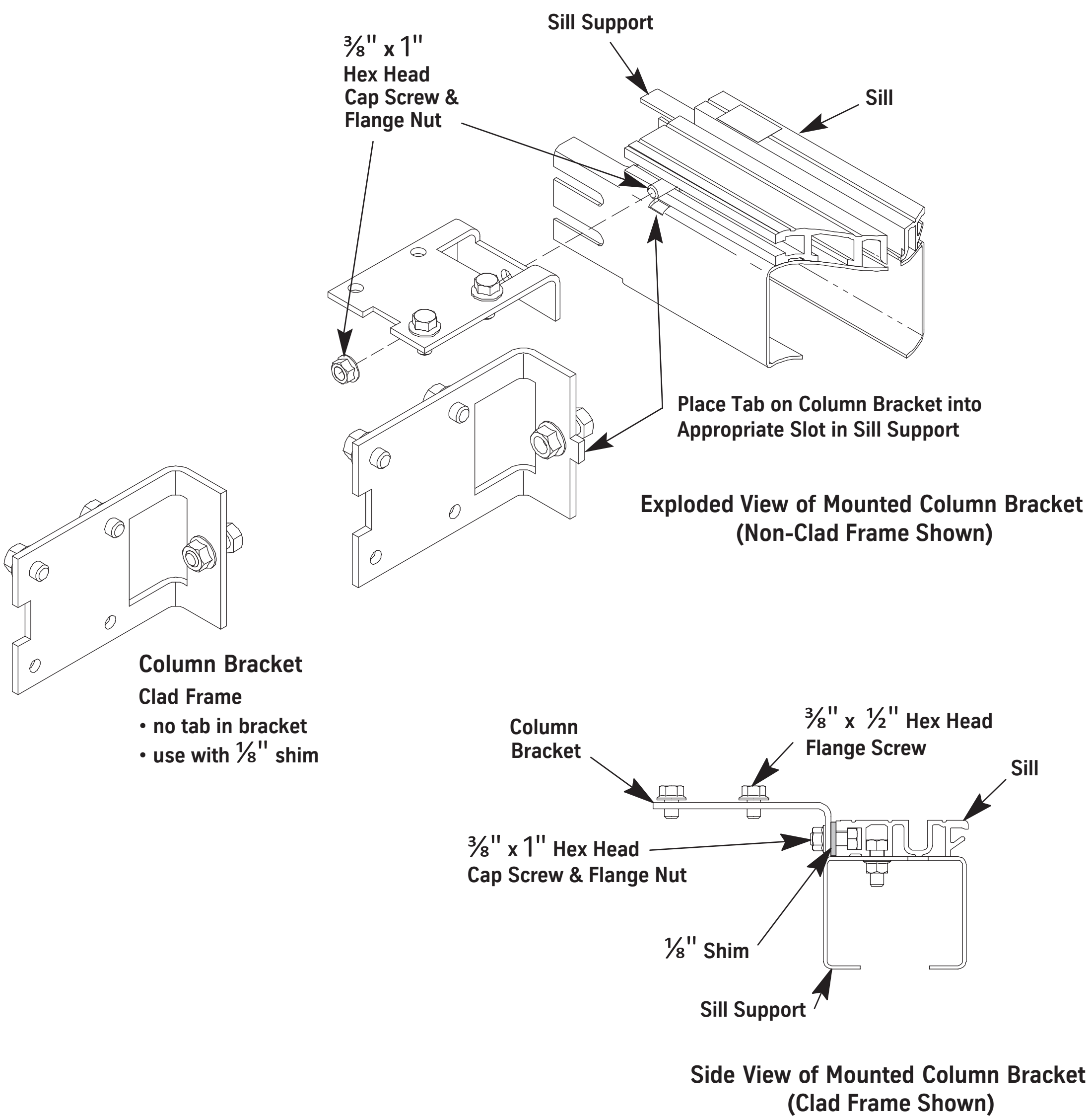


Figure 4 - Column Bracket Installation for Standard Sill

Install the Sill Support to the Struts

For all steps in this procedure see Figure 5 on page 7-8.

1. Hang the sill leveling tool in the slots or oval cutout on the back of each entrance strut.

2. Use the adjustment trigger to set the tool so that the support angle is roughly 2” below the finished floor.

3. Lay the sill and/or sill support on the support angles.

4. At each end of the sill and on each side of the strut, install a carriage bolt and a flange nut.

5. Hand-tighten into matching slots of the sill support and strut.

Note: The nut goes inside the assembly.

6. Raise the sill to the finished floor level.

7. Level the sill side-to-side and front-to-back.

8. Move the sill up so that the daylight lines and the centerline stamped into the header are even with the car sill.

Note: Ensure that the adjustment is accurate because this determines the accuracy of the entrance frame installation.

9. Verify that the vertical surface of the sill support is even with the angled fascia hanger on the sill.

10. Tighten the fasteners on the hall side.

11. Tighten the fasteners on the car side.

12. Repeat this procedure for all landings.

Install the Sill Support to the Struts

(continued)

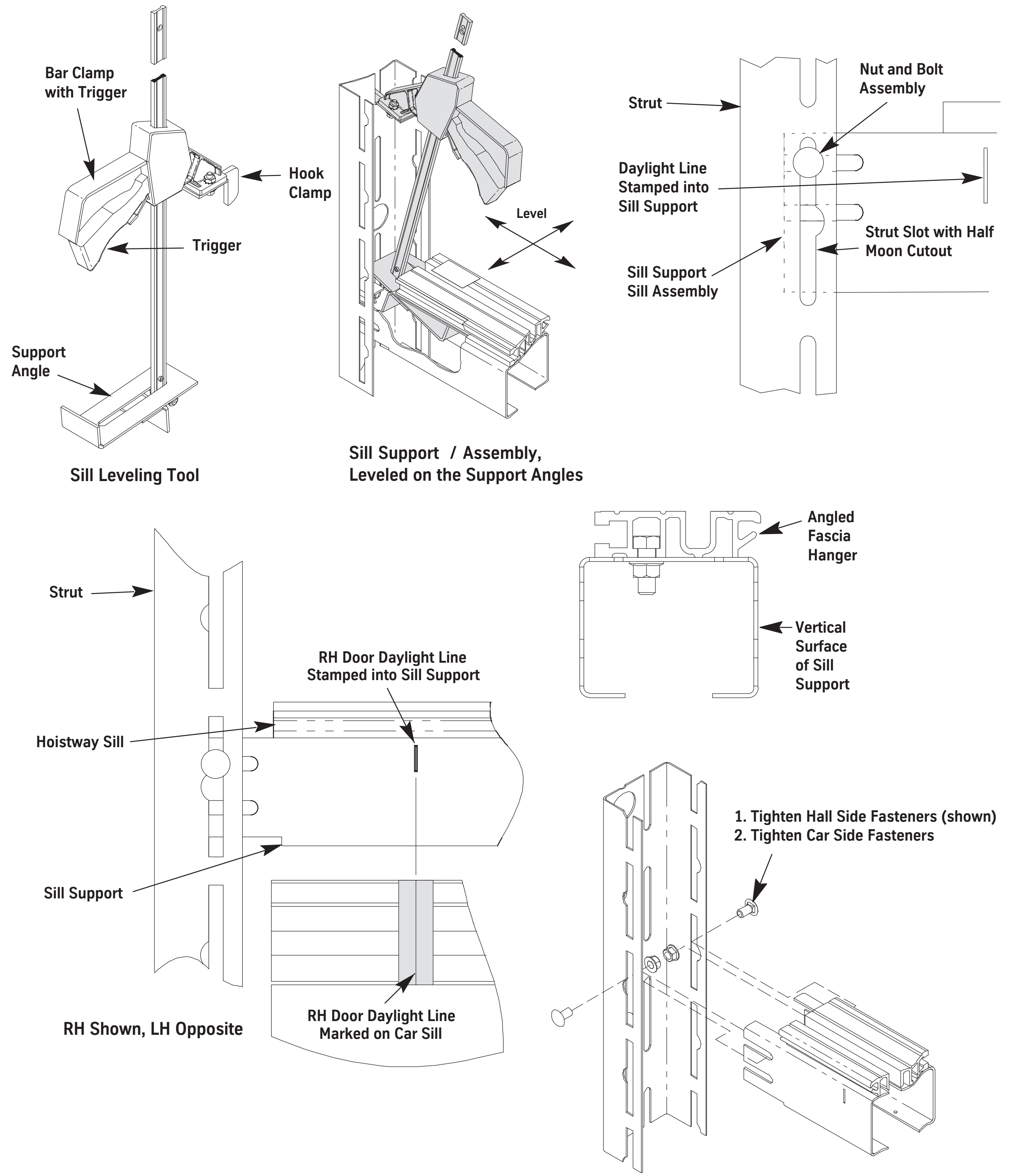


Figure 5 - Install the Sill Support to the Struts

Install the Hoistway Header

Note: Gauge sticks are needed for this procedure.

- For standard door height (84“) - two gauge sticks are provided for each job.
- For non-standard door height - use the following formula to determine the length, and cut the gauge sticks to this measurement.

  Gauge Stick Length: Sill-to-Header Dimension = Opening Height + 7 15/16”.

1. Move the platform up where the header can be reached.
2. Place the gauge sticks on the sill of the landing below, one at each end of the sill. See Figure 6 on page 7-10 for all steps on this page.
3. Place the header on the gauge sticks.
   a. At each end of the header, install carriage bolts and flange nuts.
   b. Hand-tighten into the matching slots of the header and strut.
4. Move the platform up so that the daylight lines and the centerline stamped into the header are even with the car sill.
5. To prevent the door operator equipment from being out-of-plumb:
   a. First tighten the fasteners on the back of the header at both ends.
   b. Then tighten the fasteners on the front of the header at both ends.
6. Repeat this procedure for all landings.

Adjust the Hoistway Sill and Header

1. Level the platform with a landing.
2. Verify that the clearance between the hoistway sill and the car sill is 1 1/4”.

Adjust the Hoistway Sill and Header
(continued)

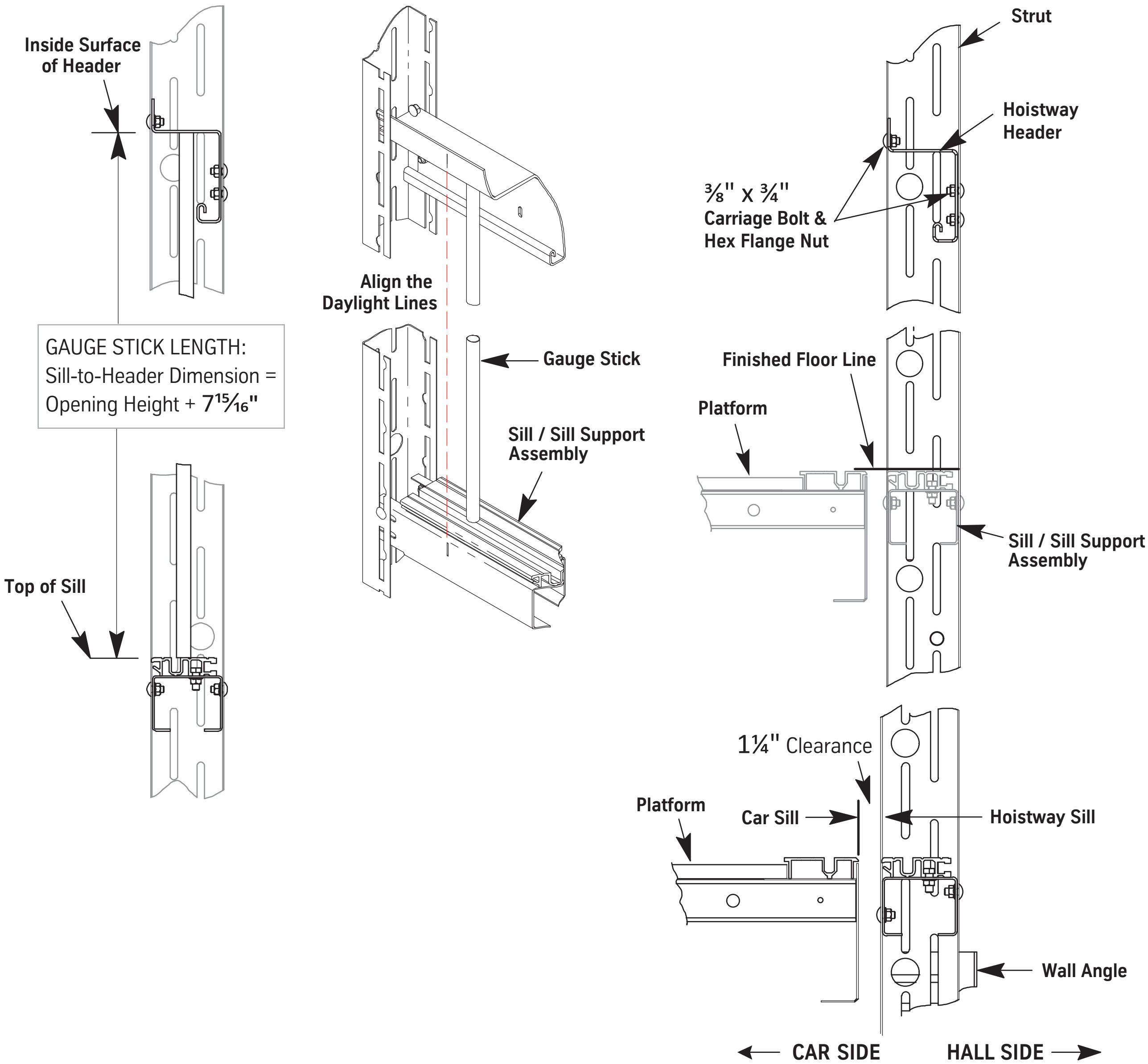


Figure 6- Install and Adjust the Hoistway Header

Assemble the Frame

Note: The transom is mounted between the columns.

1. Place the entrance columns and transom face down, and position each column at a slight angle to the transom. See Figure 7.
2. On each end of the transom, remove the flange screw and nut and set them aside.
3. On each end of the transom, roughly align the clips with the rectangular cutouts in the columns.
4. Swing the column toward the transom while pushing down on the column.
5. Ensure that the back side (toward the car) of the transom is flush with the back side of the column.
6. Install the flange screw and nut in the matching holes of the transom and column.
7. Repeat steps 3 through 7 for the other column.
8. Verify that the columns are square with the transom.
9. Ensure all fasteners are tight, and repeat this procedure for all landings.

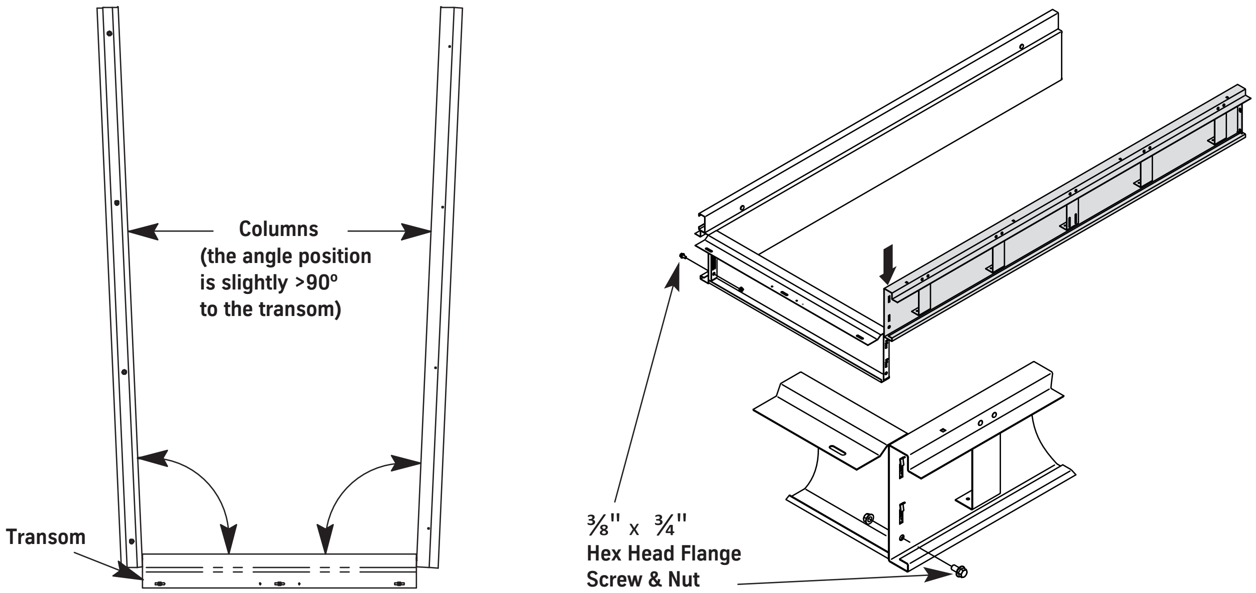


Figure 7- Assemble the Frame

Attach the Frame to the Sill

1. Attach the frame to the column brackets.
   a. Stand the frame on the column mounting brackets.
   b. Install the hex head flange screws in the bottom of each column.
2. Align the frame columns so that they overlap the hoistway sill 1/8” (the depth of the cutout on the top back edge of the hoistway sill). See Figure 8.
3. Tighten the four screws between the columns and the column brackets.
4. Move the platform up high enough to reach the header and transom.

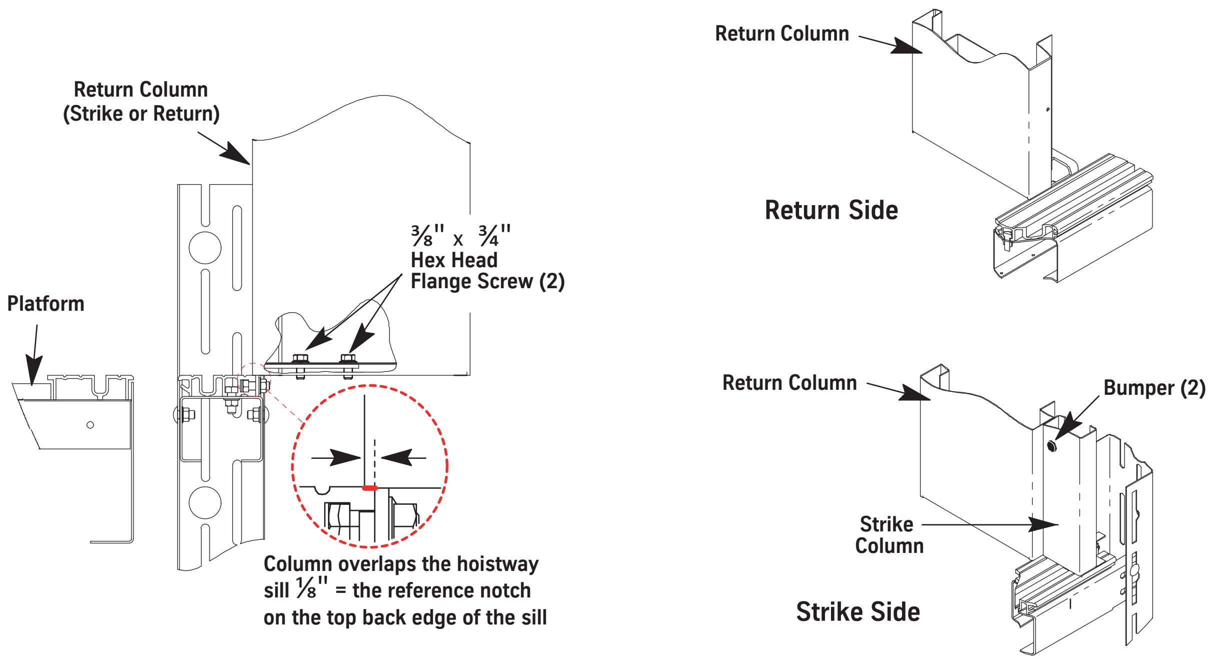


Figure 8 - Attach the Frame (standard sill shown)

Attach the Transom to the Header

1. Attach the transom to the header. See Figure 9.

- For non-clad frames:
  a. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
  b. Tighten the screws.

- For clad frames:
  a. Before the screws are added, install a 1/8” shim between the transom and the header.
  b. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
  c. Tighten the screws.

2. Install one washer head self-tapping screw into the header.

3. Repeat this procedure for all landings.

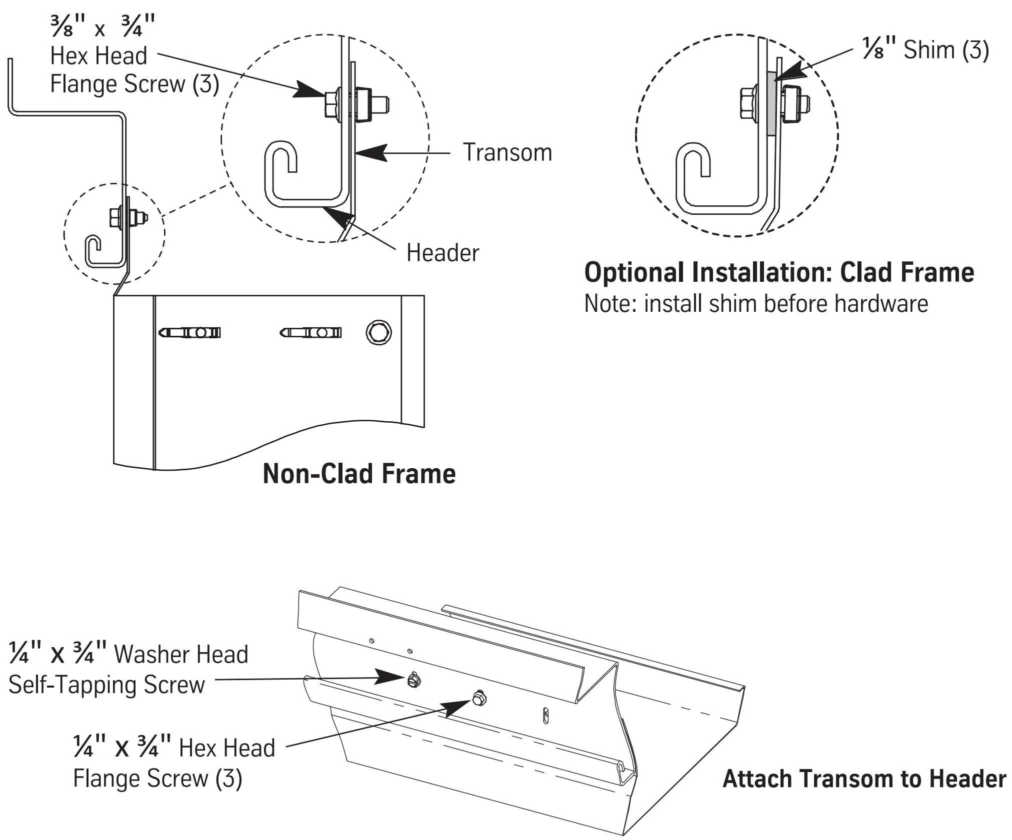


Figure 9 - Attach the Transom to the Header

Install the Grout Angles

1. Use self-tapping screws to install the grout angle on the bottom of the sill support and also tight against the hoistway wall. See Figure 10.

Note: Grout angles have a 2 1/2” leg and a 3 1/2” leg. Based on the gap, either leg can be placed against the hoistway wall.

2. Anchor the grout angle to the wall.

3. Repeat this procedure for each landing.

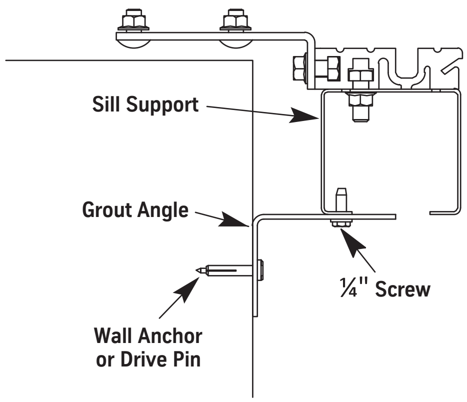


Figure 10 - Grout Angle Installation

Install Fixture Boxes

Use brackets to install the fixture boxes at each landing.

Install Hoistway Doors

1. Load the hoistway doors onto the platform.

2. At a landing, place the hoistway door(s) on the hoistway sill and lean the door(s) against the hoistway header.

3. Install the door isolation bumpers. See Figure 11 on page 7-15.

Install the Hoistway Doors
(continued)

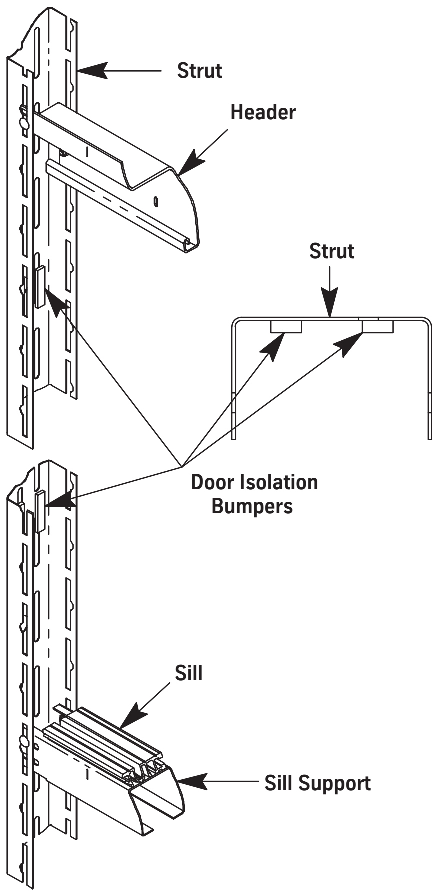


Figure 11 - Door Isolation Bumpers

4. Loosen all upthrust rollers. See Figure 12 on page 7-16.

5. Place the door rollers, one roller at a time, onto the door track.

6. Adjust the height of the door to 3/8” by turning the eccentric on the door rollers, and then lock the eccentric with the nut.

Install the Hoistway Doors
(continued)

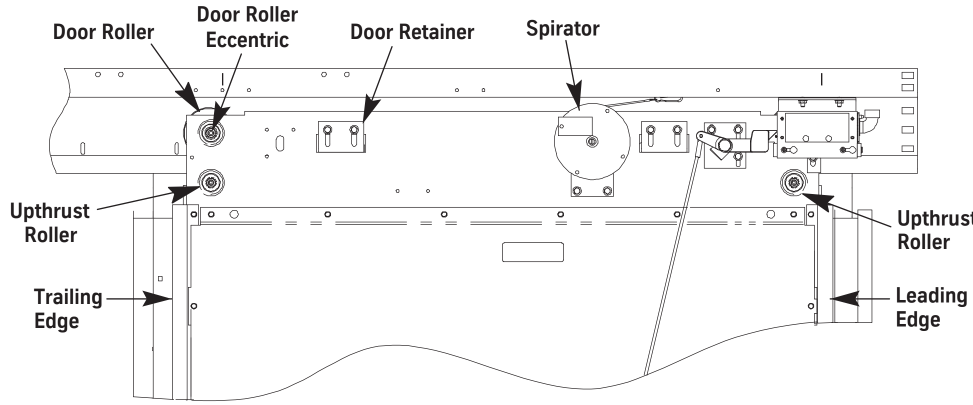


Figure 12 - Door Rollers

7. Install the door gibs and the door safety retainers. See Figure 13.

Two Gibs and One Safety Retainer per Door

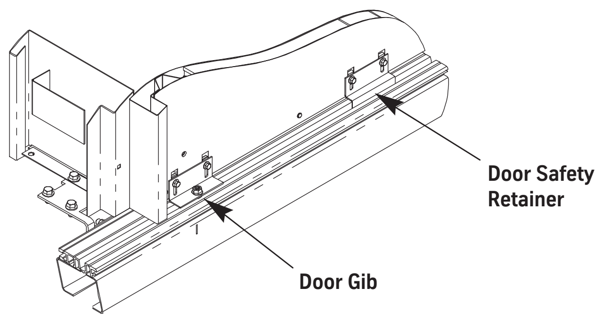


Figure 13 - Door Gibs and Safety Retainers

Adjust the Hoistway Door Running Clearance

1. Place a 5/16” shim (running clearance) underneath the leading edge of the door. See Figure 14 on page 7-17.
2. Loosen the upthrust roller, turn it to its lowest adjustment, and then snug it in place.
3. Adjust the eccentric on the door roller so that the door is flush with the shim and the door roller is flush with the track.
4. After the adjustment is made, tighten the door roller eccentric.
5. Remove the shim, and place it under the trailing edge of the door. Repeat steps 2 through 4.
6. Remove the shim, and verify that the door(s) are flush with the frame columns.

Adjust the Hoistway Door Running Clearance
(continued)

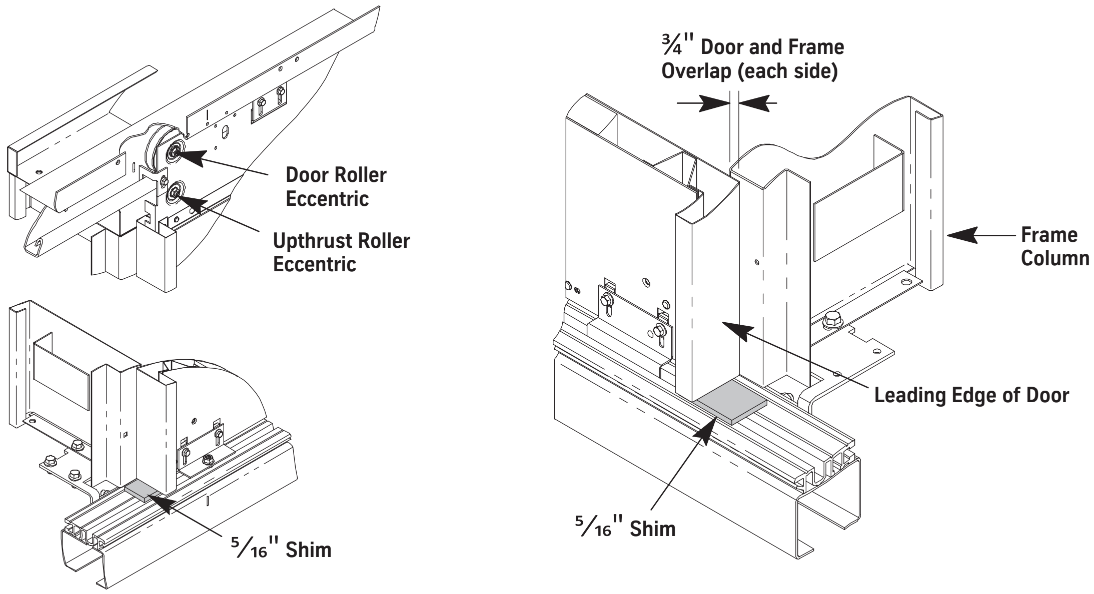


Figure 14 - Adjust Door-to-Sill Running Clearance

Adjust the Upthrust Rollers

1. Turn the eccentric of the upthrust roller clockwise until the roller just touches the bottom of the door track.
2. Adjust the eccentric so that a gap of .015″ is between the upthrust roller and the door track. See Figure 15.

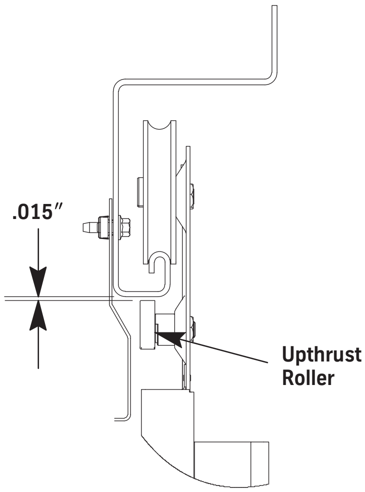


Figure 15- Adjust Upthrust Roller Clearance

Adjust the Door Gibs

1. Adjust the door gib brackets and the door retainer brackets for a 1/8” running clearance between the brackets and the hoistway sill. Tighten the bolts after adjustment. See Figure 16.

2. Place a 1/4” shim between the bottom of the entrance frame column and the bottom of the leading edge of the door panel. See Figure 17.

3. Use a 3/16” hex wrench and turn the eccentric of the door gib to cause the door panel to just touch the 1/4” shim, and then tighten the locknut.

4. Repeat Steps 2 and 3 for the trailing edge.

5. Verify that the door rolls freely and also tracks parallel to the hoistway sill groove. Adjust as necessary.

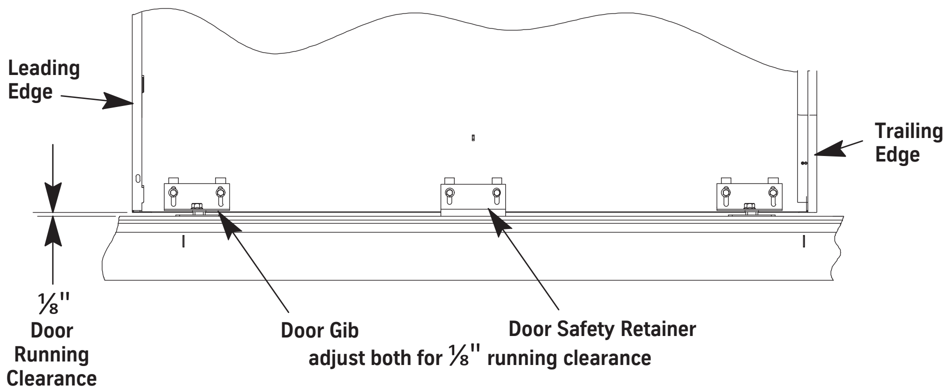


Figure 16 - Standard Sill Running Clearance

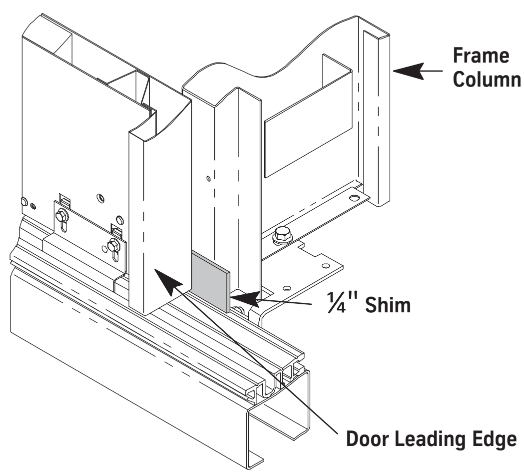


Figure 17- Door-to-Frame Running Clearance

Install and Adjust the Spirator

1. Wrap the spirator cable three or four times around the spirator to connect the cable.

2. Use the spirator cable clip to attach the cable to the header. See Figure 18.

3. Adjust the spirator so that the doors close when they are released 1/2” from the fully closed position.

4. Verify that the doors close fully with no “double bump” when the doors touch each other.

Notes:

- The spirator must close the doors from any open position.
- To obtain proper door operation from floor to floor, the spirator tension should be the same at each floor.

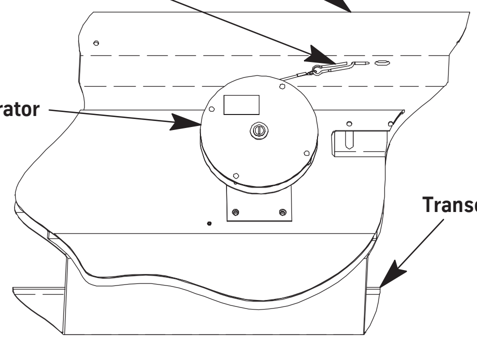


Figure 18 - Spirator

Install and Adjust the Top Door Retainers

1. On each side of the door panel, use the provided hardware to install a top door retainer on the hanger. See Figure 19 on page 7-20.

2. Verify that there is sufficient running clearance between the retainer and the track, and adjust if needed.

3. On each side of the door panel, use the provided hardware to install a track retainer clip on the hanger.

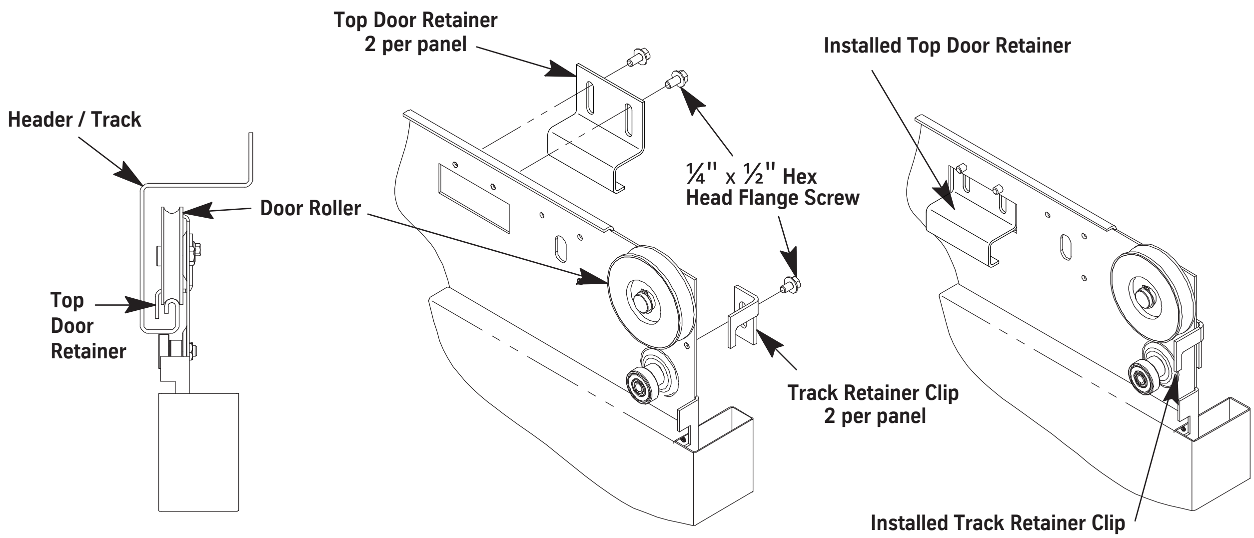


Figure 19 - Top Door Retainer

Install and Adjust the Interlocks

1. Install the interlock contact box. Evenly align the cover screws with the face of the header. See Figure 20.

2. Remove the cover from the interlock box.

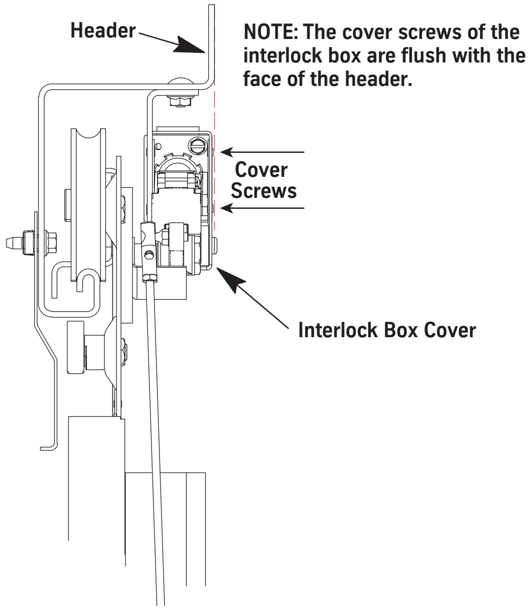


Figure 20 - Install the Door Interlock

3. Close the doors, and verify the following. See Figure 21 on page 7-22.

   a. The interlock hook is centered front-to-back on the contacts.

   b. The interlock hook does not contact the front or the back of the contact box. If necessary, either shim the interlock box or remove ONLY ONE of the two washers on the interlock hook hinge bolt.

CAUTION **Never remove both washers on the interlock hook shaft.**

4. Adjust the following to obtain the correct measurements:

   a. Interlock box - when the doors are closed, there is 1/8” between the interlock hook and both sides of the locking tab on the box.

   b. Connecting rod length - when the hook is resting on its contacts, the interlock hook has 1/32” clearance with the top of the locking tab on the box.

      Note: The pickup roller crank should be resting on its stop at this time.

   c. Interlock hook - contact compression of 3/32”.

      - The hook touches both contact leafs at the same time.
      - When the hook is raised by the crank, the hook clears the box at the top and also the locking tab by a minimum of 1/8”. If necessary, adjust the interlock hook stop to limit the hook travel.

Install and Adjust the Interlocks

(continued)

5. Move the rollers and the interlock hook, and verify that there is 9/32" hook engagement before the contacts are bridged. If necessary, adjust the plastic contact block in the interlock box to obtain the proper angle and position of the contacts.

6. Repeat this procedure for all other landings.

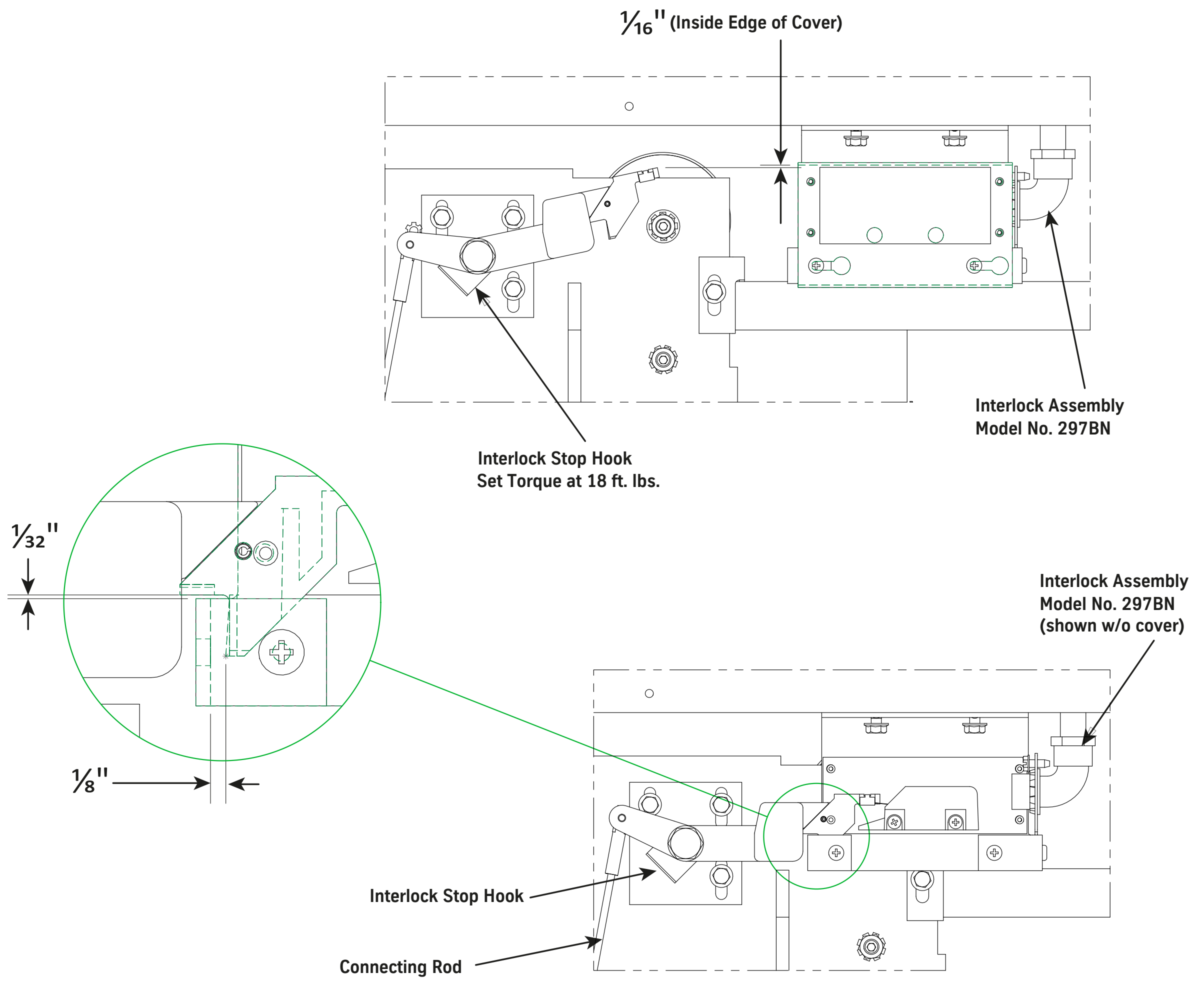


Figure 21 - Single Speed Interlock Adjustment

Interlock Wiring

1. Remove the interlock box cover.

2. Ensure that after the hook is in the locked position, and the shorting bar has a good wipe on the contacts.

WARNING **All door interlock contacts must be wired in series. See the wiring diagrams for details.**

3. Repeat Steps 1 and 2 for all other landings.

Install the Fascia Plates and Dust Covers

1. Position the platform near the top landing.

2. Center a top fascia plate in the opening, and hook the fascia plate onto the hoistway sill of the top landing. See Figure 22 on page 7-24 through Figure 24 on page 7-26.

3. Use self-tapping screws to anchor the top fascia plate to the top landing hoist-way sill support.

4. Install the first intermediate fascia plate by hooking it onto the top fascia plate.

Note: If required, install the remaining intermediate fascia plates by hooking each one onto the last one installed.

5. Clip the bottom fascia plate to the top of the header.

Note: The bottom fascia plate vertically overlaps the last intermediate fascia plate.

6. Measure the distance between the sill support and the header, and subtract one inch.

7. Cut two fascia plate stiffeners (from the provided fascia stiffener angle) to the length measured in the previous step.

8. Clamp the angles in place behind and also flush with the edge of the fascia plates.

9. Run self-tapping screws through the pilot holes in the fascia plates to anchor the fascia plates to the stiffeners.

10. Repeat Steps 2 through 9 for all intermediate landings.

11. If required, center a top fascia plate in the opening and hook it onto the hoistway sill of the bottom landing.

Note: The fascia plate and the toe guard in the pit must extend far enough below the sill so that when the car is on compressed buffers the platform toe guard will not be below the hoistway toe guard.

12. Use self-tapping screws to anchor the top fascia plate to the bottom landing hoistway sill support.

13. Install the toe guard by hooking it onto the top fascia plate.

14. Fasten the toe guard to the wall with the provided drive pin anchors.

15. If required, install all dust covers.

Install the Fascia Plates and Dust Covers
(continued)

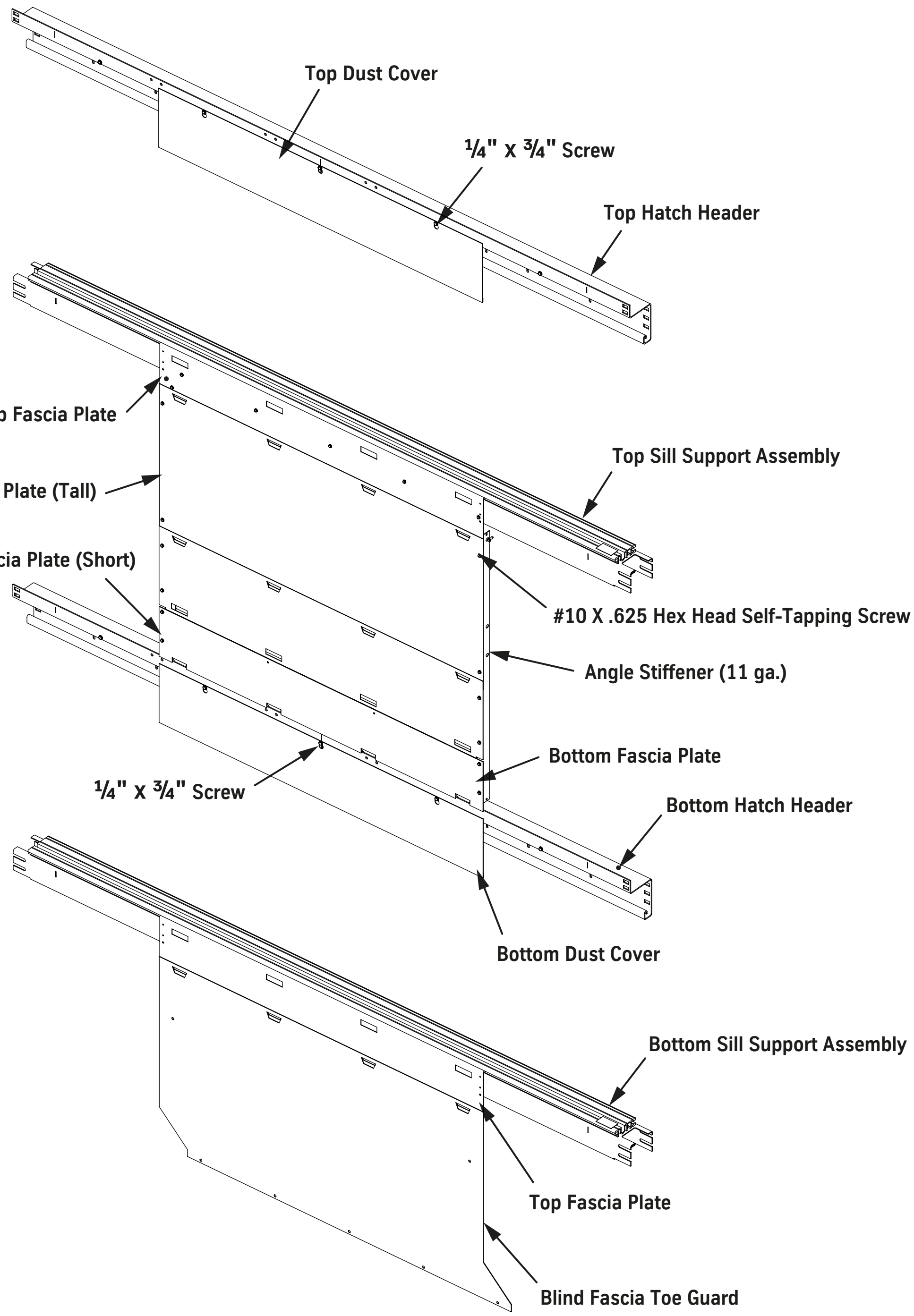
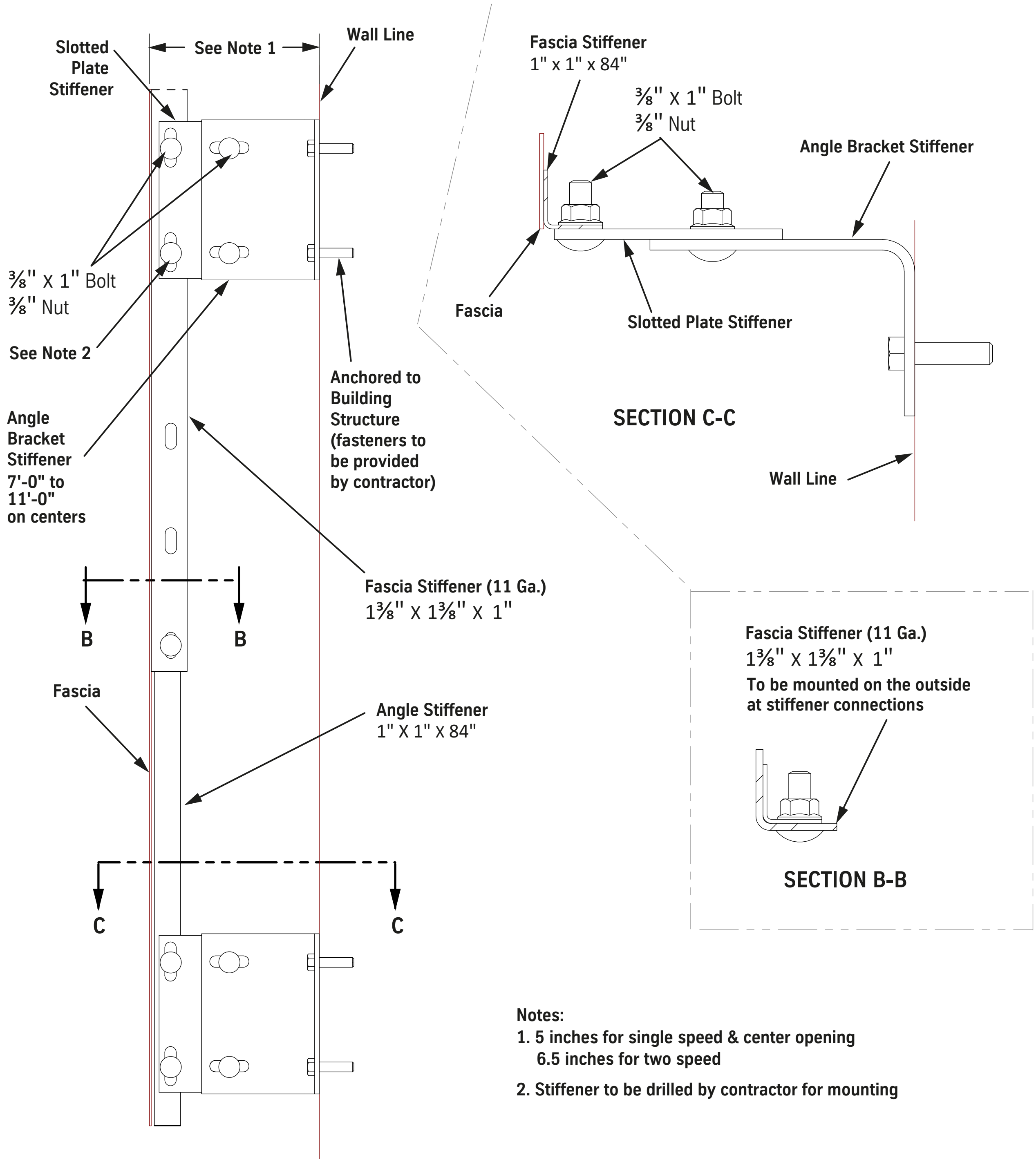


Figure 22- Install Fascia Plates, Dust Covers, and Toe Guards (1 of 3)

Install the Fascia Plates
(continued)



Notes:
1. 5 inches for single speed & center opening
   6.5 inches for two speed
2. Stiffener to be drilled by contractor for mounting

Figure 23- Install Fascia Plates, Dust Covers, and Toe Guards (2 of 3)

Install the Fascia Plates
(continued)

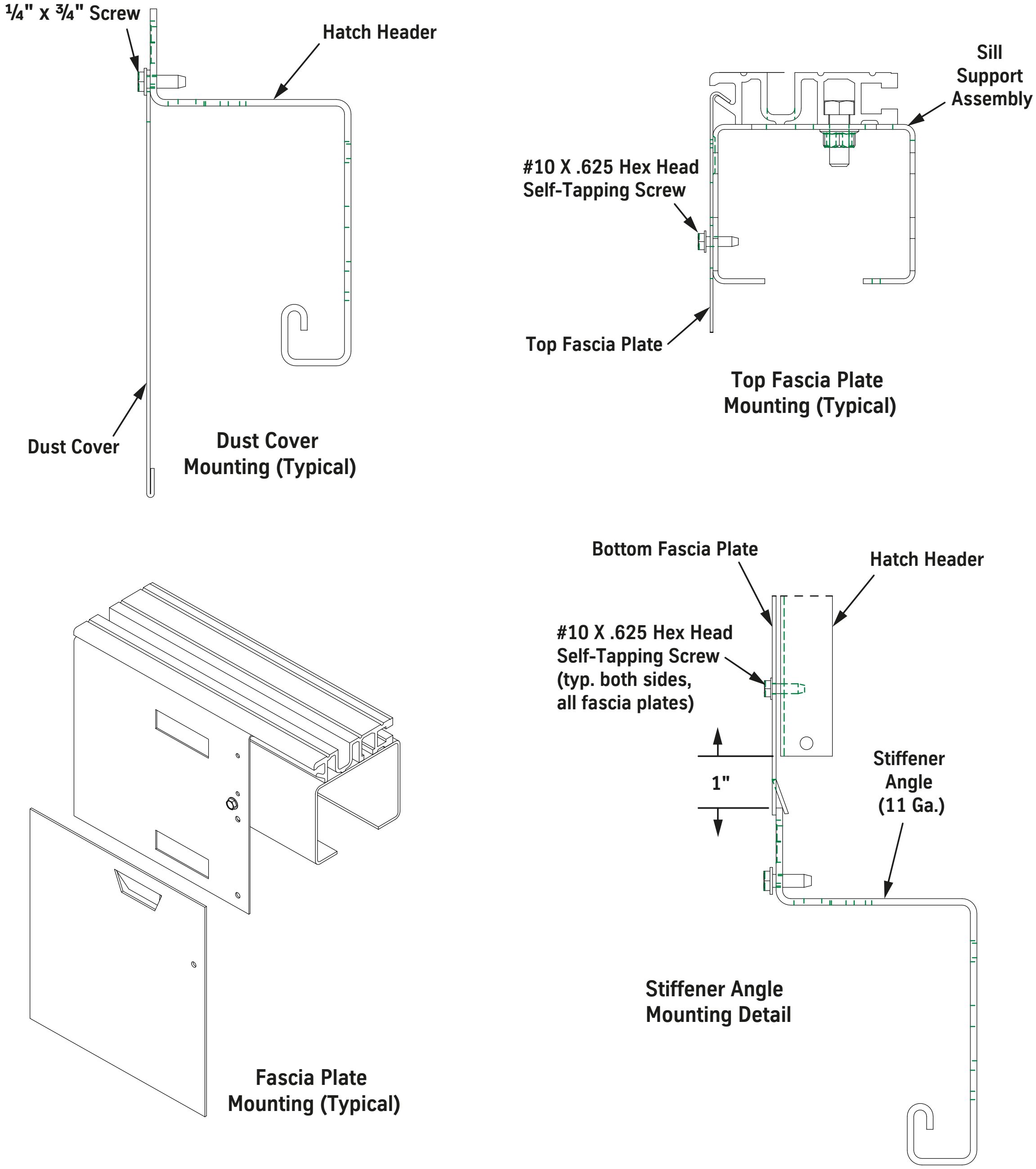


Figure 24 - Install Fascia Plates, Dust Covers, and Toe Guards (3 of 3)

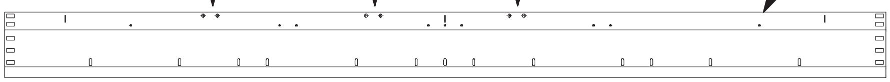
Install the Type 2 Door Restrictor

1. Mark the position of the hoistway restrictor angle. See Figure 25.

2. Use the supplied hardware to install the restrictor angle on the fascia.

Note: The restrictor angle must not be lower than 1″ below the top of the hoistway sill.

3. Repeat steps 1 and 2 for all landings.



Location of Mounting Holes for Hoistway Header Restrictor Plate

Opening Width	Angle Position
32”	35 3/8”
34”	37 3/8”
36”	39 3/8”
38”	41 3/8”
40”	43 3/8”
42”	45 3/8”
44”	47 3/8”
46”	49 3/8”
48”	51 3/8”

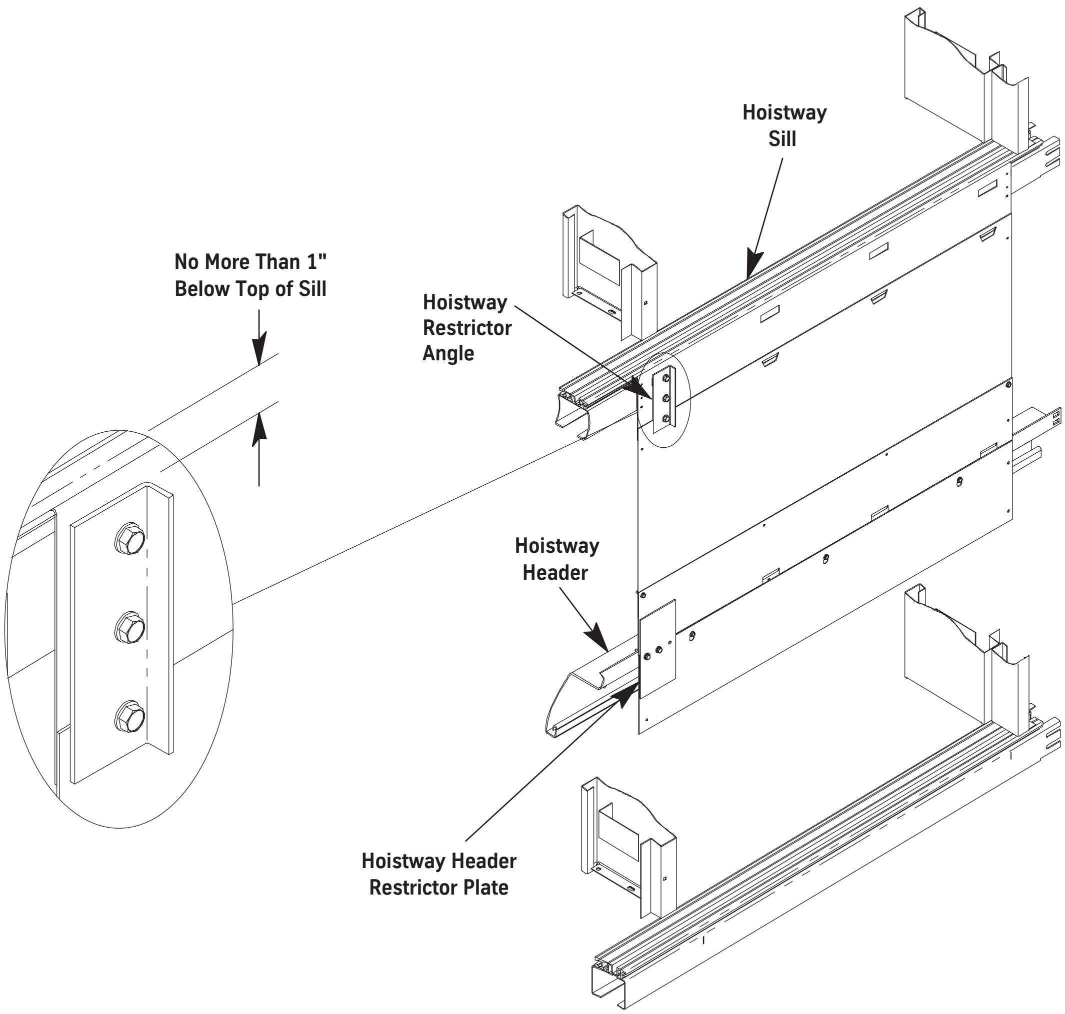


Figure 25 - Hoistway Restrictor Angle Positions

Install the Car Door Restrictor

1. Install the car door restrictor into the two key slots on the trailing edge of the car door.
2. Use washers to adjust the car door restrictor so that it is plumb and a 1/4" minimum interference when the car door restrictor engages the hoistway restrictor angle. See Figure 26.

Restrictor Testing

Run the car, and verify the following throughout the hoistway:

- The car door will open when the car is within 3″ of each landing.
- The car door will not open more than 4″ when the car is 18″ or more away from each landing (except where the car doors open only to fascia). This includes top and bottom overtravel.
- There is 1/4" minimum interference when the car door restrictor engages the hoistway restrictor angle.

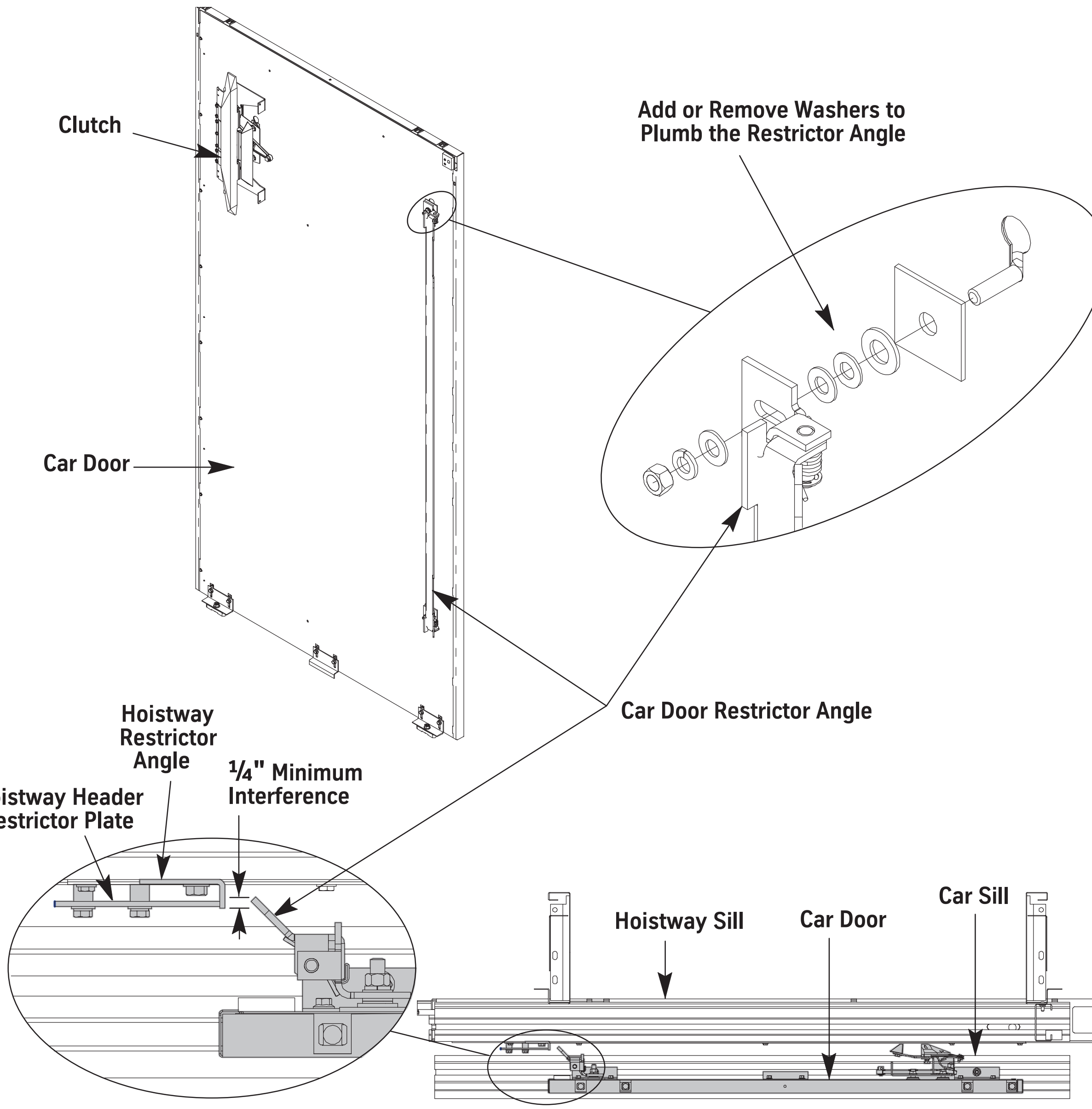


Figure 26 - Install the Car Door Restrictor Angle

Two Speed Installation

Center Opening Installation starts on 7 - 56

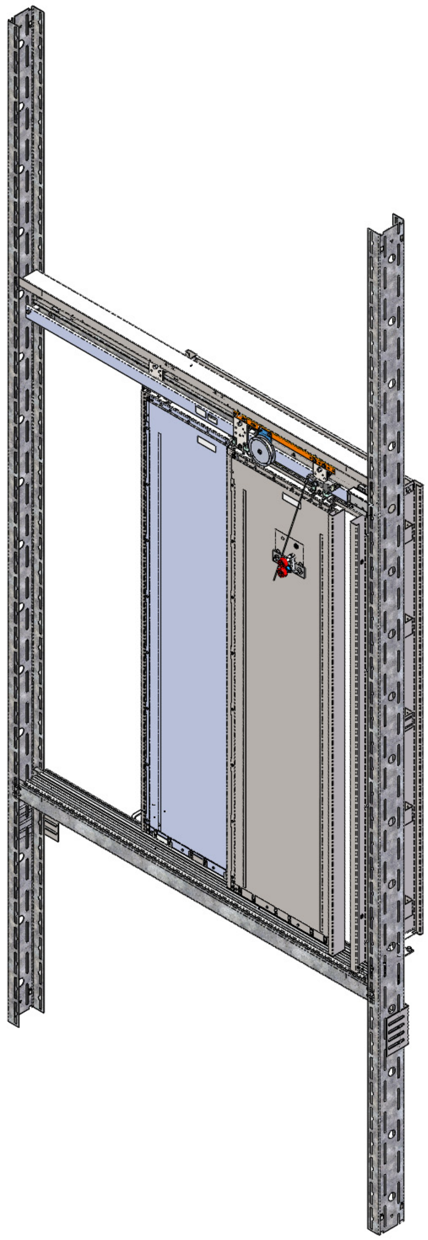


Figure 27 - Two Speed M721 Entrance

Install the Wall Angles

Note: See the job layouts and Figure 28 on page 7-31 for all steps in this procedure.

1. Verify that a running platform with the car sill is installed.

2. Obtain the finished floor height dimension from the contractor.

3. Determine the daylight line location for the strike side.

4. Apply tape to the car sill, and mark the line on the tape.

5. Mark the horizontal position of the inside face of the master (first) wall angle relative to the daylight line nearest the strike column. Extra wall angles are provided if the pit is more than 6 feet deep.

6. Install the wall angle.

Notes:

- Where hoistway space allows, turn the wall angles away from the door opening.
- Wall anchors must be located below the sill support assembly.

7. Drop a plumb line in the front of the hoistway to locate the positions of the remaining master wall angles.

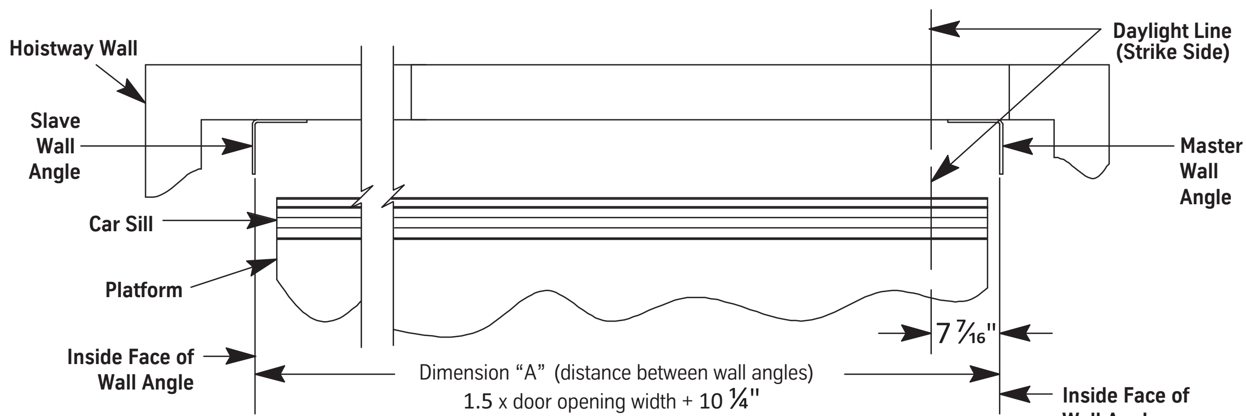
8. Install the remaining master wall angles.

9. Make sure that the master wall angles are square with the platform and plumb with each other. Check the tightness of the wall anchors.

10. Create a gauge stick for the slave wall angle. Cut a piece of light, but stiff material (e.g., 3/4” EMT) for Dimension “A”.

11. Place the gauge stick against the master wall angle and locate, mark, and install the slave wall angles at all floors.

Install the Wall Angles
(continued)



Door Opening Width (inches)	Dimension “A” (inches)
48	82 ¼
54	91 ¼

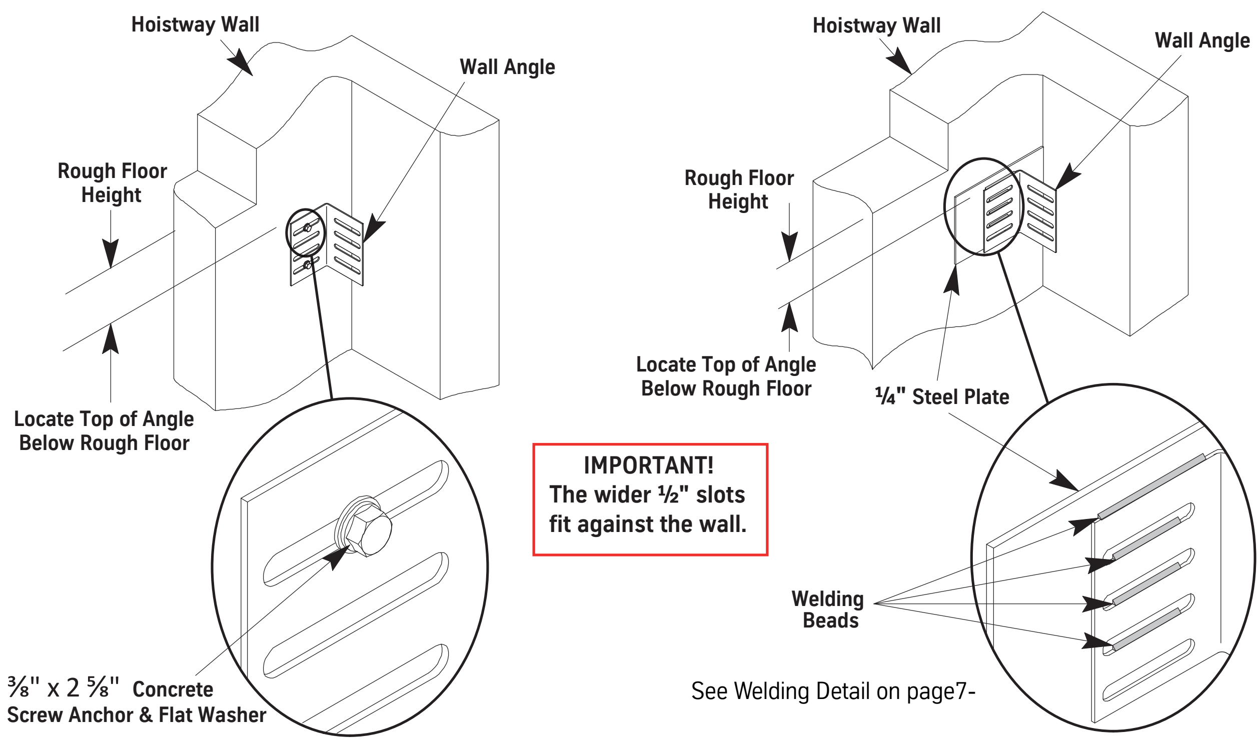


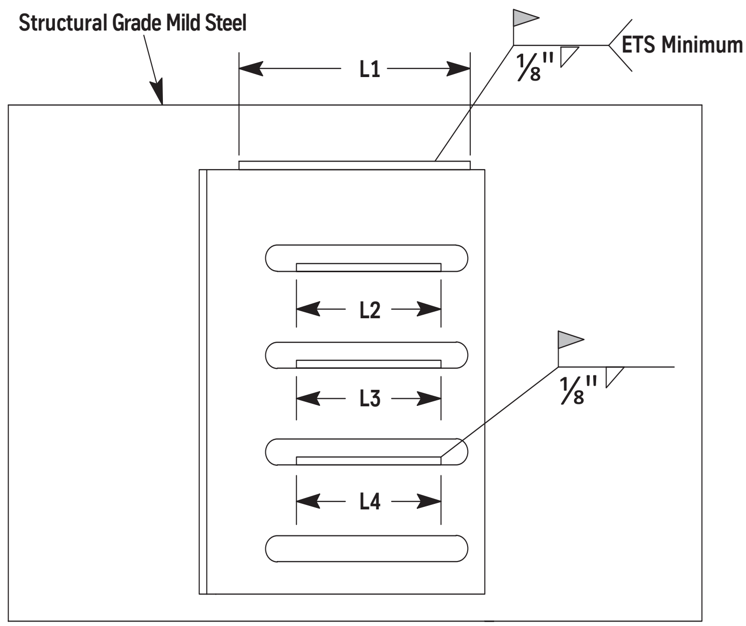
Figure 28 - Wall Angle Placement

Welding Detail

1. Before welding, make sure the steel is clean. Remove burrs, paint, or coating in weld area.
2. Welding of elevator parts that are specified in *ASME A17.1 Safety Code For Elevators And Escalators*, shall conform to *A17.1, Section 8.8, Welding*.
3. Perform all welding in a well ventilated area, *ANSI Z49.1 Safety In Welding, Cutting And Allied Processes*.
4. Weld entrance wall angles to structural mild steel in two or more locations.

   Use horizontal fillet welds on square edges of the wall angle (recommended, but not required). The total effective length of fillet welds should equal or exceed 4 inches.

   Example: (L1 + L2 + L3 + L4 +..... + Ln = 4 inches minimum. The length of each fillet should be a minimum of 3/4 inches.
5. The type of filler metal used will depend on the welding process, but in no case shall the nominal tensile strength of the filler metal be less than 60,000 PSI.
6. For suitable structural mild steel or preheat specifications, refer to *AWS D1.1* or *AWS D1.3* whichever is applicable.



Stack the Struts

Note: See Figure 29 on page 7-33 for all steps in this procedure.

1. Set two struts on the pit floor, and fasten them to the wall angles.

Note: A compression splice is required every 32 feet.

2. Adjust the struts so that they are 11/4” from the car sill. The strut-to-car sill adjustment will set the final sill clearance.
3. Clip a strut splice to the top of the two struts.Triangles in splices must match the direction (up or down) of triangles in the struts.
4. Clip the second set of struts to the splices, use a splice bar and a hammer to drive the upper strut onto the splice, and fasten the struts to the next set of wall angles. At each landing, verify that the struts are 11/4” from the car sill.
5. Repeat this procedure until all of the struts are stacked, spliced, and fastened to wall angles.
6. Check all struts for plumb on two sides, and then securely fasten them.

Stack the Struts
(continued)

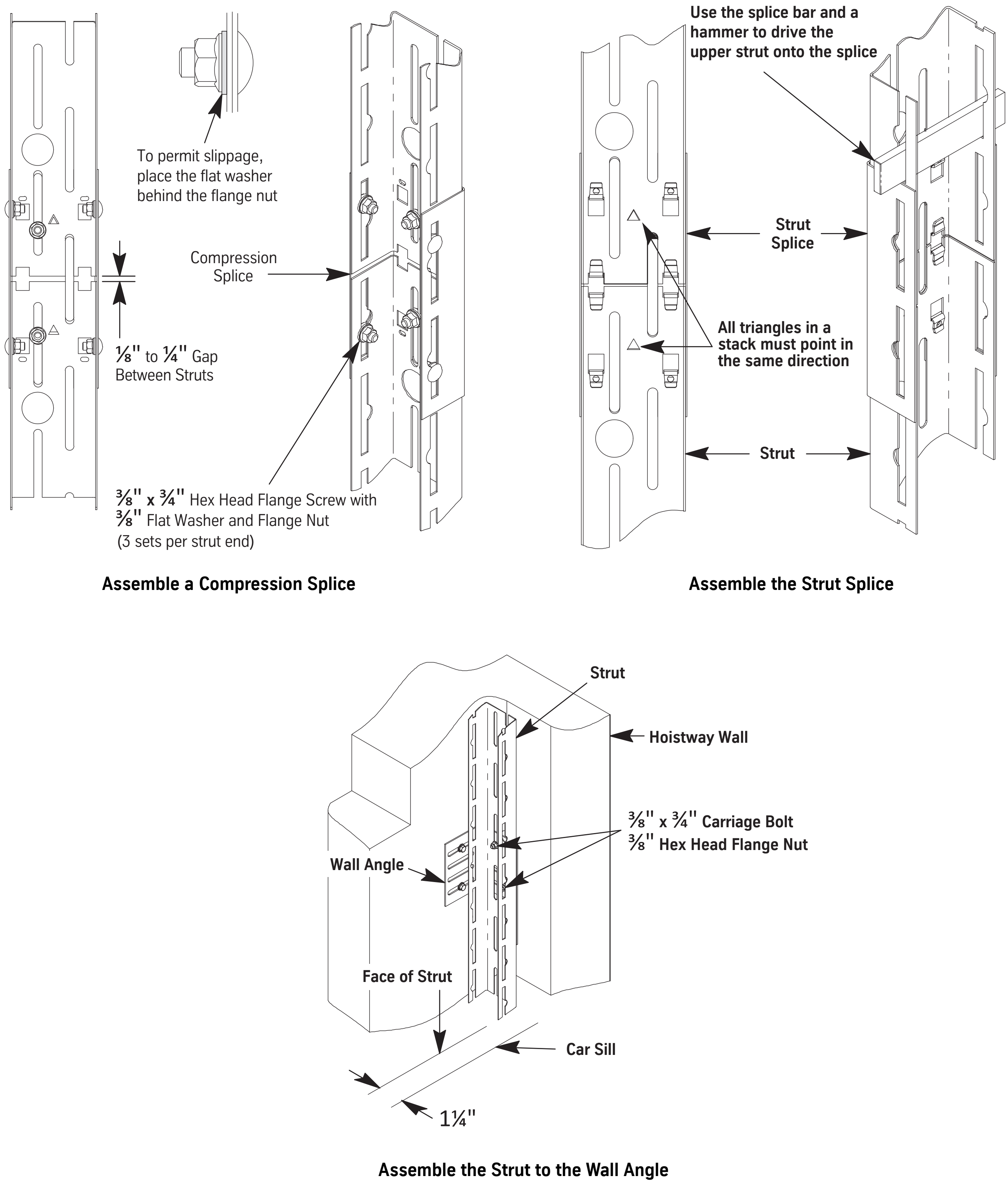


Figure 29 - Stack and Assemble the Struts

Install the Hoistway Sill

1. Determine the strike side of the hoistway sill.

2. Locate the two slots in the sill support.

3. Remove the hex head cap screws from the column mounting brackets, and slip them into the slot on the back side of the sill. See Figure 30.

4. Loosely attach each mounting bracket, and then adjust the bracket's tab to fit into the slot.

5. Tighten the brackets to the sill.

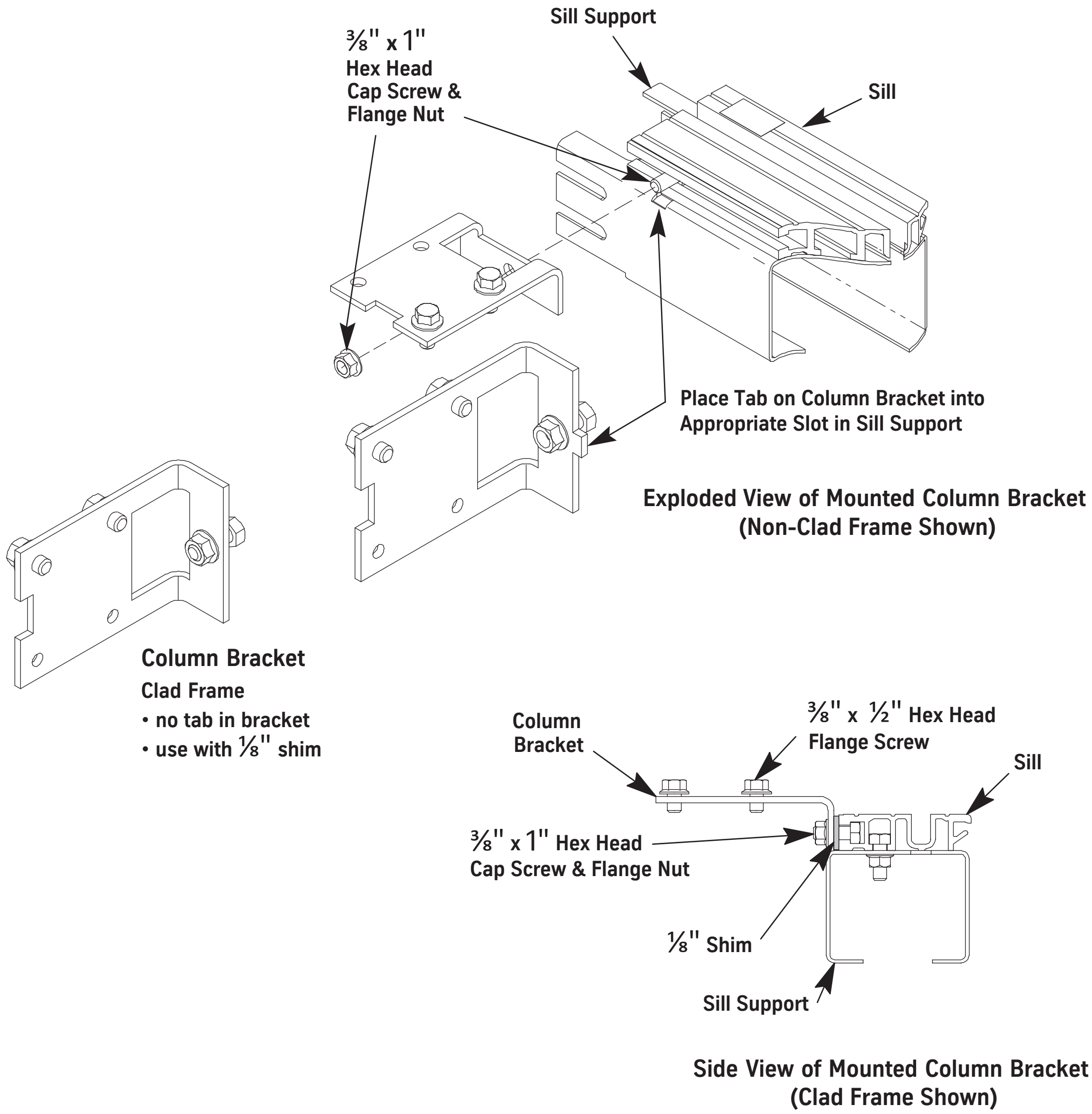


Figure 30 - Column Bracket Installation for Standard Sill

Install Sill Support to Struts

For all steps in this procedure see Figure 31 on page 7-36.

1. Hang the sill leveling tool in the slots or oval cutout on the back of each entrance strut.
2. Use the adjustment trigger to set the tool so that the support angle is roughly 2 inches below the finished floor.
3. Lay the sill and/or sill support on the support angles.
4. At each end of the sill and on each side of the strut, install a carriage bolt and a flange nut.
5. Hand-tighten into matching slots of the sill support and strut.

Note: The nut goes inside the assembly.

6. Raise the sill to the finished floor level.
7. Level the sill side-to-side and front-to-back.
8. Move the sill up so that the daylight lines and the centerline stamped into the header are even with the car sill.

Note: Ensure that the adjustment is accurate because this determines the accuracy of the entrance frame installation.

9. Verify that the vertical surface of the sill support is even with the angled fascia hanger on the sill.
10. Tighten the fasteners on the hall side.
11. Tighten the fasteners on the car side.
12. Repeat this procedure for all landings.

Install Sill Support to Struts
(continued)

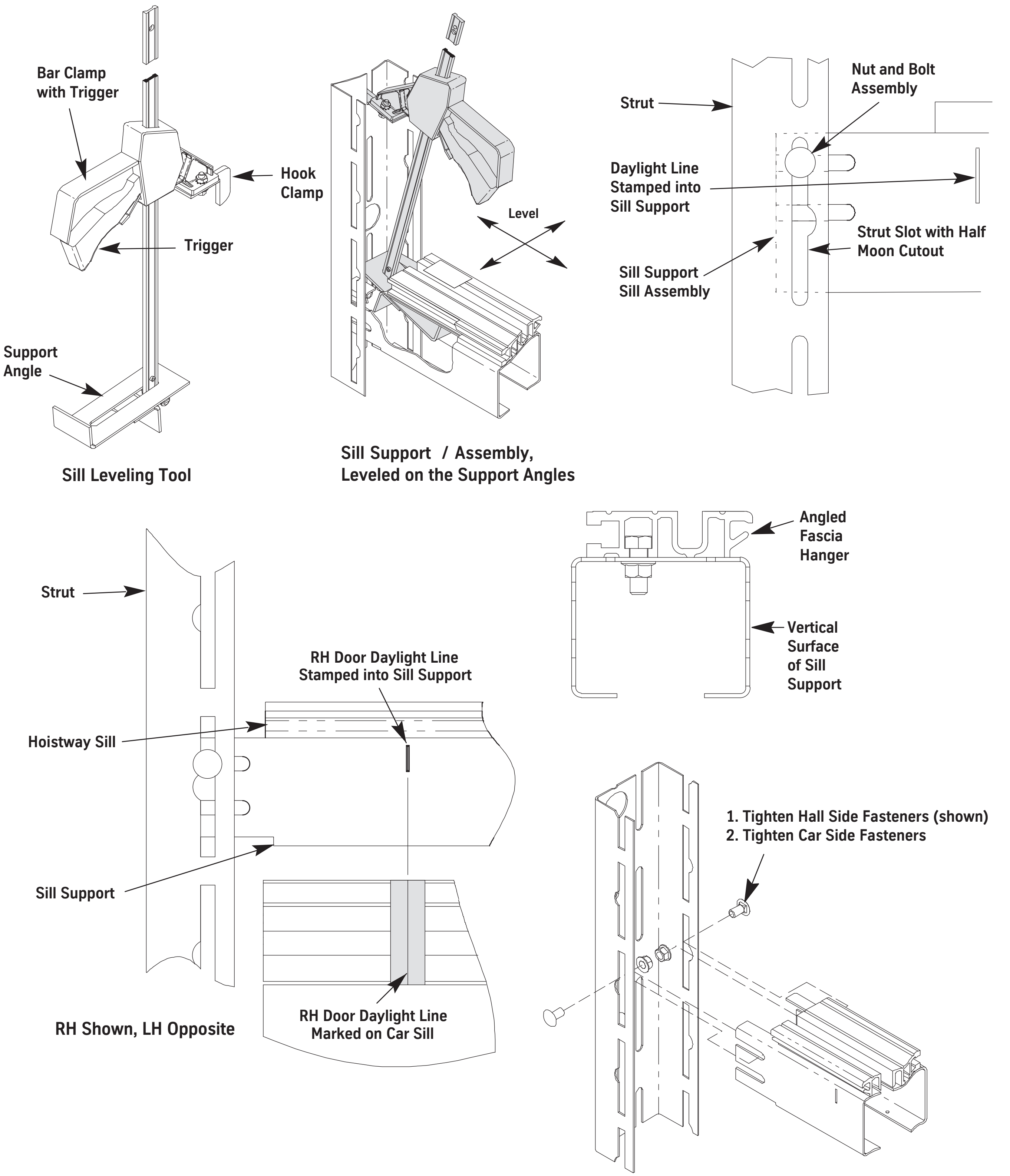


Figure 31 - Install the Sill Support to the Struts

Install the Hoistway Header

Note: Gauge sticks are needed for this procedure.

- For standard door height (84”) - two gauge sticks are provided for each job.
- For non-standard door height - use the following formula to determine the length, and cut the gauge sticks to this measurement.

  Gauge Stick Length: Sill-to-Header Dimension = Opening Height + 10.3125.

1. Move the platform up where the header can be reached.
2. Place the gauge sticks on the sill of the landing below, one at each end of the sill. See Figure 32 on page 7-38 for all steps on this page.
3. Place the header on the gauge sticks.
   a. At each end of the header, install carriage bolts and flange nuts.
   b. Hand-tighten into the matching slots of the header and strut.
4. Move the platform up so that the daylight lines and the centerline stamped into the header are even with the car sill.
5. To prevent the door operator equipment from being out-of-plumb:
   a. First tighten the fasteners on the back of the header at both ends.
   b. Then tighten the fasteners on the front of the header at both ends.
6. Repeat this procedure for all landings.

Adjust the Hoistway Header

1. Level the platform with a landing.
2. Verify that the clearance between the hoistway sill and the car sill is 1.25 inches.

Install the Hoistway Header
(continued)

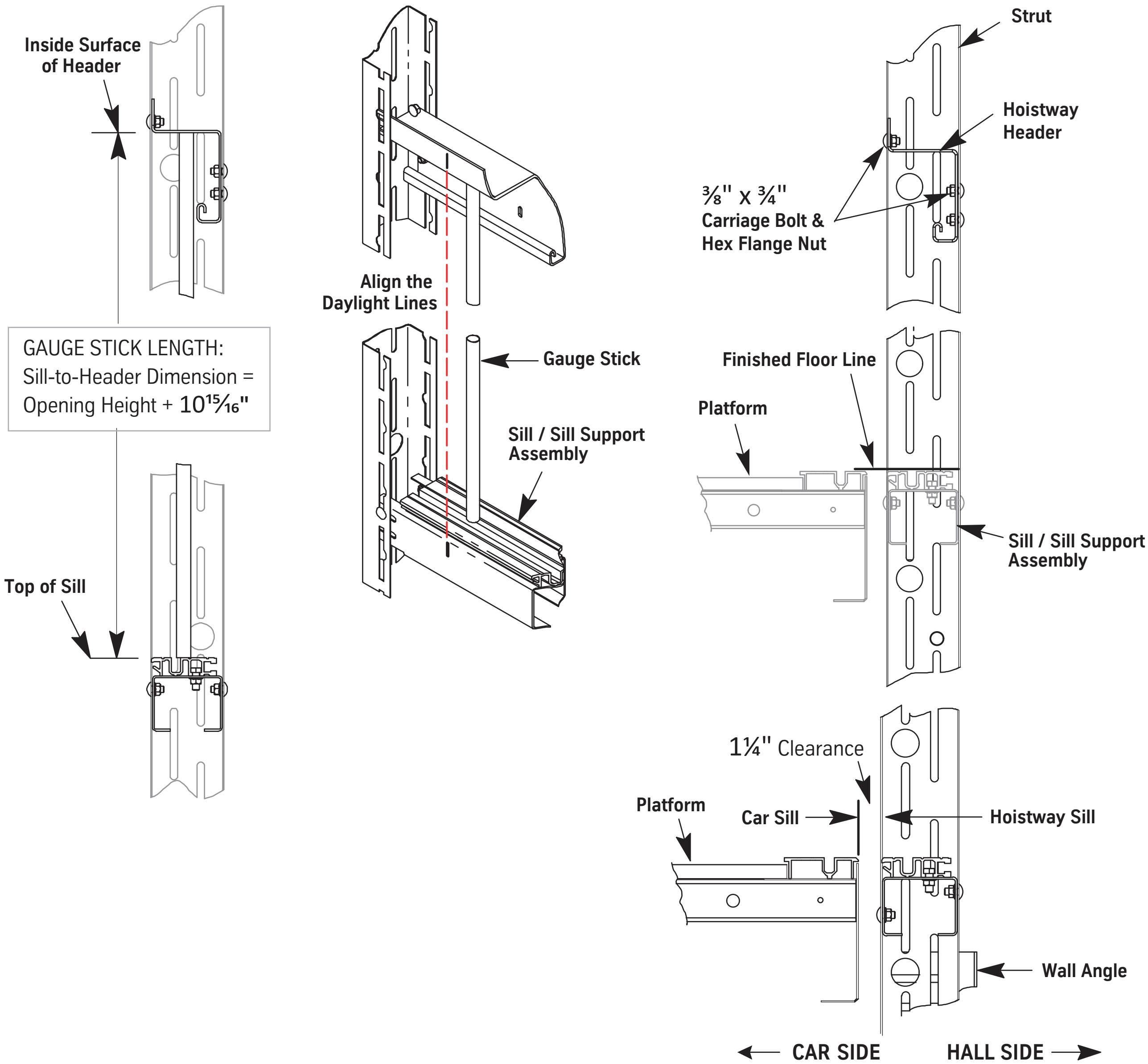


Figure 32- Install and Adjust the Hoistway Header

Assemble the Frame

Note: The transom is mounted between the columns.

1. Place the entrance columns and transom face down, and position each column at a slight angle to the transom. See Figure 33.
2. On each end of the transom, remove the flange screw and nut and set them aside.
3. On each end of the transom, roughly align the clips with the rectangular cutouts in the columns.
4. Swing the column toward the transom while pushing down on the column.
5. Ensure that the back side (toward the car) of the transom is flush with the back side of the column.
6. Install the flange screw and nut in the matching holes of the transom and column.
7. Repeat steps 3 through 7 for the other column.
8. Verify that the columns are square with the transom.
9. Ensure all fasteners are tight, and repeat this procedure for all landings.

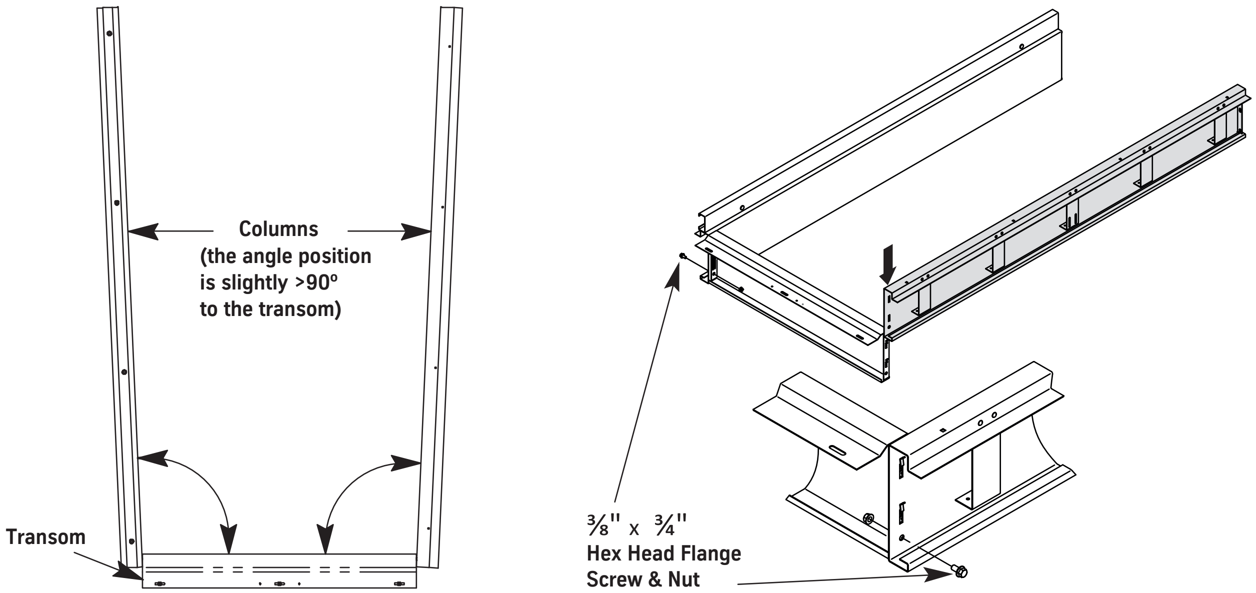


Figure 33- Assemble the Frame

Attach the Frame to the Sill

1. Attach the frame to the column brackets.
   a. Stand the frame on the column mounting brackets.
   b. Install the hex head flange screws in the bottom of each column.
2. Align the frame columns so that they overlap the hoistway sill 1/8” (the depth of the cutout on the top back edge of the hoistway sill). See Figure 34.
3. Tighten the four screws between the columns and the column brackets.
4. Move the platform up high enough to reach the header and transom.

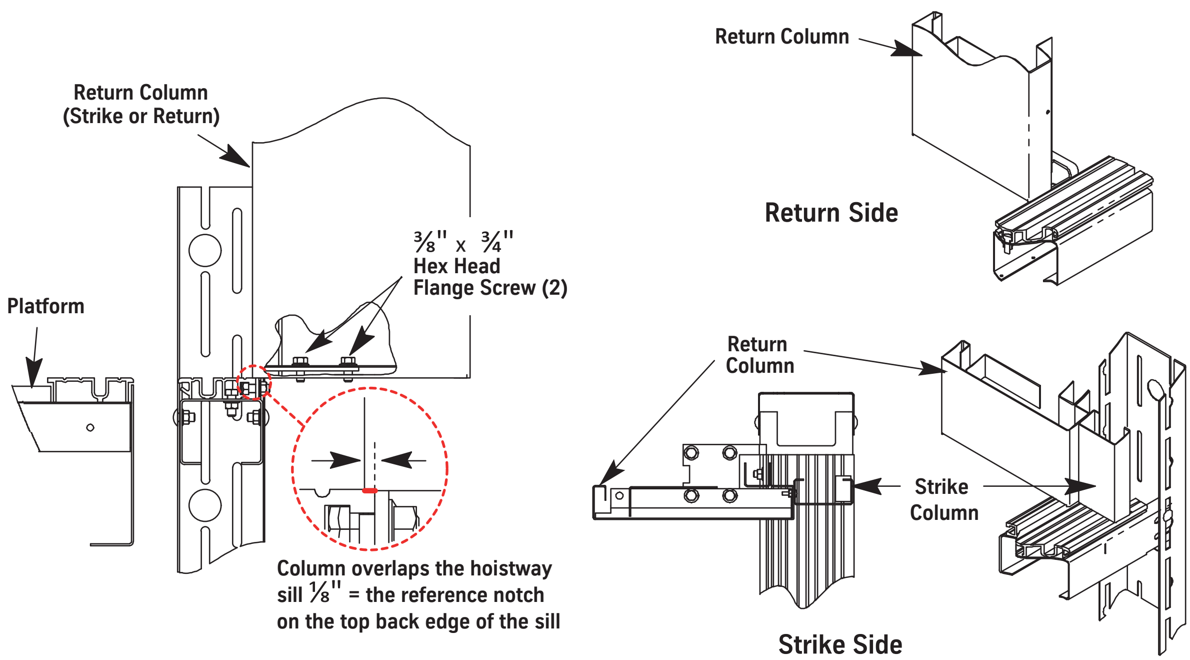


Figure 34 - Attach the Frame (standard sill shown)

Attach the Transom to the Header

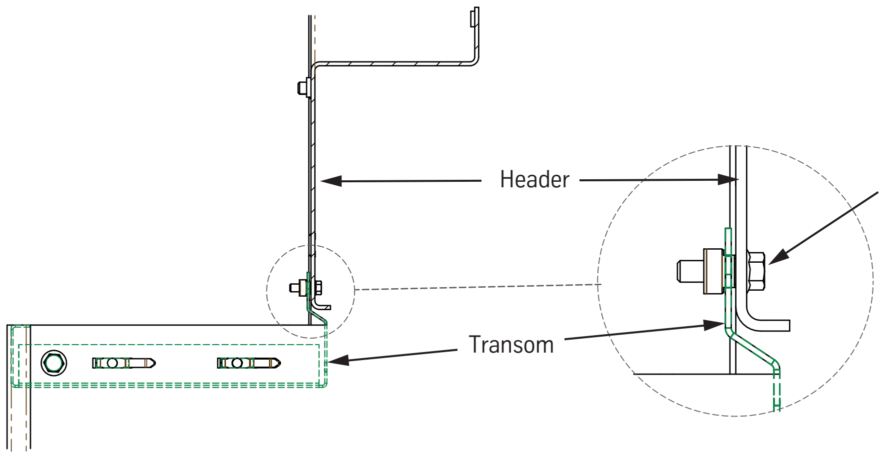
1. Attach the transom to the header. See Figure 35.

- For non-clad frames:
    a. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
    b. Tighten the screws.

- For clad frames:
    a. Before screws are added, install a 1/8" shim between the transom and the header.
    b. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
    c. Tighten the screws.

2. Install one washer head self-tapping screw into the header.

3. Repeat this procedure for all landings.



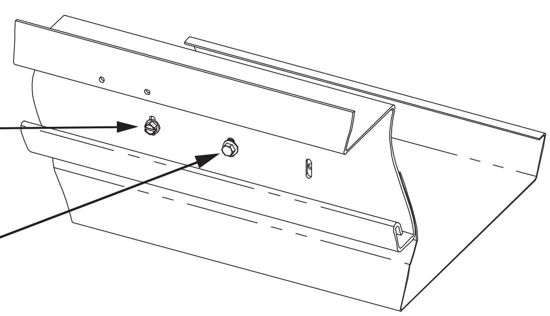


Figure 35 - Attach the Transom to the Header

Install the Grout Angles

1. Use self-tapping screws to install the grout angle on the bottom of the sill support and also tight against the hoistway wall. See Figure 36.

Note: Grout angles have a 2 1/2” leg and a 3 1/2” leg. Based on the gap, either leg can be placed against the hoistway wall.

2. Anchor the grout angle to the wall.

3. Repeat this procedure for each landing.

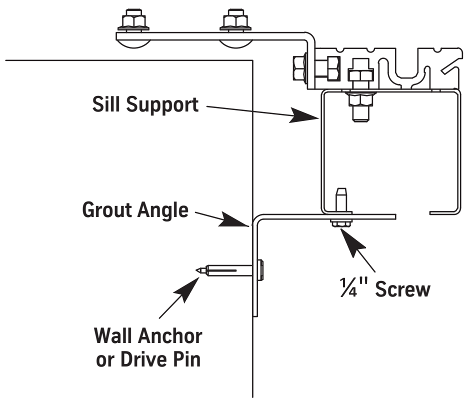


Figure 36 - Grout Angle Installation

Install Fixture Boxes

Use brackets to install the fixture boxes at each landing.

Install Hoistway Doors

1. Load the hoistway doors onto the platform.

2. At a landing, place the hoistway door(s) on the hoistway sill and lean the door(s) against the hoistway header.

3. Install the door isolation bumpers. See Figure 37 on page 7-43.

4. Loosen all upthrust rollers. See Figure 38 on page 7-43.

5. Place the door rollers, one roller at a time, onto the door track.

6. Adjust the height of the door to 3/8” by turning the eccentric on the door rollers, and then lock the eccentric with the nut.

Install Hoistway Doors
(continued)

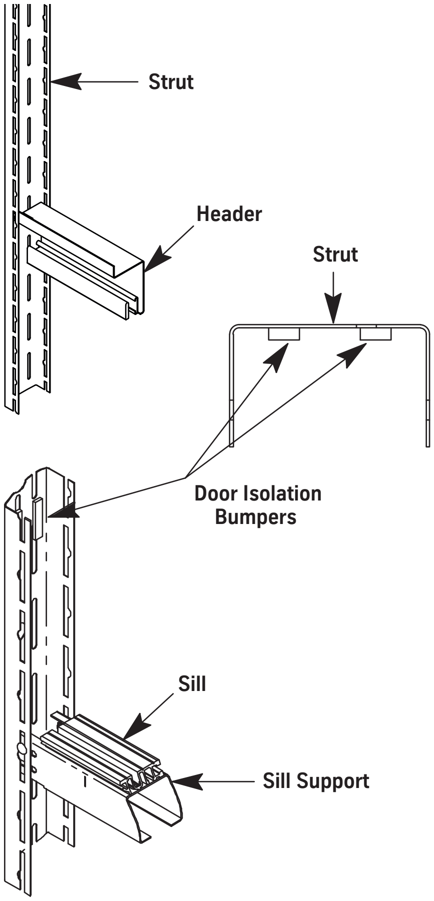


Figure 37 - Door Isolation Bumpers

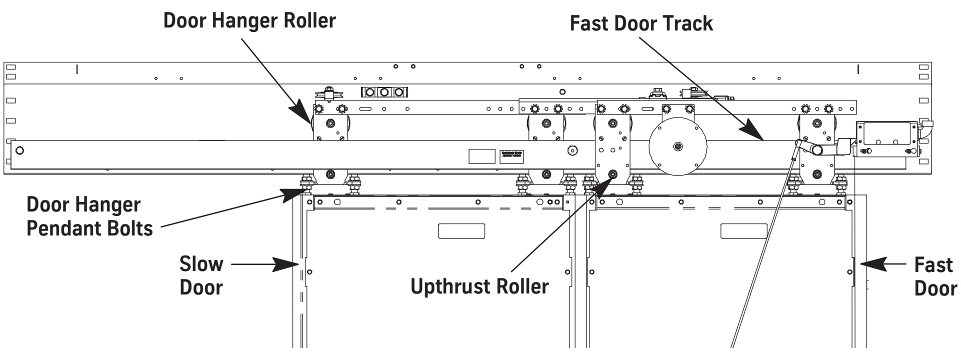


Figure 38 - Door Rollers

Install Hoistway Doors
(continued)

7. Install the door gibs and the door safety retainers. See Figure 39.

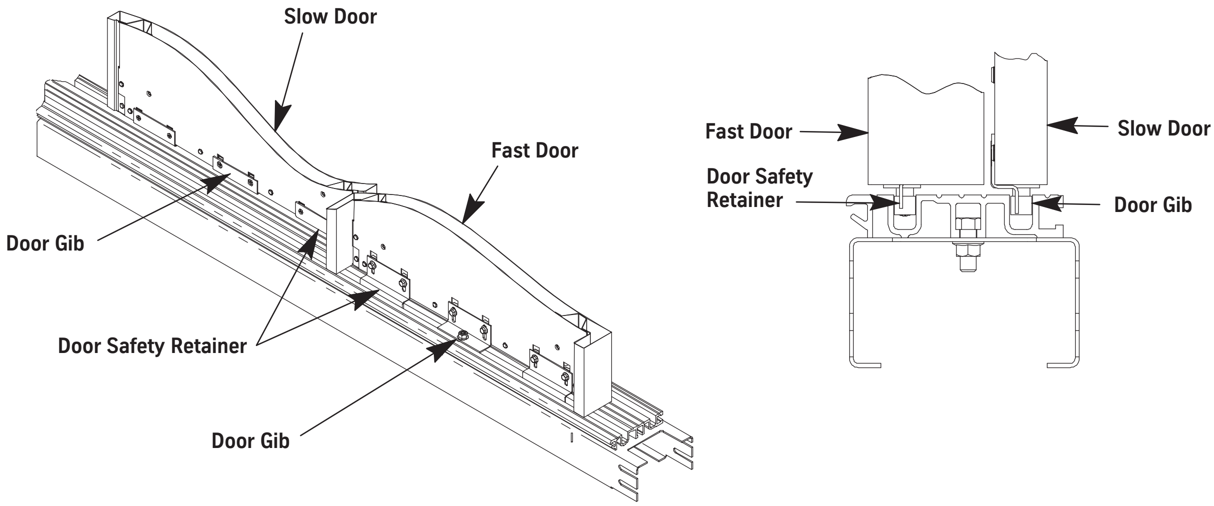


Figure 39 - Door Gibs and Safety Retainers

Adjust the Hoistway Door Running Clearance

1. Place a 5/16” shim (running clearance) underneath the leading edge of the door. See Figure 40 on page 7-45.
2. Loosen the upthrust roller, turn it to its lowest adjustment, and then snug it in place.
3. Adjust the eccentric on the door roller so that the door is flush with the shim and the door roller is flush with the track.
4. After the adjustment is made, tighten the door roller eccentric.
5. Remove the shim, and place it under the trailing edge of the door. Repeat steps 2 through 4.
6. Remove the shim, and verify that the door(s) are flush with the frame columns.

Adjust the Hoistway Door Running Clearance
(continued)

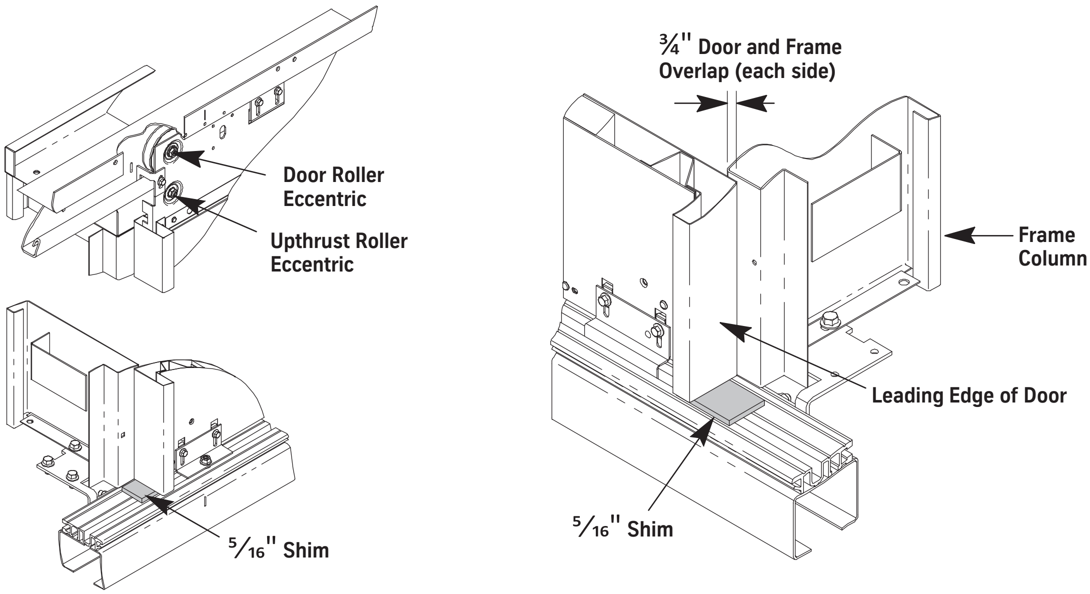


Figure 40 - Adjust Door-to-Sill Running Clearance

Adjust the Upthrust Rollers

1. Turn the eccentric of the upthrust roller clockwise until the roller just touches the bottom of the door track.
2. Adjust the eccentric so that a gap of .015″ is between the upthrust roller and the door track. See Figure 41.

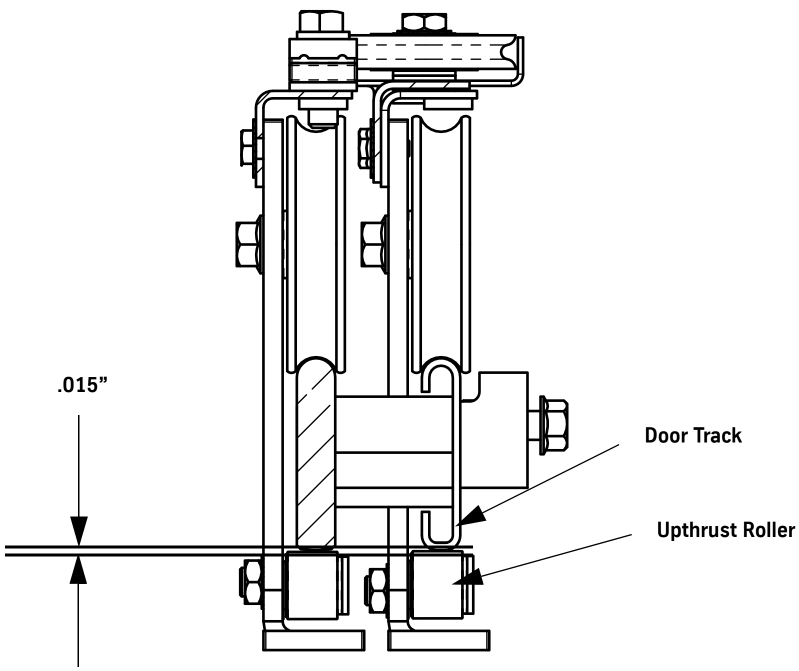


Figure 41- Adjust Upthrust Roller Clearance

Adjust the Door Gibs

1. Adjust the door gib brackets and the door safety guide brackets to obtain a 1/8" running clearance between the brackets and the hoistway sill. After adjustment, tighten the bolts.

Adjust the Frame Column

2. Place a 1/4" shim between the bottom of the entrance frame column and the bottom of the leading edge of the slow door panel.
    a. Loosen the door gib screws.
    b. Adjust the slow door leading edge to just touch the 1/4" shim.
    c. Adjust the trailing door edge to just touch the 1/4" shim.
    d. Tighten the door gib screws.

Adjust the Door Panels

3. Place the 1/4" shim between the two door panels.
    a. Adjust the door gibs so that the fast door trailing edge just touches the 1/4" shim.
    b. Place the 1/4" shim between the fast door leading edge and the strike column.
    c. Adjust the door gibs so that the fast door leading edge just touches the 1/4" shim.

4. Verify that the doors roll freely and track parallel to the hoistway sill grooves. Adjust as necessary.

Install and Adjust the Spirator

1. Wrap the spirator cable three or four times around the spirator to connect the cable.

2. Use the spirator cable clip to attach the cable to the header. See Figure 18.

3. Adjust the spirator so that the doors close when they are released 1/2" from the fully closed position.

4. Verify that the doors close fully with no "double bump" when the doors touch each other.

Notes:

- The spirator must close the doors from any open position.
- To obtain proper door operation from floor to floor, the spirator tension should be the same at each floor.

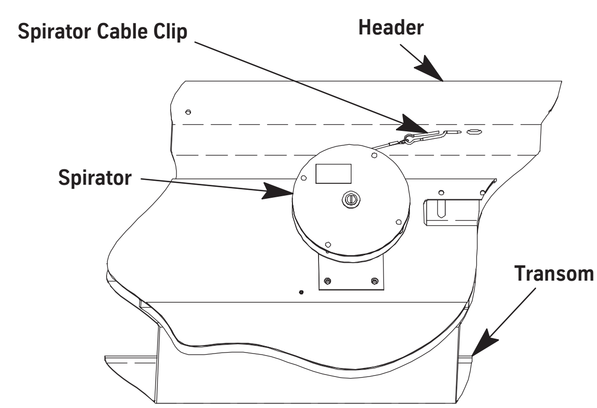


Figure 42 - Spirator

Install the Top Door Retainers

1. On each side of the door panel, use the provided hardware to install a top door retainer on the hanger. See Figure 43.

2. Verify that there is sufficient running clearance between the retainer and the track, and adjust if needed.

3. On each side of the door panel, use the provided hardware to install a track retainer clip on the hanger.

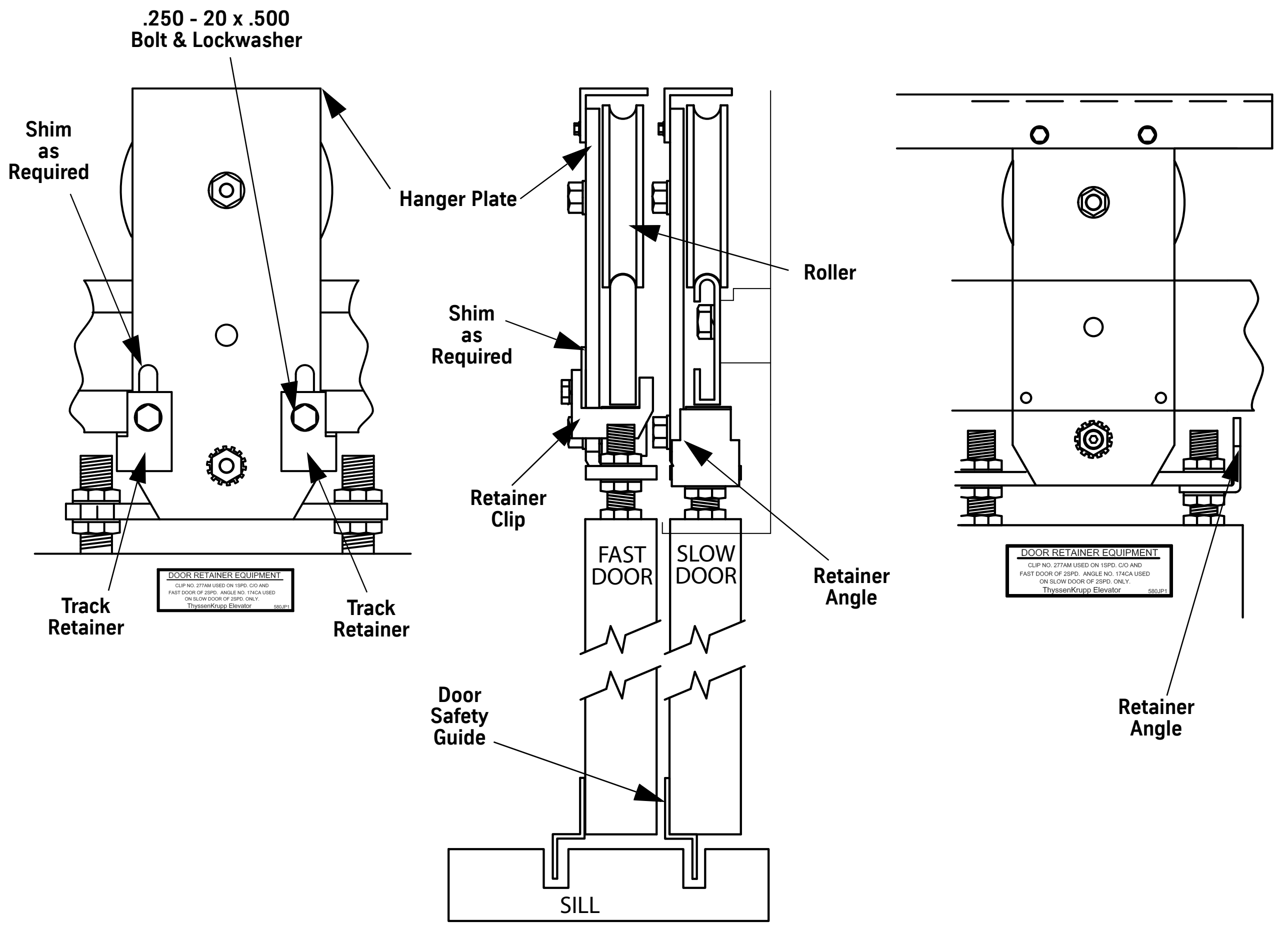


Figure 43 - Top Door Retainer

Install and Adjust the Interlocks

1. Install the interlock contact box. Evenly align the cover screws with the face of the header.

2. Remove the cover from the interlock box.

3. Close the doors, and verify the following. See Figure 44 on page 7-49.

    a. The interlock hook is centered front-to-back on the contacts.

    b. The interlock hook does not contact the front or the back of the contact box. If necessary, either shim the interlock box or remove ONLY ONE of the two washers on the interlock hook hinge bolt.

CAUTION **Never remove both washers on the interlock hook shaft.**

4. Adjust the following to obtain the correct measurements:

    a. Interlock box - when the doors are closed, there is 1/8” between the interlock hook and both sides of the locking tab on the box.

    b. Connecting rod length - when the hook is resting on its contacts, the interlock hook has 1/32” clearance with the top of the locking tab on the box.

    Note: The pickup roller crank should be resting on its stop at this time.

    c. Interlock hook - contact compression of 3/32”.

        - The hook touches both contact leafs at the same time.

        - When the hook is raised by the crank, the hook clears the box at the top and also the locking tab by a minimum of 1/8”. If necessary, adjust the interlock hook stop to limit the hook travel.

5. Move the rollers and the interlock hook, and verify that there is 9/32” hook engagement before the contacts are bridged. If necessary, adjust the plastic contact block in the interlock box to obtain the proper angle and position of the contacts.

6. Repeat this procedure for all other landings.

Interlock Wiring

1. Remove the interlock box cover.

2. Ensure that after the interlock hook is in the locked position, the shorting bar has a good wipe on the contacts.

WARNING **All door interlock contacts must be wired in series. See the wiring diagrams for details.**

3. Repeat Steps 1 and 2 for all other landings.

Install and Adjust the Interlocks
(continued)

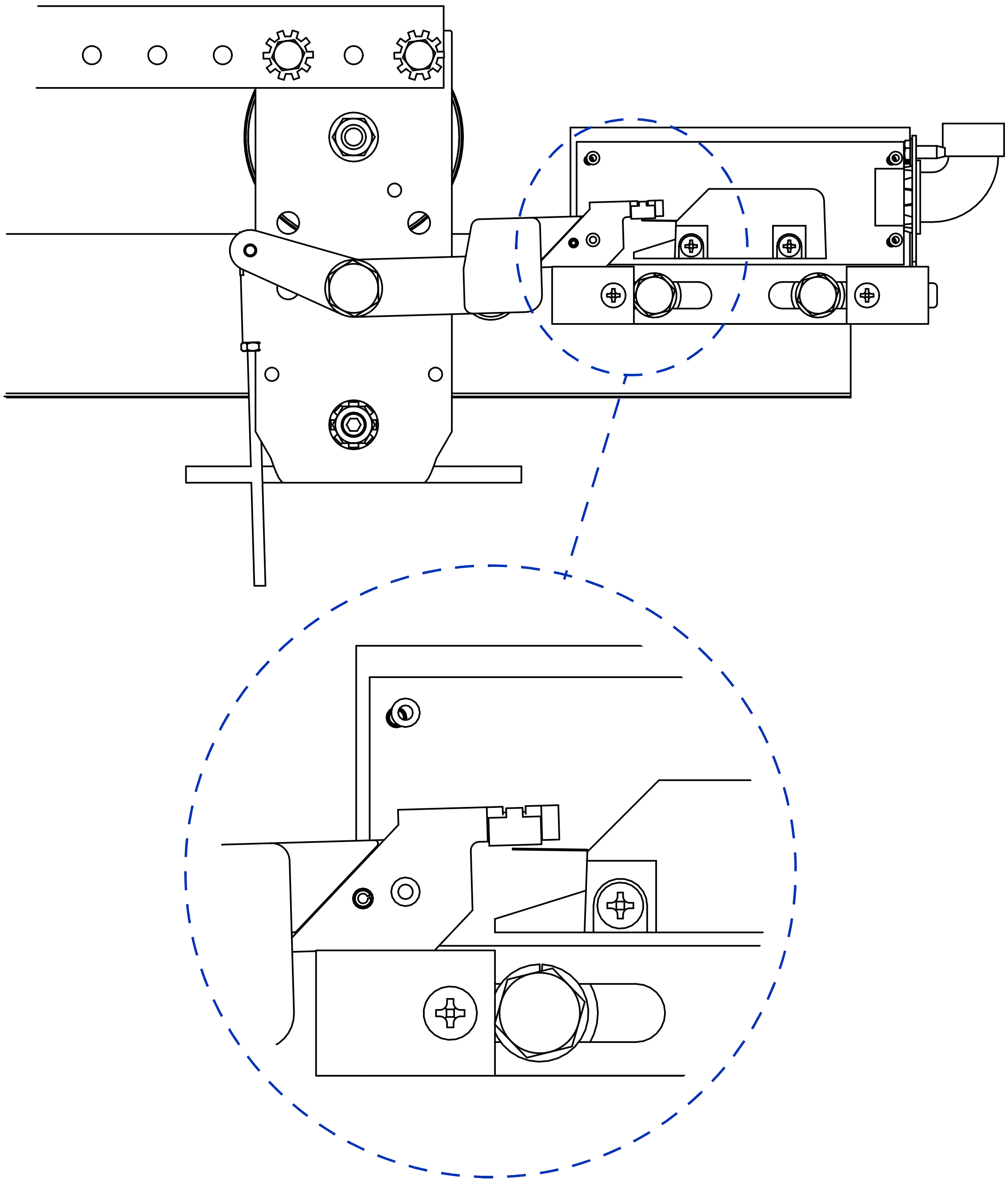


Figure 44 - Two Speed Interlock Adjustment

Install Fascia Plates and Dust Covers

1. Position the platform near the top landing.

2. Center a top fascia plate in the opening, and hook the fascia plate onto the hoistway sill of the top landing. See Figure 22 on page 7-24 through Figure 24 on page 7-26.

3. Use self-tapping screws to anchor the top fascia plate to the top landing hoistway sill support.

4. Install the first intermediate fascia plate by hooking it onto the top fascia plate.

Note: If required, install the remaining intermediate fascia plates by hooking each one onto the last one installed.

5. Clip the bottom fascia plate to the top of the header.

Note: The bottom fascia plate vertically overlaps the last intermediate fascia plate.

6. Measure the distance between the sill support and the header, and subtract one inch.

7. Cut two fascia plate stiffeners (from the provided fascia stiffener angle) to the length measured in the previous step.

8. Clamp the angles in place behind and also flush with the edge of the fascia plates.

9. Run self-tapping screws through the pilot holes in the fascia plates to anchor the fascia plates to the stiffeners.

10. Repeat Steps 2 through 9 for all intermediate landings.

11. If required, center a top fascia plate in the opening and hook it onto the hoistway sill of the bottom landing.

Note: The fascia plate and the toe guard in the pit must extend far enough below the sill so that when the car is on compressed buffers the platform toe guard will not be below the hoistway toe guard.

12. Use self-tapping screws to anchor the top fascia plate to the bottom landing hoistway sill support.

13. Install the toe guard by hooking it onto the top fascia plate.

14. Fasten the toe guard to the wall with the provided drive pin anchors.

15. If required, install all dust covers.

Install Fascia Plates and Dust Covers
(continued)

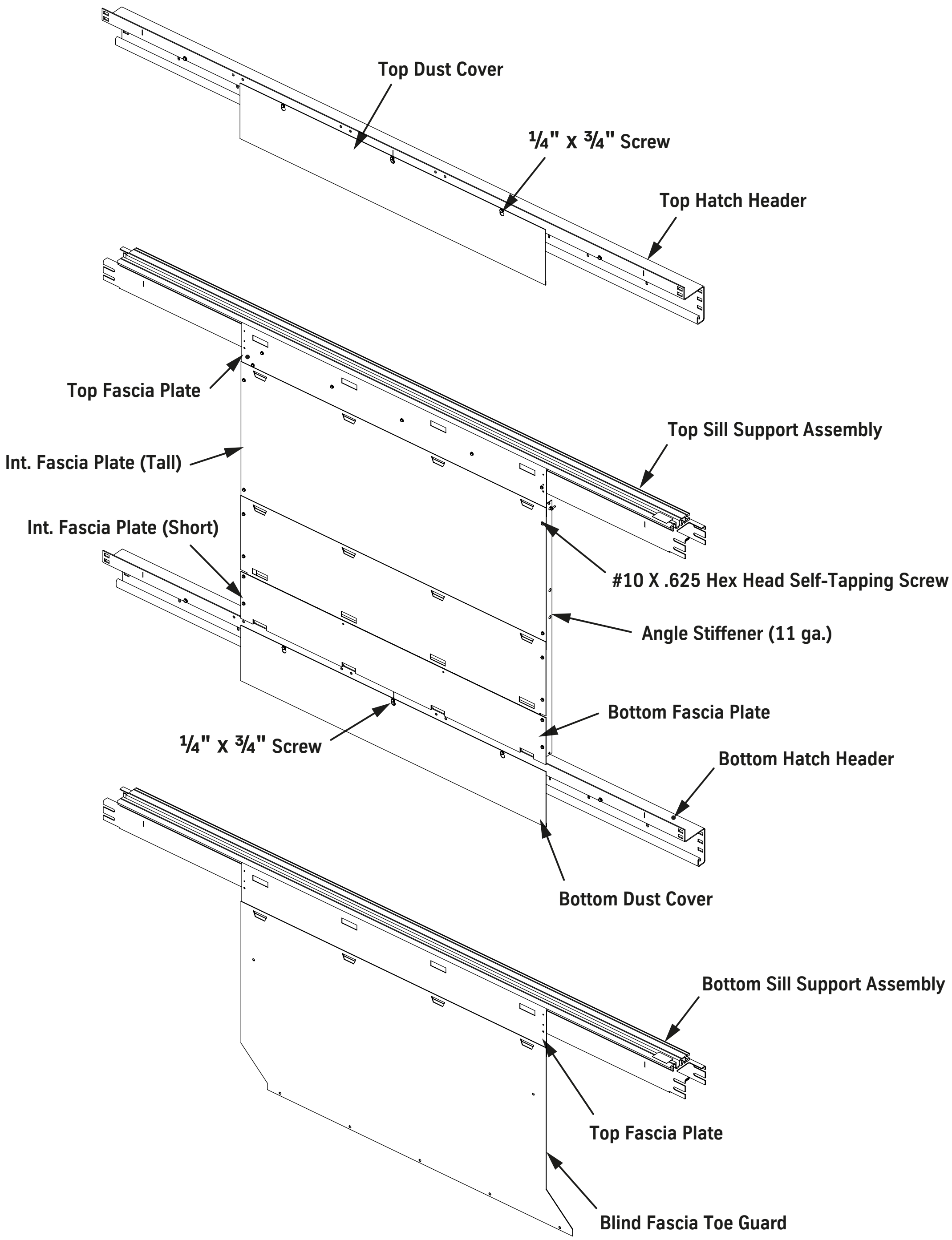
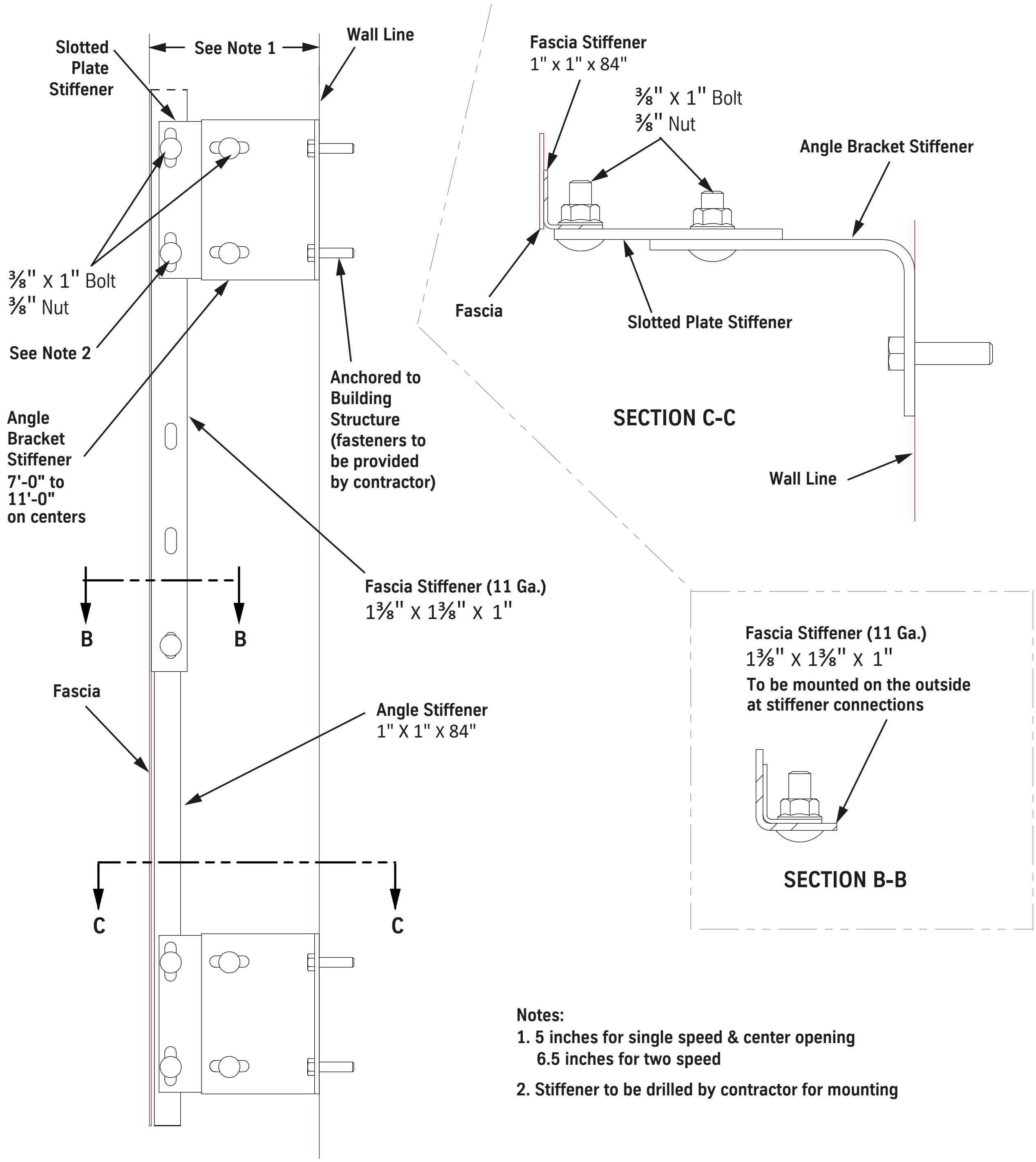


Figure 45- Install Fascia Plates, Dust Covers, and Toe Guards (1 of 3)

Install the Fascia Plates

(continued)



Notes:

1. 5 inches for single speed & center opening
   6.5 inches for two speed
2. Stiffener to be drilled by contractor for mounting

Figure 46- Install Fascia Plates, Dust Covers, and Toe Guards (2 of 3)

Install the Fascia Plates

(continued)

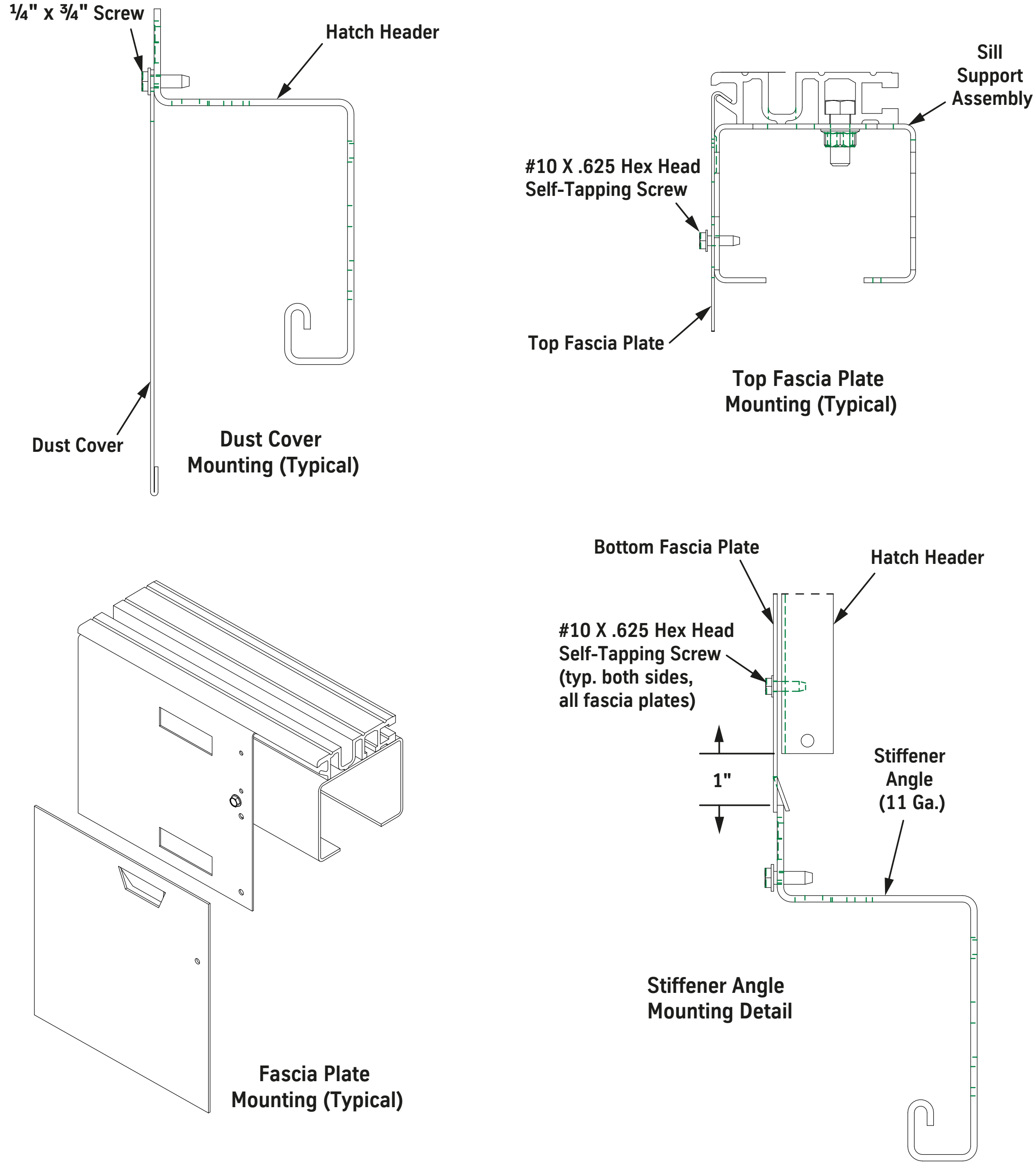


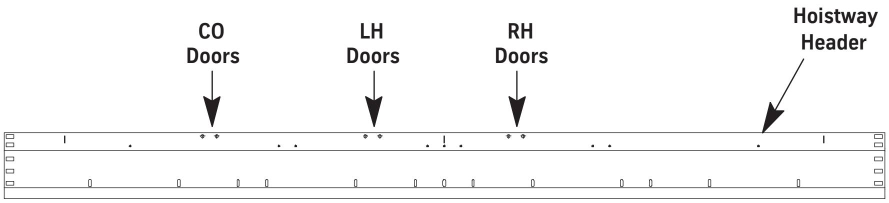
Figure 47 - Install Fascia Plates, Dust Covers, and Toe Guards (3 of 3)

Install the Type 2 Door Restrictor

1. Mark the position of the hoistway restrictor angle. See Figure 25.
2. Use the supplied hardware to install the restrictor angle on the fascia.

Note: The restrictor angle must not be lower than 1″ below the top of the hoistway sill.

3. Repeat steps 1 and 2 for all landings.



Location of Mounting Holes for Hoistway Header Restrictor Plate

Opening Width	Angle Position
36”	20 3/4”
38”	21 3/4”
40”	22 3/4”
42”	23 3/4”
44”	24 3/4”
46”	25 3/4”
48”	26 3/4”
50”	27 3/4”
52”	28 3/4”
54”	29 3/4”

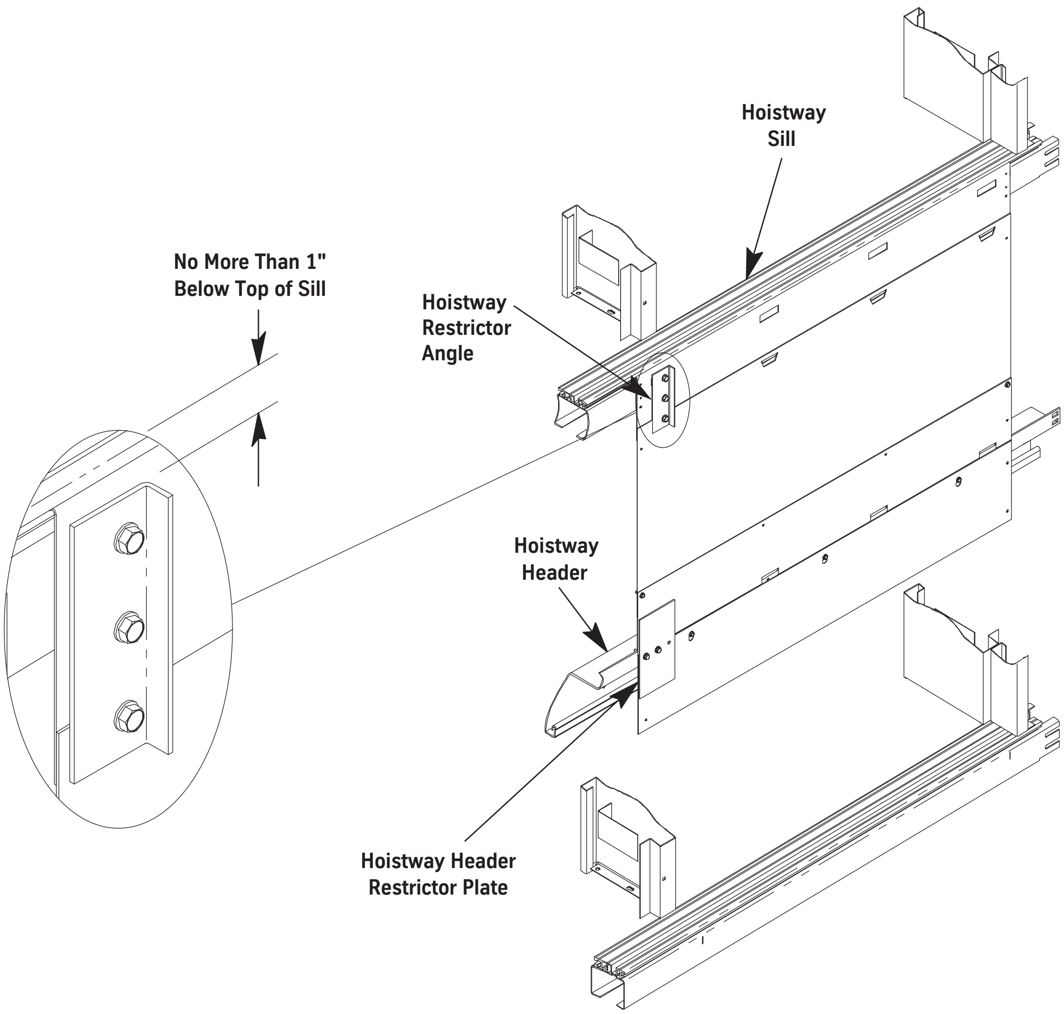


Figure 48 - Hoistway Restrictor Angle Positions

Install the Car Door Restrictor

1. Install the car door restrictor on the trailing edge of the fast door.
2. Use washers to adjust the car door restrictor so that it is plumb with a 1/4" minimum interference when the car door restrictor engages the hoistway restrictor angle. See Figure 49.

Restrictor Testing

Run the car, and verify the following throughout the hoistway:

- The car door will open when the car is within 3″ of each landing.
- The car door will not open more than 4″ when the car is 18″ or more away from each landing (except where the car doors open only to fascia). This includes top and bottom overtravel.
- There is 1/4" minimum interference when the car door restrictor engages the hoistway restrictor angle.

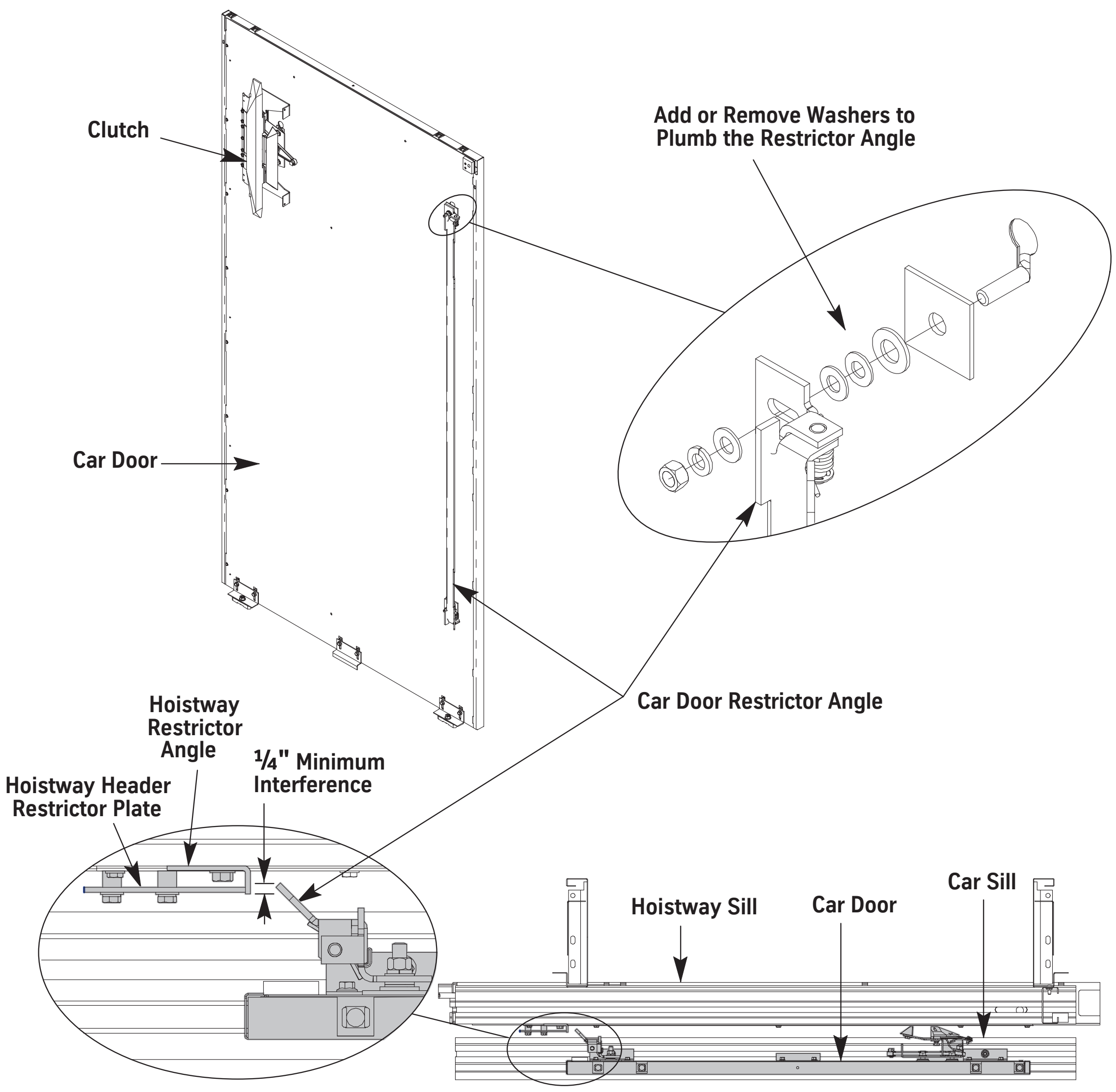


Figure 49 - Install the Car Door Restrictor

Center Opening Installation

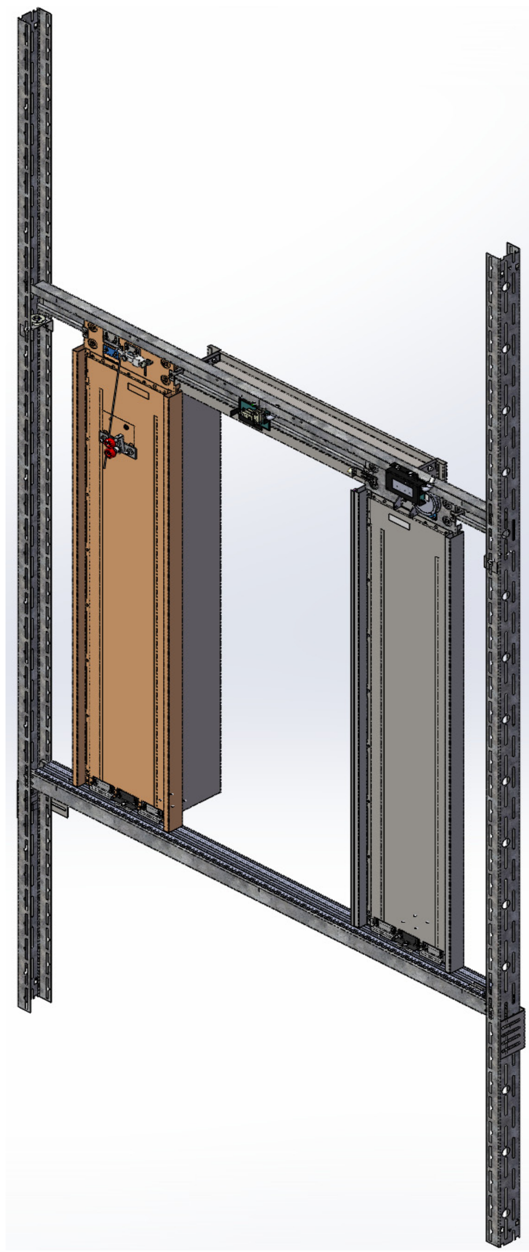


Figure 50 - Center Opening M721 Entrance

Install the Wall Angles

Note: See the job layouts and Figure 51 on page 7-58 for all steps in this procedure.

1. Verify that a running platform with the car sill is installed.

2. Obtain the finished floor height dimension from the contractor.

3. Determine the daylight line location for the strike side.

4. Apply tape to the car sill, and mark the line on the tape.

5. Mark the horizontal position of the inside face of the master (first) wall angle relative to the daylight line nearest the strike column. Extra wall angles are provided if the pit is more than 6 feet deep.

6. Install the wall angle.

Notes:

- Where hoistway space allows, turn the wall angles away from the door opening.
- Wall anchors must be located below the sill support assembly.

7. Drop a plumb line in the front of the hoistway to locate the positions of the remaining master wall angles.

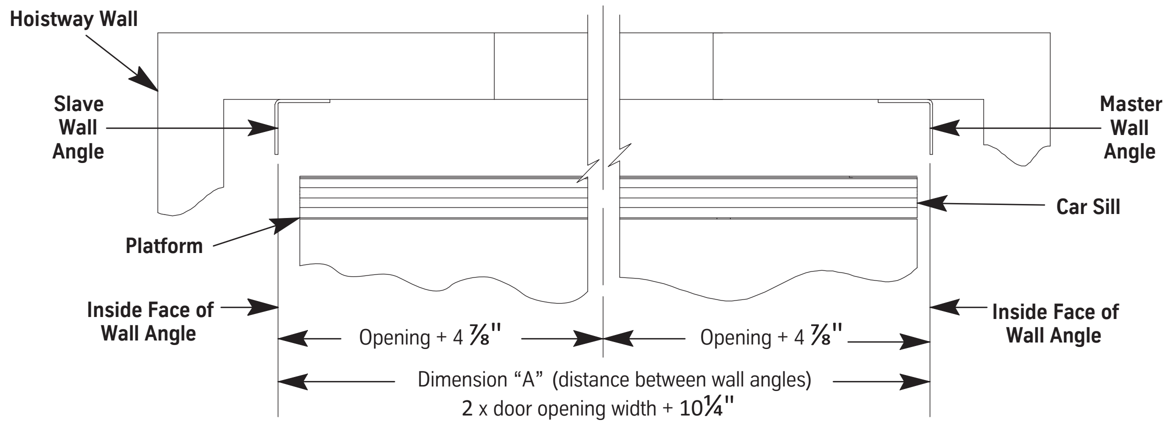
8. Install the remaining master wall angles.

9. Make sure that the master wall angles are square with the platform and plumb with each other. Check the tightness of the wall anchors.

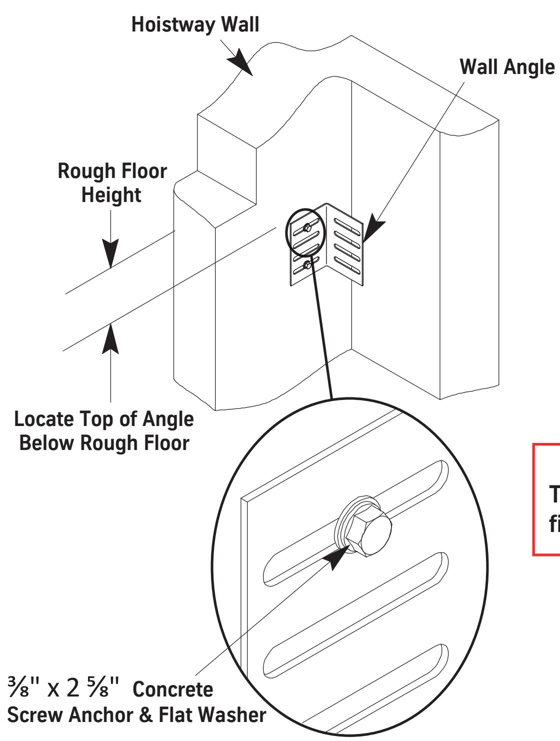
10. Create a gauge stick for the slave wall angle. Cut a piece of light, but stiff material (e.g., 3/4” EMT) for Dimension “A”.

11. Place the gauge stick against the master wall angle and locate, mark, and install the slave wall angles at all floors.

Install the Wall Angles
(continued)



Door Opening Width (inches)	Dimension "A" (inches)
36	81 ¾
42	93 ¾
48	105 ¾
60	129 ¾



IMPORTANT!
The wider ½" slots fit against the wall.

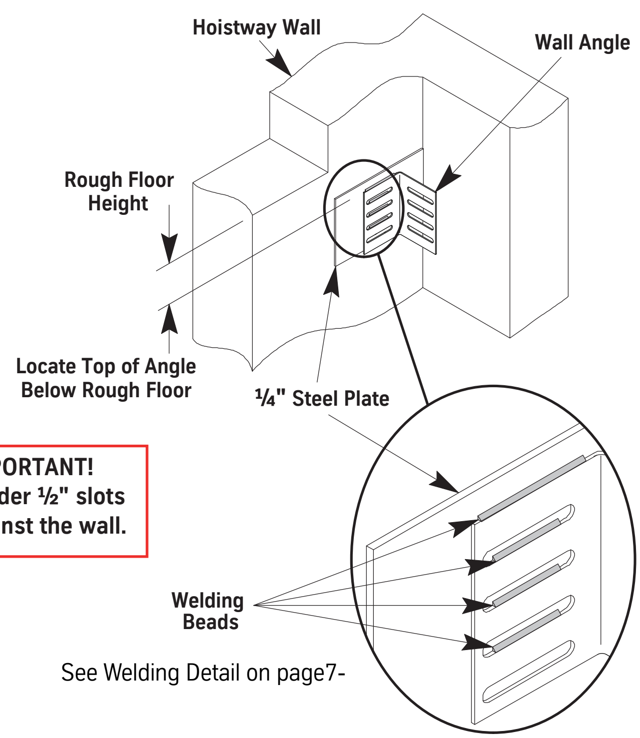


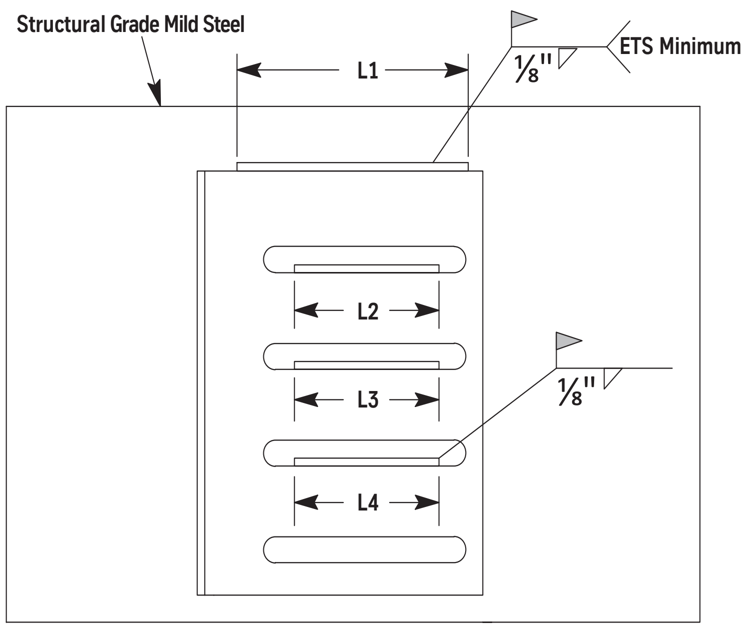
Figure 51 - Wall Angle Placement

Welding Detail

1. Before welding, make sure the steel is clean. Remove burrs, paint, or coating in weld area.
2. Welding of elevator parts that are specified in *ASME A17.1 Safety Code For Elevators And Escalators*, shall conform to *A17.1, Section 8.8, Welding*.
3. Perform all welding in a well ventilated area, *ANSI Z49.1 Safety In Welding, Cutting And Allied Processes*.
4. Weld entrance wall angles to structural mild steel in two or more locations.

   Use horizontal fillet welds on square edges of the wall angle (recommended, but not required). The total effective length of fillet welds should equal or exceed 4 inches.

   Example: (L1 + L2 + L3 + L4 +..... + Ln = 4 inches minimum. The length of each fillet should be a minimum of 3/4 inches.
5. The type of filler metal used will depend on the welding process, but in no case shall the nominal tensile strength of the filler metal be less than 60,000 PSI.
6. For suitable structural mild steel or preheat specifications, refer to *AWS D1.1* or *AWS D1.3* whichever is applicable.



Stack the Struts

Note: See Figure 52 on page 7-60 for all steps in this procedure.

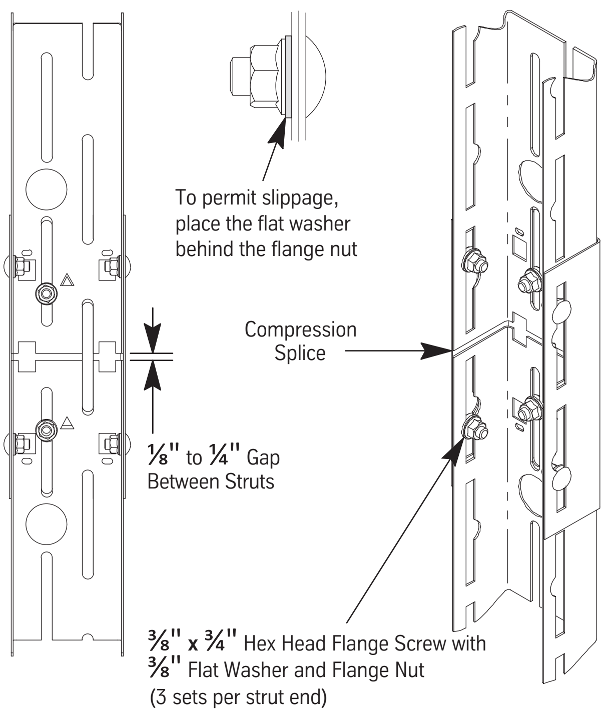
1. Set two struts on the pit floor, and fasten them to the wall angles.

Note: A compression splice is required every 32’.

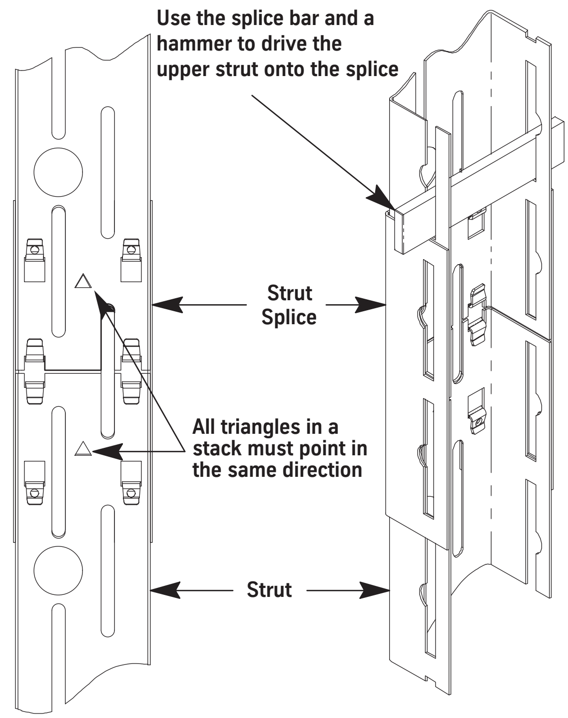
2. Adjust the struts so that they are 1 1/4” from the car sill. The strut-to-car sill adjustment will set the final sill clearance.
3. Clip a strut splice to the top of the two struts.Triangles in splices must match the direction (up or down) of triangles in the struts.
4. Clip the second set of struts to the splices, use a splice bar and a hammer to drive the upper strut onto the splice, and fasten the struts to the next set of wall angles. At each landing, verify that the struts are 1 1/4” from the car sill.
5. Repeat this procedure until all of the struts are stacked, spliced, and fastened to wall angles.
6. Check all struts for plumb on two sides, and then securely fasten them.

Stack the Struts

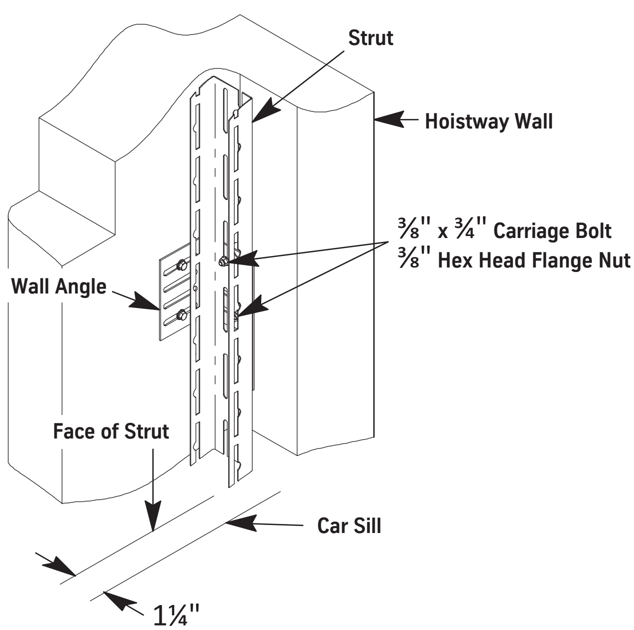
(continued)



Assemble a Compression Splice



Assemble the Strut Splice



Assemble the Strut to the Wall Angle

Figure 52 - Stack and Assemble the Struts

Install the Hoistway Sill

1. Locate the two slots on either side of the centerline in the sill support.
2. Remove the hex head cap screws from the column mounting brackets, and slip them into the slot on the back side of the sill. See Figure 53.
3. Loosely attach each mounting bracket, and then adjust the bracket's tab to fit into the slot.
4. Tighten the brackets to the sill.

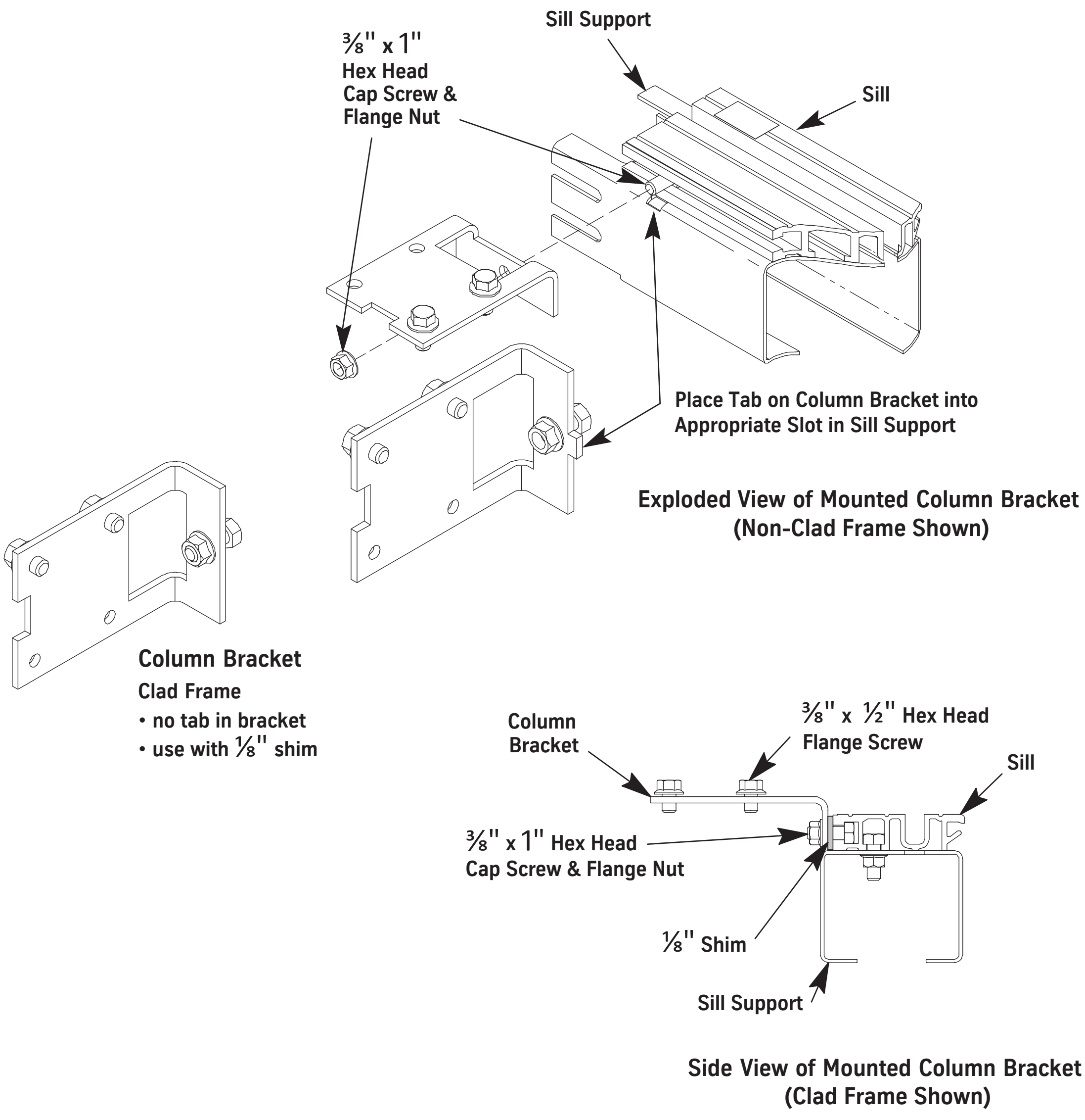


Figure 53 - Column Bracket Installation for Standard Sill

Install the Sill Support to the Struts

For all steps in this procedure see Figure 5 on page 7-8.

1. Hang the sill leveling tool in the slots or oval cutout on the back of each entrance strut.

2. Use the adjustment trigger to set the tool so that the support angle is roughly 2” below the finished floor.

3. Lay the sill and/or sill support on the support angles.

4. At each end of the sill and on each side of the strut, install a carriage bolt and a flange nut.

5. Hand-tighten into matching slots of the sill support and strut.

Note: The nut goes inside the assembly.

6. Raise the sill to the finished floor level.

7. Level the sill side-to-side and front-to-back.

8. Move the sill up so that the daylight lines and the centerline stamped into the header are even with the car sill.

Note: Ensure that the adjustment is accurate because this determines the accuracy of the entrance frame installation.

9. Verify that the vertical surface of the sill support is even with the angled fascia hanger on the sill.

10. Tighten the fasteners on the hall side.

11. Tighten the fasteners on the car side.

12. Repeat this procedure for all landings.

Install the Sill Support to the Struts
(continued)

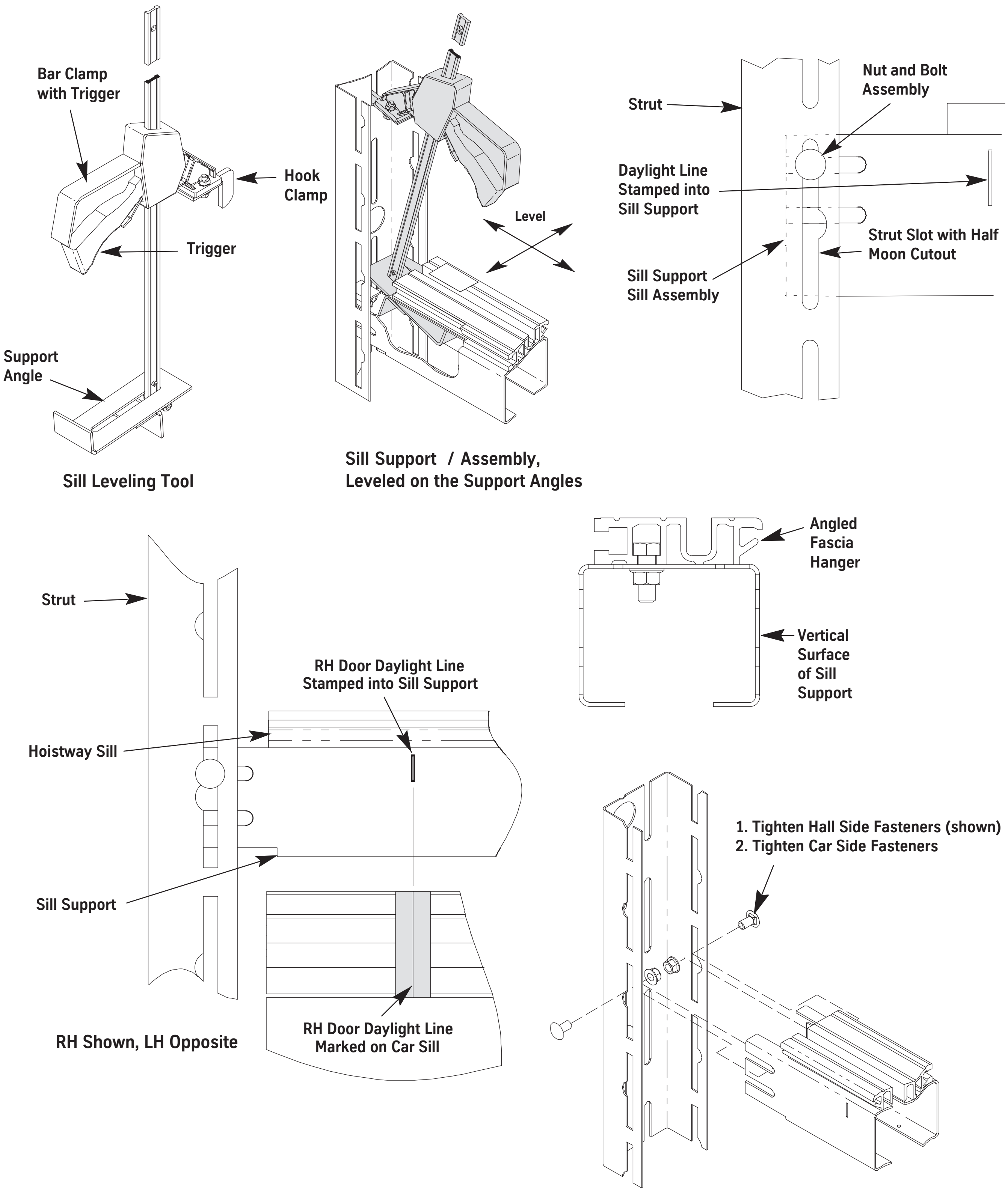


Figure 54 - Install the Sill Support to the Struts

Install the Hoistway Header

Note: Gauge sticks are needed for this procedure.

- For standard door height (84”) - two gauge sticks are provided for each job.
- For non-standard door height - use the following formula to determine the length, and cut the gauge sticks to this measurement.

  Gauge Stick Length: Sill-to-Header Dimension = Opening Height + 7 15/16”.

1. Move the platform up where the header can be reached.
2. Place the gauge sticks on the sill of the landing below, one at each end of the sill. See Figure 55 on page 7-65 for all steps on this page.
3. Place the header on the gauge sticks.
   a. At each end of the header, install carriage bolts and flange nuts.
   b. Hand-tighten into the matching slots of the header and strut.
4. Move the platform up so that the daylight lines and the centerline stamped into the header are even with the car sill.
5. To prevent the door operator equipment from being out-of-plumb:
   a. First tighten the fasteners on the back of the header at both ends.
   b. Then tighten the fasteners on the front of the header at both ends.
6. Repeat this procedure for all landings.

Adjust the Hoistway Sill and Header

1. Level the platform with a landing.
2. Verify that the clearance between the hoistway sill and the car sill is 1 1/4”.

Adjust the Hoistway Sill and Header

(continued)

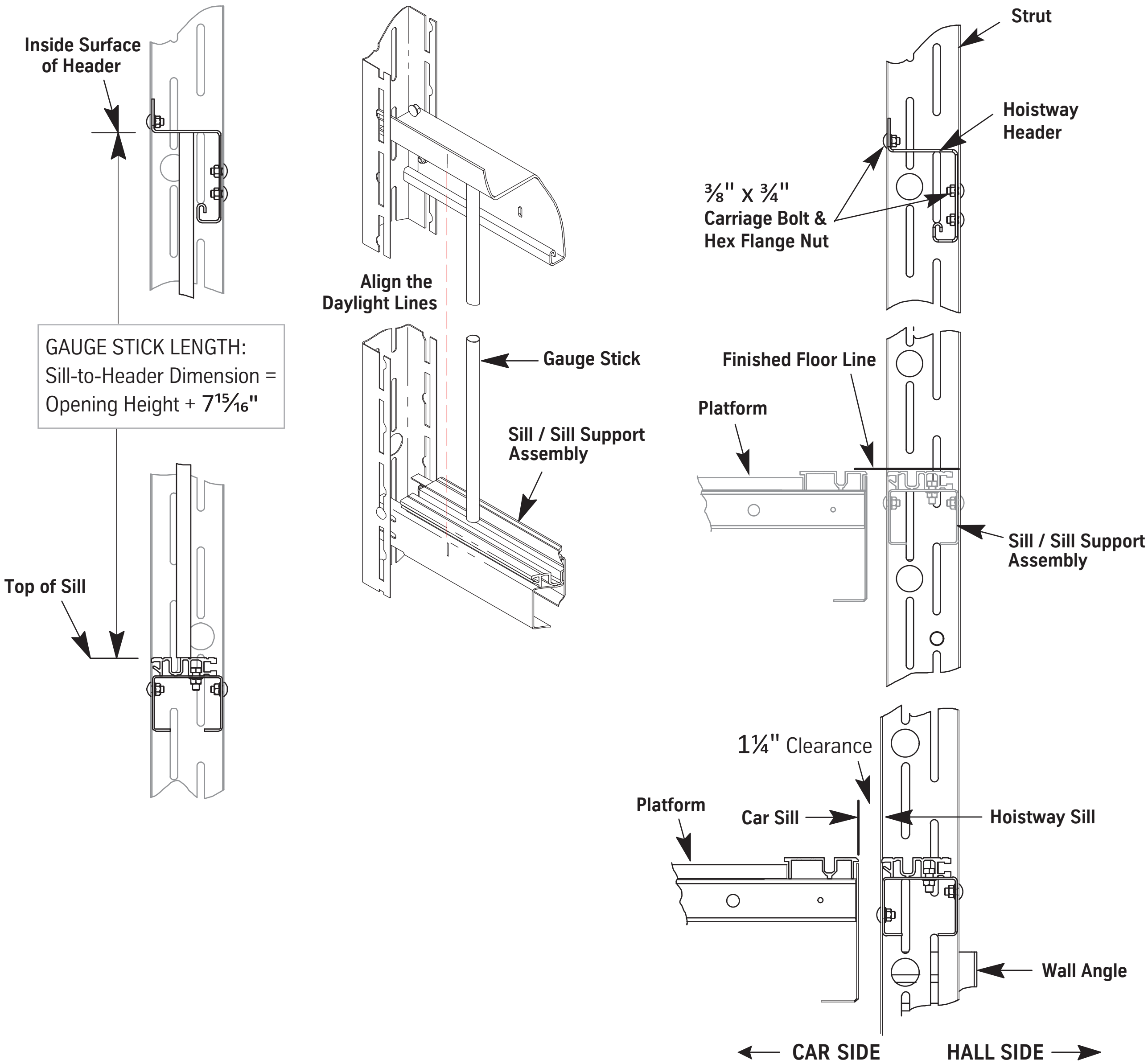


Figure 55- Install and Adjust the Hoistway Header

Assemble the Frame

Note: The transom is mounted between the columns.

1. Place the entrance columns and transom face down, and position each column at a slight angle to the transom. See Figure 56.
2. On each end of the transom, remove the flange screw and nut and set them aside.
3. On each end of the transom, roughly align the clips with the rectangular cutouts in the columns.
4. Swing the column toward the transom while pushing down on the column.
5. Ensure that the back side (toward the car) of the transom is flush with the back side of the column.
6. Install the flange screw and nut in the matching holes of the transom and column.
7. Repeat steps 3 through 7 for the other column.
8. Verify that the columns are square with the transom.
9. Ensure all fasteners are tight, and repeat this procedure for all landings.

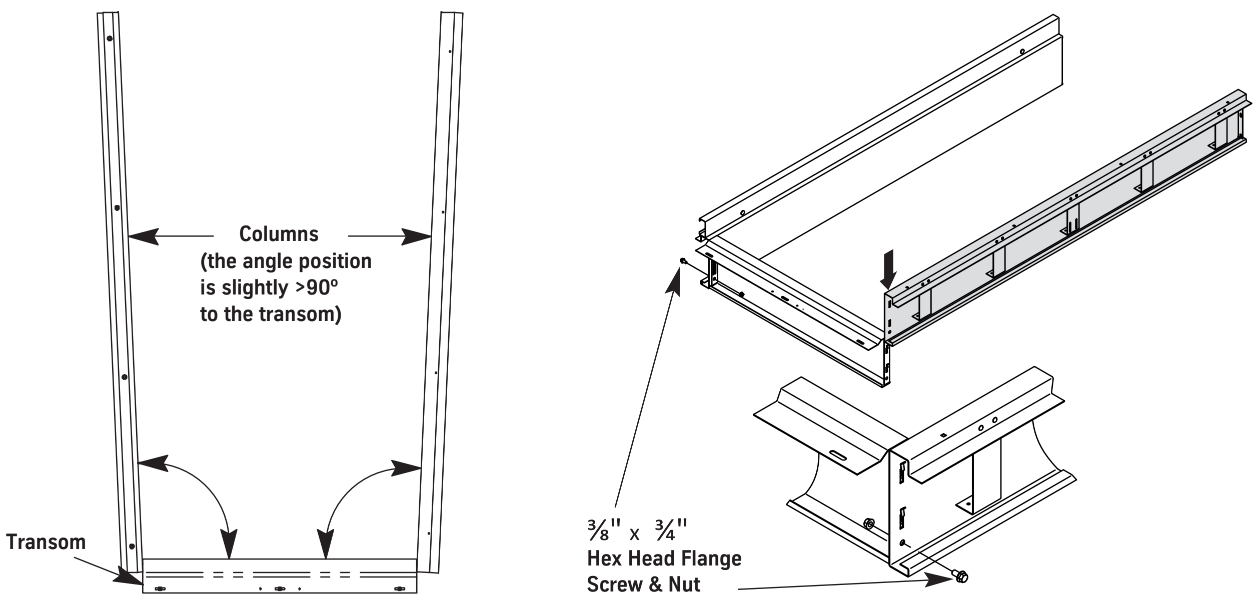


Figure 56- Assemble the Frame

Attach the Frame to the Sill

1. Attach the frame to the column brackets.
   a. Stand the frame on the column mounting brackets.
   b. Install the hex head flange screws in the bottom of each column.

2. Align the frame columns so that they overlap the hoistway sill 1/8" (the depth of the cutout on the top back edge of the hoistway sill). See Figure 57.

3. Tighten the four screws between the columns and the column brackets.

4. Move the platform up high enough to reach the header and transom.

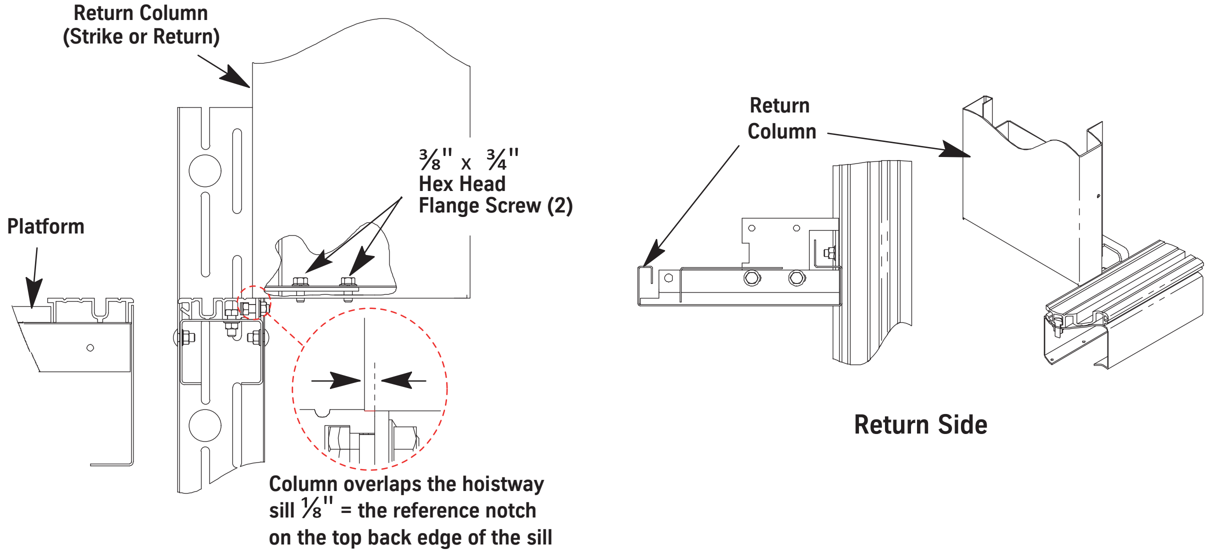


Figure 57 - Attach the Frame (standard sill shown)

Attach the Transom to the Header

1. Attach the transom to the header. See Figure 58.

- For non-clad frames:
    a. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
    b. Tighten the screws.

- For clad frames:
    a. Before the screws are added, install a 1/8" shim between the transom and the header.
    b. Install the hex flange screws through the holes in the header that match the transom slots with the cage nuts.
    c. Tighten the screws.

2. Install one washer head self-tapping screw into the header on each side of the middle hex head flange screw.

3. Repeat this procedure for all landings.

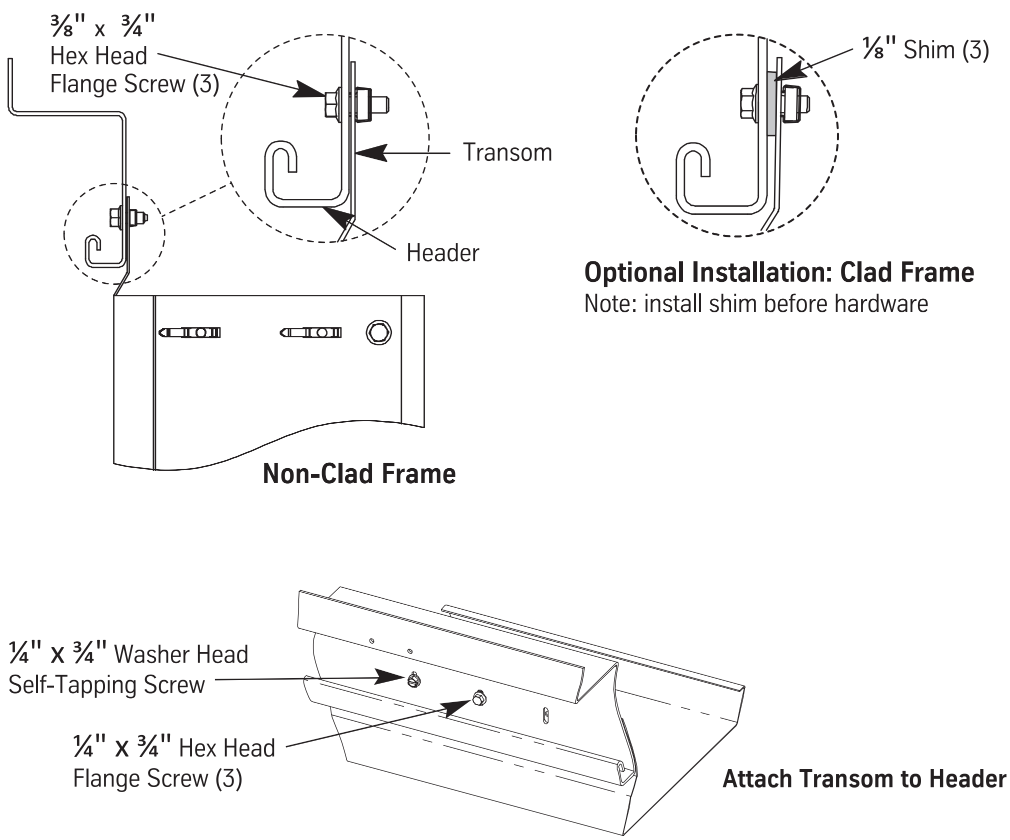


Figure 58 - Attach the Transom to the Header

Install the Grout Angles

1. Use self-tapping screws to install the grout angle on the bottom of the sill support and also tight against the hoistway wall. See Figure 59.

Note: Grout angles have a 2 1/2” leg and a 3 1/2” leg. Based on the gap, either leg can be placed against the hoistway wall.

2. Anchor the grout angle to the wall.

3. Repeat this procedure for each landing.

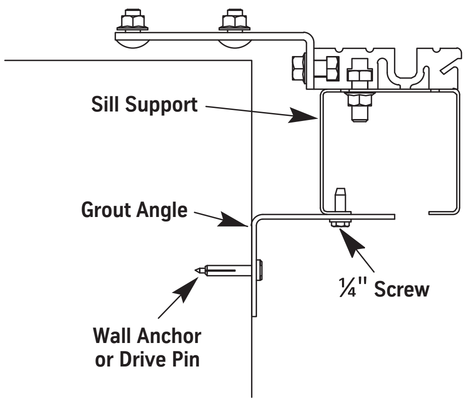


Figure 59 - Grout Angle Installation

Install Fixture Boxes

Use brackets to install the fixture boxes at each landing.

Install Hoistway Doors

1. Load the hoistway doors onto the platform.

2. At a landing, place the hoistway door(s) on the hoistway sill and lean the door(s) against the hoistway header.

3. Install the door isolation bumpers. See Figure 60 on page 7-70.

Install the Hoistway Doors
(continued)

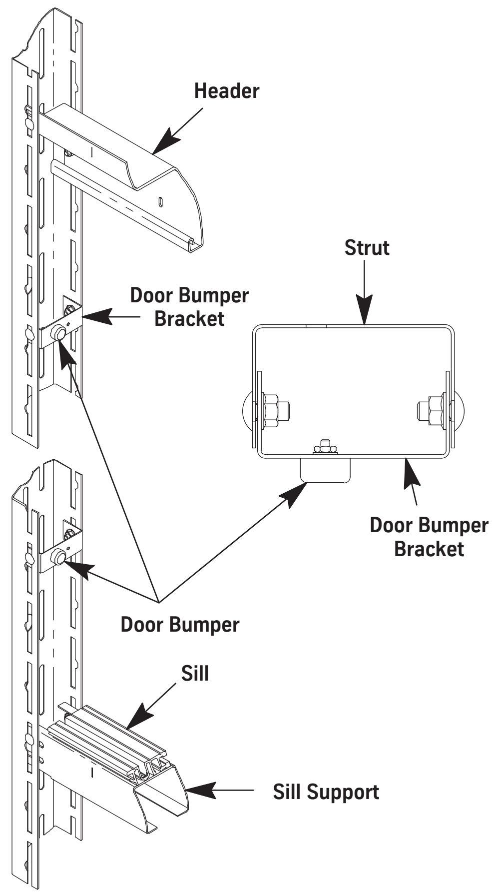


Figure 60 - Door Isolation Bumpers

4. Loosen all upthrust rollers. See Figure 61 on page 7-71.

5. Place the door rollers, one roller at a time, onto the door track.

CAUTION **Take care when installing center opening doors because the door retainer could damage the track.**

6. Adjust the height of the door to 3/8” by turning the eccentric on the door rollers, and then lock the eccentric with the nut.

7. Install the door gibs and the door safety retainers. See Figure 62 on page 7-71.

Install the Hoistway Doors
(continued)

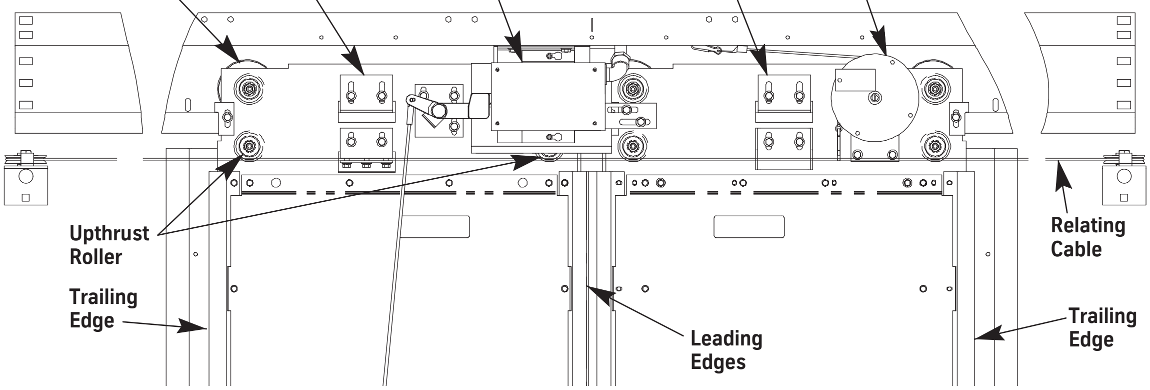


Figure 61 - Door Rollers

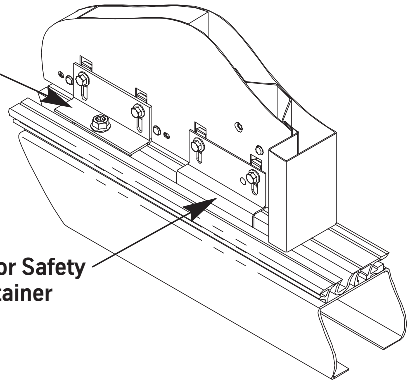


Figure 62 - Door Gibs and Safety Retainers

Adjust the Hoistway Door Running Clearance

1. Place a 5/16” shim (running clearance) underneath the leading edge of the door. See Figure 63.
2. Loosen the upthrust roller, turn it to its lowest adjustment, and then snug it in place.
3. Adjust the eccentric on the door roller so that the door is flush with the shim and the door roller is flush with the track.
4. After the adjustment is made, tighten the door roller eccentric.
5. Remove the shim, and place it under the trailing edge of the door. Repeat steps 2 through 4.
6. Repeat steps 1 through 6 for the second door panel.
7. Remove the shim, and verify that the door(s) are flush with the frame columns.

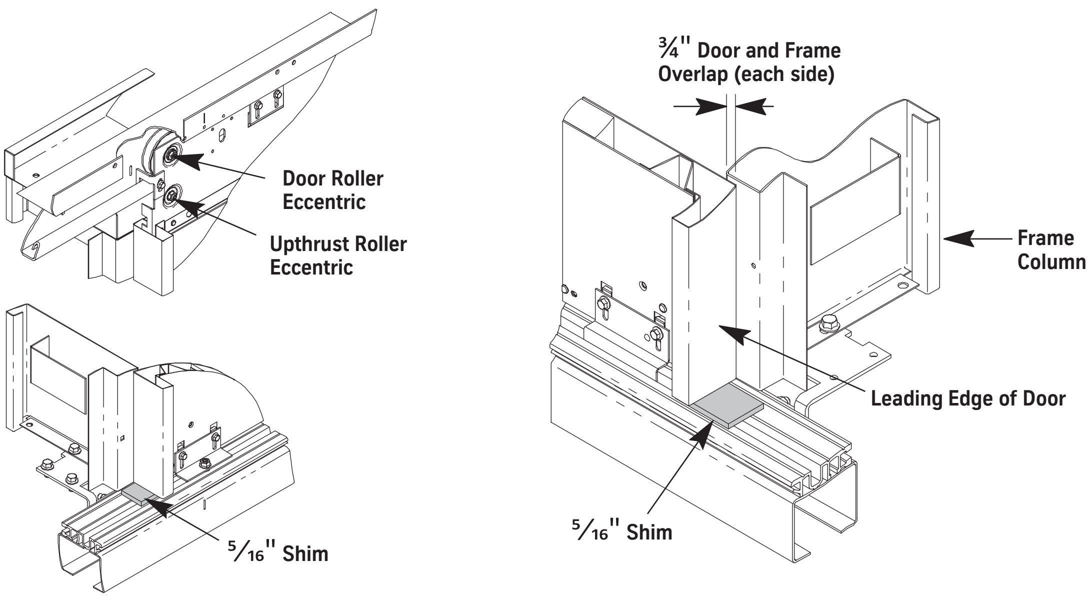


Figure 63 - Adjust Door-to-Sill Running Clearance

Adjust Upthrust Rollers

1. Turn the eccentric of the upthrust roller clockwise until the roller just touches the bottom of the door track.
2. Adjust the eccentric so that a gap of .015″ is between the upthrust roller and the door track. See Figure 64.

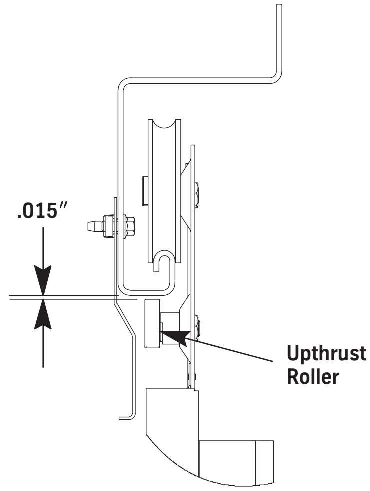


Figure 64- Adjust Upthrust Roller Clearance

Adjust the Door Gibs

1. Adjust the door gib brackets and the door safety guide brackets to obtain a 1/8” running clearance between the brackets and the hoistway sill. After adjustment, tighten the bolts. See Figure 65 on page 7-74.

Adjust the Frame Column

2. Place a 1/4” shim between the bottom of the entrance frame column and the bottom of the leading edge of the slow door panel.

   a. Loosen the door gib screws.

   b. Adjust the slow door leading edge to just touch the 1/4” shim.

   c. Adjust the trailing door edge to just touch the 1/4” shim.

   d. Tighten the door gib screws.

   e. Repeat this step for the door trailing edge.

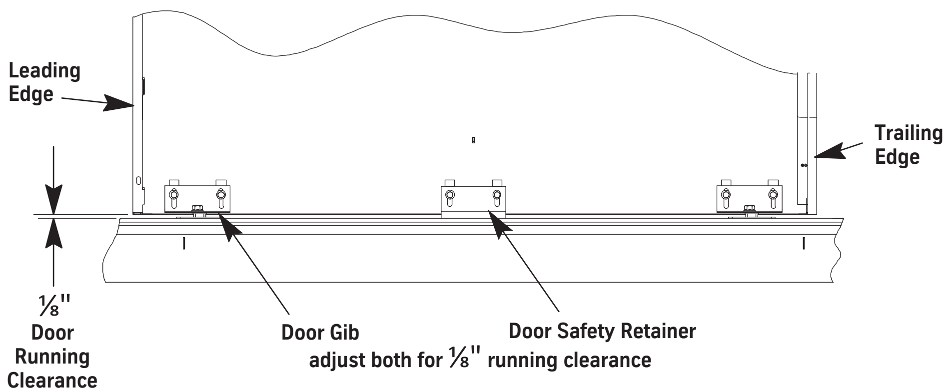
Adjust the Door Gibs
(continued)

Adjust the Door Panels

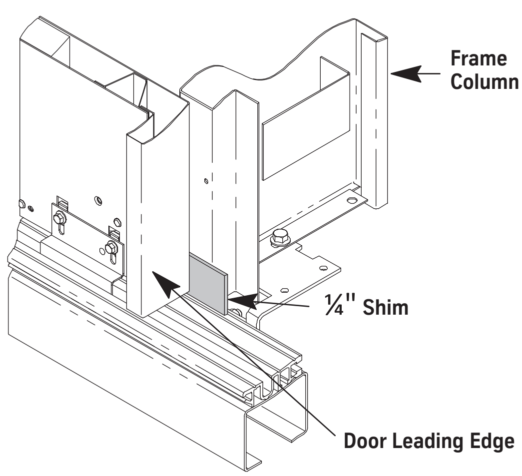
3. Place the 1/4” shim between the two door panels.
    a. Adjust the door gibs so that the fast door trailing edge just touches the 1/4” shim.
    b. Place the 1/4” shim between the fast door leading edge and the strike column.
    c. Adjust the door gibs so that the fast door leading edge just touches the 1/4” shim.

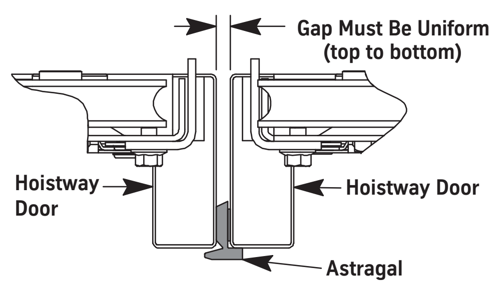
4. Verify that the doors roll freely and track parallel to the hoistway sill grooves. Adjust as necessary.

5. Fully close the doors and check the gap between the leading edges of the two doors. This gap must be equal from top to bottom. See Figure 65.



Standard Sill Running Clearance





Door Gap

Door-to-Frame Running Clearance

Figure 65 - Adjust the Door Gibs

Install and Adjust the Spirator

1. Wrap the spirator cable three or four times around the spirator to connect the cable.
2. Use the spirator cable clip to attach the cable to the header. See Figure 66.
3. Adjust the spirator so that the doors close when they are released 1/2” from the fully closed position.
4. Verify that the doors close fully with no “double bump” when the doors touch each other.

Notes:

- The spirator must close the doors from any open position.
- To obtain proper door operation from floor to floor, the spirator tension should be the same at each floor.

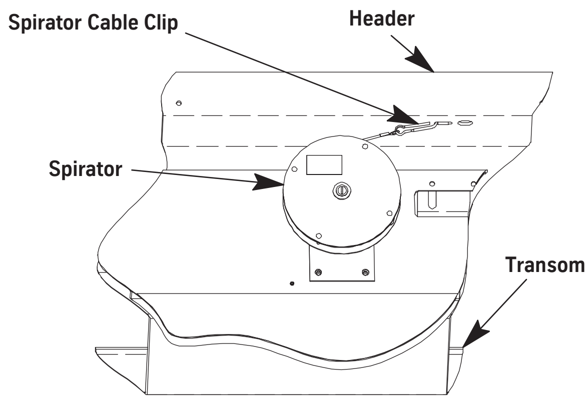


Figure 66 - Spirator

Install and Adjust the Top Door Retainers

1. On each side of the door panel, use the provided hardware to install a top door retainer on the hanger. See Figure 67 on page 7-76.

2. Verify that there is sufficient running clearance between the retainer and the track, and adjust if needed.

3. On each side of the door panel, use the provided hardware to install a track retainer clip on the hanger.

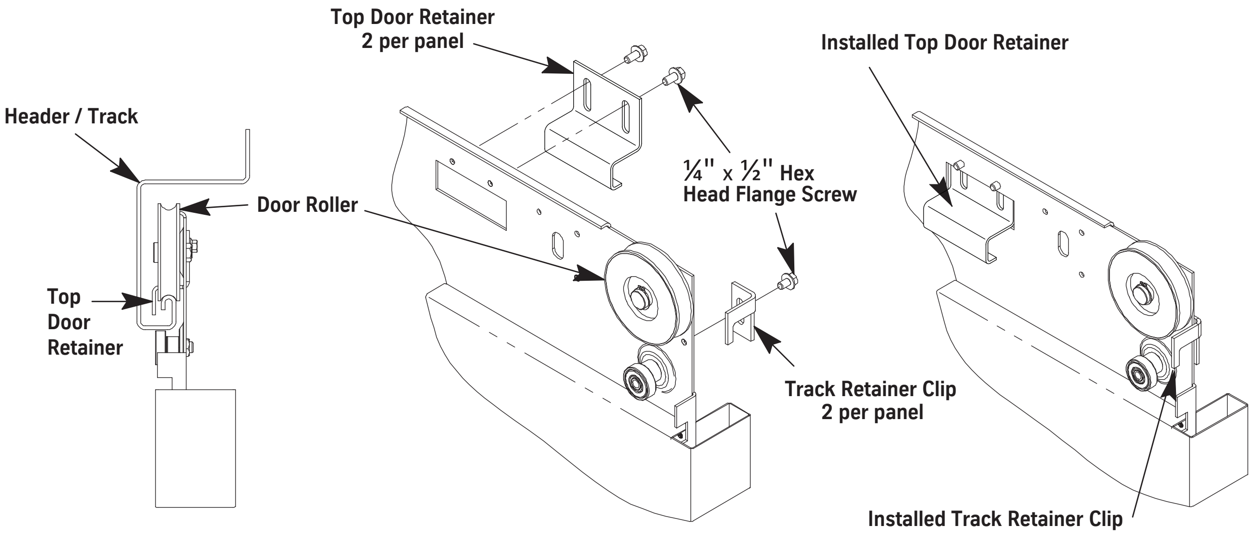


Figure 67 - Top Door Retainer

Install the Door Relating Cable

1. Install one relating cable pulley assembly in the strut on each end of the hoistway header. See Figure 68 on page 7-77.

2. Wrap the relating cable around the two pulleys, and install the ends into the relating cable clamp assembly.

3. Place the relating cable (located on back side of the hanger assembly) between the two plates of the relating cable anchor, and tighten the two plates together.

4. Tighten the relating cable tension with the four nuts on the relating cable clamp assembly.

Note: The relating cable should be tight, but not enough to cause the doors to bind.

5. Fully close the hoistway doors.

6. Move the doors until their meeting point is aligned with the centerline of the sill and the header. Adjust the relating cable tension (if necessary).

7. Fully open the hoistway doors.

8. Verify that the edge of the door is flush with the return column.

9. Verify that the relating cable clears all pulleys and other obstructions. Adjust if necessary.

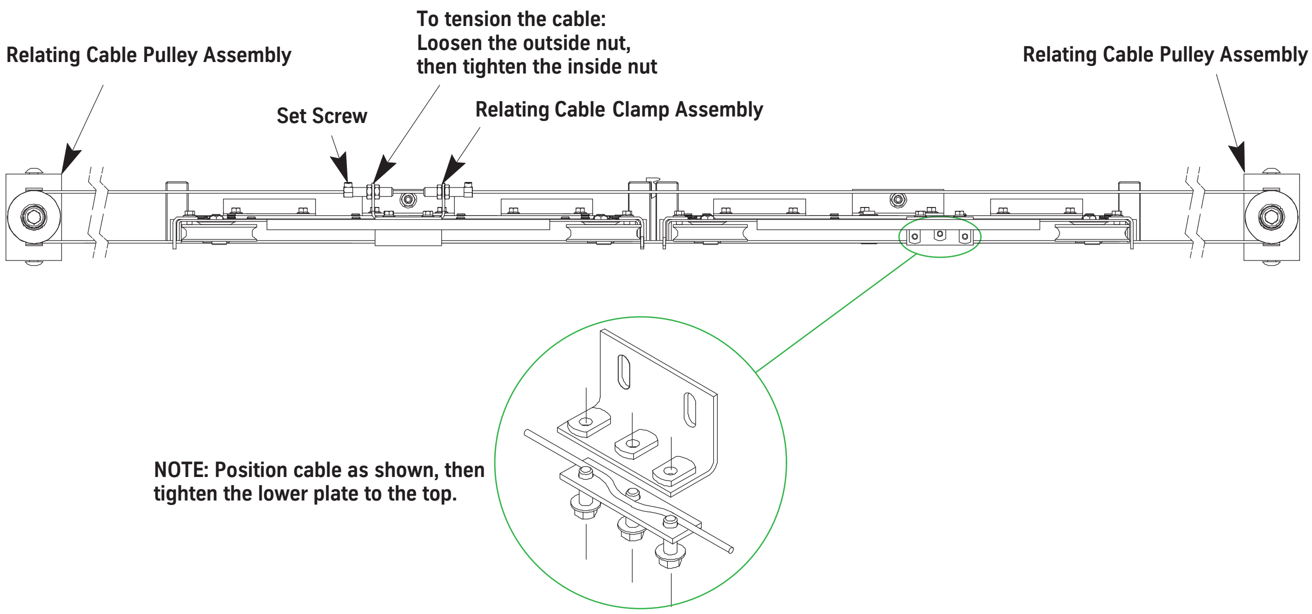


Figure 68 - Relating Cable Installation

Install and Adjust the Interlocks

1. Install the interlock contact box. Evenly align the cover screws with the face of the header. See Figure 69.

2. Remove the cover from the interlock box.

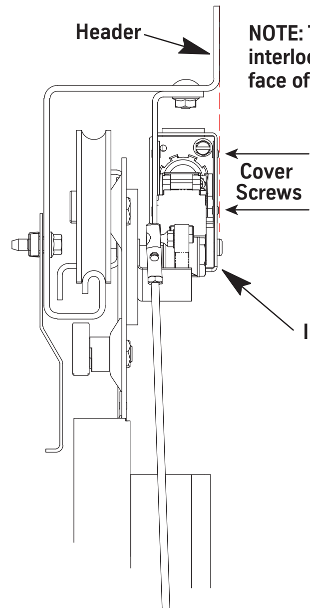


Figure 69 - Install the Door Interlock

3. Close the doors, and verify the following. See Figure 70 on page 7-79.

   a. The interlock hook is centered front-to-back on the contacts.

   b. The interlock hook does not contact the front or the back of the contact box. If necessary, either shim the interlock box or remove ONLY ONE of the two washers on the interlock hook hinge bolt.

CAUTION **Never remove both washers on the interlock hook shaft.**

4. Adjust the following to obtain the correct measurements:

   a. Interlock box - when the doors are closed, there is 1/8” between the interlock hook and both sides of the locking tab on the box.

   b. Connecting rod length - when the hook is resting on its contacts, the interlock hook has 1/32” clearance with the top of the locking tab on the box.

      Note: The pickup roller crank should be resting on its stop at this time.

   c. Interlock hook - contact compression of 3/32”.

      - The hook touches both contact leafs at the same time.
      - When the hook is raised by the crank, the hook clears the box at the top and also the locking tab by a minimum of 1/8”. If necessary, adjust the interlock hook stop to limit the hook travel.

Install and Adjust the Interlocks

(continued)

5. Move the rollers and the interlock hook, and verify that there is 9/32" hook engagement before the contacts are bridged. If necessary, adjust the plastic contact block in the interlock box to obtain the proper angle and position of the contacts.

6. Repeat this procedure for all other landings.

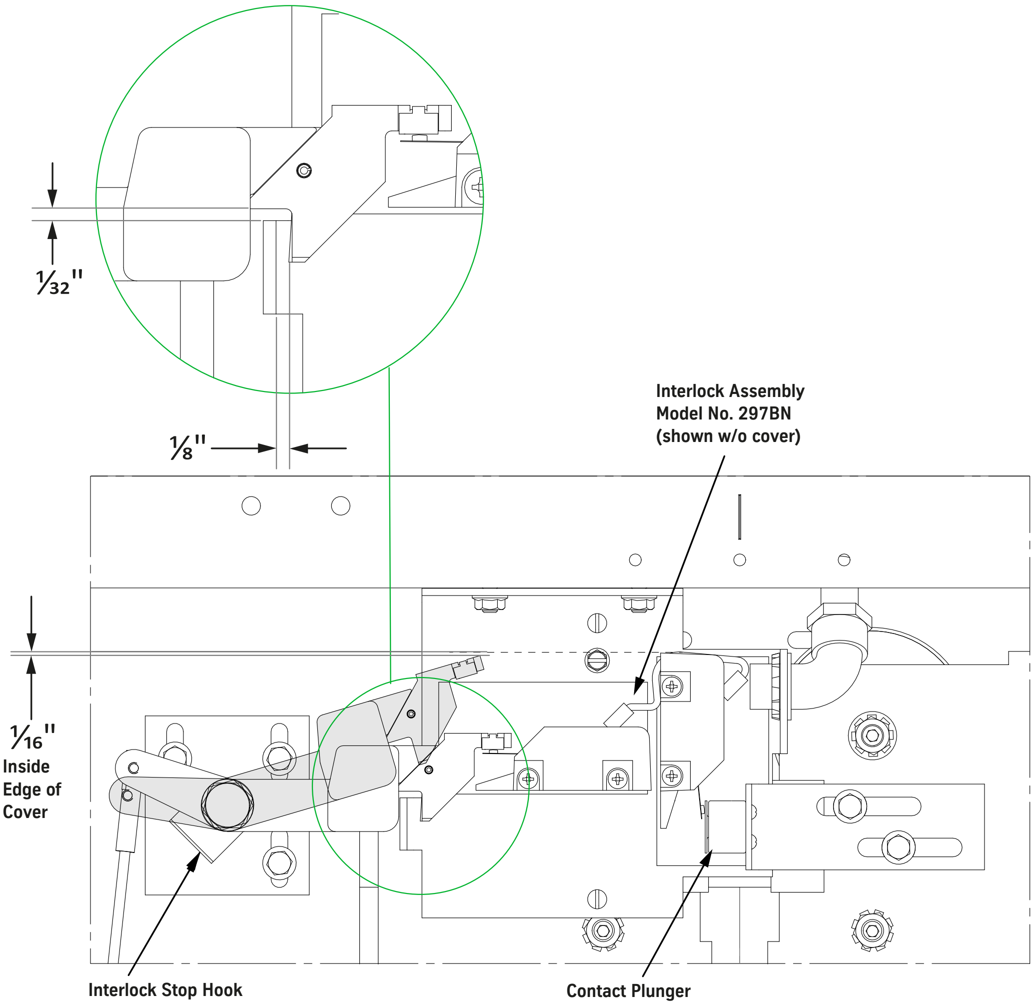


Figure 70 - Center Opening Interlock Adjustment

Interlock Wiring

1. Remove the interlock box cover.

2. Ensure that after the hook is in the locked position, and the shorting bar has a good wipe on the contacts.

WARNING **All door interlock contacts must be wired in series. See the wiring diagrams for details.**

3. Repeat Steps 1 and 2 for all other landings.

Install the Fascia Plates and Dust Covers

1. Position the platform near the top landing.

2. Center a top fascia plate in the opening, and hook the fascia plate onto the hoistway sill of the top landing. See Figure 71 on page 7-81 through Figure 73 on page 7-83.

3. Use self-tapping screws to anchor the top fascia plate to the top landing hoistway sill support.

4. Install the first intermediate fascia plate by hooking it onto the top fascia plate.

Note: If required, install the remaining intermediate fascia plates by hooking each one onto the last one installed.

5. Clip the bottom fascia plate to the top of the header.

Note: The bottom fascia plate vertically overlaps the last intermediate fascia plate.

6. Measure the distance between the sill support and the header, and subtract one inch.

7. Cut two fascia plate stiffeners (from the provided fascia stiffener angle) to the length measured in the previous step.

8. Clamp the angles in place behind and also flush with the edge of the fascia plates.

9. Run self-tapping screws through the pilot holes in the fascia plates to anchor the fascia plates to the stiffeners.

10. Repeat Steps 2 through 9 for all intermediate landings.

11. If required, center a top fascia plate in the opening and hook it onto the hoistway sill of the bottom landing.

Note: The fascia plate and the toe guard in the pit must extend far enough below the sill so that when the car is on compressed buffers the platform toe guard will not be below the hoistway toe guard.

12. Use self-tapping screws to anchor the top fascia plate to the bottom landing hoistway sill support.

13. Install the toe guard by hooking it onto the top fascia plate.

14. Fasten the toe guard to the wall with the provided drive pin anchors.

15. If required, install all dust covers.

Install the Fascia Plates and Dust Covers

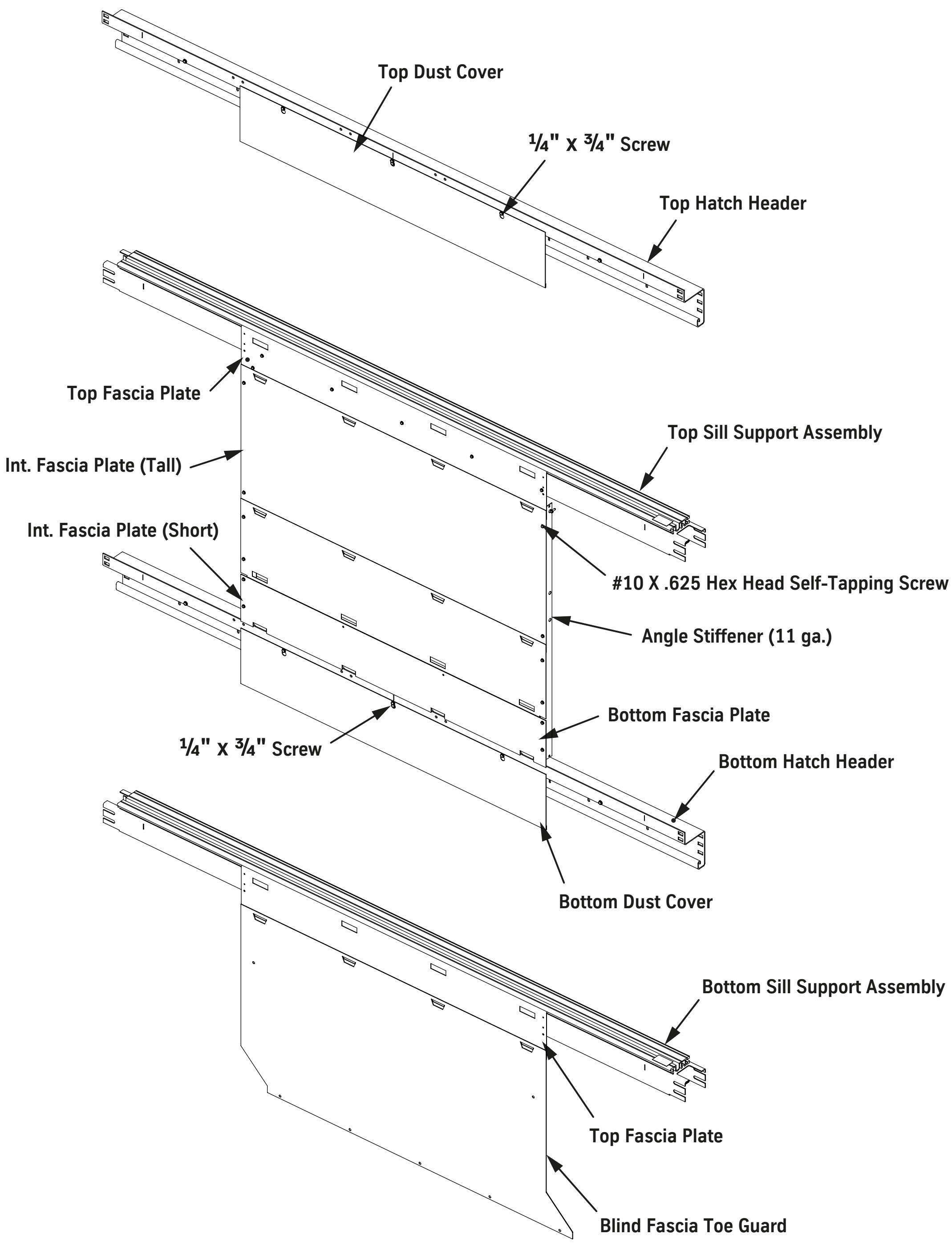


Figure 71- Install Fascia Plates, Dust Covers, and Toe Guards (1 of 3)

Install the Fascia Plates
(continued)

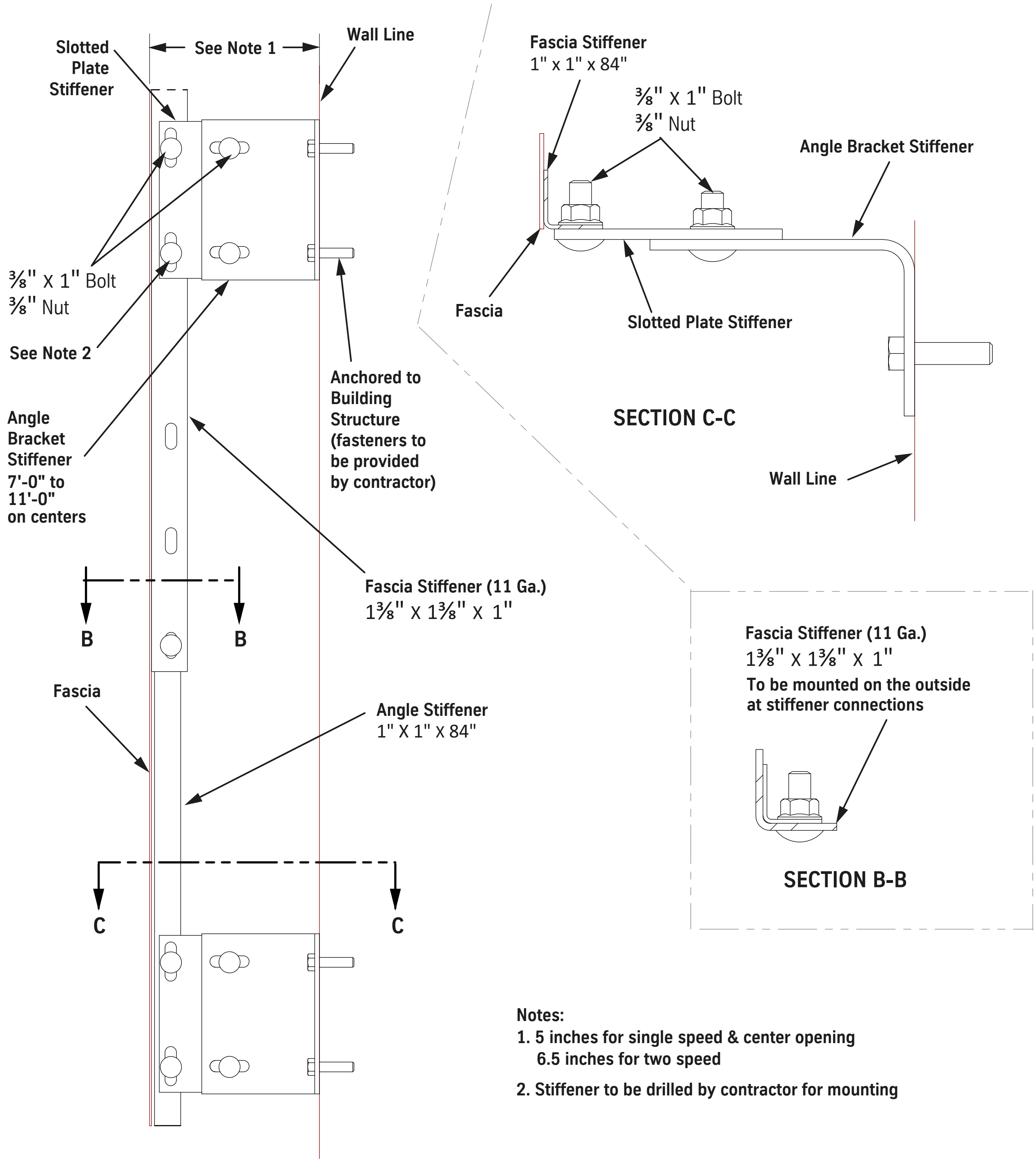
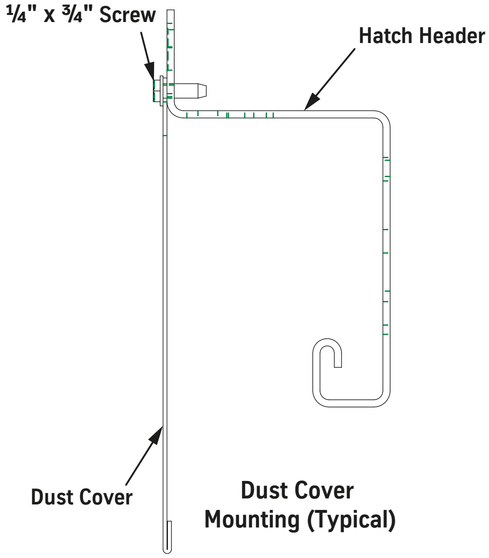
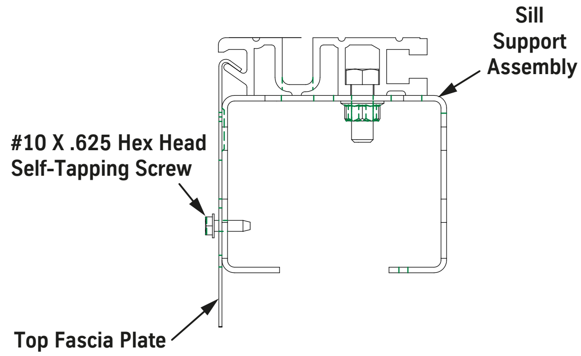


Figure 72- Install Fascia Plates, Dust Covers, and Toe Guards (2 of 3)

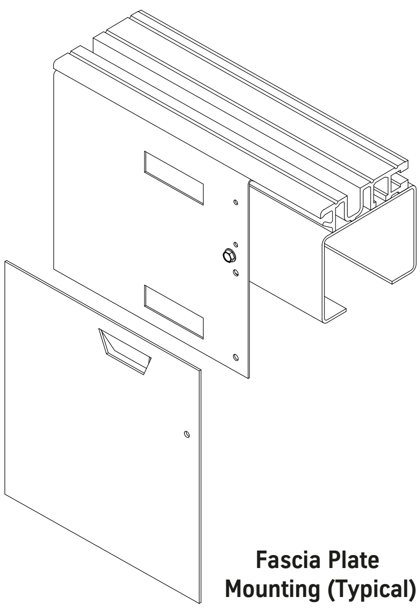
Install the Fascia Plates
(continued)



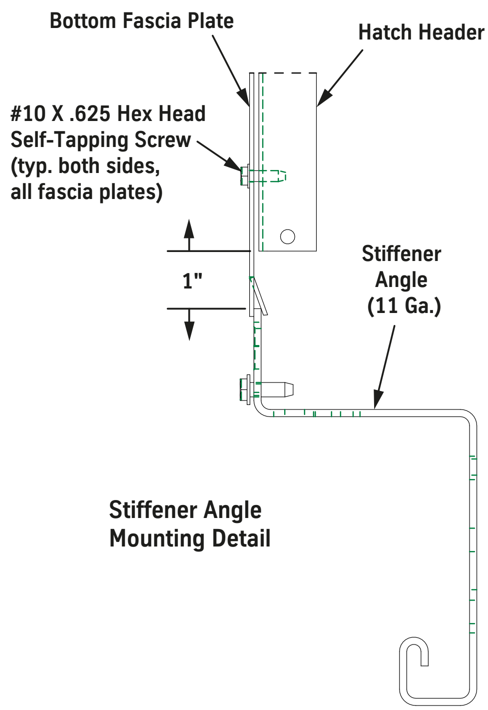
Dust Cover Mounting (Typical)



Top Fascia Plate Mounting (Typical)



Fascia Plate Mounting (Typical)



Stiffener Angle Mounting Detail

Figure 73 - Install Fascia Plates, Dust Covers, and Toe Guards (3 of 3)

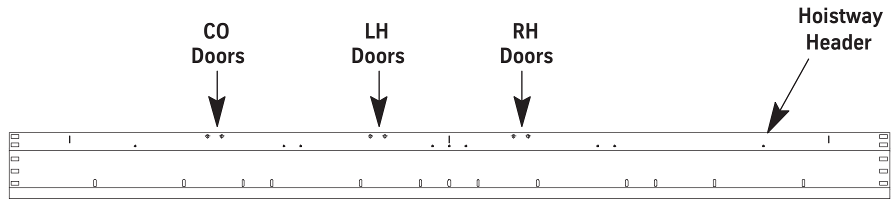
Install the Type 2 Door Restrictor

1. Mark the position of the hoistway restrictor angle. See Figure 74.

2. Use the supplied hardware to install the restrictor angle on the fascia.

Note: The restrictor angle must not be lower than 1" below the top of the hoistway sill.

3. Repeat steps 1 and 2 for all landings.



Location of Mounting Holes for Hoistway Header Restrictor Plate

Opening Width	Angle Position
36”	19 7/8”
38”	20 7/8”
40”	21 7/8”
42”	22 7/8”
44”	23 7/8”
46”	24 7/8”
48”	25 7/8”
50”	26 7/8”
52”	27 7/8”
54”	28 7/8”
56”	29 7/8”
58”	30 7/8”
60”	31 7/8”

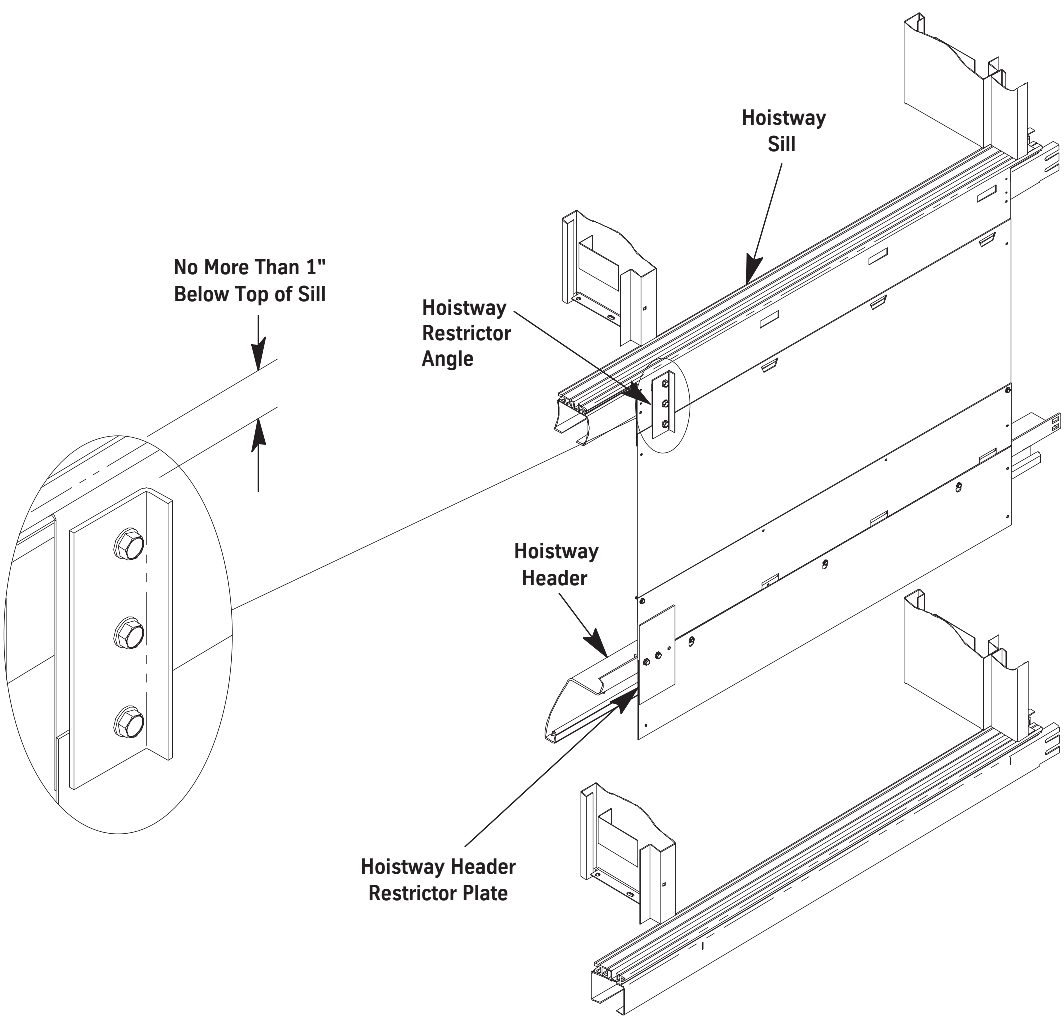


Figure 74 - Hoistway Restrictor Angle Positions

Install the Car Door Restrictor

1. Install the car door restrictor into the two key slots on the trailing edge of the car door.
2. Use washers to adjust the car door restrictor so that it is plumb and a 1/4” minimum interference when the car door restrictor engages the hoistway restrictor angle. See Figure 75.

Restrictor Testing

Run the car, and verify the following throughout the hoistway:

- The car door will open when the car is within 3″ of each landing.
- The car door will not open more than 4″ when the car is 18″ or more away from each landing (except where the car doors open only to fascia). This includes top and bottom overtravel.
- There is 1/4” minimum interference when the car door restrictor engages the hoistway restrictor angle.

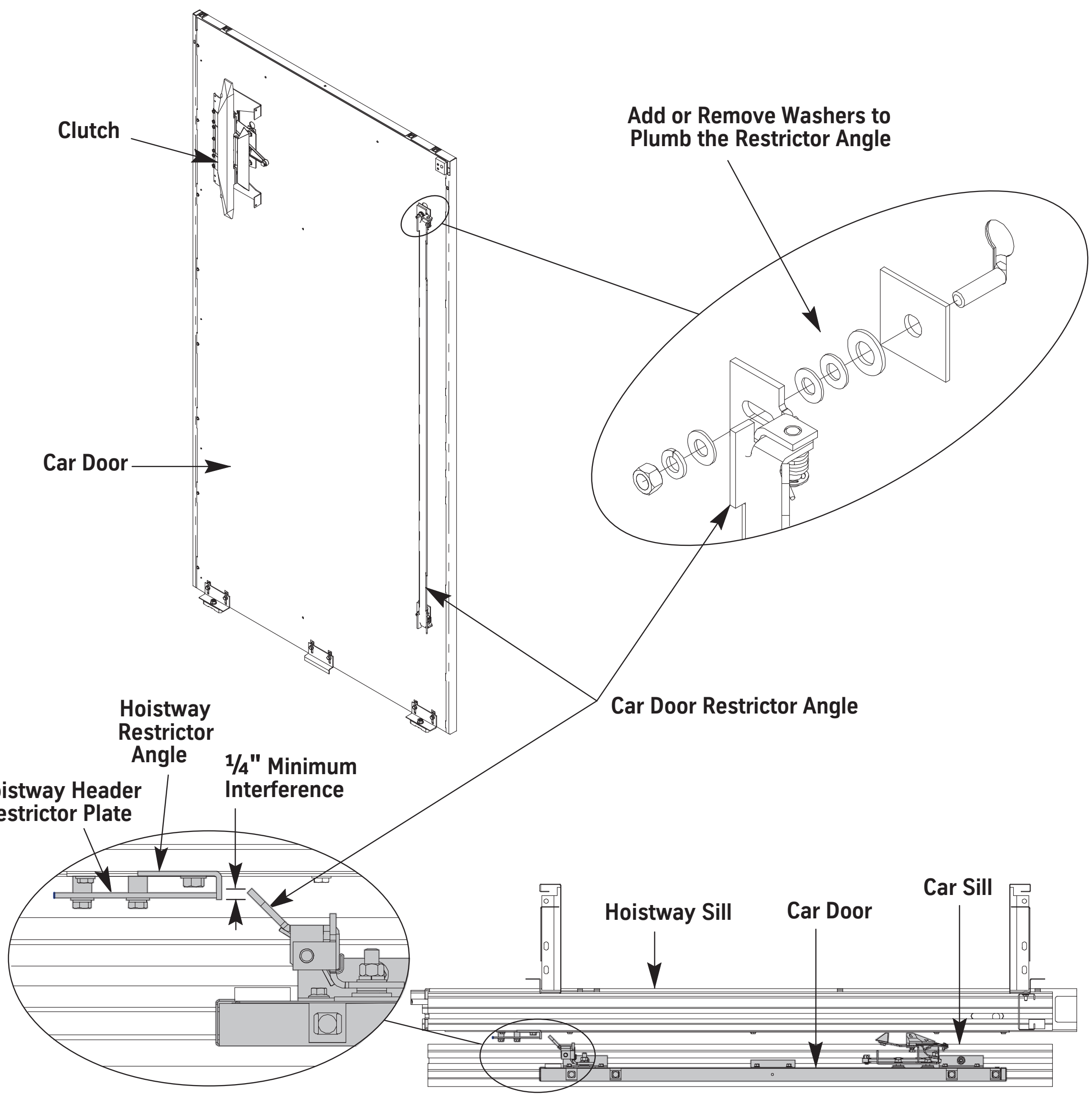


Figure 75 - Install the Car Door Restrictor Angle

Maintenance

Hoistway Doors and Tracks (each floor)

Monthly

1. Wiggle the top of the doors to check the door hangers for looseness.
2. Check that the door tracks are smooth and clean.
3. Unlock the doors, and move the hoistway door by hand to check the door rollers for cracking tires, loose bearings, or unusual noise.
4. Inspect the shorting bar contact of the hoistway door interlock.
5. Manually move the doors on track to check the door relating cables for excessive looseness, fraying, or loose connections; Ensure that the nylon idler pulleys rotate smoothly.
6. Manually move the doors on the track to check for cracked or broken eccentric rollers.
7. Manually check the door closer mounting bracket for looseness, and move the doors the full travel on the track and listen for unusual noises.
8. Manually check the door interlock hook bolt for tightness, and check for clearance on the lock box cover.
9. Ensure the proper rotation on pickup rollers and check for cracking; Pull on the mounting to ensure it is tight.
10. Wiggle the bottom of the doors to check that the door guide mounting brackets are tight.
11. Ensure that the fire tabs are in place, and move the doors the full travel to check for scraping or rubbing noises.
12. Ensure a minimum of 1 1/8" clearance between door panels.
13. While running the car on Inspection Operation the length of the hoistway, randomly stop the car, trip a hoistway door lock, and attempt to run the car (to verify that the car will not run with the door unlocked).

Note: If car the runs with the doors unlocked, check the controller wiring for jumper of door relays for welded contacts.

Maintenance
(continued)

Annually

The car door restrictor may be temporarily deactivated by depressing and blocking the restrictor to allow it to pass the header restrictor angle.

1. Inspect the door gibs:
   a. Move the car to allow access to the bottom of the doors.
   b. Unlock doors, and move them full travel to check that doors move freely on sill.
   c. Check gibs for wear (adjust or replace as necessary).
   d. Check that the fire tab screws are tight.
   e. Check for door-to-sill clearance of 1 1/4" (optimum) to 3 1/8" (maximum).
2. Remove and store the dust cover.
3. Unlock the doors, and partially open them.
4. Inspect the door hangers, eccentrics, and tracks:
   a. Check that the tracks are smooth and clean, and tighten the mounting bolts.
   b. Manually move doors to check the door rollers for cracks and for smooth bearing operation; check that the mounting bolt is tight.
   c. Use a flashlight to observe the gap between the roller and the track, check the eccentric setting.

Note: Set as close as possible throughout door travel with-out causing drag (approx. .015").

   d. Ensure that the eccentrics and hanger bolts are tight.
5. Inspect the relating cable:
   a. Manually move the doors and check the relating cable for frays or excessive looseness; adjust as necessary, and tighten all fastenings.
   b. Check the condition of nylon pulleys for smooth operation, and tighten the mounting bracket.

Note: Adjustment here will affect the interlock settings.

6. Inspect the door closer (spirator):
   a. Fully open the doors, and listen for unusual noises from the closer.
   b. Check that the closer mounting bracket is tight.
   c. Check the cable for fraying, and check the cable fastening.
   d. Stop doors within 1 1/2" from fully closed, and release them to check the setting of the closer (doors should close from any position).

Maintenance
(continued)

7. Inspect the door interlocks:

   a. Remove the screws from the interlock cover, and remove the cover.

   b. Verify that the lock is centered in the catch (shim as required).

   c. Unlock the doors, and then allow them to close to check the clearances of the following:

      - The pickup of the interlock hook = 1/8" from the top of box with the hook up
      - The drop
      - The engagement of the hook before the contacts bridge = 9/32"
      - The overtravel on the contacts = 3/32"
      - Equal height of the contacts and the hook-to-locking bar clearance = 1/8" after locked (lateral movement indicates a bushing problem)

   d. Clean the bridging bar, and tighten the mounting bolts.

   e. Turn OFF the mainline disconnect.

   f. Clean the lock contacts, and tighten the screws in the contact assembly base.

   g. Replace the interlock box cover.

8. Inspect the clutch vane and the pick-up rollers:

   a. Position the clutch vane in front of the pick-up rollers by moving the car and checking for proper clearance (1 1/4" maximum) between the face of the vane and the pick-up roller.

   b. Check that the depth of the rollers into the clutch is 3/4 to FULL roller on the vane.

   c. Check the pickup roller assembly mounting bolts

Cleaning Architectural Finishes

Any cleaning or refinishing, other than routine, should be handled by qualified professionals.

Architectural Powder Coating

Clean all surfaces with a soft cloth or soft natural bristle brush with a non-abrasive, PH neutral solution. Do not use strong solvents such as thinners, or solutions containing chlorinated hydrocarbons, esters, ketones, or any abrasive cleaners.

Plastic Laminate

Routine cleaning with a mild detergent will remove fingerprints, smears, and everyday spills.Do not use abrasives or harsh chemicals.

Stainless Steel

Routine cleaning with a mild detergent will remove fingerprints, smears, and everyday liquid spills.Consumer-type glass cleaners and stainless steel cleaners may also be used. Do not use abrasives or harsh chemicals.

Muntz (Bronze)

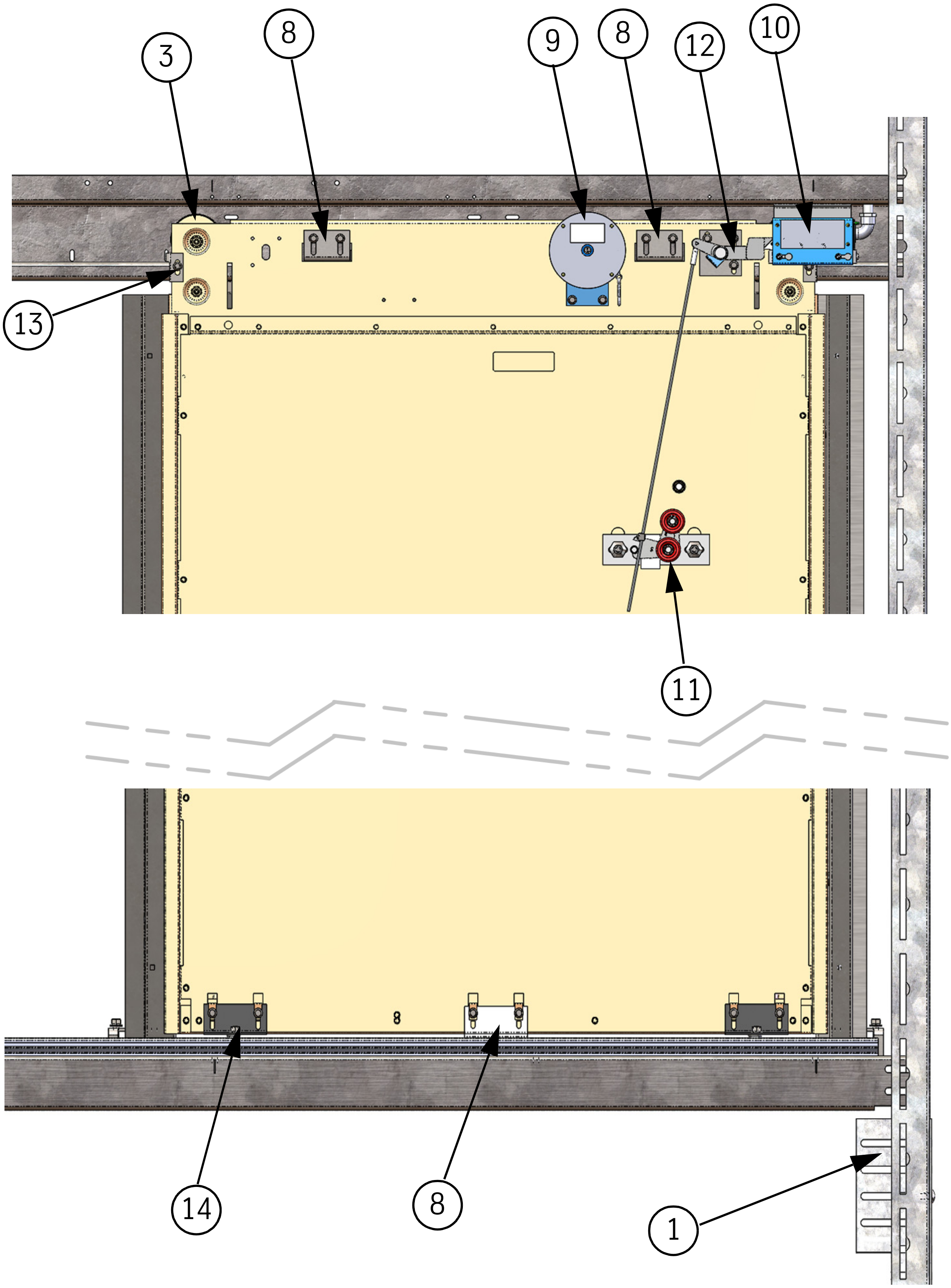
These surfaces are coated with a lacquer finish. To prevent scuffing, use a paste wax (for clear coats finishes) every week. Routine cleaning with a damp, soft cloth will remove spills, smears and fingerprints. Do not use abrasives or harsh chemicals.

Replacement Parts

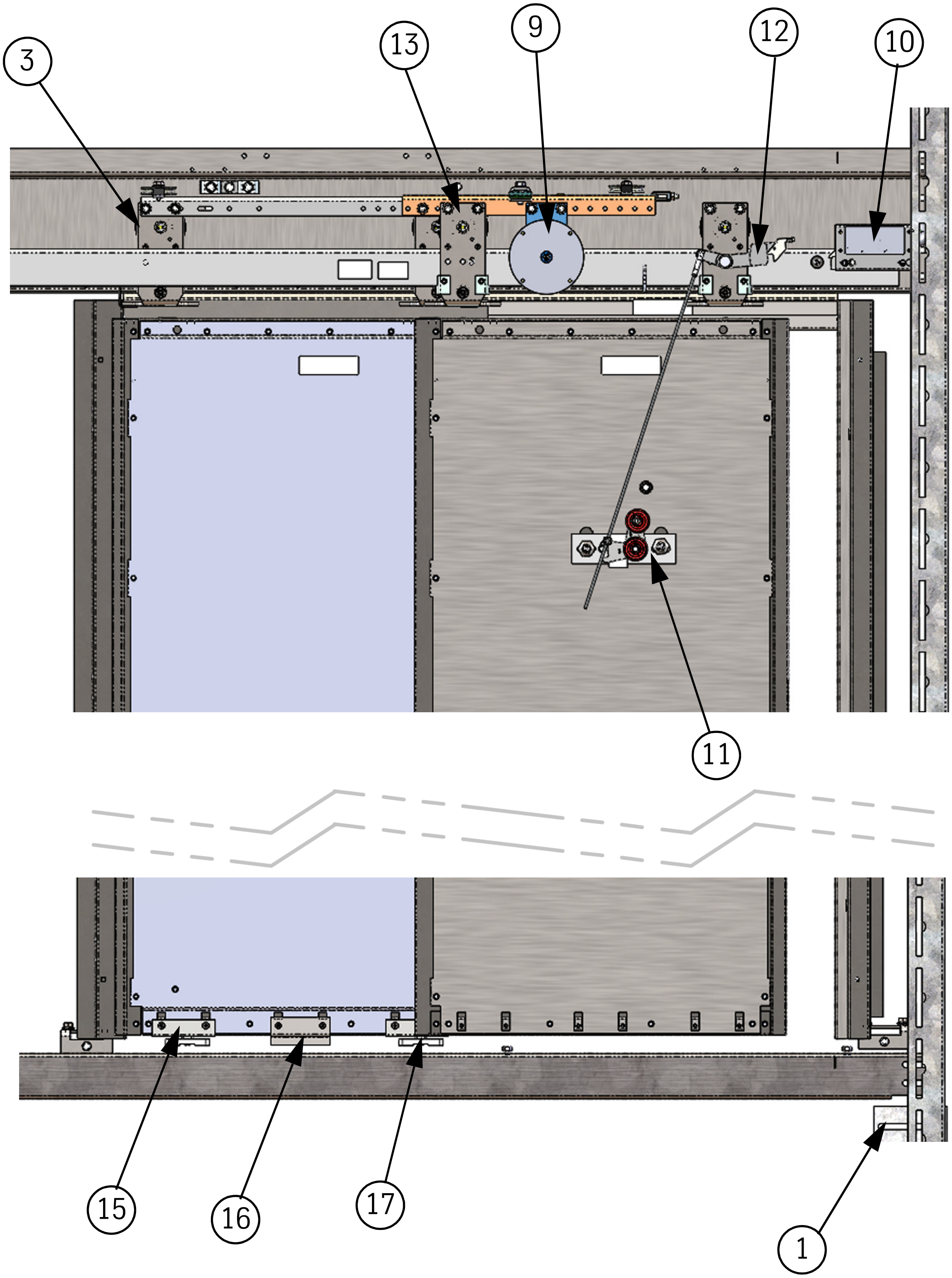
Single Speed see 7 - 90
Two Speed see 7 - 91
Center Opening see 7 - 92

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		174JC2	Wall Angle
2		196JE1	Angle Bracket
3		124580	Hanger Roller
4		792AK2	Fascia Stiffener (11 GA.)
5		760CF2	Shim
6		286AJ37	EMT Steel Conduit, 91.938" length
7		286AJ36	EMT Steel Conduit, 94.25" length
8		711GJ1	Safety Door Retainer, Top, SS
		711ET1	Safety Door Retainer, Bottom, SS
		711GR1	Safety Door Retainer, CO
9		278AC1	Closer Reel Assembly, LH, SS
		278AC101	Closer Reel Assembly, RH & CO
10		297BN3	Contact Box Assembly, LH
		297BN4	Contact Box Assembly, RH
		297BJ	Contact Box Assembly, CO
11		596EV1	Roller Crank Assembly Mount, LH
		596EV101	Roller Crank Assembly Mount, RH
12		532AF1	Interlock Hook Contact Assembly, LH
		532101	Interlock Hook Contact Assembly, RH
13		277ED1	Track Retainer Clip, LH
		277ED101	Track Retainer Clip, RH
14		454DW1	Gib Door Guide Assembly, SS
15		454FB	Door Guide Assembly, 2S
16		196BBJ	Door Safety Guide Retainer Bracket, 2S
17		454FK	Door Gib Guide, 2S
18		196AHM1	Cable Anchor Bracket Assembly, CO
19		297DA	Gate Switch Contact Assembly, CO
20		196AHP1	Cable Clamp Bracket, CO
21		224AJ	Relating Cable Assembly, CO
22		196BBH1	Relating Cable Assembly Bracket, CO
23		200BAP2	Bolt Kit, Wall Angle (All Bolts Kits Not Shown)
		200LA1	Bolt Kit, Strut Splice (Compression)
		200BDR1	Bolt Kit, Entrance
		200FF1	Bolt Kit, Fascia Plate
		200FX1	Bolt Kit, Fascia Stiffener
		200AEJ1	Bolt Kit, Toe Guard
		200PT1	Bolt Kit, Dust Cover
		200BLF1	Bolt Kit, Hardware SS
		200BLE1	Bolt Kit, Hardware CO

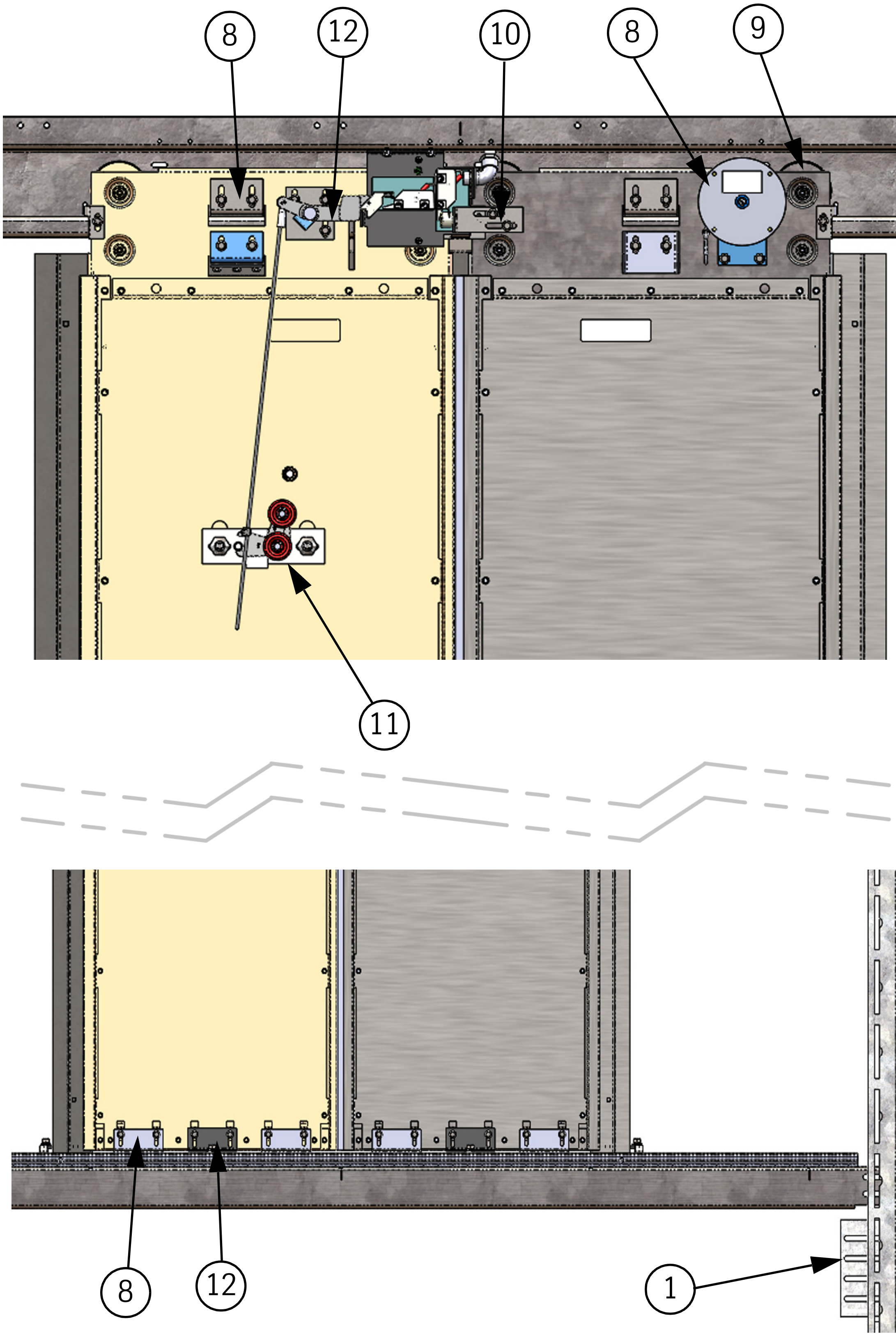
Single Speed Opening



Two Speed Opening



Center Opening



POWER UNITS

POWER UNITS

(8) Power Units Contents

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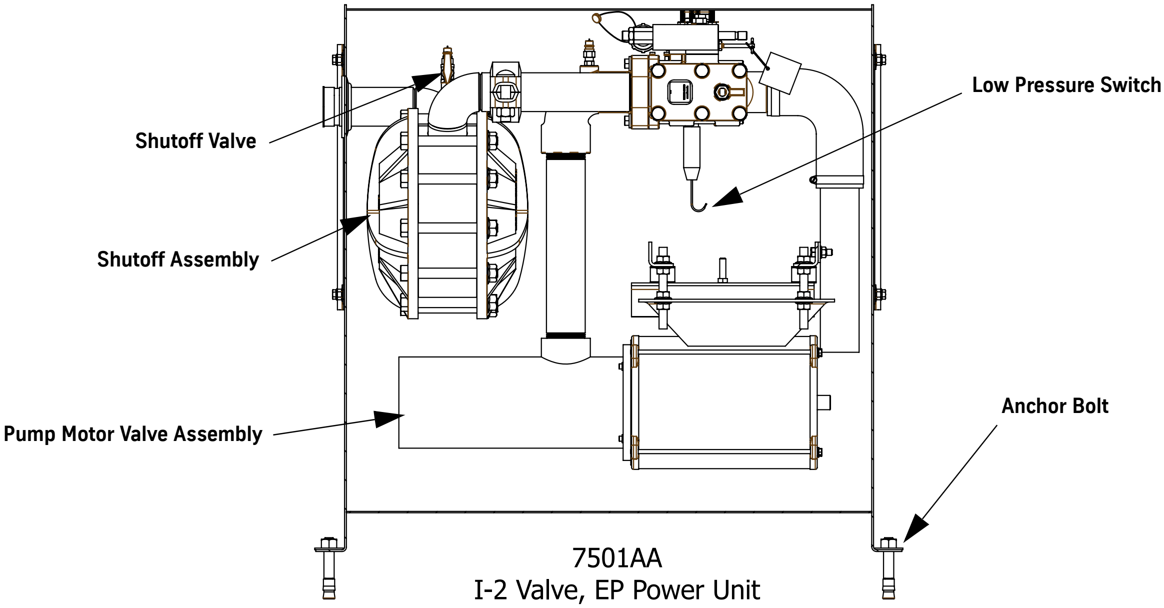
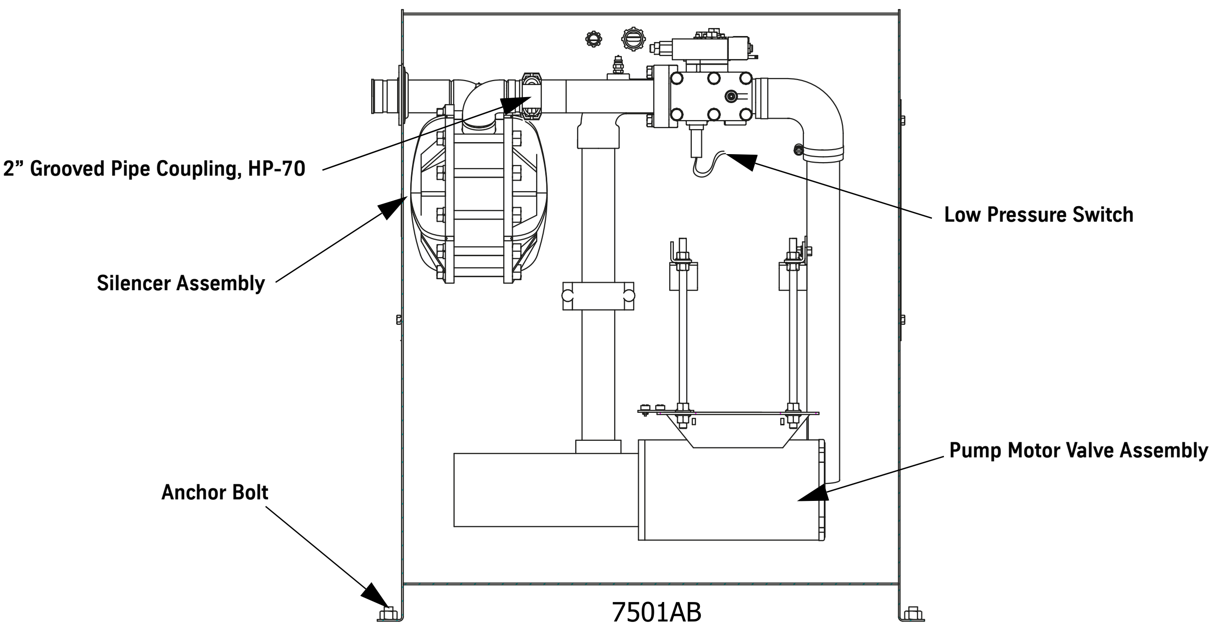
Submersible Power Units

See the installation details on next page.

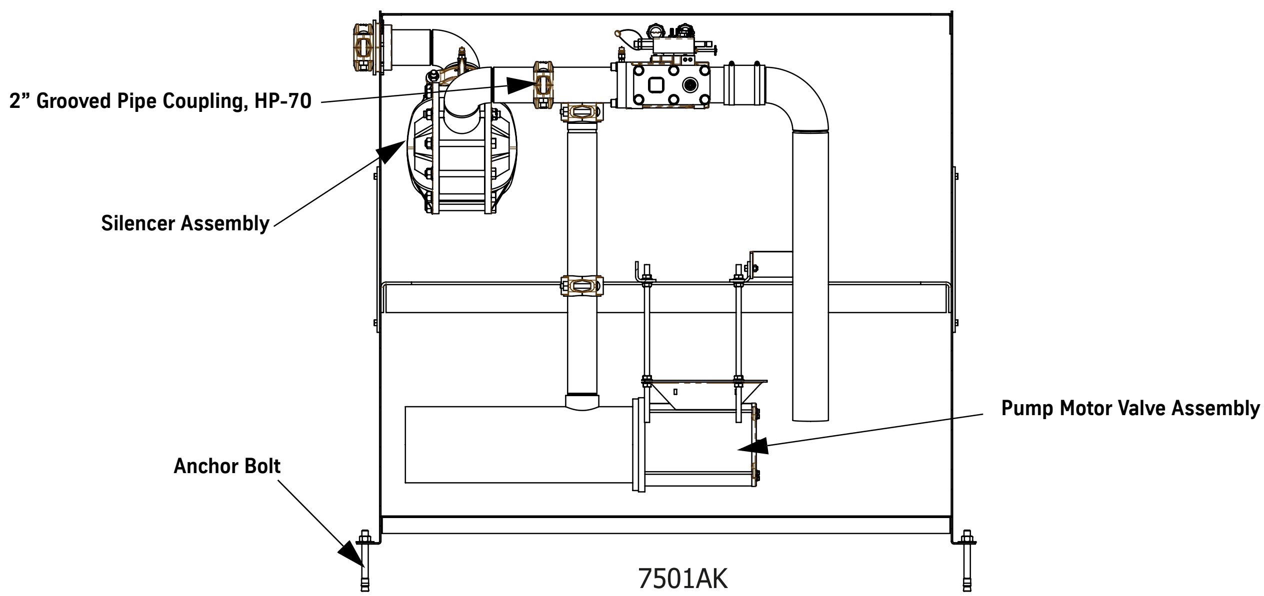


7501AA
I-2 Valve, EP Power Unit

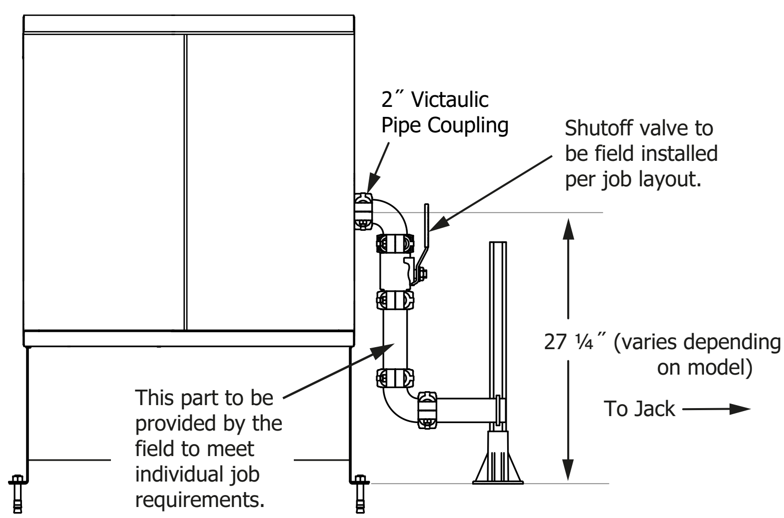


7501AB
I-2 Valve, EP Power Unit

Submersible Power Units
(continued)

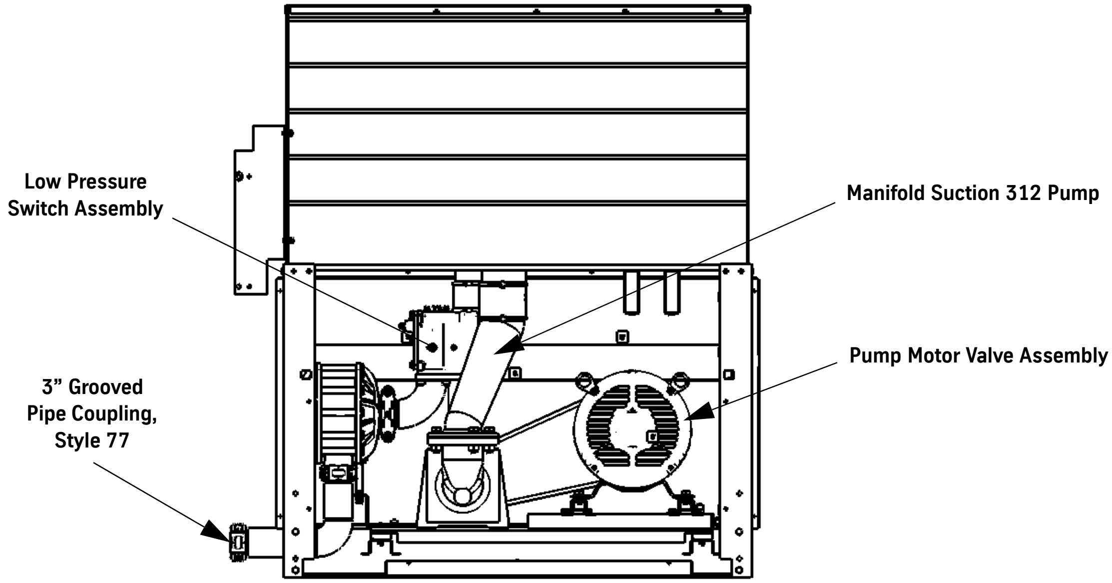


7501AK
I-3 Valve, EP Power Unit

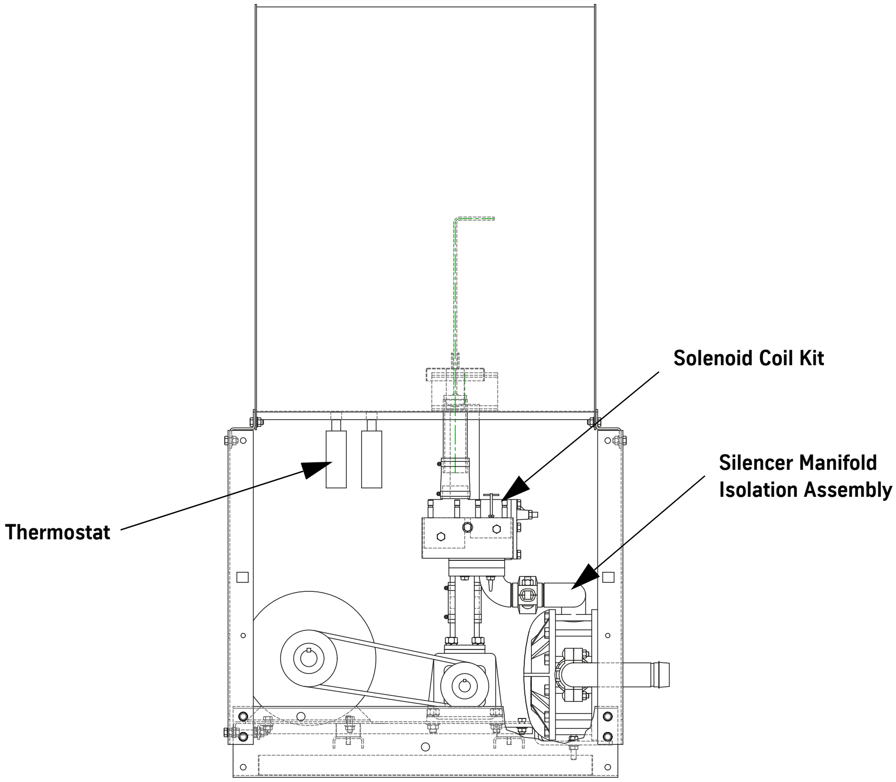


Installation Details

Dry Power Units



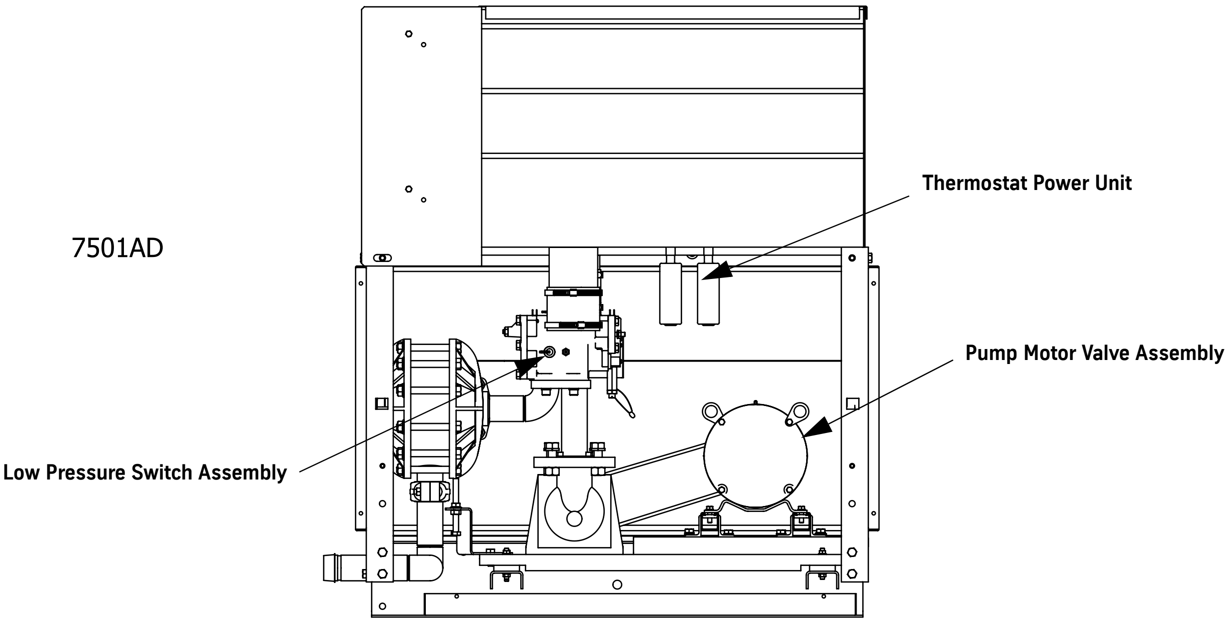
7501AE



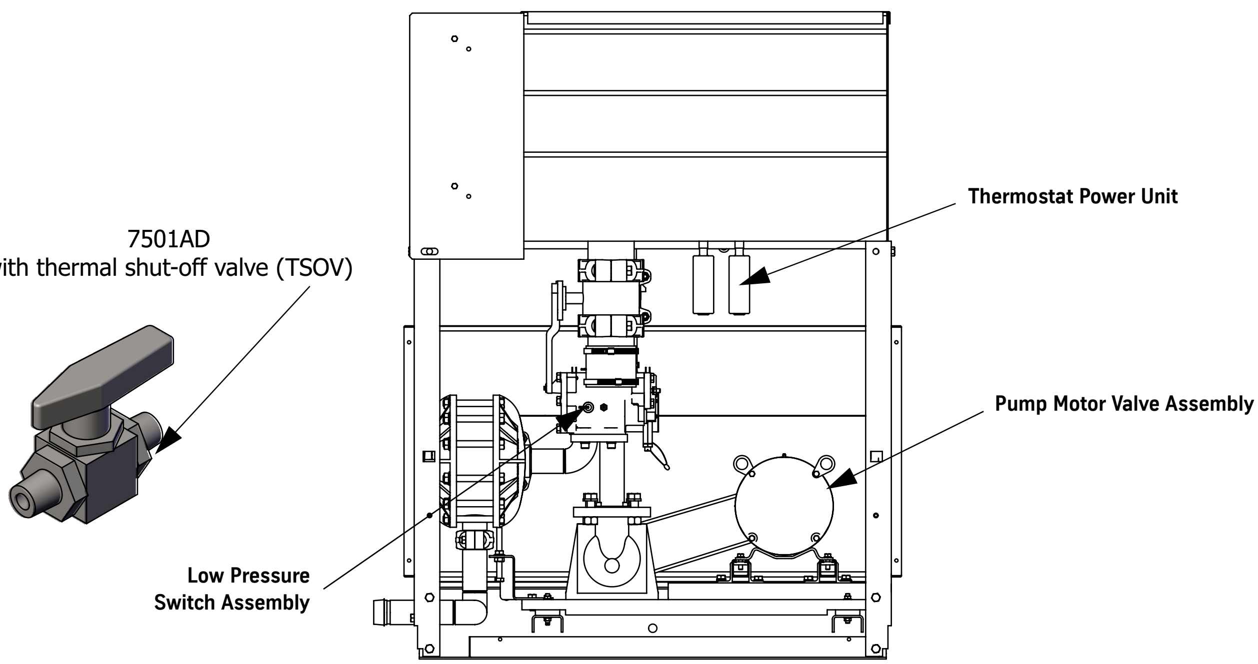
7501AF

Dry Power Units
(continued)

7501AD



7501AD
with thermal shut-off valve (TSOV)



Parts List

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		200RR7	Kit, Overspeed Valve Assembly, 2” Grooved
		200RR8	Kit, Overspeed Valve Assembly, 3” Grooved
2		886AH4	Overspeed Valve Assembly, 2” NPT, 90°
		886AM4	Overspeed Valve Assembly, 3” NPT, 90°
3		200RL1	Kit, Shutoff Valve, 2” Grooved
		200RL2	Kit, Shutoff Valve, 3” Grooved
4		200BY1	Shutoff Valve, 2” Threaded
		200BY2	Shutoff Valve, 3” Threaded
5		200BCX1	Kit, Eccentric Reducer 3” to 2”
6		200RN15	Kit, Coupling, 2”
		200RN18	Kit, Coupling, 3”
		200RN17	Kit, Coupling, 2” for 1 & 2 Stage Twin Post
		642EK1	Tee Pipe, 2” Victaulic for 3 Stage Twin Post
7		642KL1	In-line Bleeder Assembly Pipe, 2”
		642KL2	In-line Bleeder Assembly Pipe, 3”
8		421AB1	Oil Level Gauge
9		564AY3	Enviromax Lubricant, 55 Gallon Bucket
		564AY4	Enviromax Lubricant, 5 Gallon Bucket
10		200AKV1	Kit, Sight Gauge for Dry Power Units
		421AC1	Sight Gauge for Submersible Power Units
11		149257	Power Unit Cushion, Type H, Quantity = 4
12		642FR1	Electrical Insulation Couplings, Victaulic, 2”
		642FR2	Electrical Insulation Couplings, Victaulic, 3”
13		642FR3	Mechanical Insulation Couplings, Victaulic, 2”
		642FR4	Mechanical Insulation Couplings, Victaulic, 3”

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I-2® & I-3® VALVES

(9) I-2® & I-3® Valve Contents

Printed in USA January, 2015

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Preliminary Settings

Oil Viscosity and Viscosity Control

- The power unit should be located in a room that is ventilated and heated between 50^0F and 90^0F.
- Adjust the valve when the oil is at its operating temperature of 100^0F to 170^0F.
- Ensure that the unit performance is checked when the oil temperature is at minimum heated range of 100^0F or above.
- Changes in oil temperature will cause changes in valve behavior.

WARNING **Be EXTREMELY careful when making adjustments near moving belts. When operating the elevator from the controller, follow all safety precautions.**

Relief Pressure Setting

CAUTION **The I-2/I-3 Valve requires a minimum static system pressure of 90 PSI.**

1. Ensure that the car is empty.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Lower the car onto the buffers by opening the manual lowering valve. See Figure 1.
4. Close the manual lowering valve.
5. Install a pressure gauge on the quick connector (located on the far side of the valve).
6. Turn the relief pressure adjustment screw OUT until 5/8” extends beyond the relief assembly housing, and tighten the locknut.

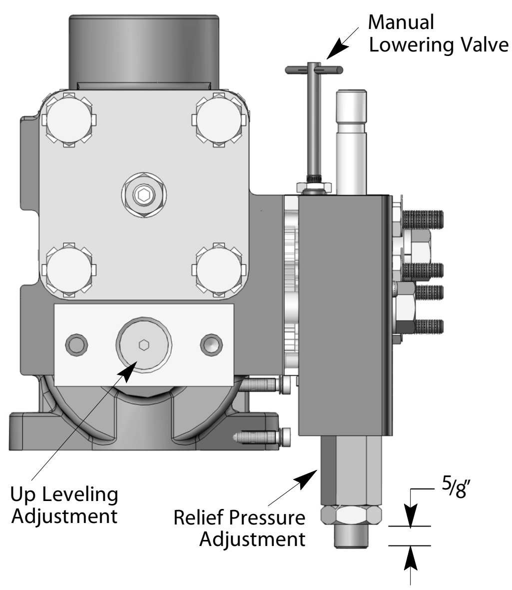


Figure 1 - Relief Pressure Setting

Low Pressure Setting

Note: OUT = Counterclockwise, CCW
IN = Clockwise, CW

1. Turn the low pressure adjustment screw OUT 1 3/4” beyond the cover plate. See Figure 2.
2. Turn the low pressure adjustment screw IN by hand until it touches the regulator piston.
3. Turn the up leveling adjustment screw OUT until it stops.
4. Turn the up leveling adjustment screw IN four (4) turns.

Adjustment Needles

Note: To make adjustments, do not loosen the nuts on the adjustment needle stems. They should be snug against the valve body at all times.

1. Turn the up start, up stop, and up slowdown adjustment needles IN to the fully closed position. See Figure 2.
2. Turn the up start needle OUT nine (9) turns.
3. Turn the up stop needle OUT three (3) turns.

Note: The up slowdown needle should remain closed.

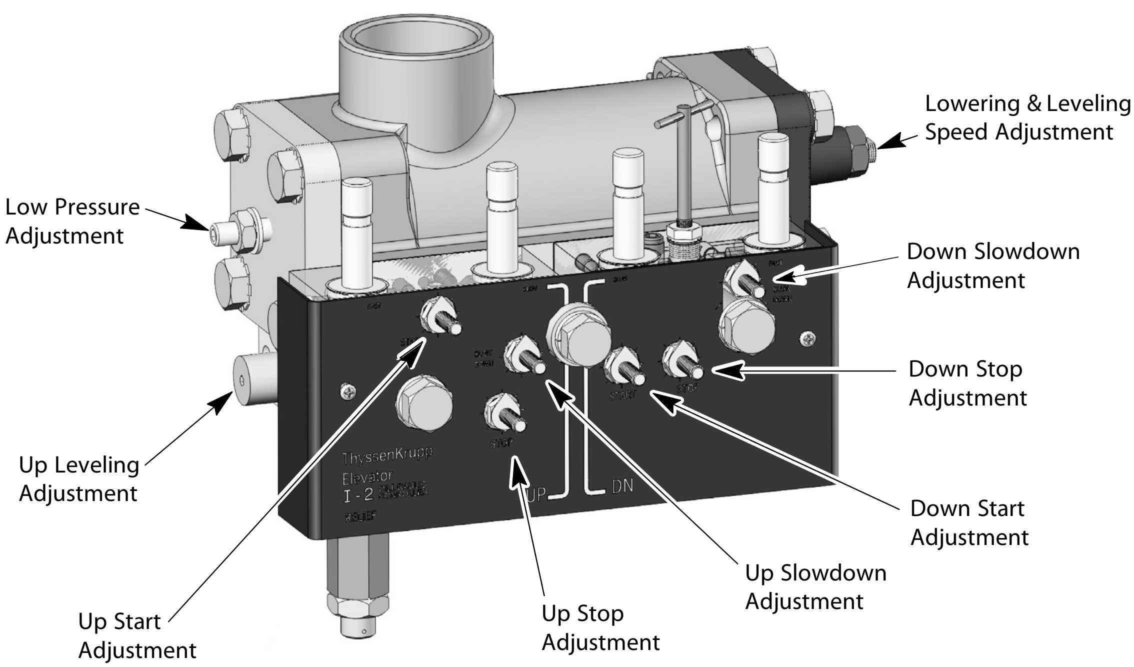


Figure 2 - Low Pressure Setting

Lowering and Leveling Speed Setting

CAUTION **To avoid damage to the piston face and seat, never turn the lowering and leveling speed adjustment unless the car is resting on the buffers or the car is in motion.**

1. With the car set on the buffers, adjust the lowering and leveling screw so that 3/4" extends beyond the valve body. See Figure 3.
2. Make sure flat end of the screw is pointed 45^{0}F counterclockwise to the tank return line.
3. Tighten the locknut.

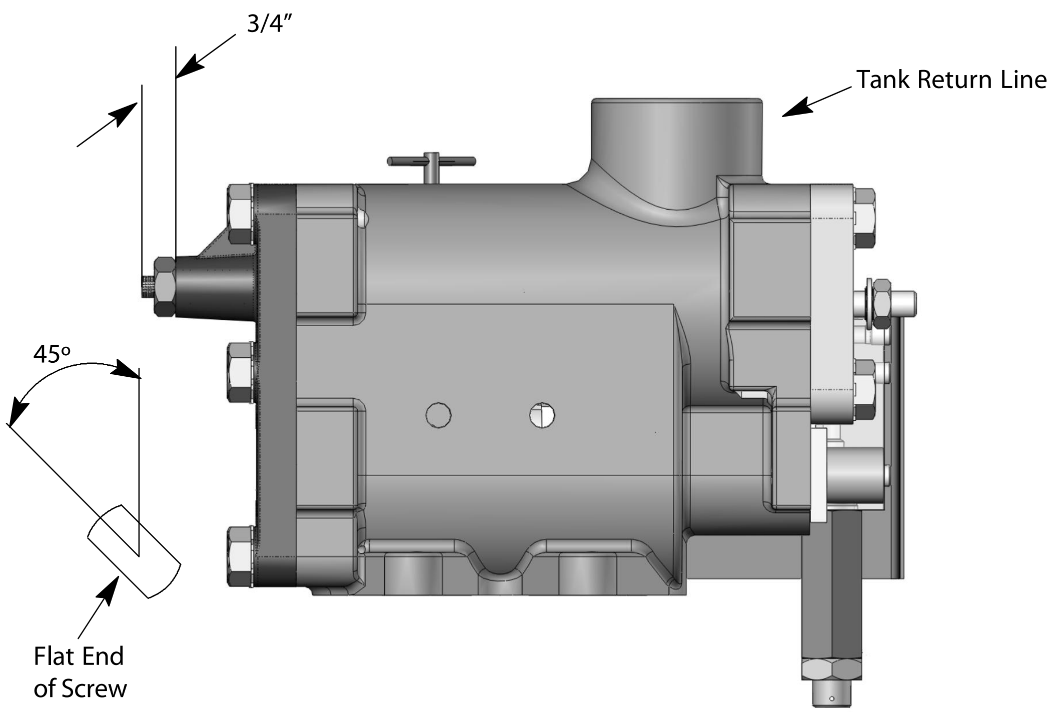


Figure 3 - Lowering and Leveling Speed Setting

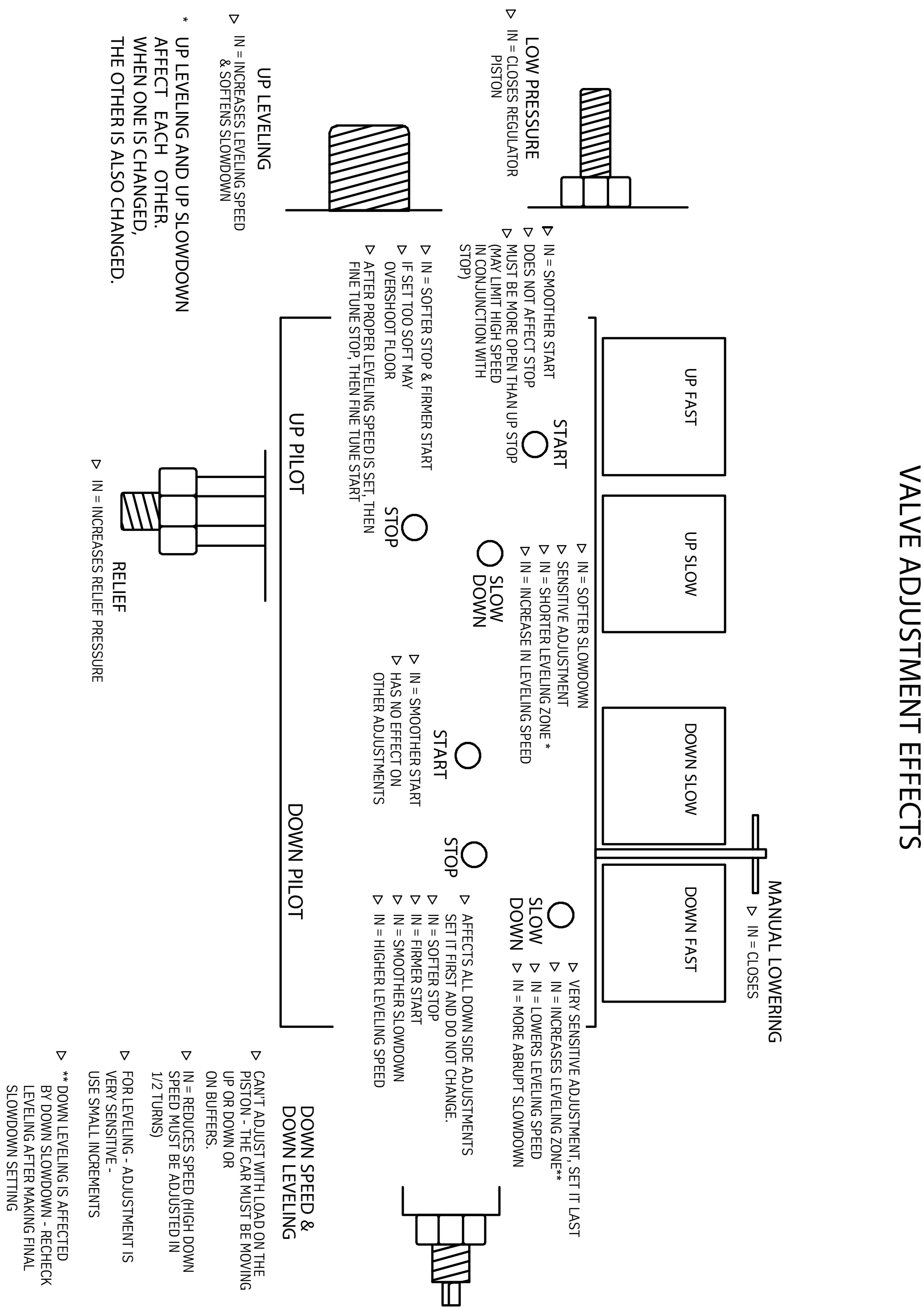
Adjustment Needles

Note: To make adjustments, do not loosen the nuts on the adjustment needle stems. They should be snug against the pilot body assembly at all times.

1. Turn the down start, down stop, and the down slowdown adjustment IN to the fully closed position.
2. Turn the down start adjustment OUT nine (9) turns.
3. Turn the down stop adjustment OUT ten (10) turns.

Note: The down slowdown adjustment must remain closed at this time.

Quick Reference Guide for Valve Adjustments



Preliminary Adjustments

WARNING **When operating the elevator from the controller, follow all safety precautions.**

1. Ensure that the car is empty and the manual lowering valve is closed.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Disable the up slow solenoid by disconnecting the solenoid wire from the controller. See the appropriate controller diagrams.
4. Disable the up fast solenoid by placing the controller on Inspection Operation.

Note: The type of controller will determine how Inspection Operation is accomplished.

5. Turn the power on, and start the motor.
6. Turn the low pressure adjustment IN just until the car starts to move.
7. Turn the low pressure adjustment OUT until the car movement stops.
8. After the car stops, turn low pressure adjustment OUT an additional one-half (1/2) turn.
9. Use these instructions on valves marked with SP on the cover plate or valve nameplate:

Note: The car must be stopped and started to check the setting.

   a. Turn the low pressure adjustment OUT three (3) turns.
   b. Check for too much time delay between the motor starting and the car movement.
   c. Turn the low pressure adjustment IN until excessive delay is eliminated.

10. Tighten the locknut.
11. Stop the motor, and turn the power off.
12. Remove any jumpers that may have been used.
13. Reconnect the up slow solenoid wire to the controller.

Relief Pressure Adjustment

1. Close the line shut-off valve, and install a pressure gauge.
2. With controller on Inspection Operation, turn power on, start motor, and read pressure.

WARNING **Stop the power unit IMMEDIATELY if pressure exceeds 625 PSI.**

3. Adjust the relief valve to relieve at the pressure indicated on the power unit nameplate. See Figure 4 on page 12 - 6.
4. Tighten the locknut, and Turn OFF, Lock, and Tag out the mainline disconnect.
5. Relieve the jack pressure by opening the manual lowering valve.
6. Close the manual lowering valve.

Relief Pressure Adjustment
(continued)

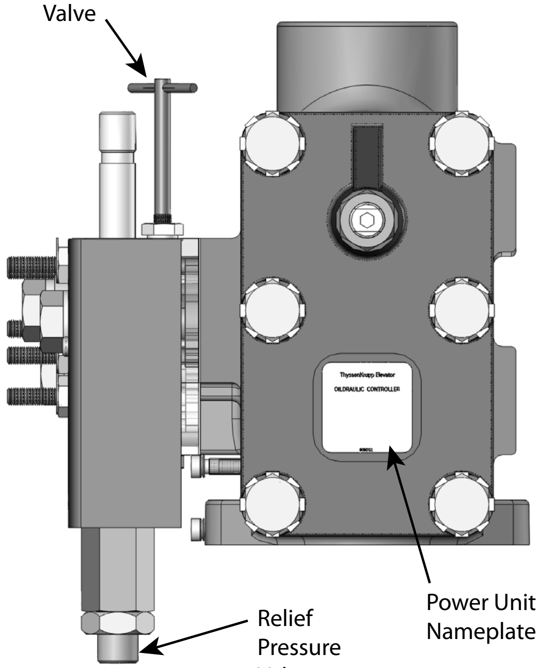


Figure 4 - Relief Pressure Adjustment

7. Turn on the power, and recheck the relief pressure.

8. Turn OFF, Lock, and Tag out the mainline disconnect, and repeat Steps 5 and 6.

9. Open the line shut-off valve.

Slowdown and Leveling Speed Adjustment

1. Turn the up slowdown adjustment OUT ten (10) turns (this action ensures that the car does not initially start up). See Figure 5 on page 12 - 7 for all steps in this procedure.

2. With the car on Inspection Operation, start the car up. Slowly turn the up slowdown adjustment screw IN until the car moves at 10 to 12 fpm.

3. Recheck the up leveling speed.

4. Verify that the down stop adjustment screw has been turned OUT ten (10) turns (this action ensures the car does not initially start down).

5. Place the car on Inspection Operation, and start the car down. Slowly turn the down stop adjustment screw IN until the car runs down at 15-20 fpm.

Slowdown and Leveling Speed Adjustment
(continued)

6. Turn the lowering and leveling speed adjustment by less than one-quarter turn increments, to adjust the leveling speed to 10-12 fpm. Pause between each change.

Note: If the lowering and leveling speed adjustment is turned too far (more than one-quarter turn) the car will lock in the down direction. If this happens, run the car up on Inspection Operation while another person in the machine room turns the lowering and leveling speed adjustment screw OUT a small amount.

7. Tighten the locknut.

8. If the car does not stop, turn the down stop adjustment screw OUT until the stop is positive.

9. Recheck the down leveling speed.

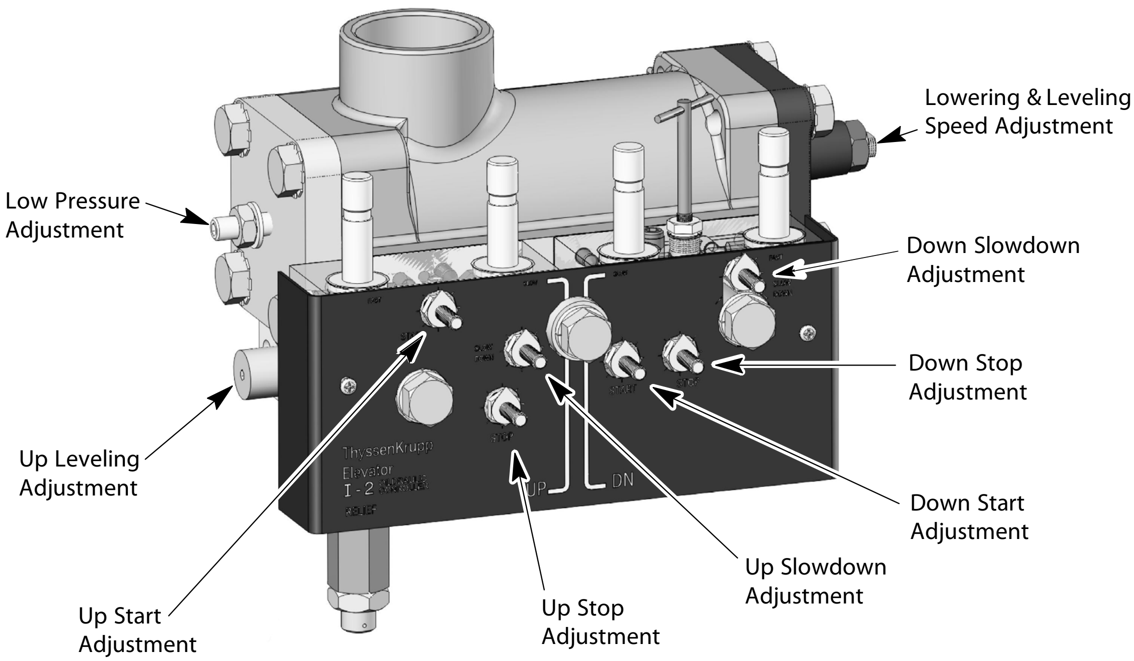


Figure 5 - Slowdown and Leveling Speed Adjustment

Final Adjustments

The manufacturing presets of the valve adjustments are attached to the inside of the controller. These values ensure movement of the car and also reduce final adjustment time. Perform these adjustments in the order given because they affect each other.

CAUTION **To be adjusted, the I-2/I-3 Valve requires a minimum static system pressure of 90 PSI.**

Up Valve Section

Up Slowdown and Up Leveling Speed

1. Verify that the car is empty.
2. Place the controller on Automatic Operation, and send the car to the lowest landing.
3. Run the car to the floor above and observe the leveling zone.
4. Adjust the up slowdown for 3 to 4 inches of leveling.

Up Slowdown - Adjust for 3 to 4 inches of Leveling	
IN (cw)	Shorten Leveling Zone
	Increase Leveling Speed
	Softer Up Slowdown

WARNING **Each time the up slowdown is adjusted, the up leveling speed must be rechecked.**

5. Run the car on Inspection Operation, and adjust the up leveling speed adjuster. The leveling speed should be 10-12 fpm.

Up Leveling -10 to 12 fpm	
IN (cw)	Increase Leveling Speed
	Softer Up Slowdown

WARNING **When operating the car from the controller, ensure all safety precautions are followed.**

6. Place the car on Automatic Operation.
7. Check the leveling zone for 3 to 4 inches, and the leveling speed for 10 to 12 fpm.
8. Continue to adjust the up slowdown needle and the up leveling adjuster until the desired performance is achieved.

Up Valve Section
(continued)

Up Stop and Up Start

Because the up stop adjustment affects the up start adjustment, it must be adjusted first.

1. Adjust the up stop for a soft but positive stop.
2. Adjust the up start for a smooth but positive start.
3. Check to be certain full up speed is reached on a one-floor run, which may require the up start to be more positive.
4. Slightly alter the slowdown adjustment to achieve optimum performance, if necessary.

IN (cw)	Up Stop	Up Start
	Stop Softer	Start Smoother
	Start Firmer	Limit High Speed

Down Valve Section

Lowering Speed

1. Place the car on Automatic Operation.
2. Set the lowering speed.
    a. Use an empty car, and turn lowering speed adjustment in one-half turn increments.
    b. After each adjustment, leave the flat end of screw pointed 45^{0}F to tank return line.

Lowering Speed	
OUT (ccw)	One-half Turn Increments
	Increase Lowering Speed

WARNING

If no speed change occurs with one full turn on the lowering speed adjuster, DO NOT CONTINUE TO TURN IT OUT. Check for a stop open wider than a start, or a mechanical piston binding.

Down Leveling Speed and Down Stop

The down leveling speed and the down stop adjustment must be performed together since the down stop adjustment affects the down leveling speed. The down leveling speed, however, does not affect the down stop adjustment.

1. Place the controller on Inspection Operation.
2. Adjust the down stop for a positive stop.
3. Adjust the down leveling speed to 10-12 fpm.
4. Tighten the locknut on the down leveling speed adjustment.

Down Valve Section
(continued)

5. Recheck the down leveling speed.

Down Stop	
IN (cw)	Stop Softer
	Increase Leveling Speed
Down Leveling Speed	
OUT (ccw)	Less than one-quarter turn increments
	Increase Leveling Speed

Down Start

1. Place the controller on Automatic Operation.

2. Adjust the down start adjustment to obtain a smooth start.

Note: Ensure that the car achieves full speed on a one-floor run. If not, make the down start more positive.

Down Start	
IN (cw)	Start Smoother

Down Slowdown

The effect of the down slowdown adjustment is the opposite of the previous adjustments. Turning OUT on the down slowdown adjustment will shorten the leveling zone. Turning IN on the down slowdown adjustment will lengthen the leveling zone. Make this adjustment in small increments as soon as a change is observed in the leveling zone. The car will overshoot the landing if the adjustment is turned OUT too far.

1. Turn the down slowdown adjustment OUT in small increments until the car has a leveling zone of 3 to 4 inches.

2. It may be necessary to slightly alter the point in the hoistway where the slowdown is initiated to achieve optimum valve and car performance.

Note: This action is usually accomplished by either switch location or selector settings.

Performance Check with Full Load

1. Place a capacity load on the car.
2. Run the car on Automatic Operation, and the check performance at all floors. All valve functions will become firmer at upper landings. If adjustments are necessary, it will affect the empty car performance.

Notes:

- The down leveling speed will increase and the down leveling zone will be shorter. It may be necessary to change the down slowdown adjustment to be certain there is at least two (2) inches of leveling.
- If necessary, turn IN on the down slowdown to increase the leveling zone.
- The up leveling speed will increase. The up leveling zone will change between no load and full load. Do not change any adjustments made with no load if there is at least one (1) inch of up leveling zone with a full load.
- If necessary, turn OUT on the up slowdown adjustment to increase the up leveling zone.

3. Verify that the car is obtaining full speed in both directions on a one-floor run.
4. Record the working pressure in the up direction.

Note: The working pressure value will be used in the next procedure.

5. Remove the capacity load from the car.

Final Relief Pressure with Full Load

1. Place the controller on Inspection Operation, and close the line shut-off valve.
2. Start the pump, and read the relief pressure.
3. Add 25% to the working pressure recorded in Step 4 of the previous procedure, and set the relief valve to relieve at this new pressure value.
4. Stop the power unit, and tighten the locknut on the relief pressure adjustment.
5. Recheck the relief pressure.

WARNING **Stop the power unit IMMEDIATELY if pressure exceeds 625 PSI.**

6. Open the line shut-off valve, and place the car on Automatic Operation.

Troubleshooting

Verify the following list before using the troubleshooting tables.
See also Troubleshooting Flowcharts in the reference material section starting on page 1 - 15.

1. No binding in the hoistway.
2. The proper voltage is being supplied to the power unit.
3. All valve adjustments have been completed as recommended.
4. All vee belts on the power unit have the proper tension.
5. There is no oil on the belts to cause slippage.

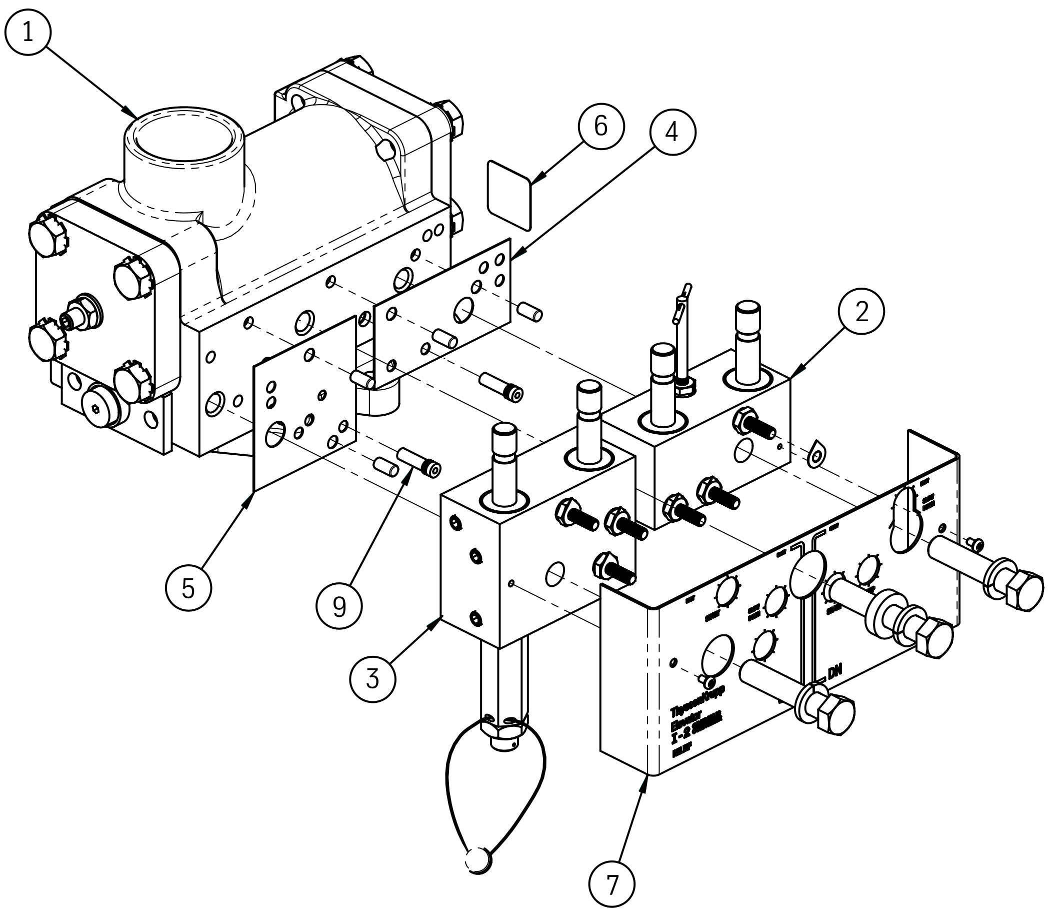
Troubleshooting Table - Up Operation

Problem	Solution
Pump runs, but the car does not run at high speed.	1. Check that the line shut-off valve is fully open. 2. Check for the correct motor rotation. 3. Check for the correct relief pressure setting. 4. Check that the up fast solenoid pulls IN.* 5. Turn OUT on the up start adjustment. 6. Turn IN on the up stop adjustment. 7. Make sure that the regulator piston is free. 8. Make sure that the up pilot piston is free.
Car will not slowdown to leveling speed.	1. Check that the up slow solenoid pulls IN.* 2. Check that the up fast solenoid drops OUT.* 3. Turn OUT on the up slowdown adjustment. 4. Check the up leveling speed. Set for 10 to 12 fpm. 5. Make sure that the regulator piston is free. 6. Make sure that the pressure control piston is free.
Car will not make a hydraulic stop.	1. Check that the up slow solenoid drops OUT.* 2. Check for the correct low pressure adjustment. 3. Turn OUT the up stop adjustment. 4. Make sure that the regulator piston is free. 5. Make sure that the up pilot piston is free.
Acceleration, deceleration, leveling speed, or stop is erratic.	1. Make sure that the check valve piston is free. 2. Make sure the spring on the regulator piston does not bind.
Leveling speed slows down or car stalls after slowdown (check if releveling speed slows down).	1. Turn IN on the slowdown adjustment. 2. Replace the leveling adjuster/strainer.
* Check the solenoids for voltage and for damage to the solenoid tube. Check the plunger for binding. Do not reseat. If the seat in the pilot body is damaged, replace the pilot.	

Troubleshooting Table - Down Operation

Problem	Solution
Car will not lower	1. Check that the line shut-off valve is fully open. 2. Check the solenoids.* 3. Turn OUT the down start adjustment. 4. Turn IN on the down stop adjustment.
Slow or bouncy down start	1. Turn OUT on the down start adjustment. 2. Turn IN on the down stop adjustment. 3. Bleed the jack of air or loosen packing, if possible.
Abrupt down start	1. Turn IN on the down start adjustment. 2. Turn OUT on the down stop adjustment.
Car will not stop when started down	1. Tighten the manual lowering valve. 2. Turn OUT on the down stop adjustment. 3. Check if solenoid valve is not closing (residual magnetism).*
Down stop too soft or bouncy	1. Turn OUT on the down stop adjustment. 2. Bleed the jack of air or loosen packing, if possible
Down stop rough	1. Turn IN fully on the down slowdown adjustment. 2. Turn IN on the down stop adjustment. 3. Turn OUT, in small increments, on the down slowdown.
Leveling bouncy	1. Check the leveling speed. Set for 10 to 12 fpm. 2. Bleed the jack of air or loosen packing, if possible.
Car will not slowdown to leveling speed	1. Check the down fast solenoid.* 2. Down slowdown adjustment may be open too much (too soft). 3. The leveling speed may be set too fast. Set for 10 to 12 fpm.
Slowdown rough	Turn OUT on the down slowdown adjustment.
Car settles (leaks) down	1. Run car to lowest position. 2. Inspect oil line, jack, and power unit for leaks. 3. Close the line valve.
Car settles (leaks) down and the oil level in the tank is less than when first set.	1. Tightly close manual lowering valve, and run the car to the top. 2. Shut off the power and record the car location. 3. Wait 15 minutes, record car location, and note amount car has settled “X”. 4. Let car sit for 8 hours, record the car location, and note the amount the car has settled “Y”. 5. If “Y” is not more than 25 times “X” arrange for homing to the lowest floor and verify proper performance. 6. Close down the first car location, wait 15 minutes and record the car location. Note the amount the car has settled “Z”. 7. If “Z” is less than “X”, replace down pilot body and adjust down functions. 8. Remove and examine the lowering and check valve pistons. 9. If piston seat is damaged, reseat piston and verify operation. 10. If piston seat is not damaged, replace valve and adjust job.

Replacement Parts

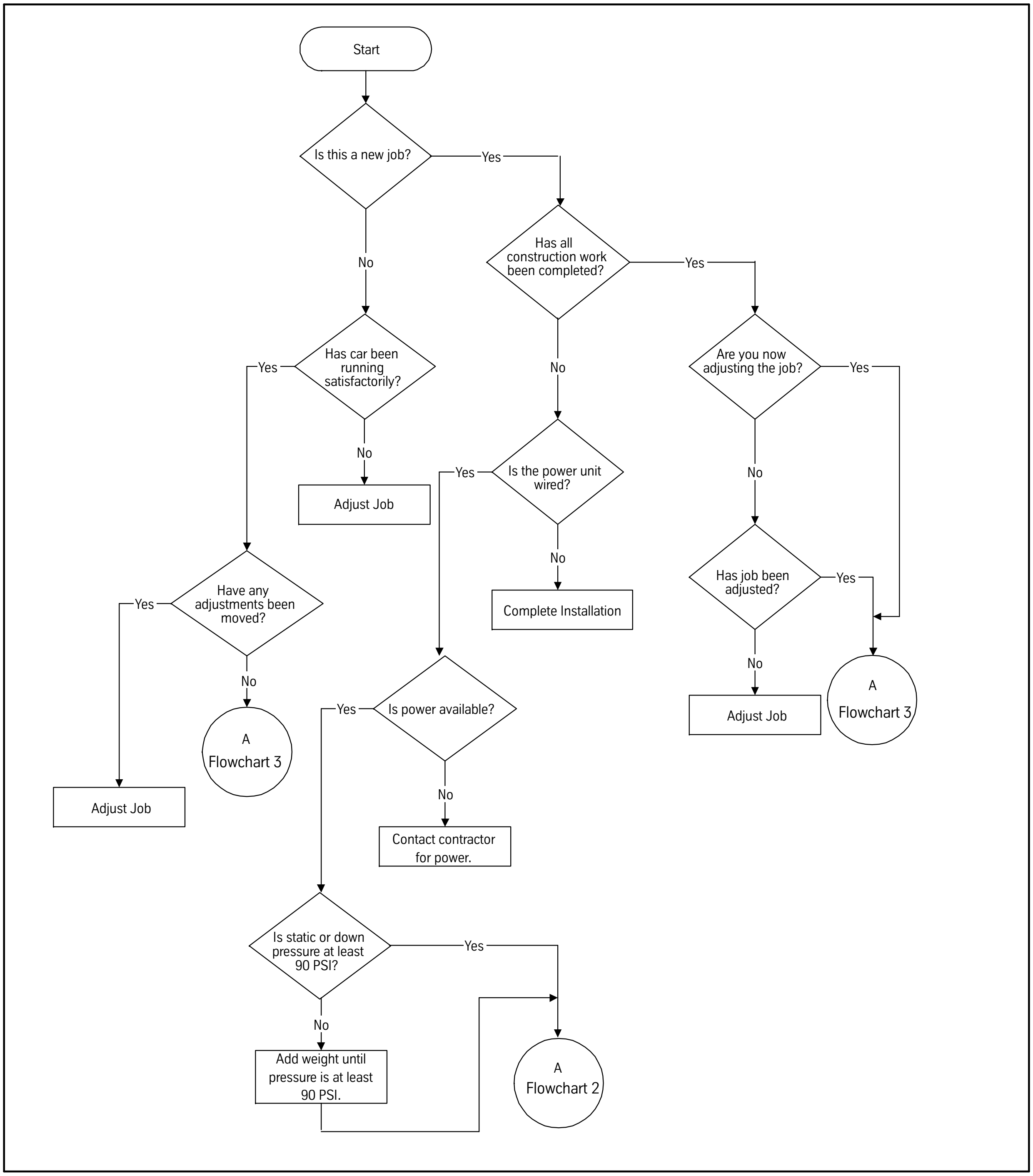


ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		148323	Valve Main Body Assembly, I-2, 125 GPM EP Units
		137744	Valve Main Body Assembly, I-2, 120-215 GPM Units
		137743	Valve Main Body Assembly, I-2, 30-100 GPM Units
		189131	Valve Main Body Assembly, I-2F, 125 GPM EP Units
		189128	Valve Main Body Assembly, I-2F, 120-215 GPM Units
		189127	Valve Main Body Assembly, I-2F, 30-100 GPM Units
		114874	Valve Main Body Assembly, I-3, Down
2		886BC1	Valve Pilot Assembly Down
3		886BD1	Valve Pilot Assembly Up
4	9781493	124213	Gasket, Down Pilot
5	9781481	124214	Gasket, Up Pilot
6		606DG1	Nameplate Valve
7		141EC2	Valve Faceplate, I-2, I-2F
		141ED2	Valve Faceplate, I-3
8		117327	Indicator Adjustment
9	9824467	799AB1	Strainer Assembly, Stainless Steel

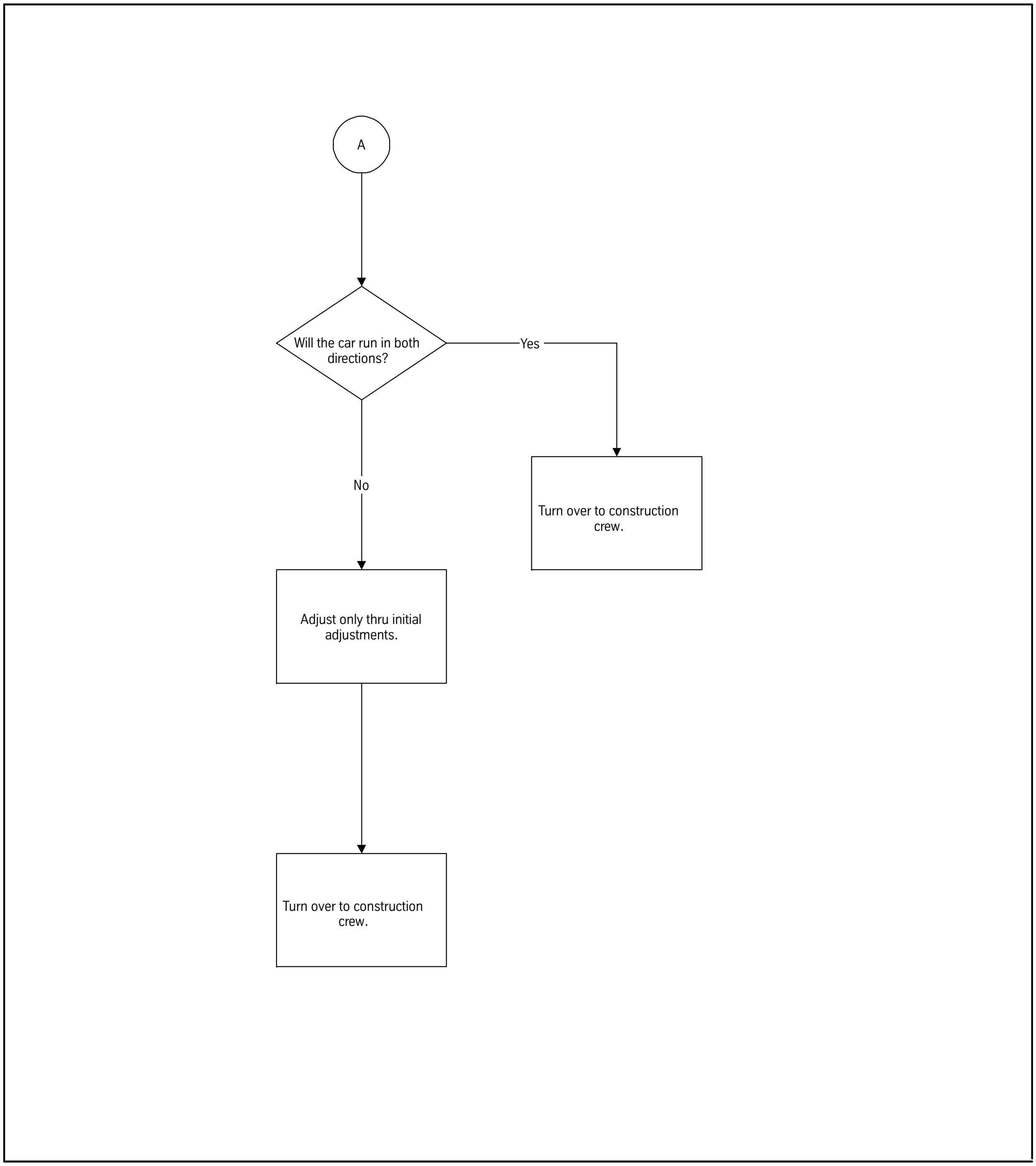
Reference Material

The material included in this section is only for reference and was obtained from the previous publication. The Technical Publications Department does not update or maintain this information.

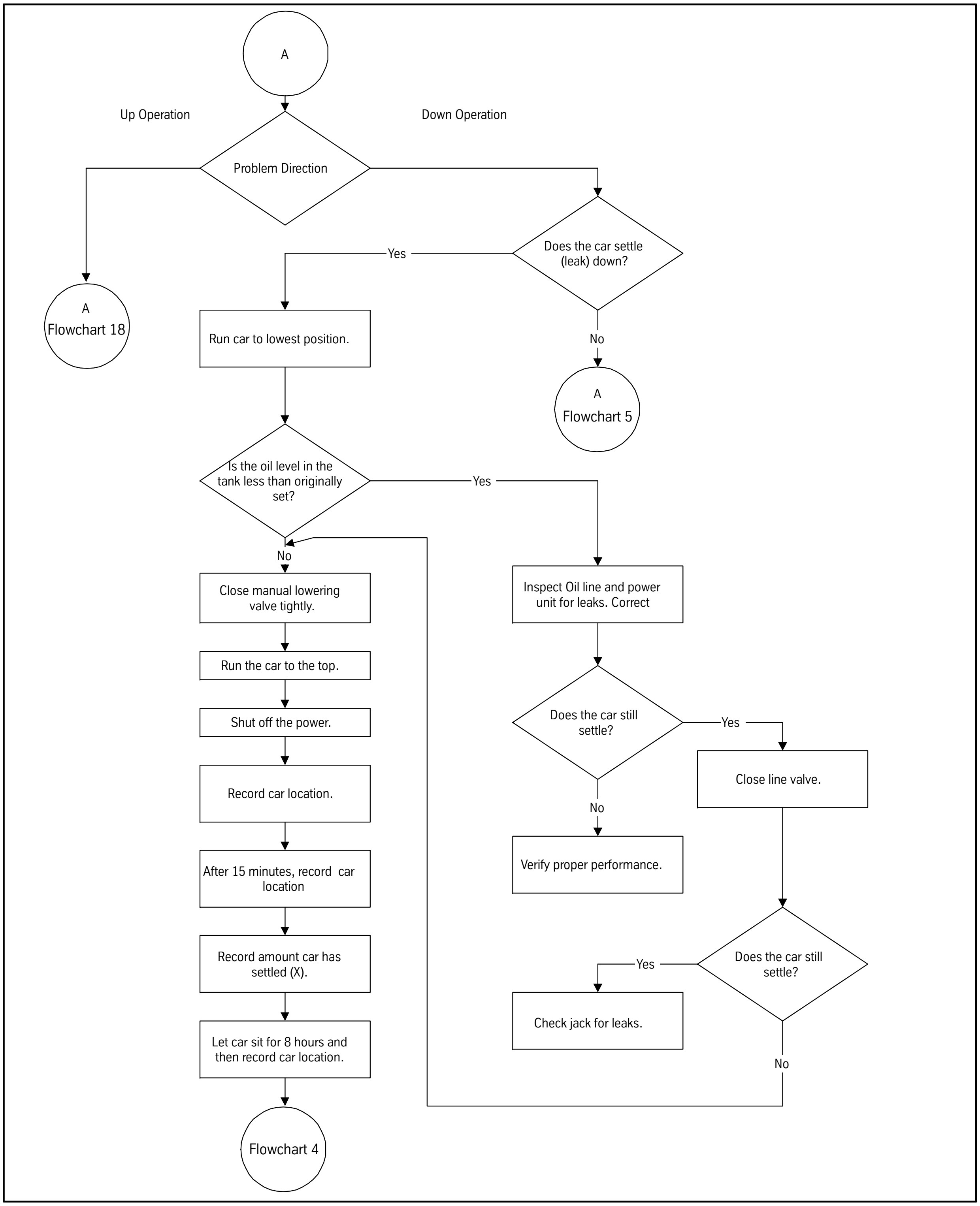
Troubleshooting Flowcharts



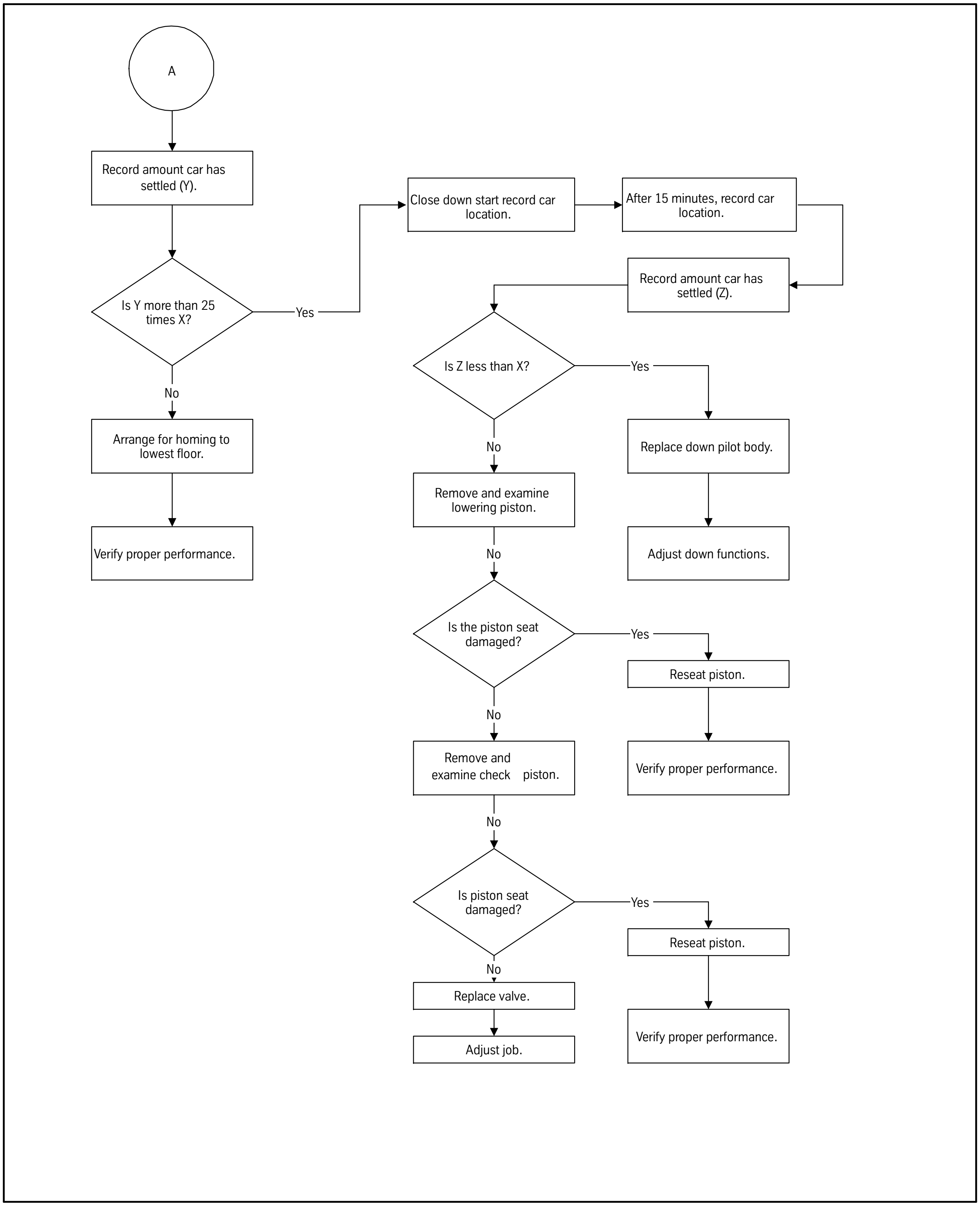
Flowchart 1


A
Will the car run in both directions?
Yes
No
Turn over to construction crew.
Adjust only thru initial adjustments.
Turn over to construction crew.

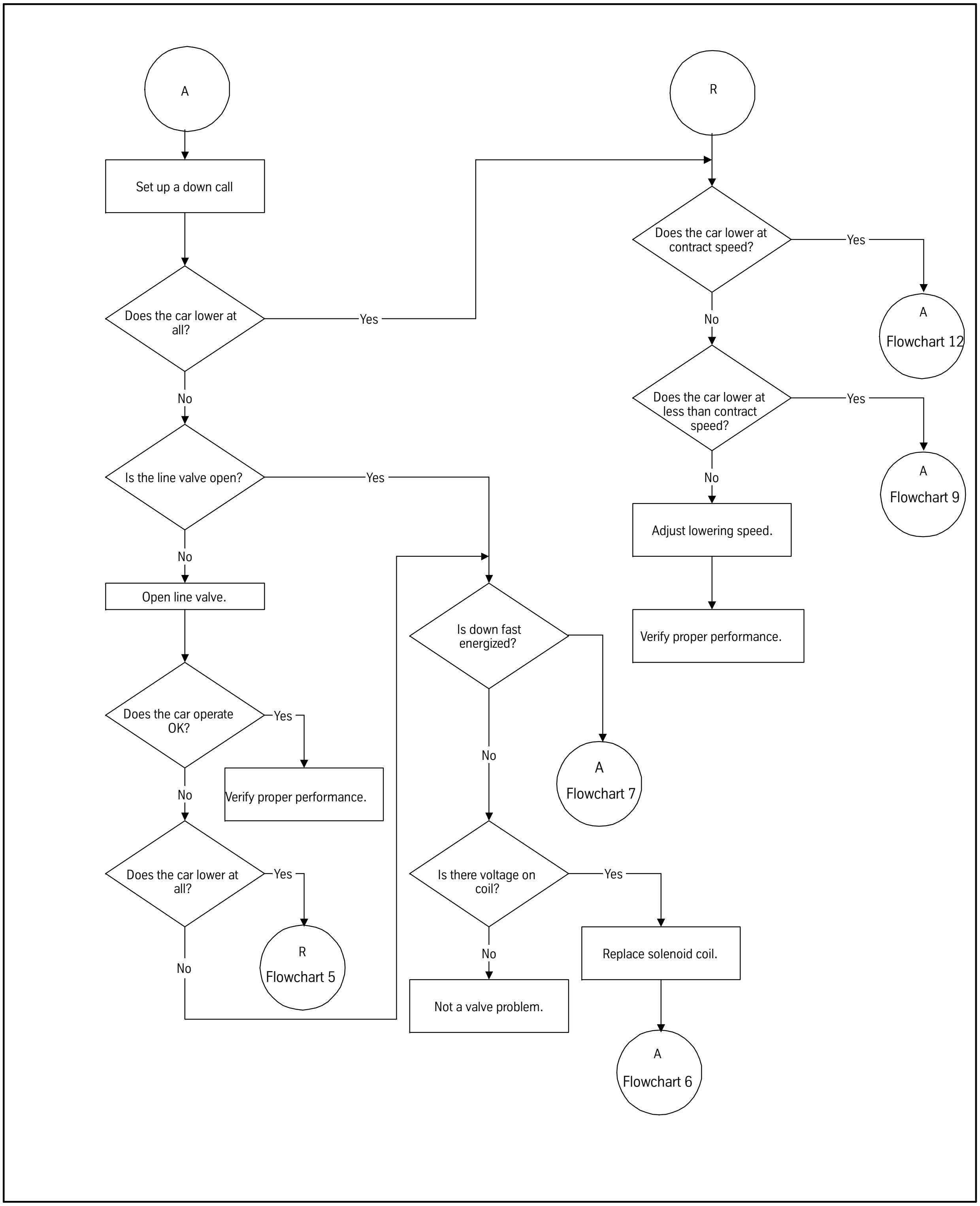
Flowchart 2


A
Up Operation
Problem Direction
Down Operation
A
Flowchart 18
Does the car settle (leak) down?
Yes
No
Run car to lowest position.
A
Flowchart 5
Is the oil level in the tank less than originally set?
Yes
No
Close manual lowering valve tightly.
Run the car to the top.
Shut off the power.
Record car location.
After 15 minutes, record car location
Record amount car has settled (X).
Let car sit for 8 hours and then record car location.
Flowchart 4
Inspect Oil line and power unit for leaks. Correct
Does the car still settle?
Yes
No
Close line valve.
Verify proper performance.
Does the car still settle?
Yes
Check jack for leaks.
No

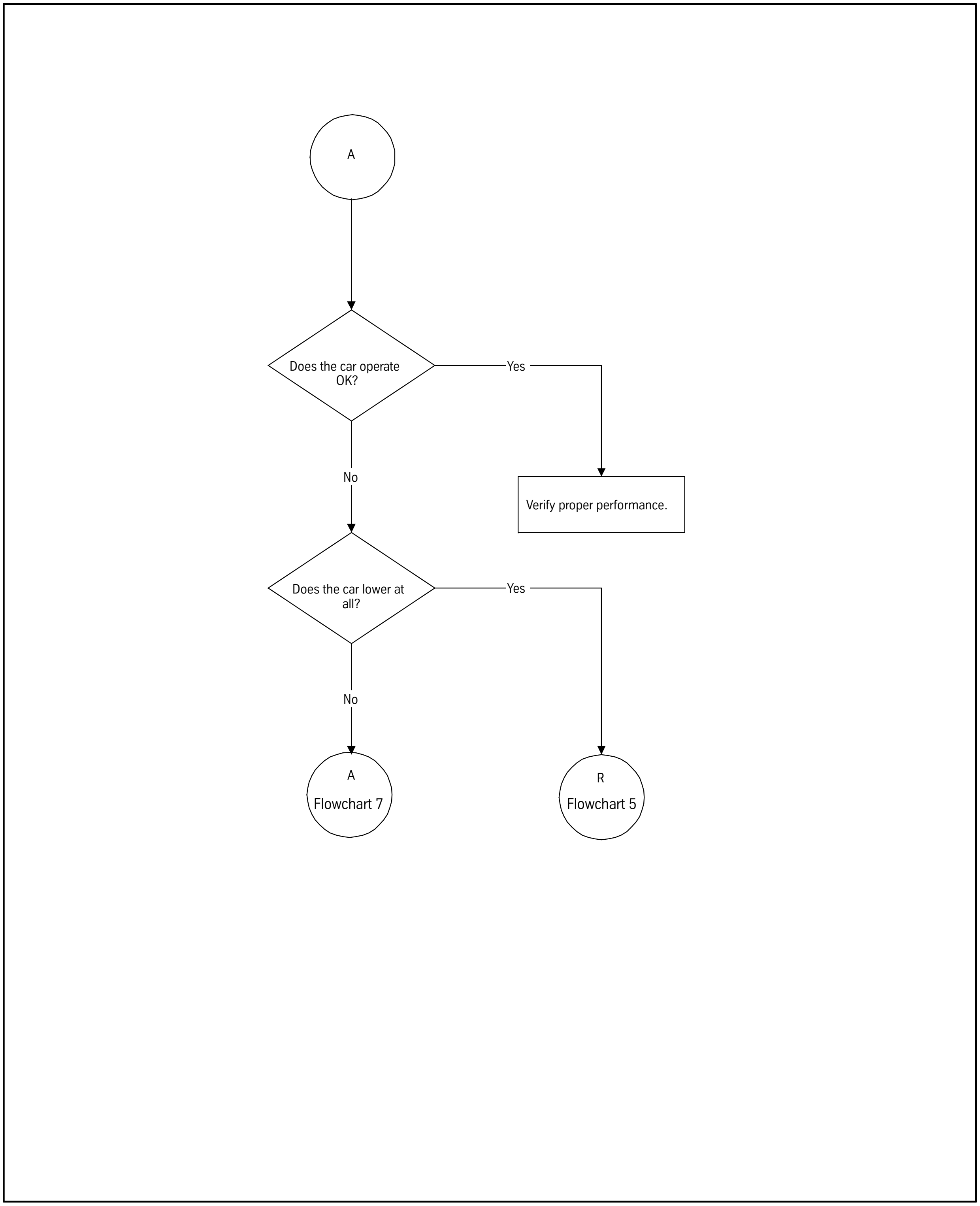
Flowchart 3


A
Record amount car has settled (Y).
Is Y more than 25 times X?
Yes
No
Arrange for homing to lowest floor.
Verify proper performance.
Close down start record car location.
After 15 minutes, record car location.
Record amount car has settled (Z).
Is Z less than X?
Yes
Replace down pilot body.
Adjust down functions.
No
Remove and examine lowering piston.
No
Is the piston seat damaged?
Yes
Reseat piston.
Verify proper performance.
No
Remove and examine check piston.
No
Is piston seat damaged?
Yes
Reseat piston.
Verify proper performance.
No
Replace valve.
Adjust job.

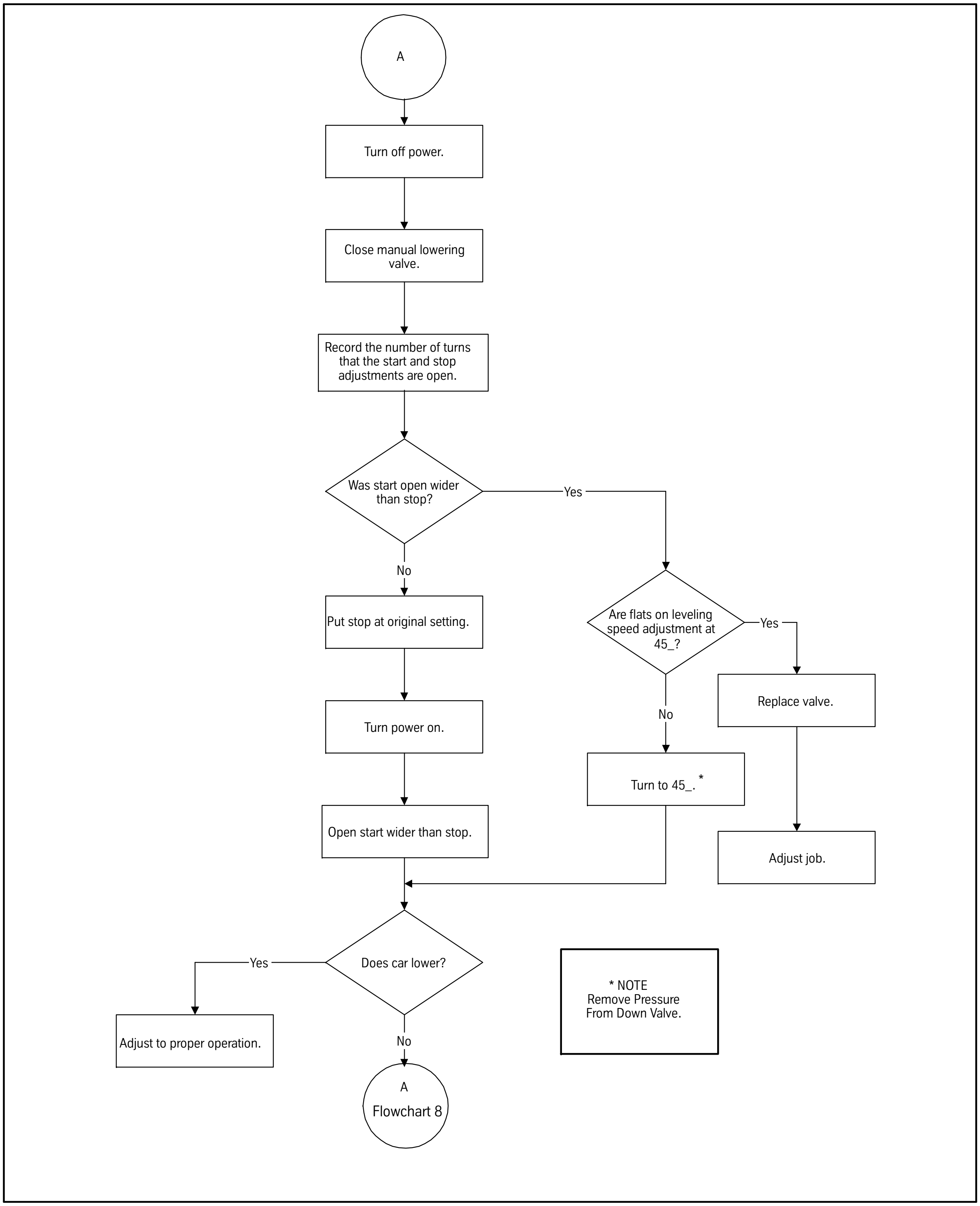
Flowchart 4


A
Set up a down call
Does the car lower at all?
Yes
No
Is the line valve open?
Yes
No
Open line valve.
Does the car operate OK?
Yes
Verify proper performance.
No
Does the car lower at all?
Yes
R
Flowchart 5
No
Is down fast energized?
A
Flowchart 7
No
Is there voltage on coil?
Yes
Replace solenoid coil.
A
Flowchart 6
No
Not a valve problem.
R
Does the car lower at contract speed?
Yes
A
Flowchart 12
No
Does the car lower at less than contract speed?
Yes
A
Flowchart 9
No
Adjust lowering speed.
Verify proper performance.

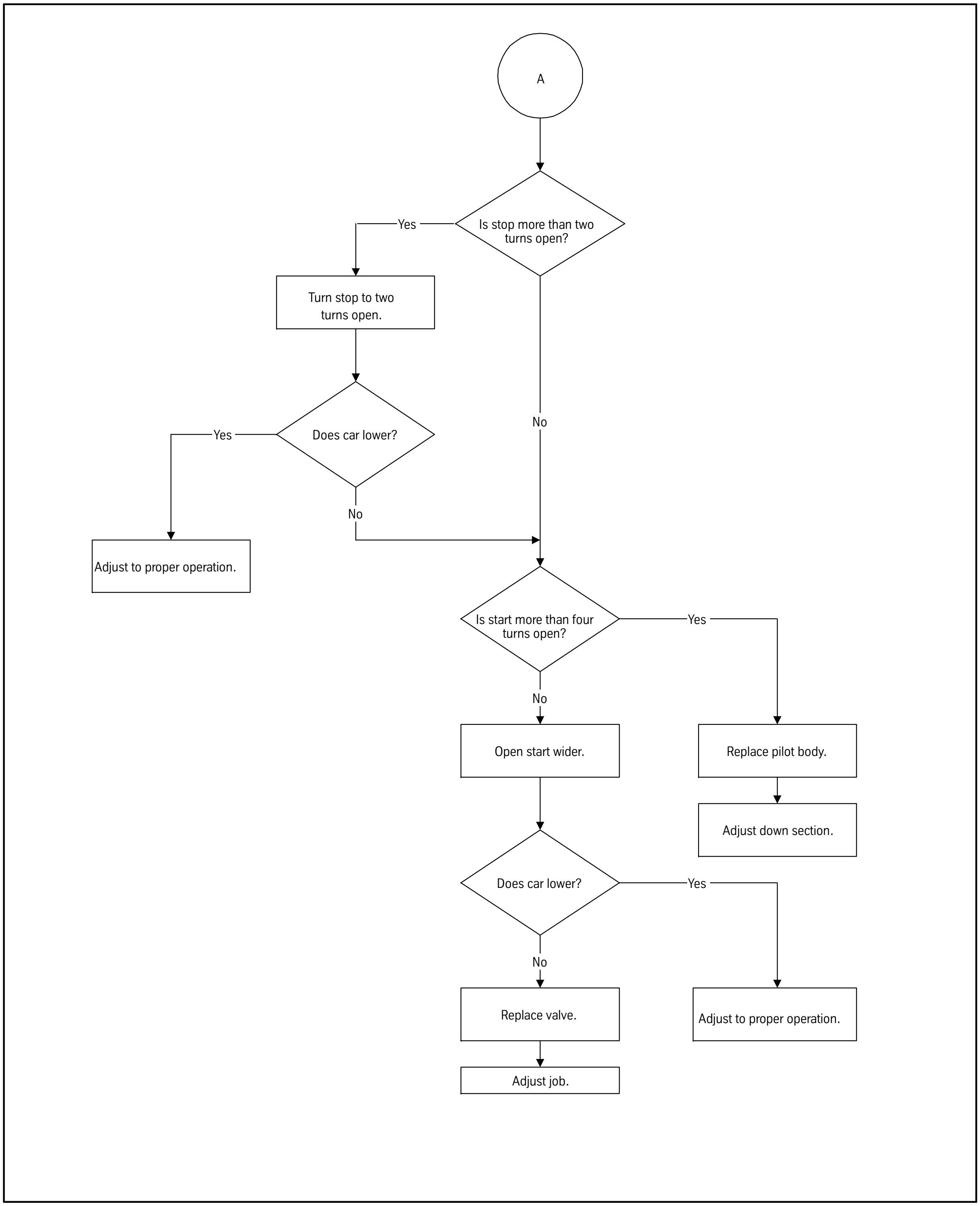
Flowchart 5


A
Does the car operate OK?
Yes
Verify proper performance.
No
Does the car lower at all?
Yes
No
A
Flowchart 7
R
Flowchart 5

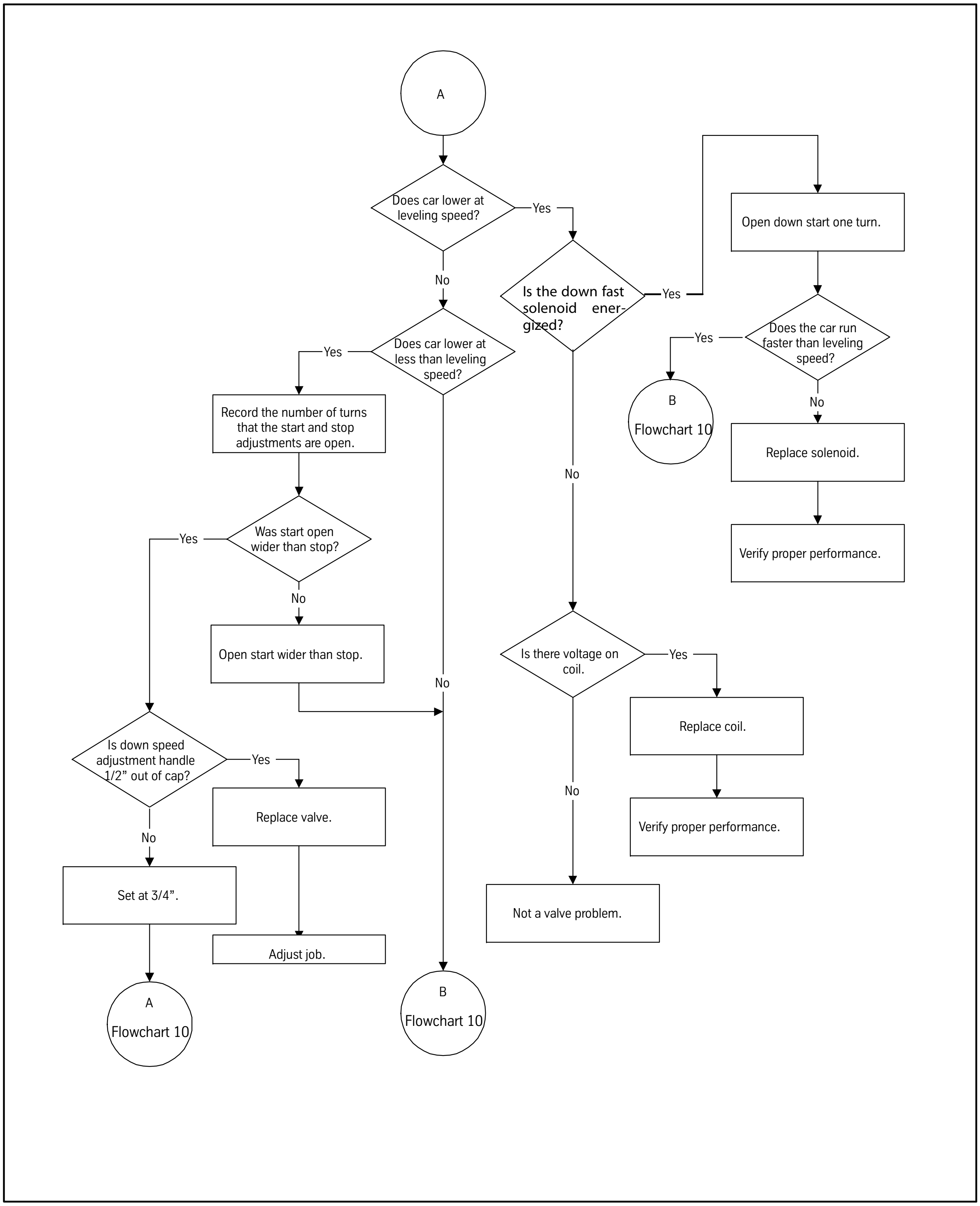
Flowchart 6


A
Turn off power.
Close manual lowering valve.
Record the number of turns that the start and stop adjustments are open.
Was start open wider than stop?
Yes
No
Put stop at original setting.
Are flats on leveling speed adjustment at 45_?
Yes
Replace valve.
No
Turn power on.
Turn to 45_. *
Adjust job.
Open start wider than stop.
Does car lower?
Yes
* NOTE
Remove Pressure
From Down Valve.
Adjust to proper operation.
No
A
Flowchart 8

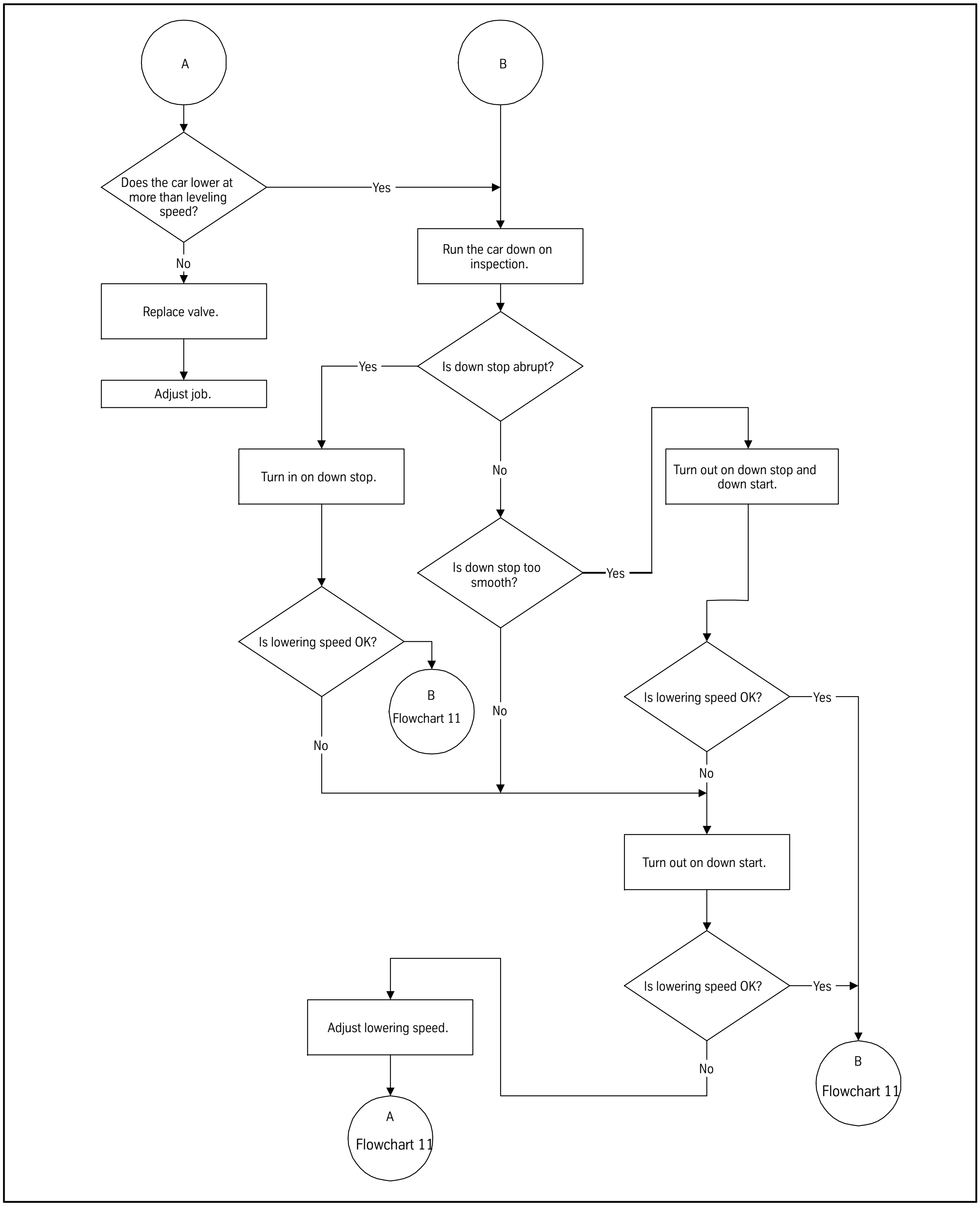
Flowchart 7


A
Is stop more than two turns open?
Yes
Turn stop to two turns open.
Does car lower?
Yes
Adjust to proper operation.
No
No
Is start more than four turns open?
Yes
Replace pilot body.
Adjust down section.
No
Open start wider.
Does car lower?
Yes
Adjust to proper operation.
No
Replace valve.
Adjust job.

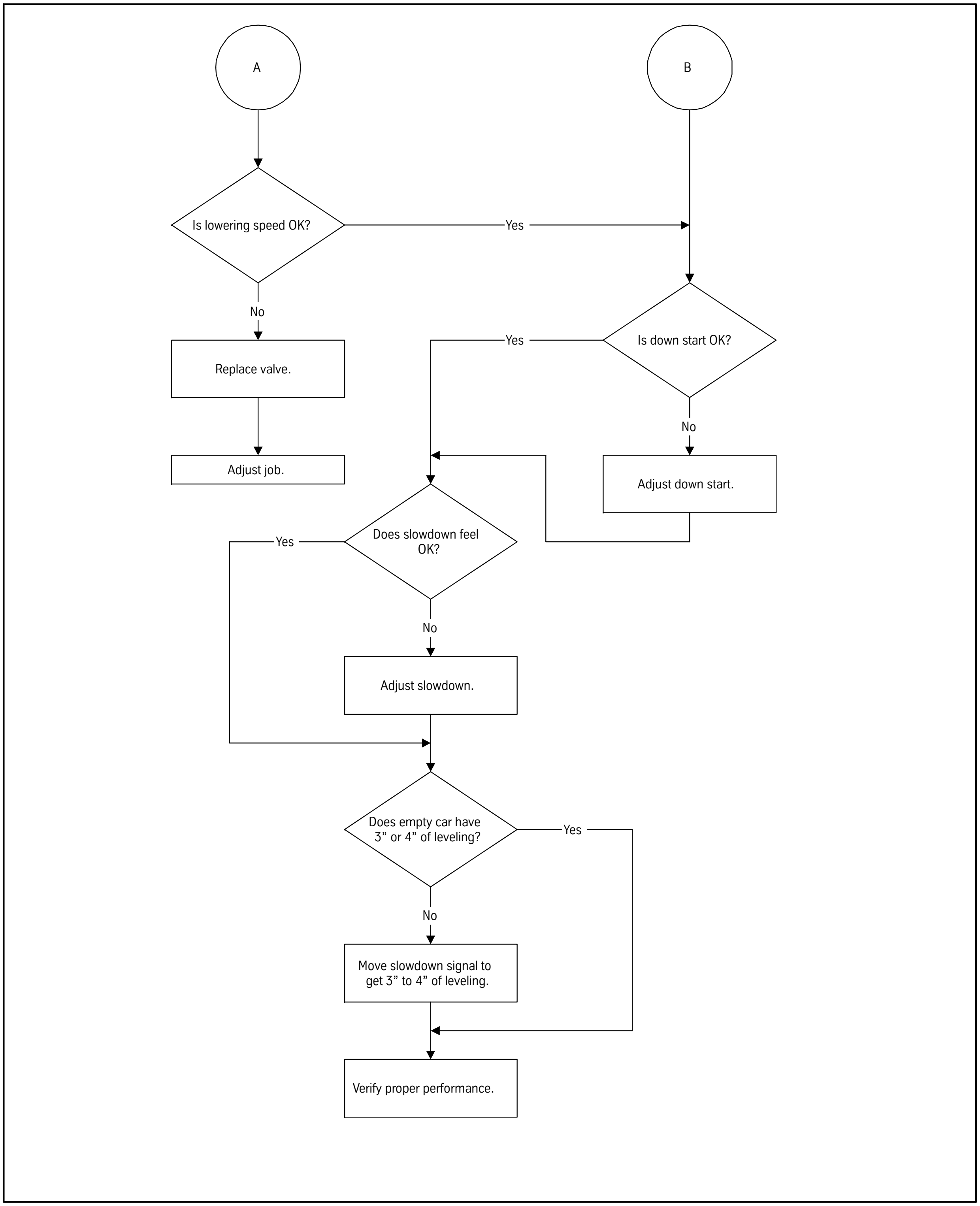
Flowchart 8


A
Does car lower at leveling speed?
Yes
No
Is the down fast solenoid energized?
Yes
Open down start one turn.
Does the car run faster than leveling speed?
Yes
B
Flowchart 10
No
Replace solenoid.
Verify proper performance.
Does car lower at less than leveling speed?
Yes
Record the number of turns that the start and stop adjustments are open.
Was start open wider than stop?
Yes
No
Open start wider than stop.
No
No
Is there voltage on coil.
Yes
Replace coil.
Verify proper performance.
No
Not a valve problem.
Is down speed adjustment handle 1/2" out of cap?
Yes
Replace valve.
No
Set at 3/4".
Adjust job.
A
Flowchart 10
B
Flowchart 10

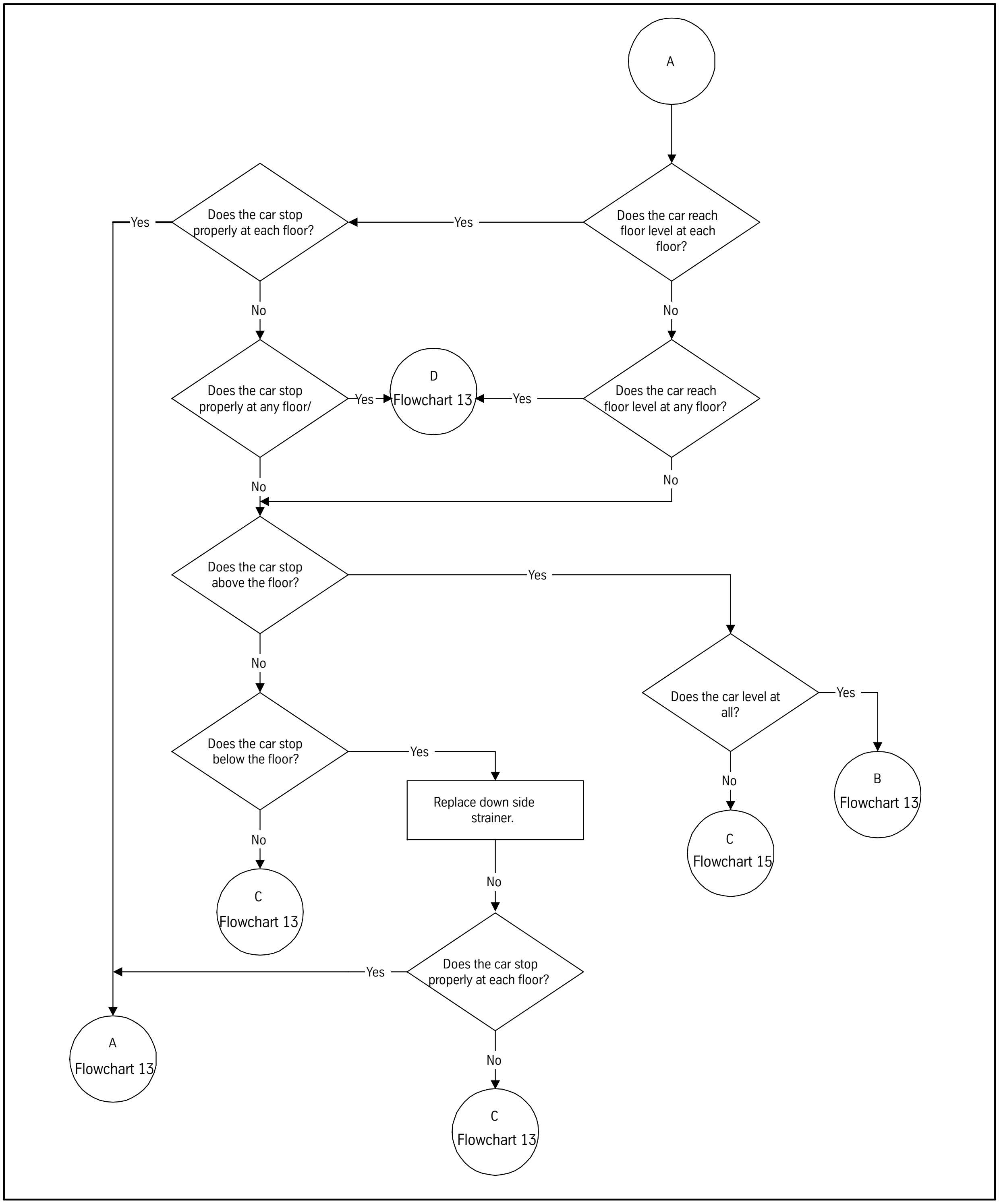
Flowchart 9



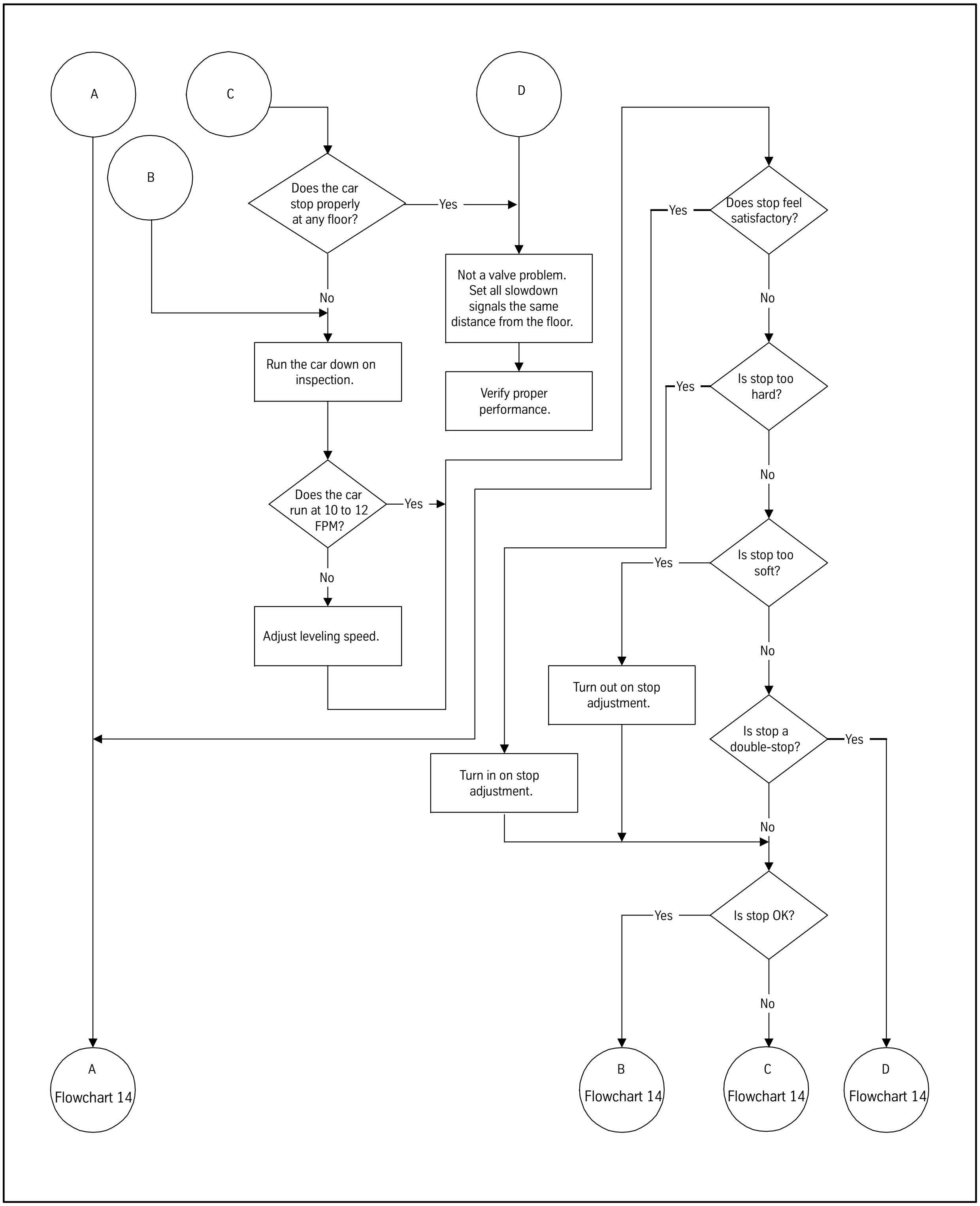
Flowchart 10



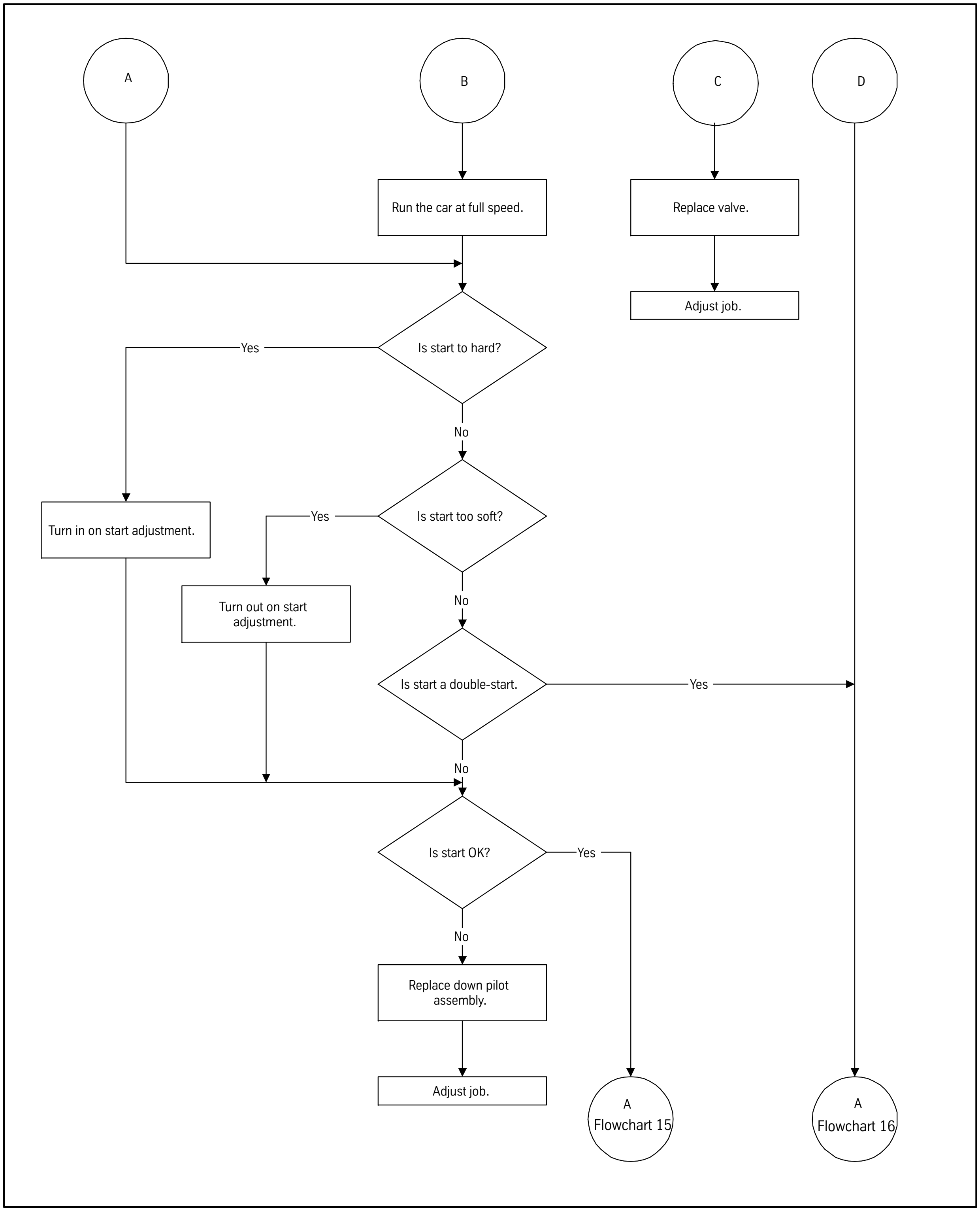
Flowchart 11



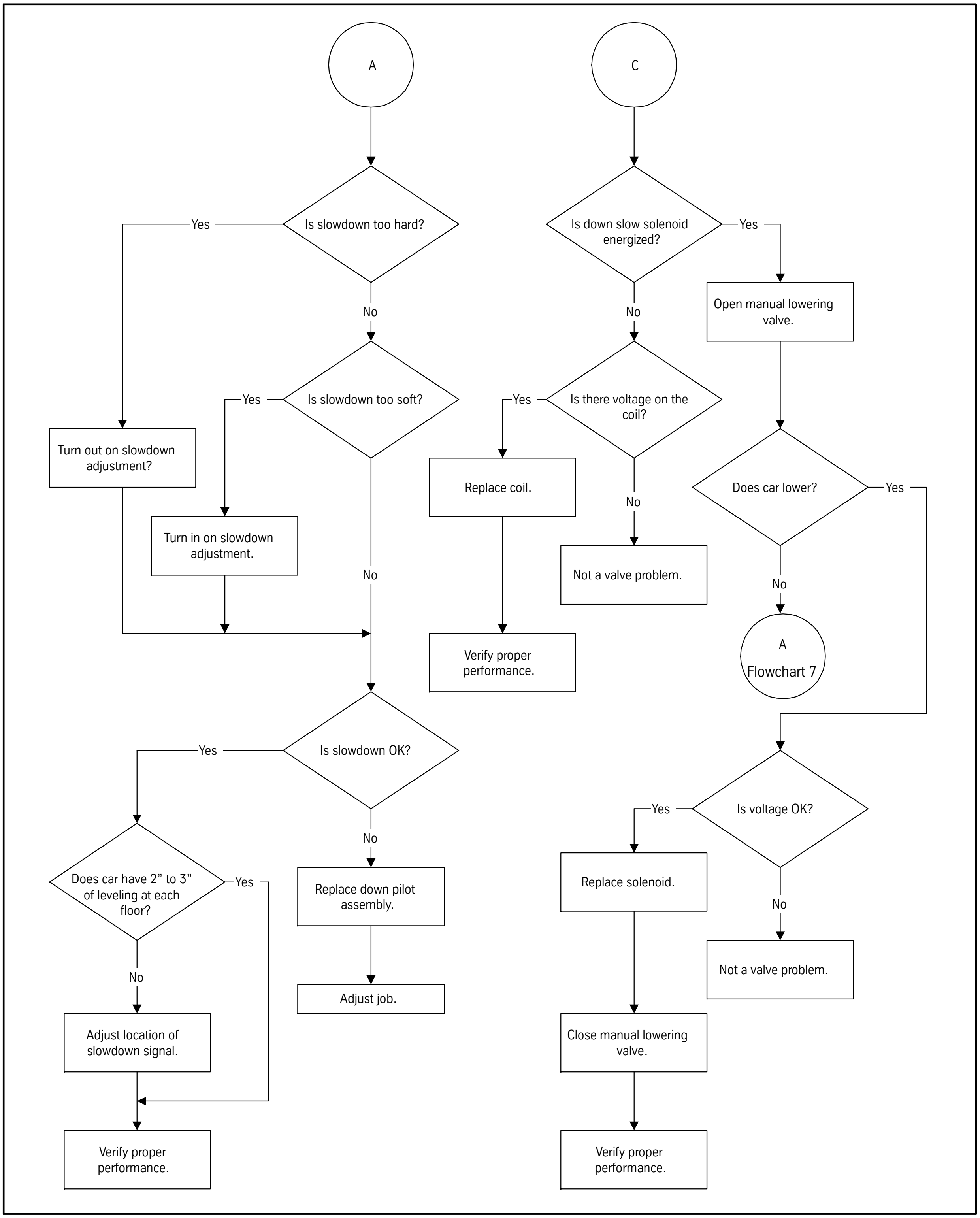
Flowchart 12



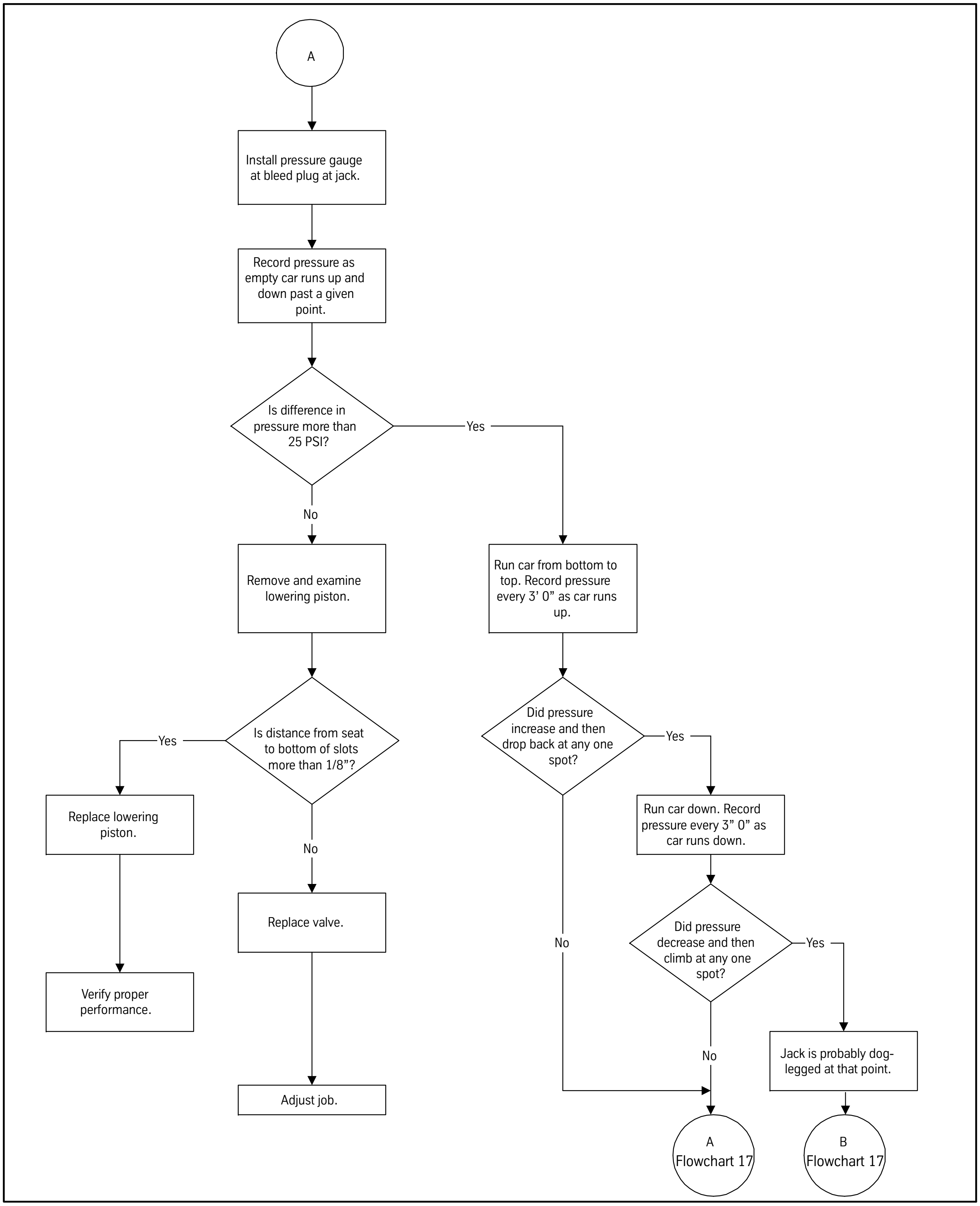
Flowchart 13



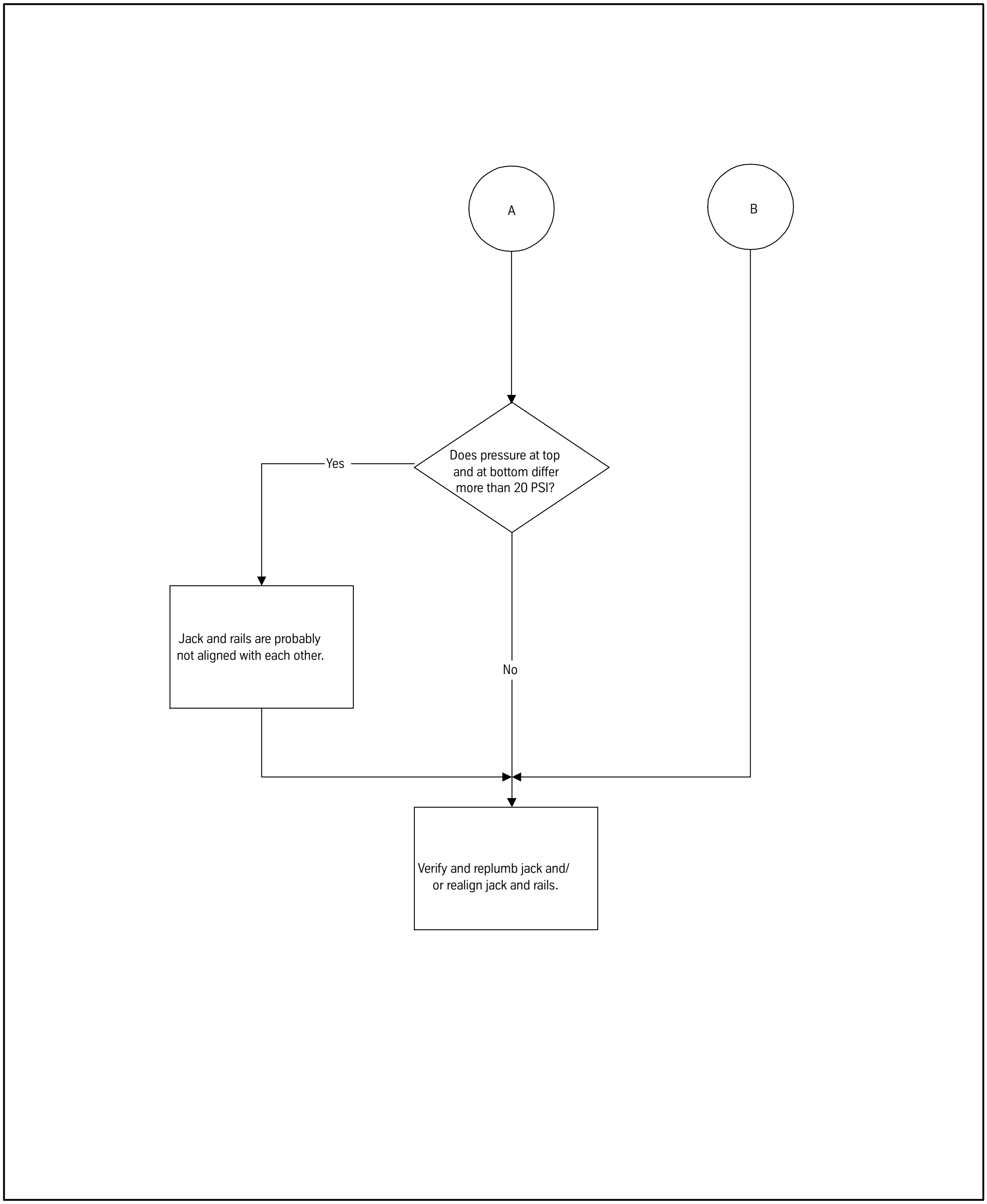
Flowchart 14



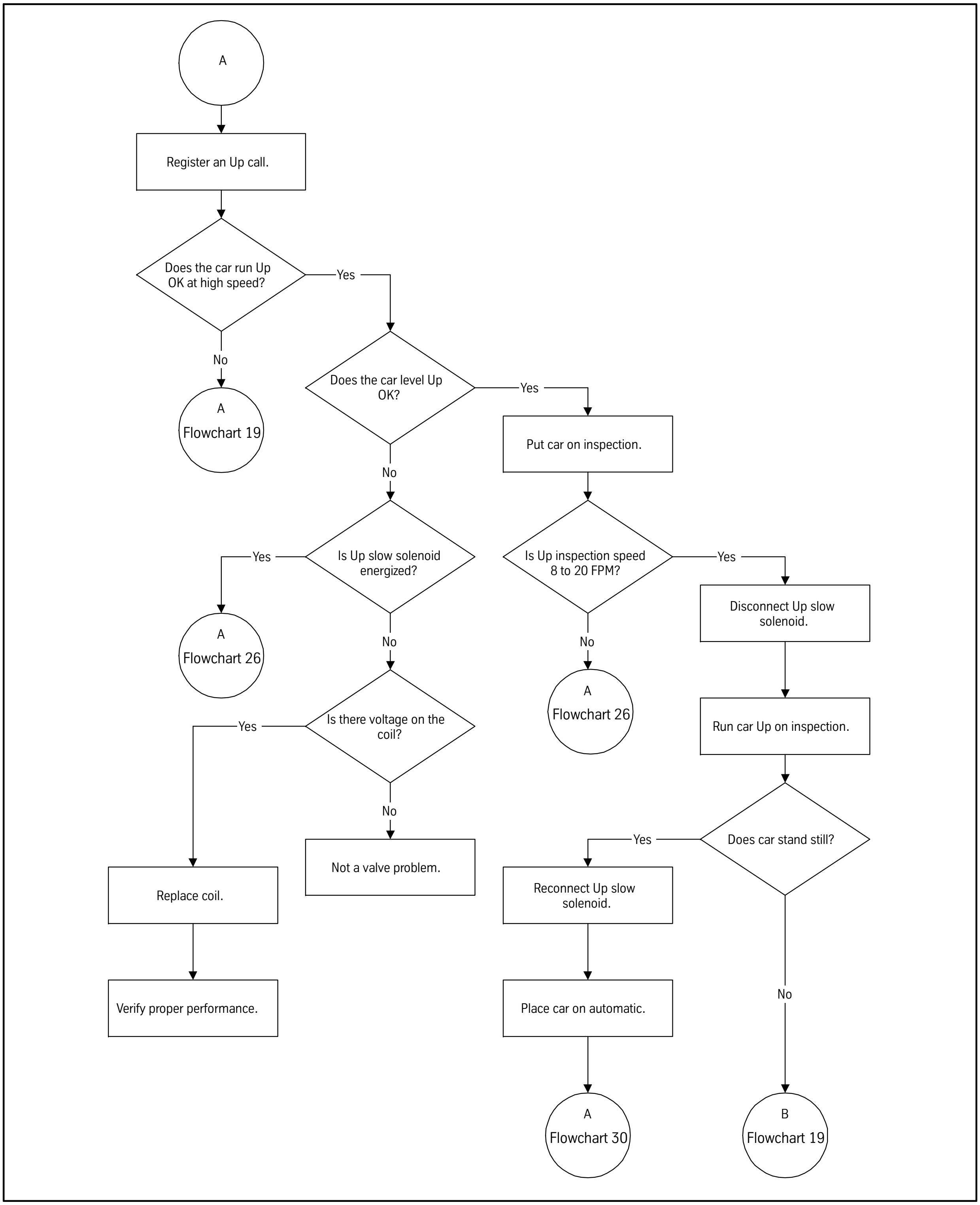
Flowchart 15



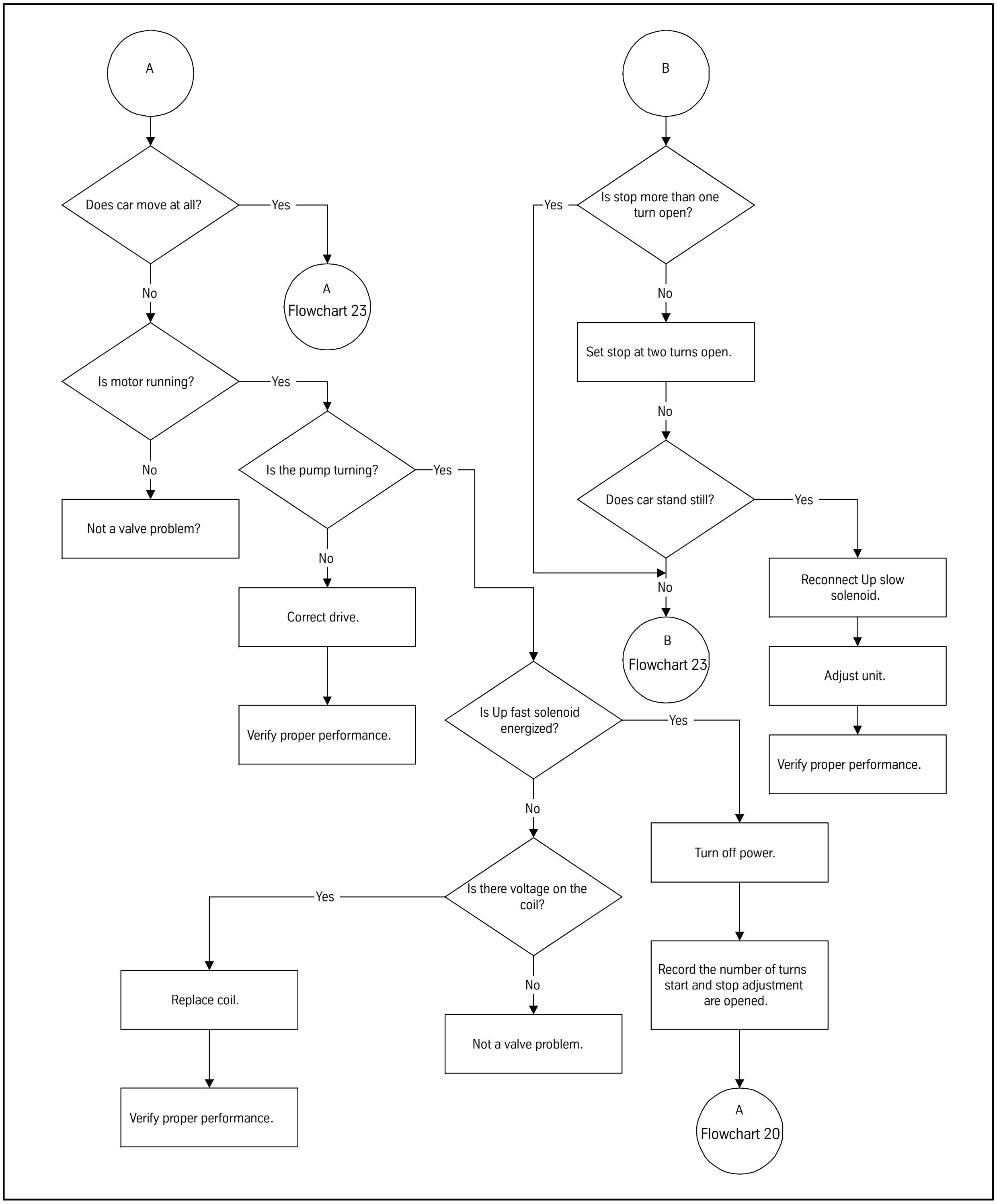
Flowchart 16



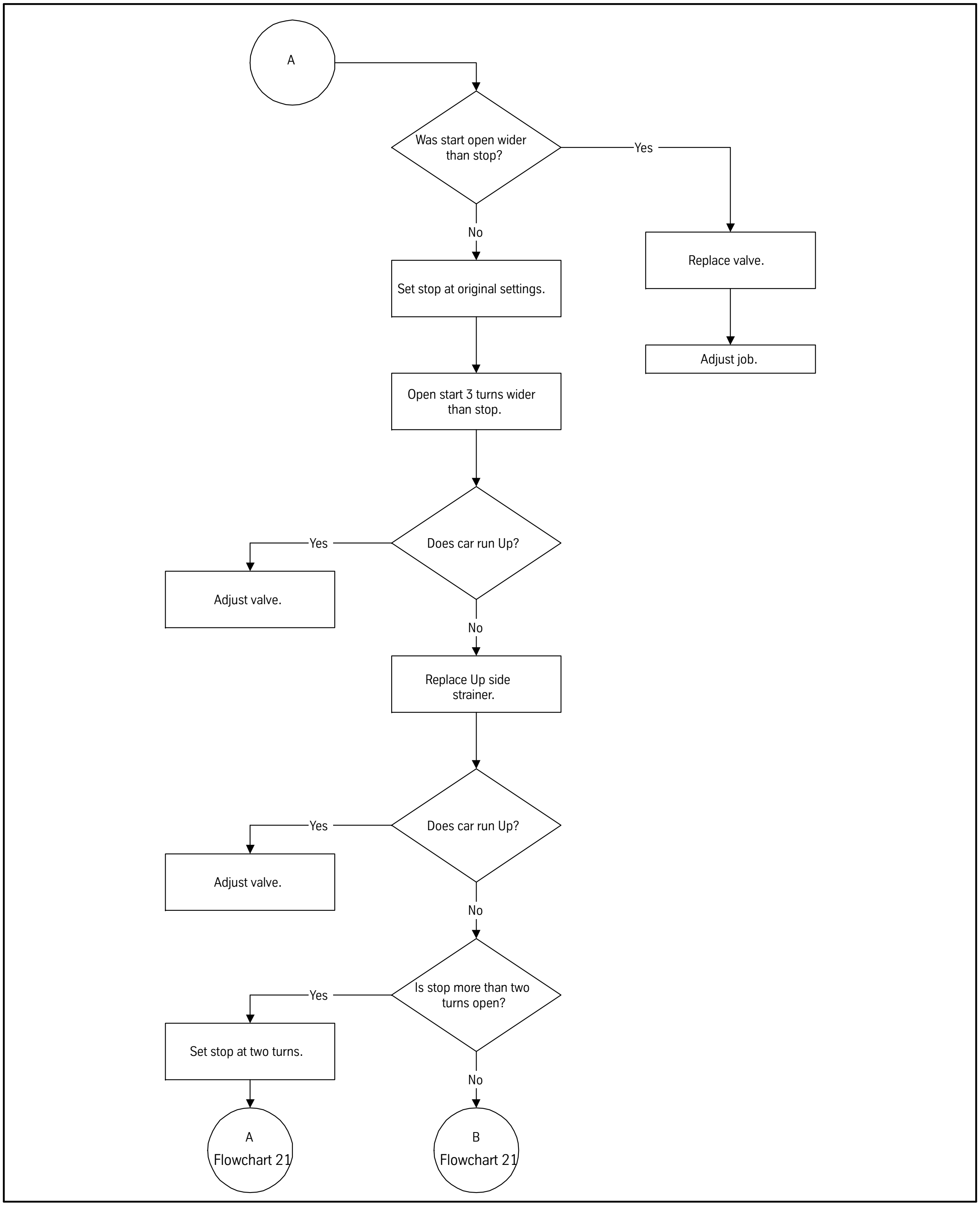
Flowchart 17



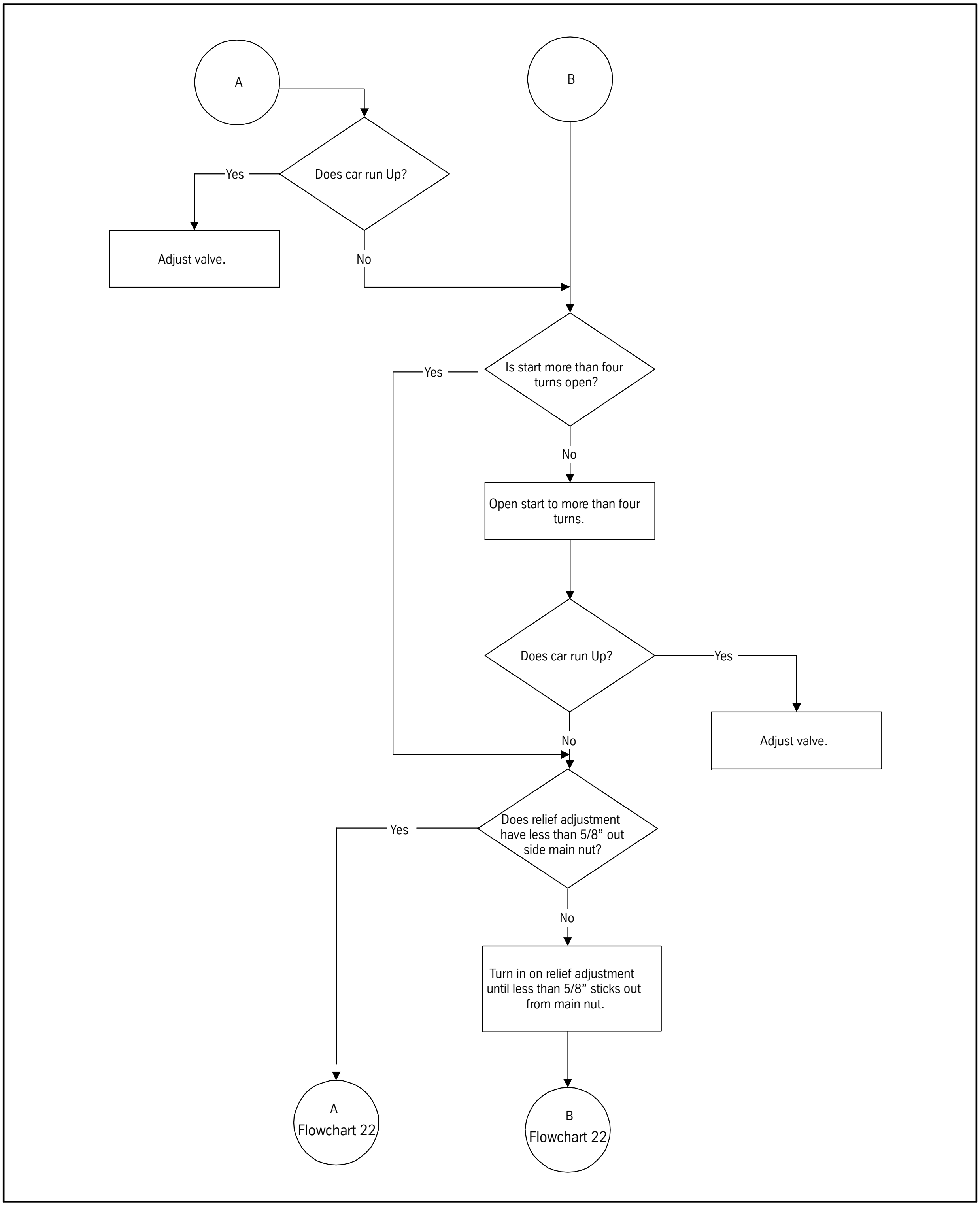
Flowchart 18



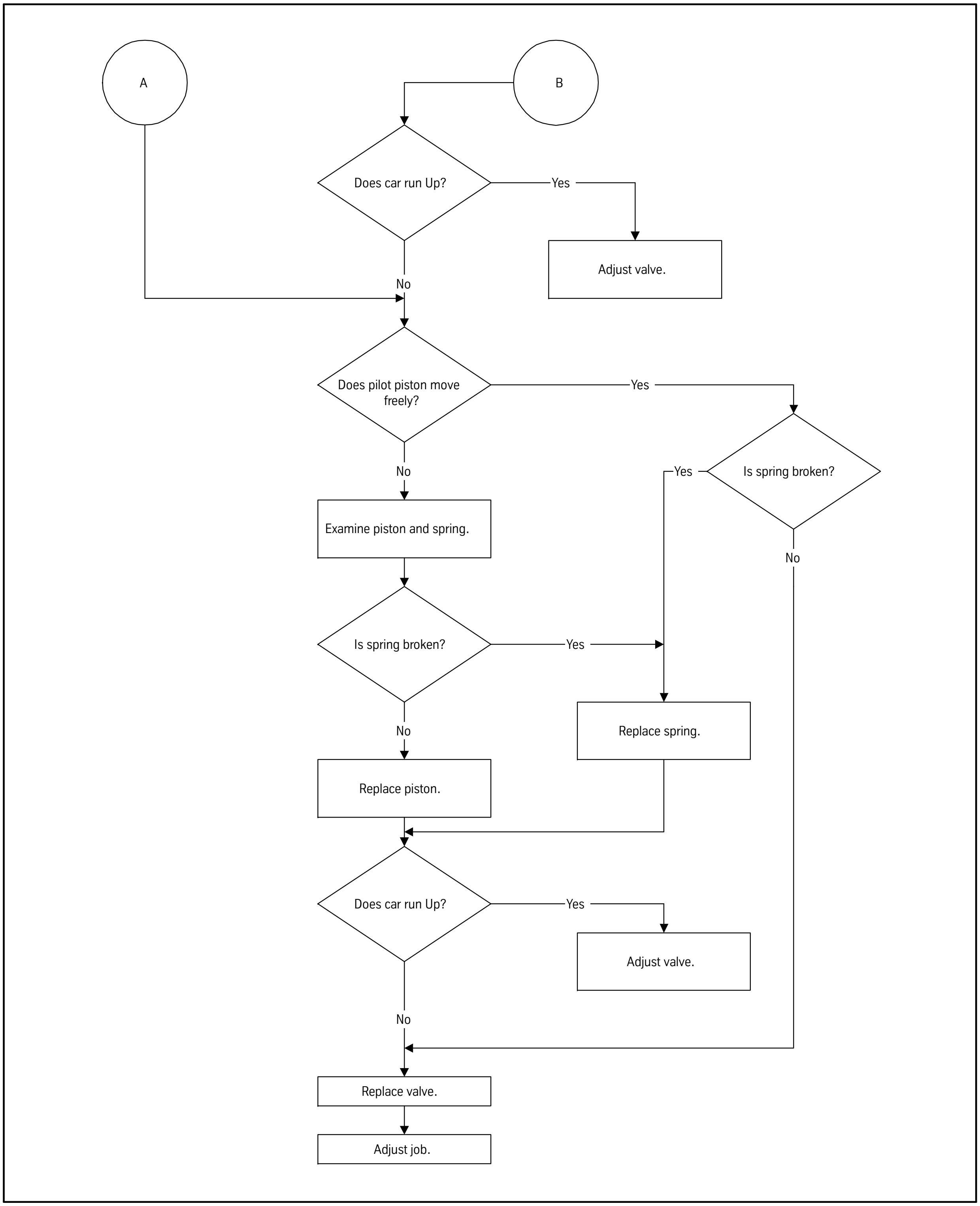
Flowchart 19



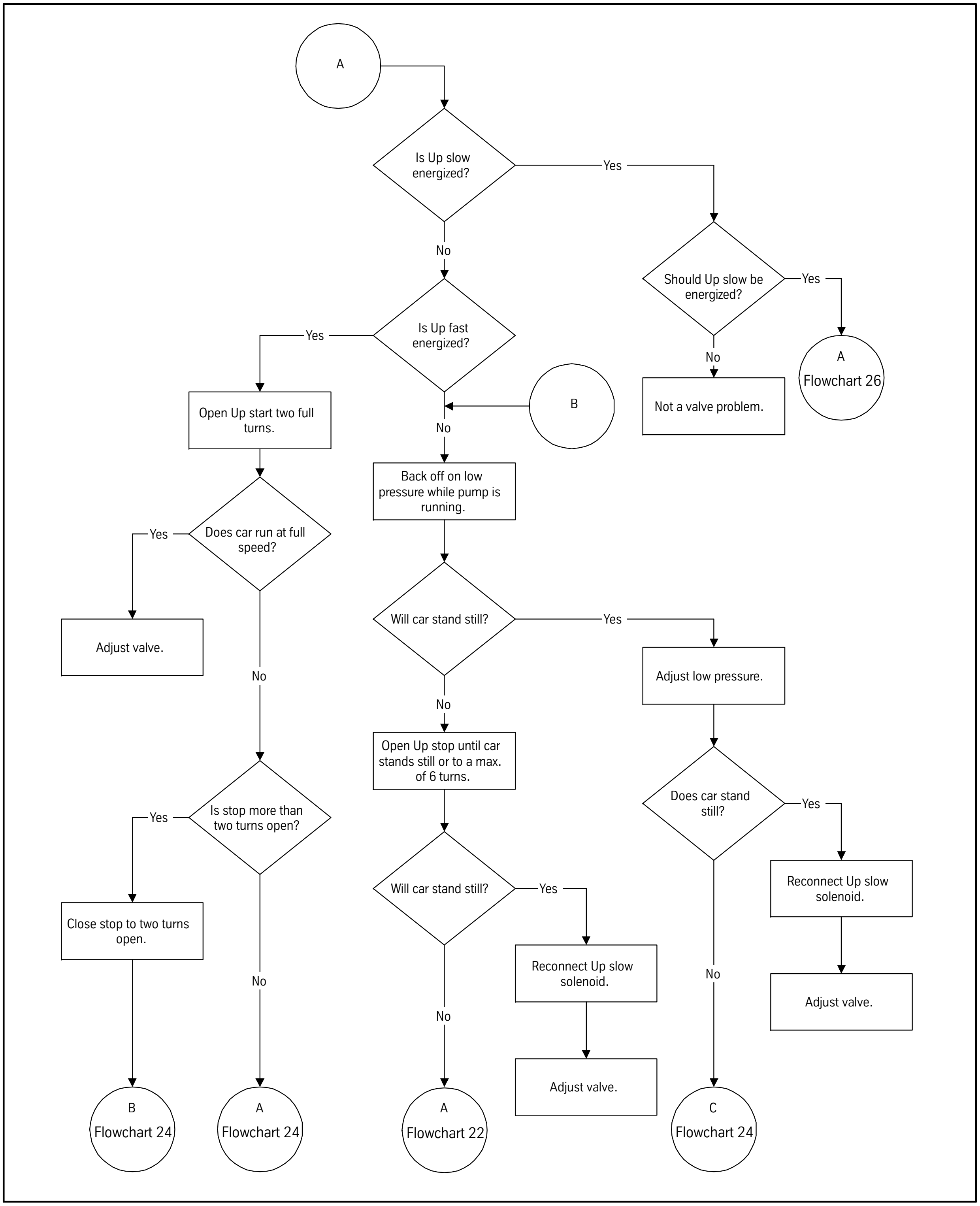
Flowchart 20



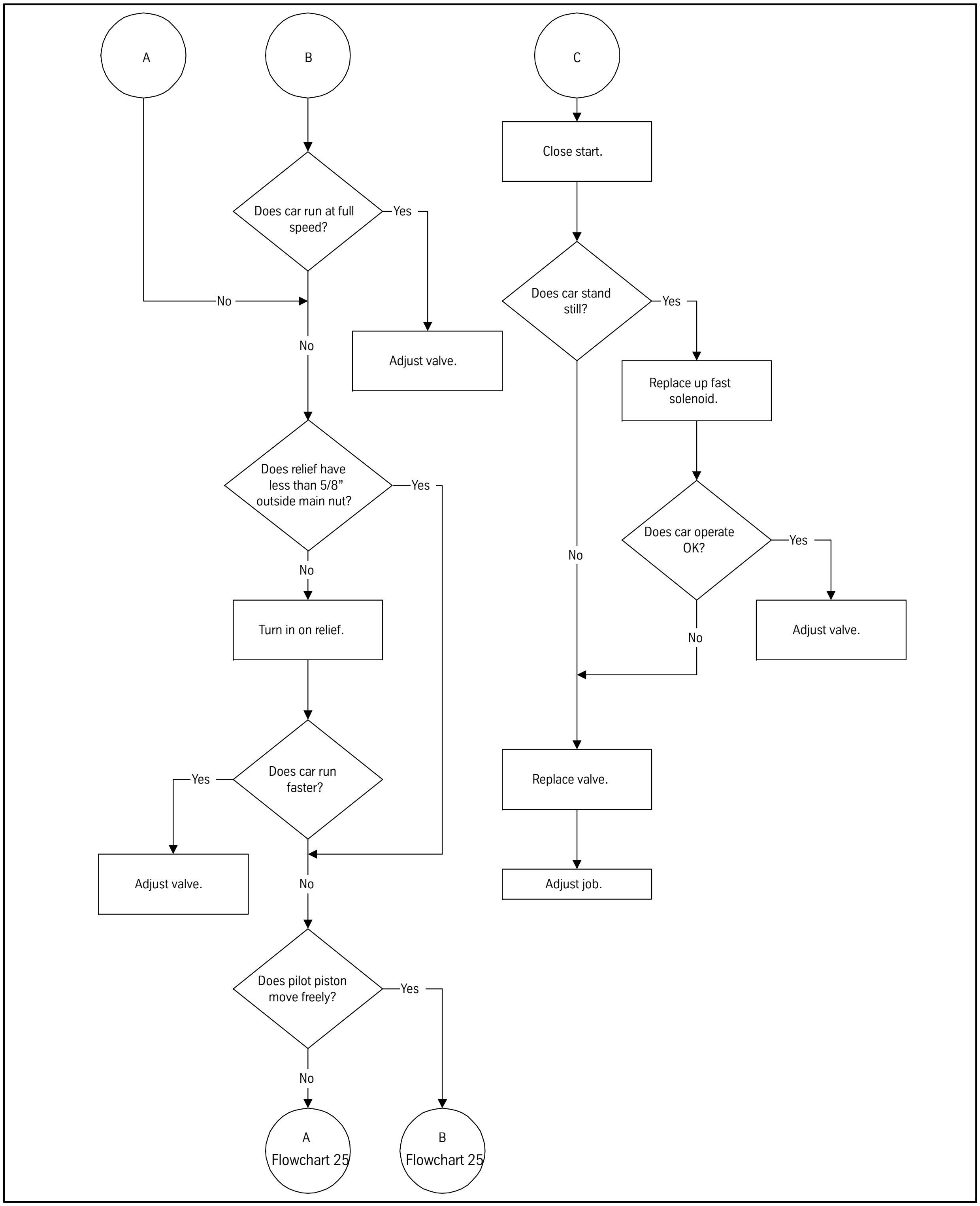
Flowchart 21



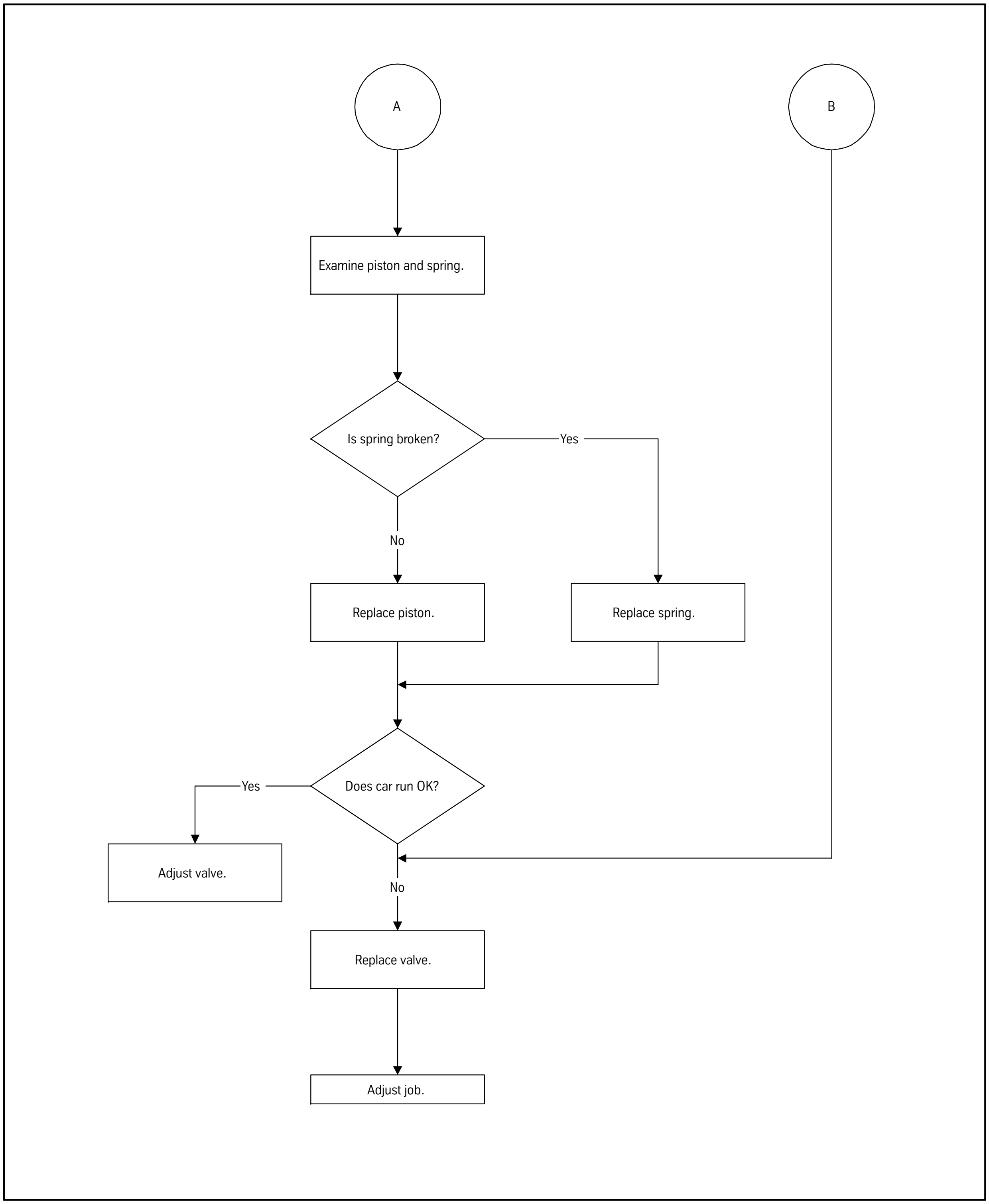
Flowchart 22



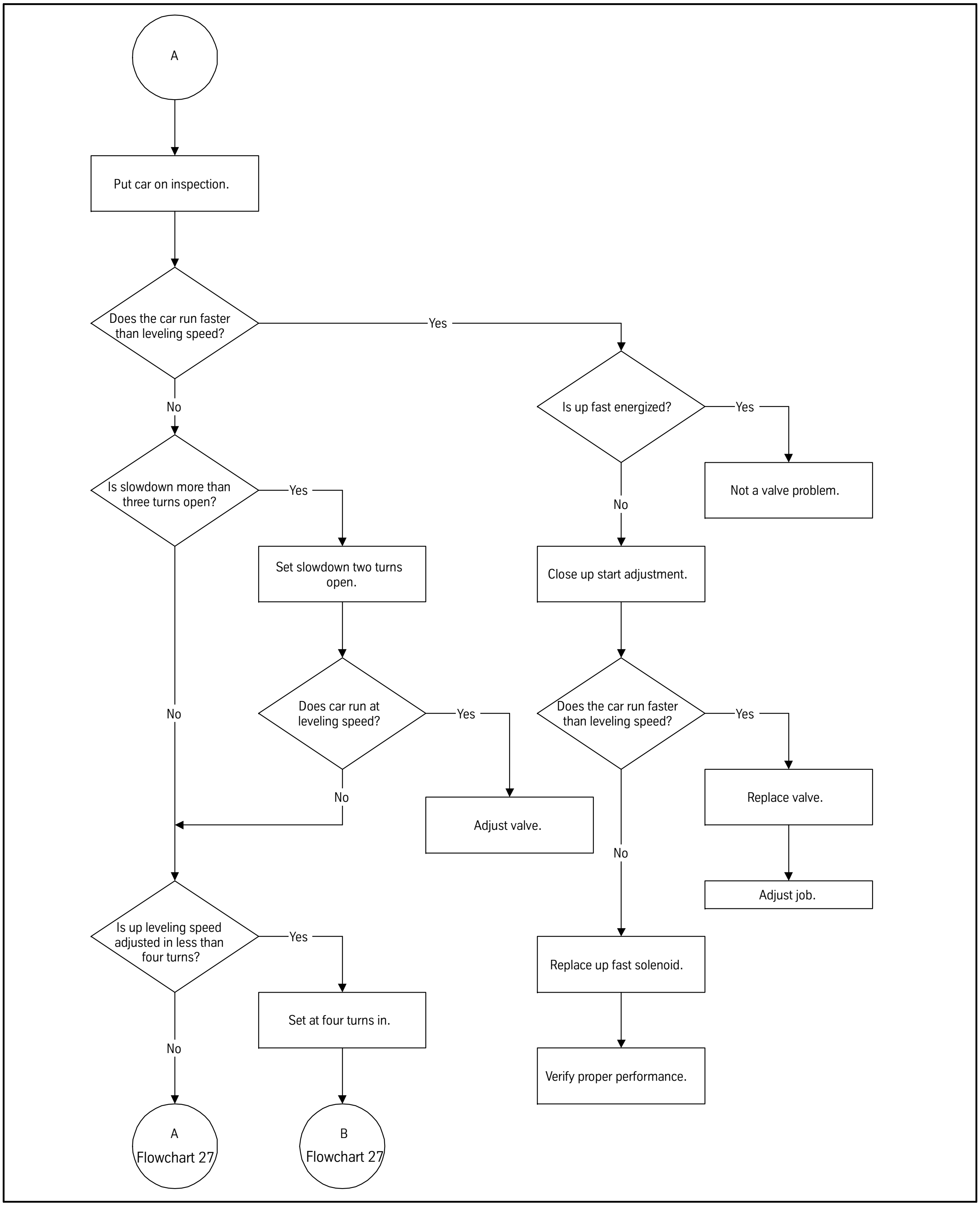
Flowchart 23



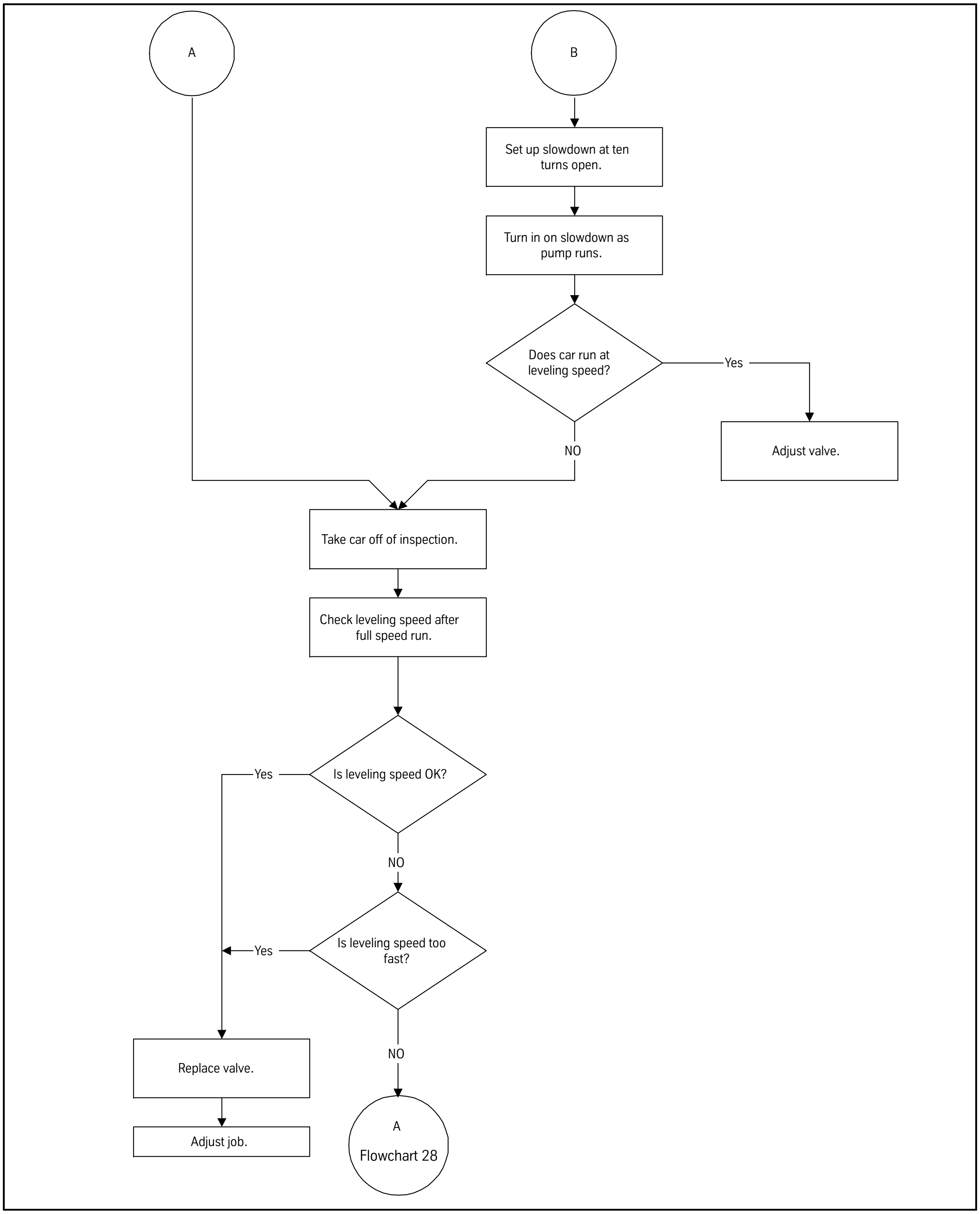
Flowchart 24



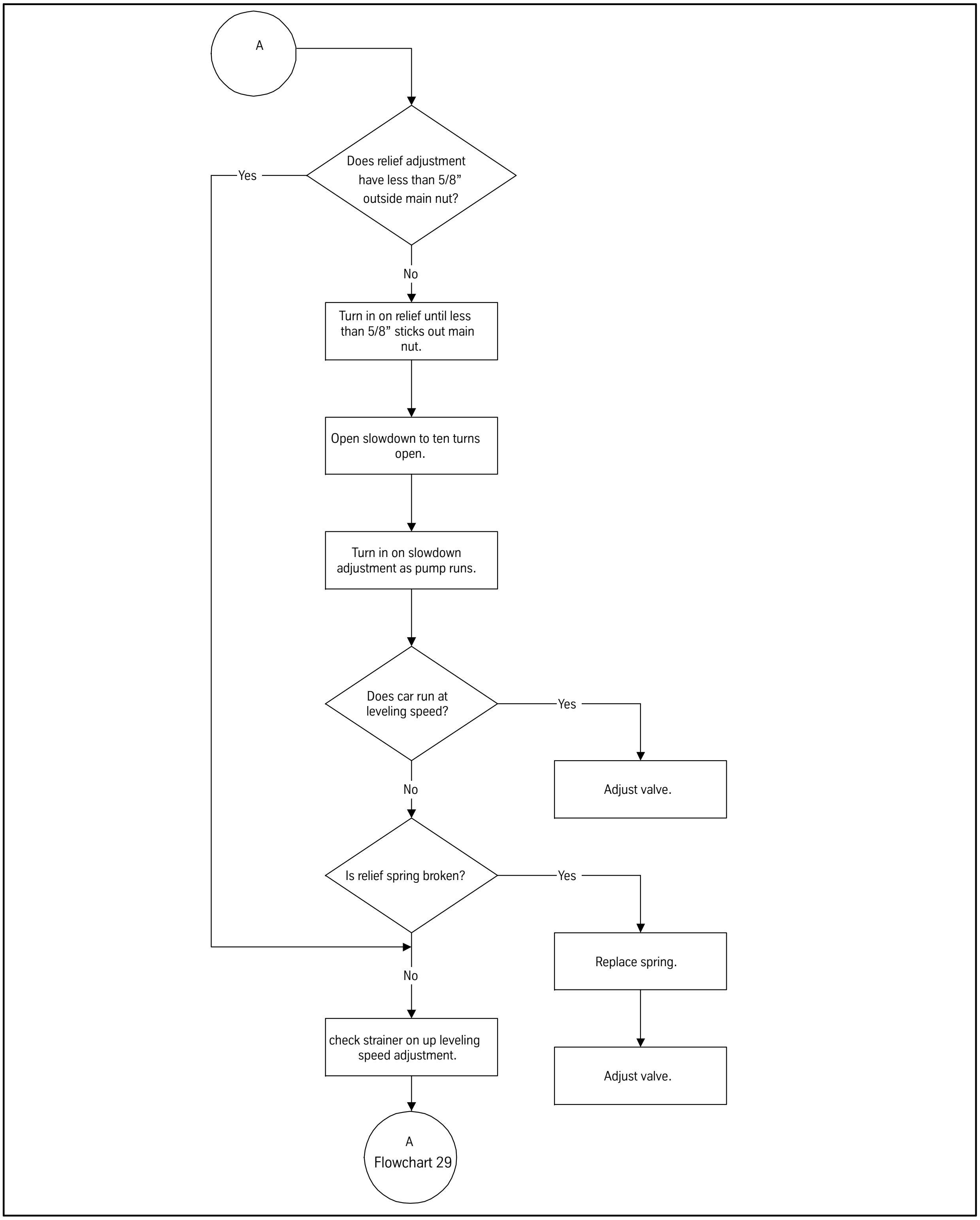
Flowchart 25



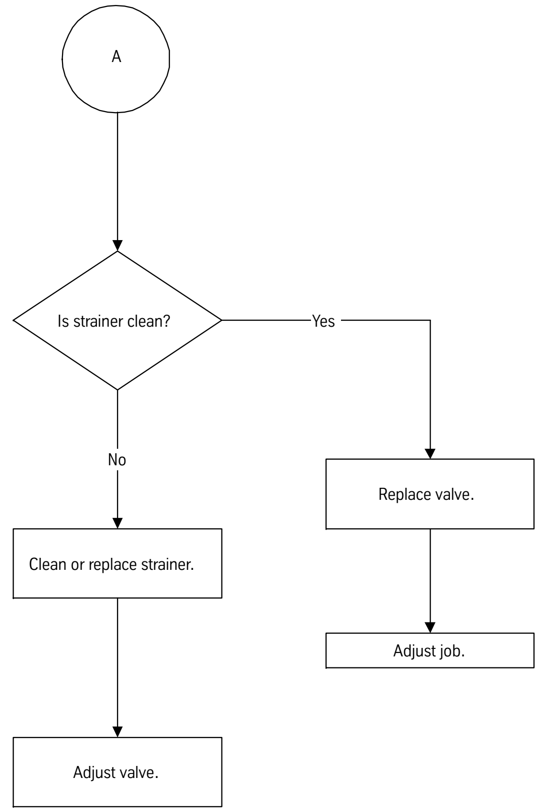
Flowchart 26



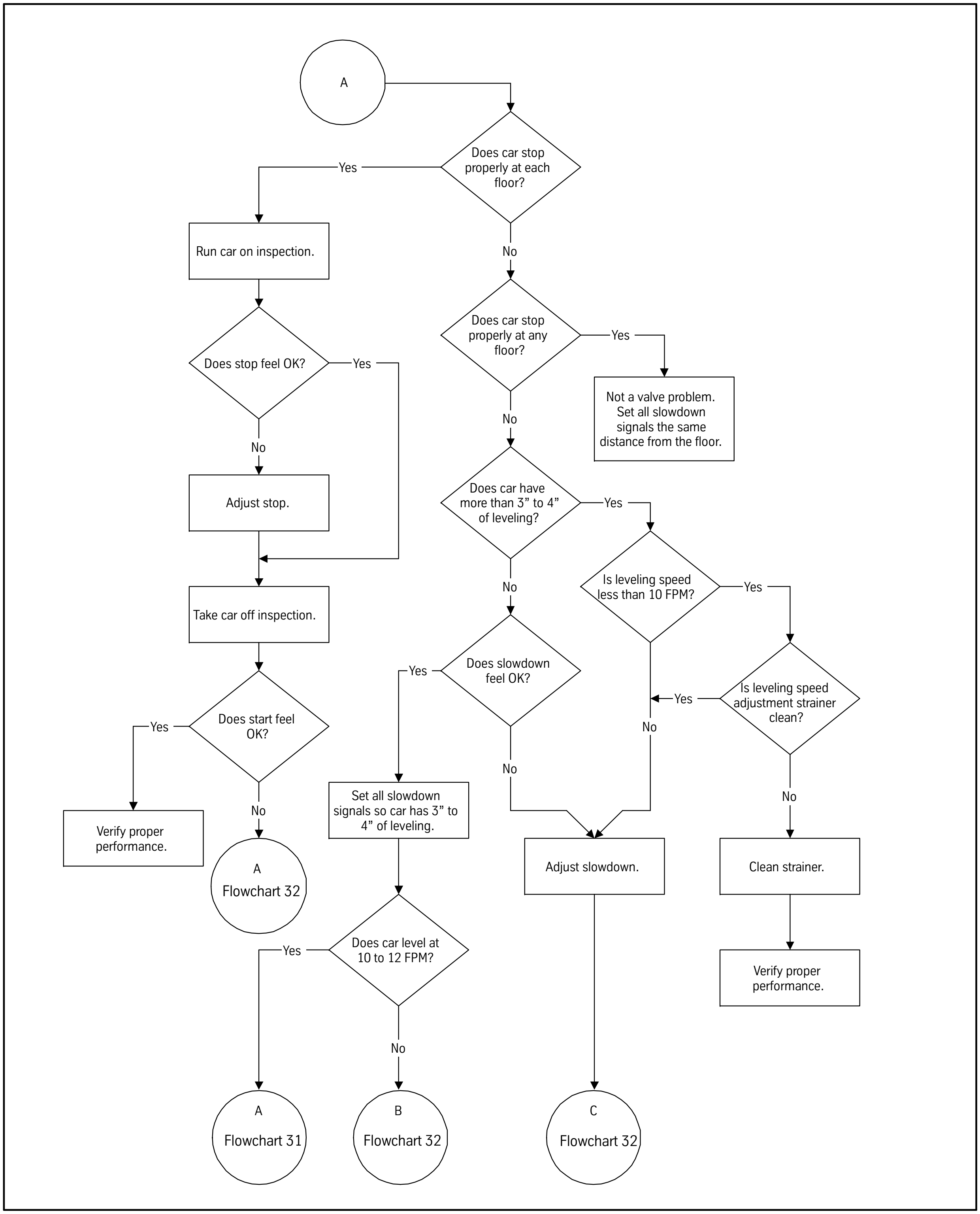
Flowchart 27



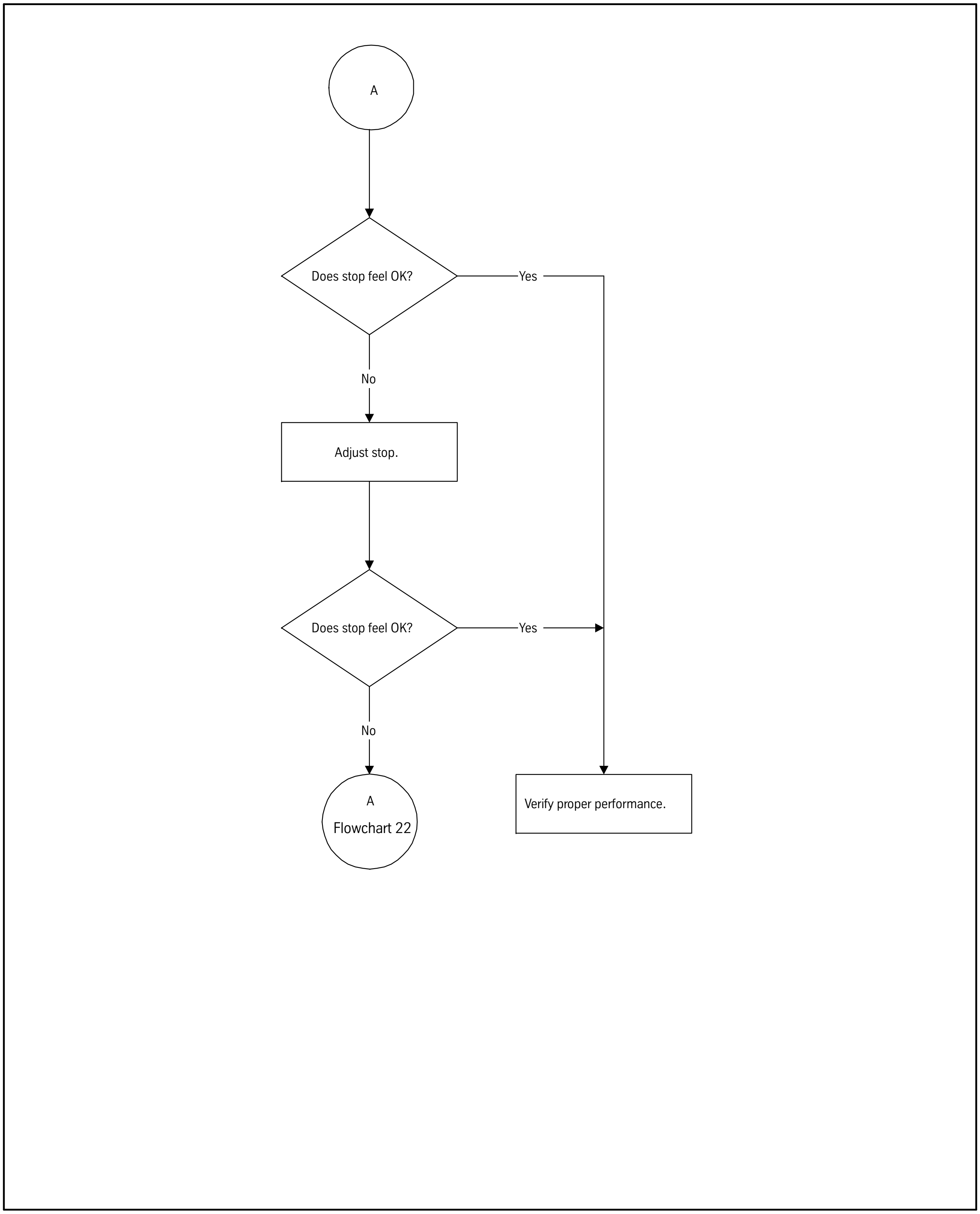
Flowchart 28



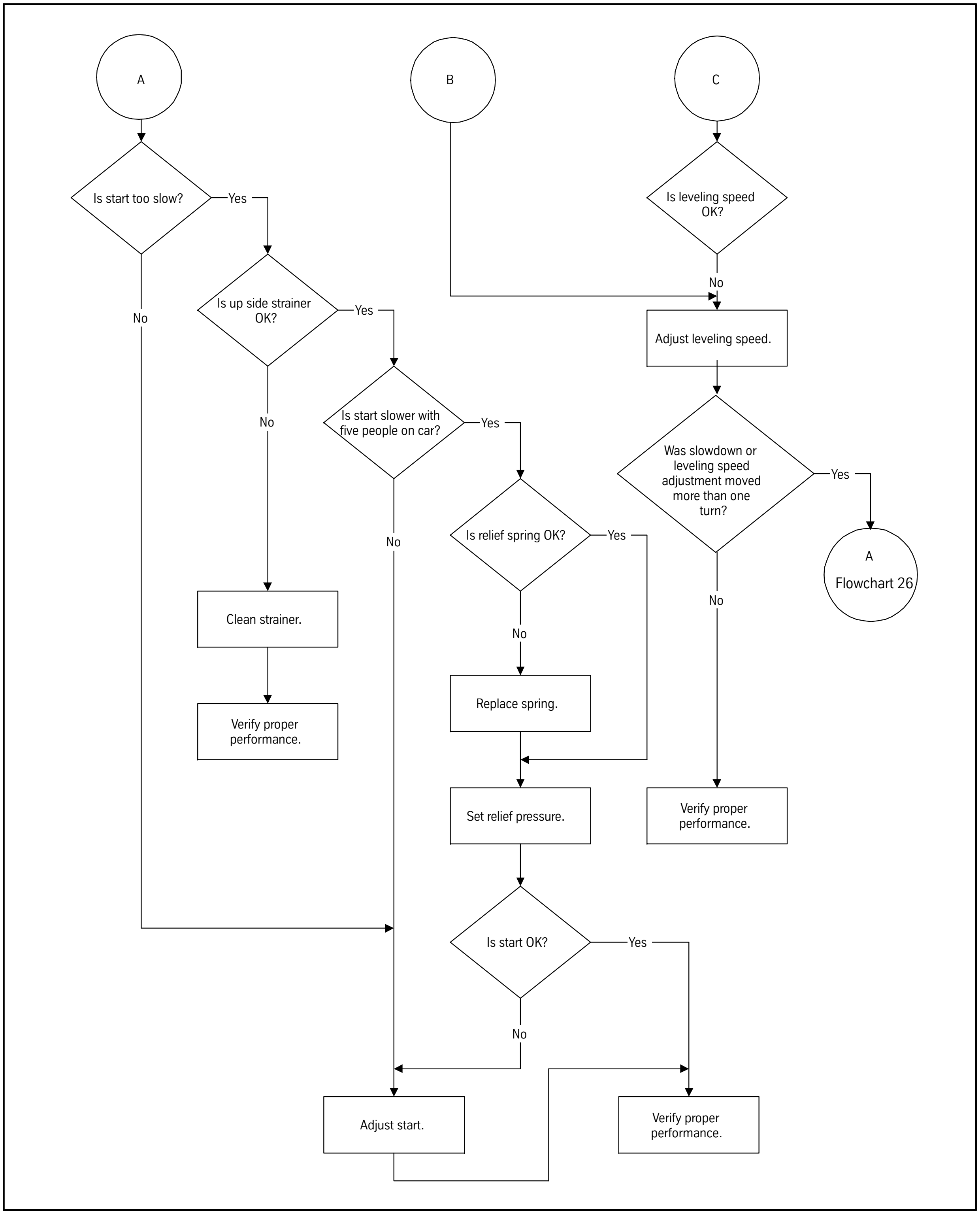
Flowchart 29



Flowchart 30



Flowchart 31



Flowchart 32

Sequence of Events

Up Valve Section

The up valve section consists of an up leveling speed adjustment, a check valve piston, a regulator piston, and a relief valve.

The valve provides these functions for the car in the Up cycle:

- Acceleration to full speed
- Slowdown to leveling speed
- Hydraulic stopping
- High-pressure relief

Sequence of Events

1. To start the car, the pump starts and the up fast solenoid energizes. See Figure 6 on page 12 - 47 and Figure 7 on page 12 - 48.
2. The regulator piston is held open by its spring and also the pump pressure on the face of the piston against the low pressure adjustment. At the beginning, all of the oil will bypass to the tank past the regulator piston, through the up start adjustment, and to the up stop adjustment.
3. The up start adjustment is open more than the up stop adjustment, making pressure build behind the regulator piston and causes it to move toward the closed position. The open amount of the up start adjustment governs how fast the regulator piston moves and how rapidly the car starts.
4. As the regulator piston closes, pressure from the pump builds up in the valve and causes the check valve piston to open. This action allows oil to flow from the pump into the jack.

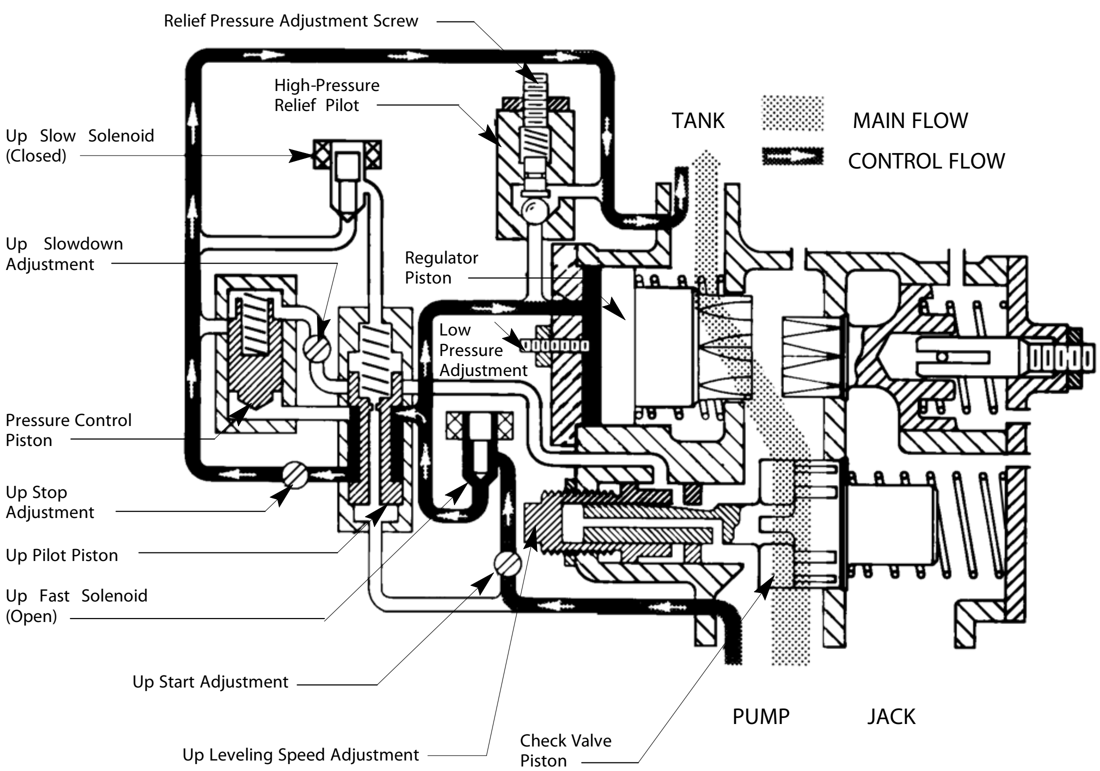


Figure 6 - Up Start Diagram

Up Valve Section
(continued)

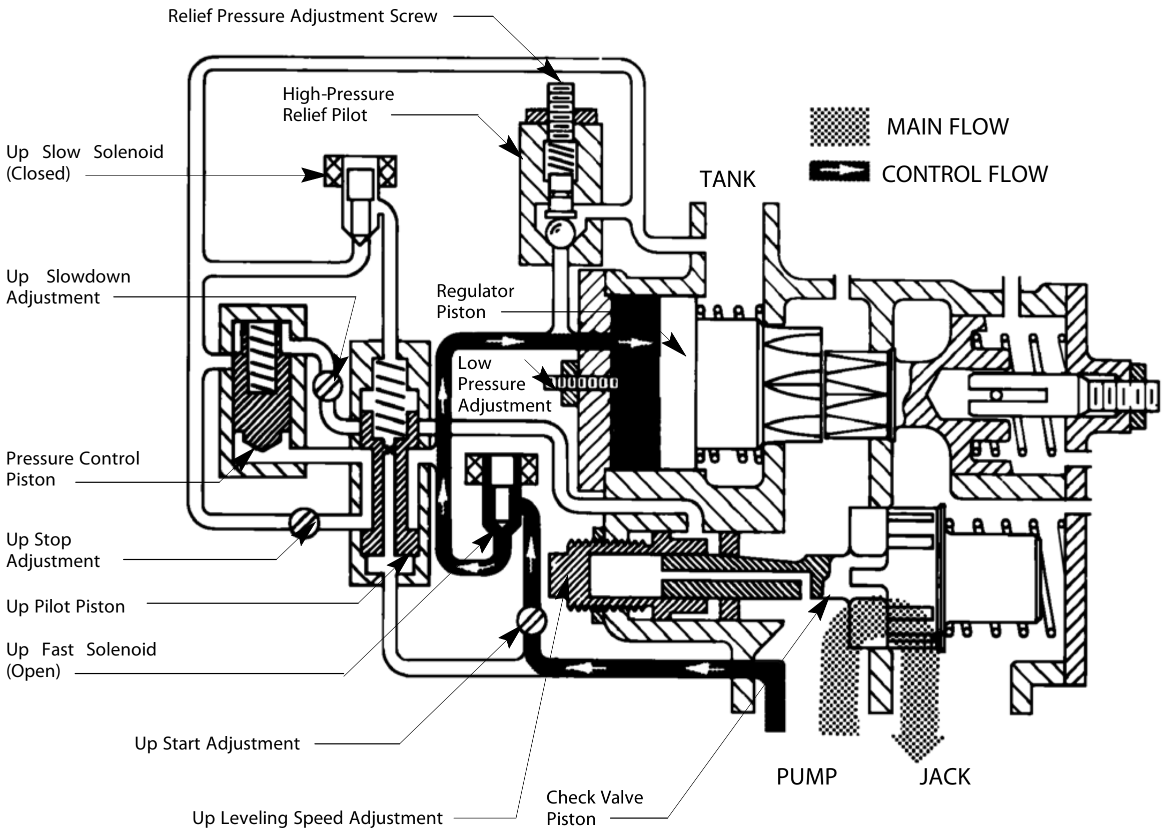


Figure 7 - Full Speed Diagram

High-pressure Relief

Sequence of Events

1. The oil is transmitted to the high-pressure pilot. See Figure 8.
2. The movement allows the oil in back of the regulator piston and at the high-pressure adjustment to escape to the tank.
3. The regulator piston moves rapidly to the low-pressure stud, allows full bypass from the pump to the tank, and relieves the excess pressure.
4. The system only maintains relief pressure as long as the pump continues to run.

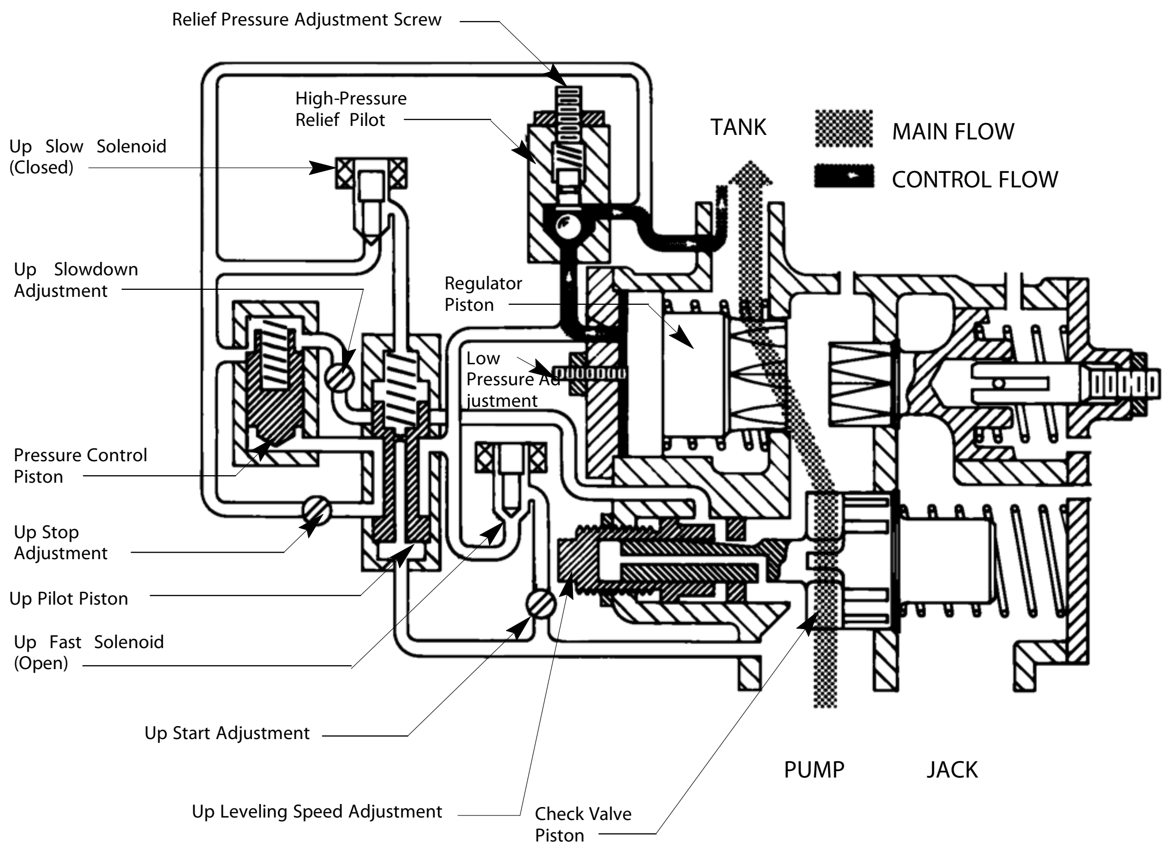


Figure 8 - High-Pressure Relief Diagram

Up Slowdown and Leveling Speed

Sequence of Events

1. From slowdown to leveling speed, the up fast solenoid is de-energized and the up slow solenoid is energized. See Figure 9.
2. The pressure on the spring end of the up pilot piston is reduced, and the up pilot piston shifts to the up position.
3. The opening to the up stop adjustment is closed and the opening to the up slowdown and leveling adjuster is opened to the back of the regulator piston.
4. Pressure behind the regulator piston is reduced as the oil flows out through the up slow-down adjustment. The regulator piston starts to open.
5. The opening at the up slowdown adjustment determines the rate of oil flow from the low pressure adjustment end of the regulator piston back into tank which controls the rate of speed change. The wider the opening, the quicker the slowdown.
6. Valve pressure drops as the regulator piston opens. This action causes the check valve piston to begin to close.
7. When the slot on the check valve piston reaches the hole in the leveling speed adjuster, less oil flows from behind the regulator piston.
8. When the slot has opened enough to allow the same amount of oil to flow in the leveling speed adjuster as the amount which flows out through the up slowdown adjustment, the system reaches a hydraulic balance, known as leveling speed.
9. The leveling speed is changed by moving the hole in the leveling speed adjuster.

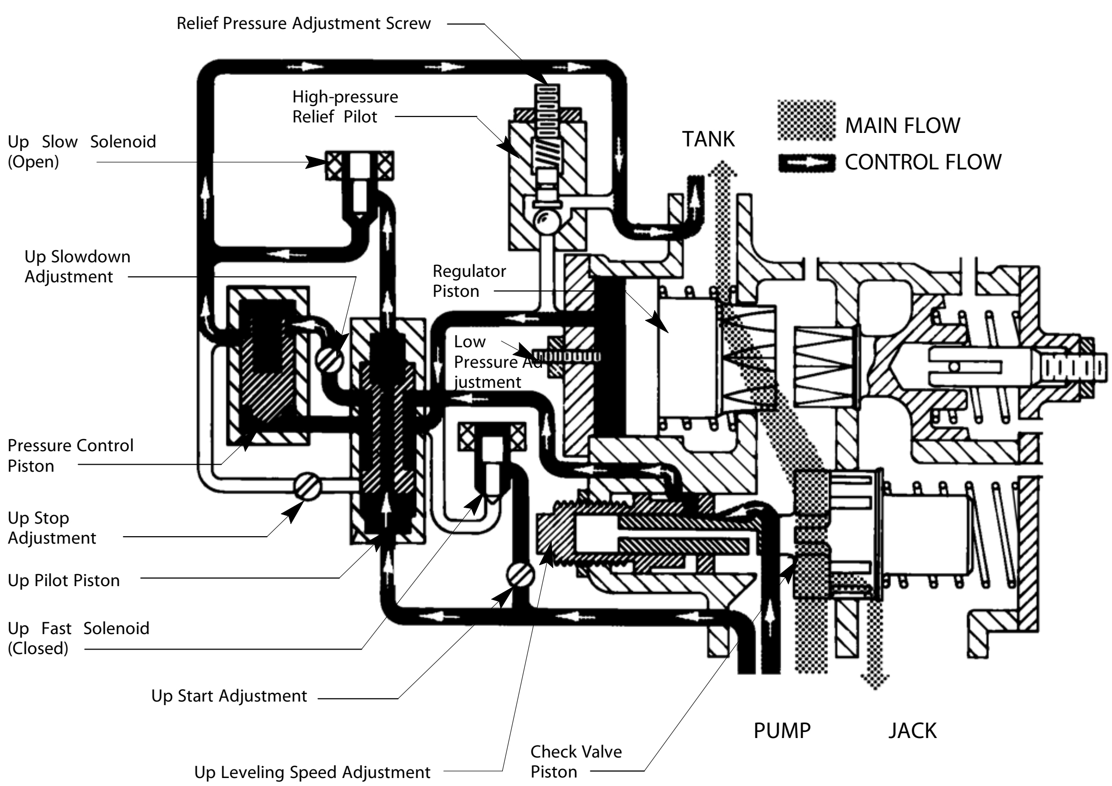


Figure 9 - Up Slowdown and Leveling Speed Diagram

Up Stop

Sequence of Events

1. The up slow solenoid is de-energized, to stop the car. The pump is kept running slightly longer on a timed delay to provide a valve stop instead of a pump stop. See Figure 10.

2. With pressure equalized on both ends of the up pilot piston, the spring will park the piston in the down position. In this position, the openings of the up slowdown and leveling adjuster will be closed and the opening of the up stop adjustment will be open.

3. The up stop adjustment allows flow out from behind the regulator piston and causes the pressure to drop.

4. Decreased oil pressure on the back of the regulator piston allows pressure from the jack (with the spring force) to push the piston against the low pressure adjustment stud allowing full bypass. At the same time, the check valve piston closes.

5. Stop rate is controlled by the opening at the stop adjustment. The wider the opening, the faster the stop.

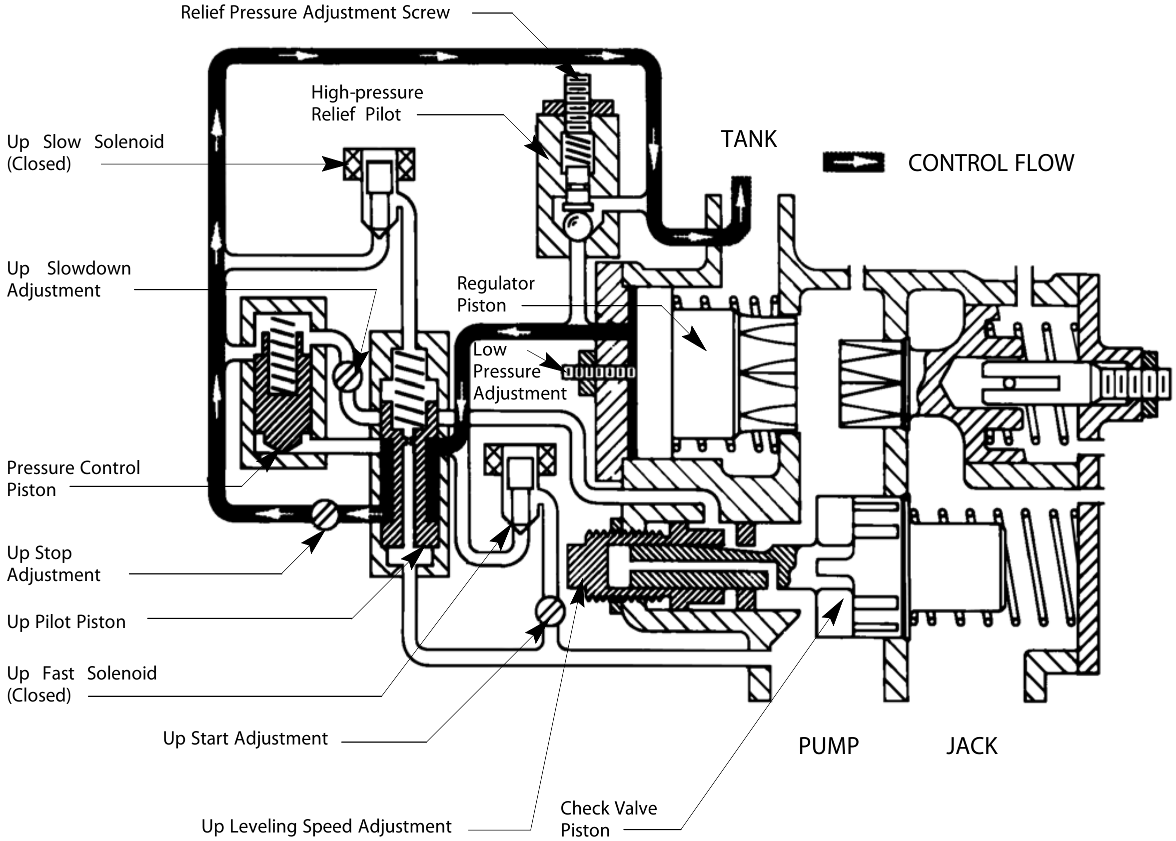


Figure 10 - Up Stop Diagram

Down Valve Section

The down portion of the valve consists of a piston that seats and can be controlled in these positions:

- Closed to stop the car
- Partially open for slow speed
- Fully open for high speed

Down Start and Full Speed

Sequence of Events

1. To start the car down, the down fast and down slow solenoids are energized simultaneously, allowing the oil behind the piston to flow to the tank through the down start adjustment. See Figure 11.

2. The reduction in pressure behind the piston causes the piston to lift. It is essential that the down start adjustment be open more than the down stop adjustment so that the oil entering through the down stop adjustment can be drained to the tank.

3. The size of the openings will govern how fast the piston moves and how rapidly the car starts. The lowering speed adjustment limits the amount the piston can open, thereby controlling the car down speed.

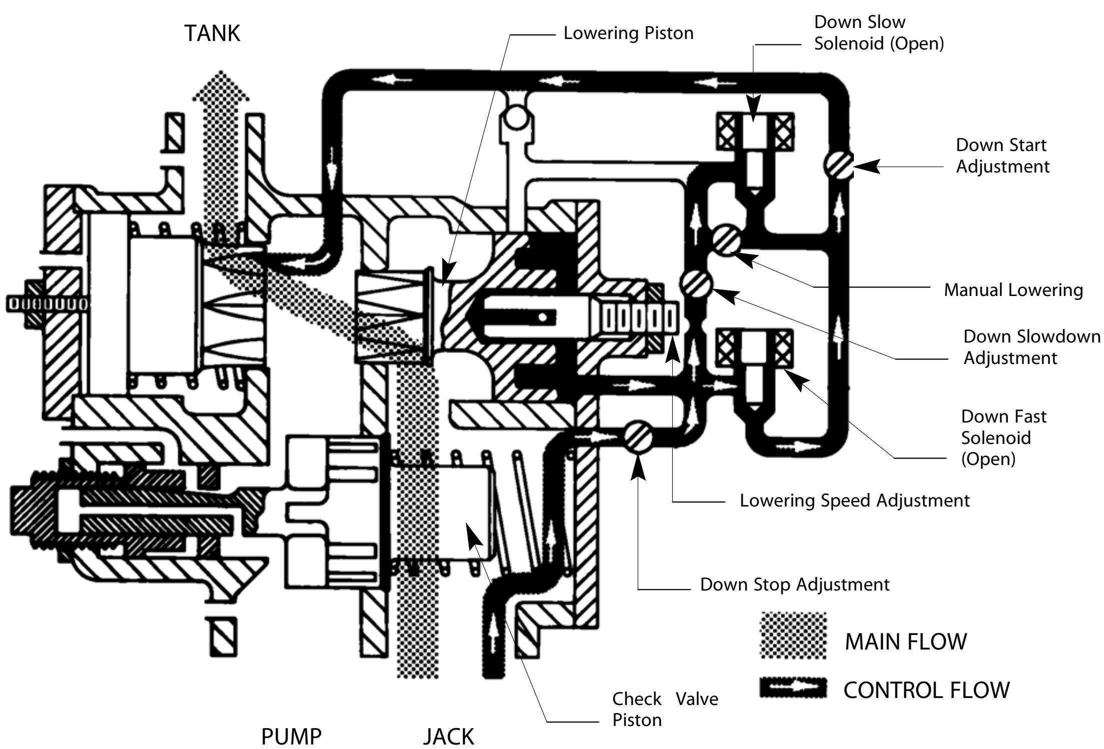


Figure 11 - Down Start and Full Speed Diagram

Down Slowdown and Leveling

Sequence of Events

1. To change to leveling speed, the down fast solenoid is closed. The lowering piston starts in the full open position and the oil passage to the tank is blocked by the piston skirt. See Figure 12.

2. Oil flows in through the down stop adjustment to the rear of the lowering piston, and out through the slowdown adjustment. The down slow solenoid and the down start adjustment, causes the lowering piston to move toward the closed position. The amount that the down slowdown adjustment is closed governs how fast the piston moves and how rapidly the car slows down.

3. The piston will stop once the oil passage to the tank (through the down slow solenoid) is opened by the skirt of the piston.

4. The lowering speed is controlled by turning the lowering and leveling adjustment in increments of full half-turns. The leveling speed is controlled by turning the lowering and leveling adjustment in less than one-quarter-turn increments.

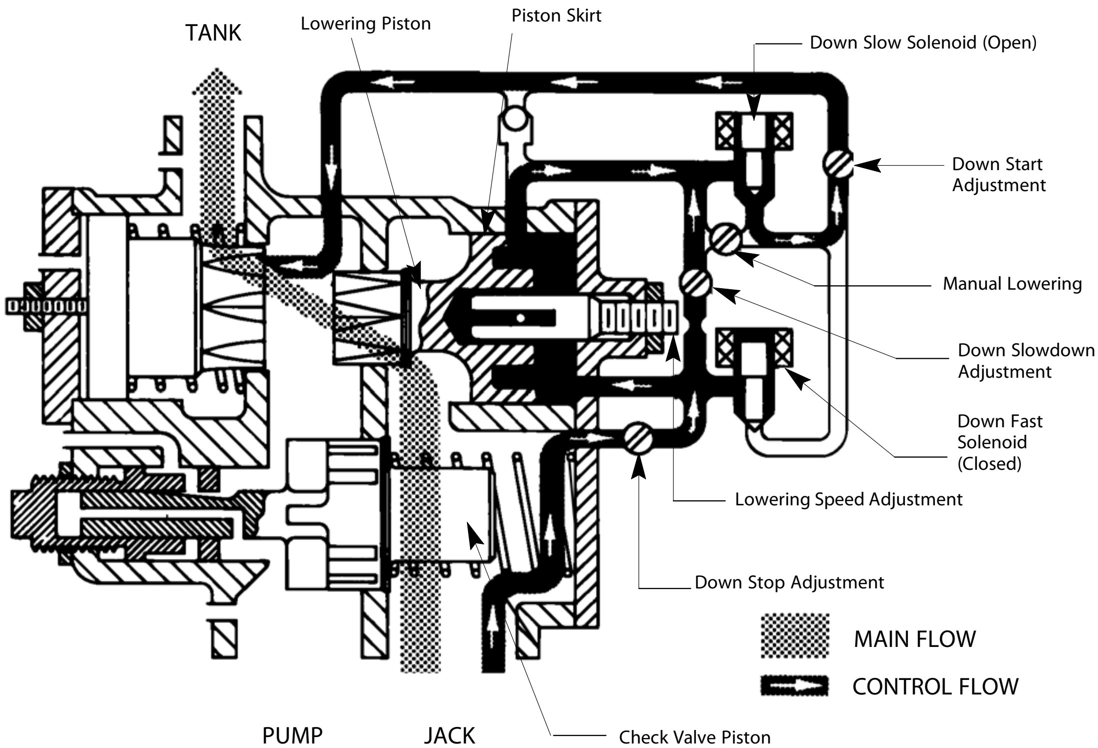


Figure 12 - Down Slowdown and Leveling Diagram

Manual Lowering

The manual lowering valve is parallel to the down slow solenoid and when opened, allows the car to be lowered at leveling speed during emergencies.

Down Stop

1. To stop the car, the down slow solenoid is de-energized, stopping all flow to the tank. Pressure from the jack and the spring will cause the piston to close. See Figure 13.

2. The rate of closing and the smoothness is controlled by the down stop adjustment.

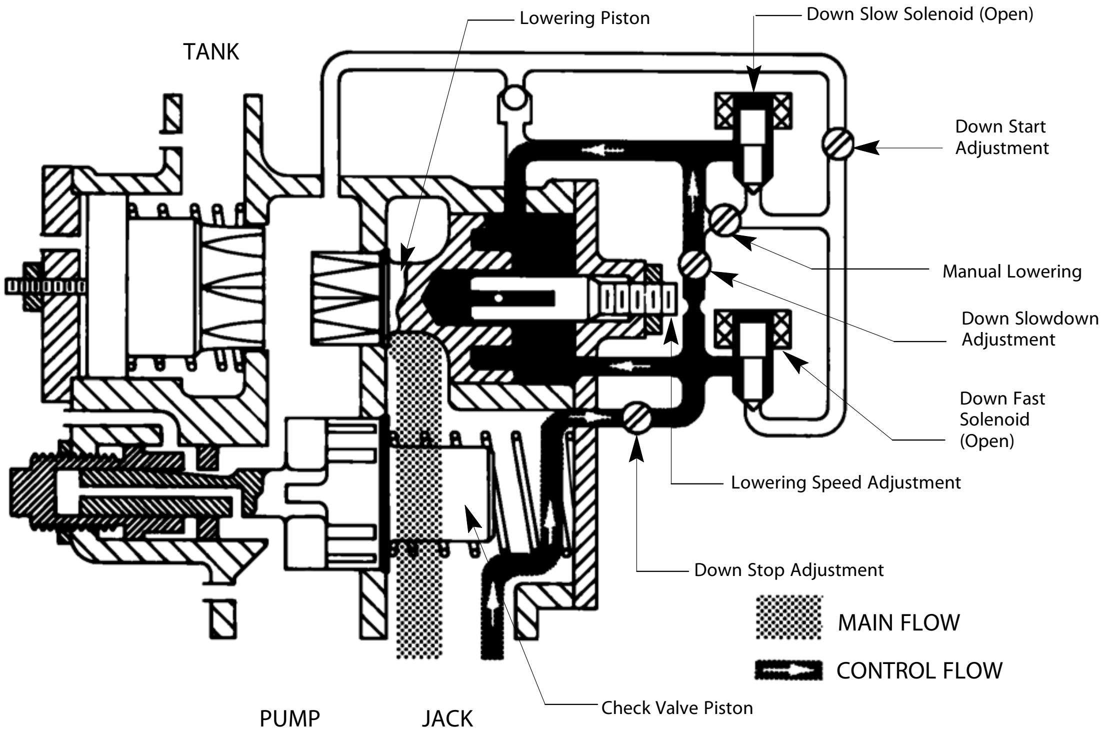


Figure 13 - Down Stop Diagram

(10) Victaulic Piping Contents

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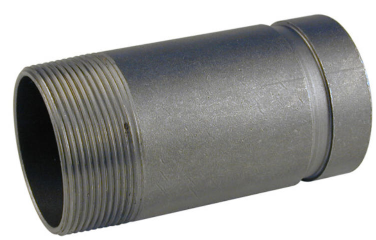
Victaulic Couplings

Vertical Express Power Units (standard option) ship with grooved outlets, grooved pipe, Victaulic couplings and elbows for installation.

- If job requirements are different than the Typical Jack Arrangements on page 10-4, the piping will require modification.
- There are no contract options to the pipe, couplings, and fittings. Additional piping, couplings and fittings for unusual pipe arrangements, long pipe runs, or special local code requirements, etc. will need to be provided.
- The pipe size is determined by the required flow rate. 2" pipe is provided for units with a flow rate of 167 GPM or less, and 3" pipe is provided for units with a flow rate higher than 167 GPM.
- Additional pipe and fittings are provided for twin post units.
- The pipe is packed with the jack, and the couplings and fittings are packed with the power unit.
- A Victaulic ball-type shutoff valve is provided. The shutoff valve is grooved and comes with a coupling for ease of addition into the pipe system.
- The grooved couplings included in the pipe kits are Victaulic Style 77 with pre-lubricated Vic-Plus gaskets.

Victaulic Ball-Type Shut Off Valve (top)
Victaulic Coupling (bottom)

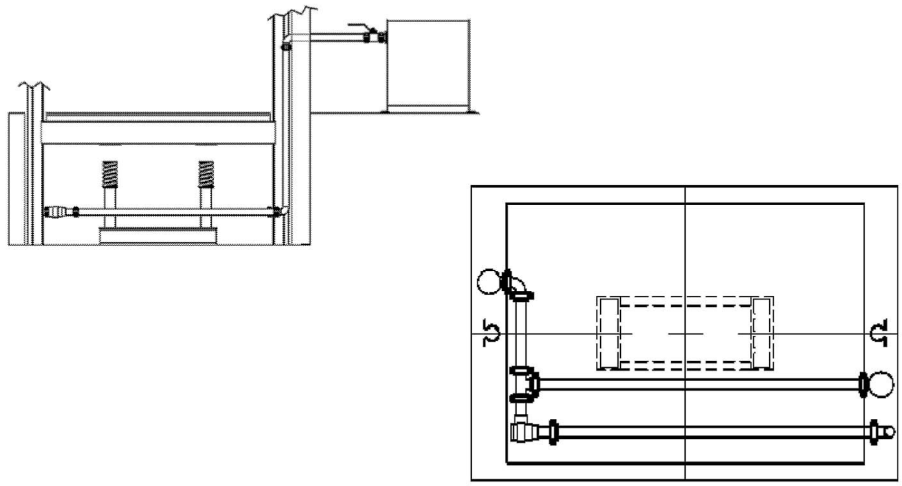


Grooved-to-Threaded Adapter

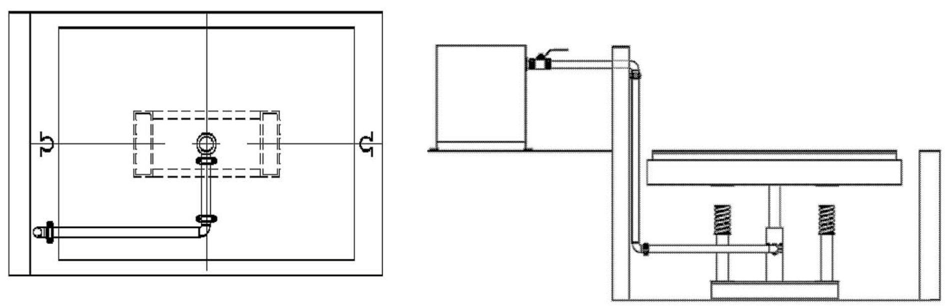
Typical Jack Arrangements

See Material List on page 10-5

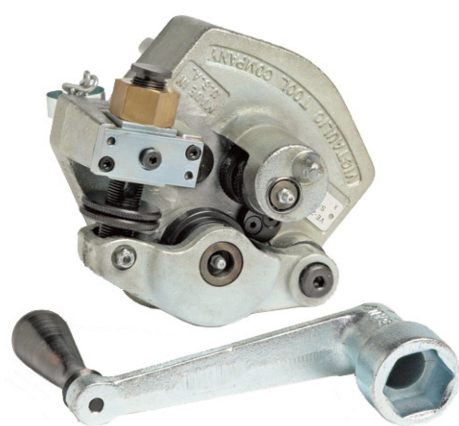
Twin Post Jack



Conventional Jack

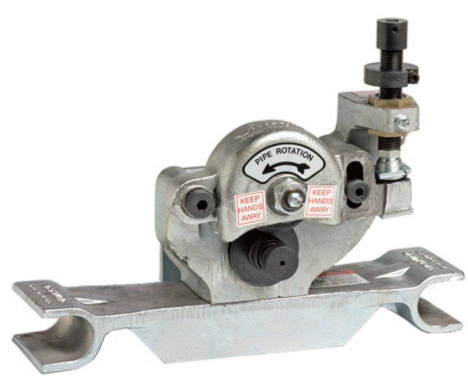


Recommended On-Site Tools



VE26 Groove in Place Groover

Lightweight, portable manually operated grooving tool used for grooving 2" - 3" Sch. 40 steel pipe.



VE226 Groove in Place Groover

Lightweight, portable and easy to mount to Victaulic VPD752 or Ridgid 300 Power Drive. used for 2" to 4" Sch. 40 pipe.

Material List

Quantity	Part No.	Description	Packed
Material List - 2" Pipe (Conventional Jack) for flows < 168 GPM			
3	642FW1	Pipe Elbow, 2", 86" C to E	With Jack
1	642AT3	Pipe Coupling, Groove, 2", HP-70	On Power Unit
5	642AT4	Pipe Coupling, Groove, 2", Style 77	In Coupling Kit
1	642EH1	Pipe Elbow, 90°, 2", VBE	
1	642AT4	Pipe Coupling, Groove, 2", Style 77	With Shutoff Valve
Material List- 3" Pipe (Conventional Jack) for flows > 167 GPM and < 240 GPM			
3	642FT1	Pipe Elbow, 3", 87" C to E	With Jack
1	642AT3	Pipe Coupling, Groove, 2", HP-70	On Power Unit
5	642EX2	Pipe Coupling, Groove, 3", Style 77	IN COUPLING KIT
1	642EW1	Pipe Elbow, 90°, 3", VBE	
1	200RM1	Kit, Reducer, Concentric 3" to 2	With Power Unit
1	642EX2	Pipe Coupling, Groove, 3", Style 77	With Shutoff Valve
1	642EX2	Pipe Coupling, Groove, 3", Style 77	With Reducer
Material List - 3" Pipe (Conventional Jack) for flows > 239 GPM			
3	642FT1	Pipe Elbow, 3", 87" C to E	With Jack
1	642EX1	Pipe Coupling, Groove, 3", HP-70	On Power Unit
5	642EX2	Pipe Coupling, Groove, 3", Style 77	In Coupling Kit
1	642EW1	Pipe Elbow, 90°, 3", VBE	
1	642EX2	Pipe Coupling, Groove, 3", Style 77	With Shutoff Valve
Material List - 2" Pipe (Twin Post) for flows < 168 GPM			
1	642EK1	Pipe, Tee, 2", VIC	In Coupling Kit
1	642AT4	Pipe Coupling, Groove, 2", Style 77	With Shutoff Valve
1	642EH1	Pipe Elbow, 90°, 2", VBE	In Coupling Kit
3	642FW1	Pipe Elbow, 2", 86" C to E	With Jack
1	642EF3	Pipe, 2" I.D., VBE, 76.625 lg.	
1	642EF4	Pipe, 2" I.D., VBE, 17.375 lg.	
10	642AT4	Pipe Coupling, Groove, 2", Style 77	In Coupling Kit
1	642AT3	Pipe Coupling, Groove, 2", HP-70	On Power Unit
1	642EH1	Pipe Elbow, 90°, 2", VBE	With Power Unit If Overspeed Not Required
Material List - 3" Pipe (Twin Post) for flows > 167 GPM			
3	642FT1	Pipe Elbow, 3", 87" C to E	With Jack
5	642EX2	Pipe Coupling, Groove, 3", Style 77	In Coupling Kit
1	642EW1	Pipe Elbow, 90°, 3", VBE	
2	200RM1	Kit, Reducer, Concentric 3" to 2"	With Power Unit
1	642EX2	Pipe Coupling, Groove, 3", Style 77	With Shutoff Valve
1	642EF3	Pipe, 2" I.D., VBE, 76.625 lg.	With Jack
1	642EF4	Pipe, 2" I.D., VBE, 17.375 lg.	
1	642EK1	Pipe, Tee, 2", VIC	In Coupling Kit
5	642AT4	Pipe Coupling, Groove, 2", Style 77	
2	642EX2	Pipe Coupling, Groove, 3", STYLE 77	With Reducers

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HOISTWAY WIRING

(11) Hoistway Wiring Contents

Printed in USA January, 2015

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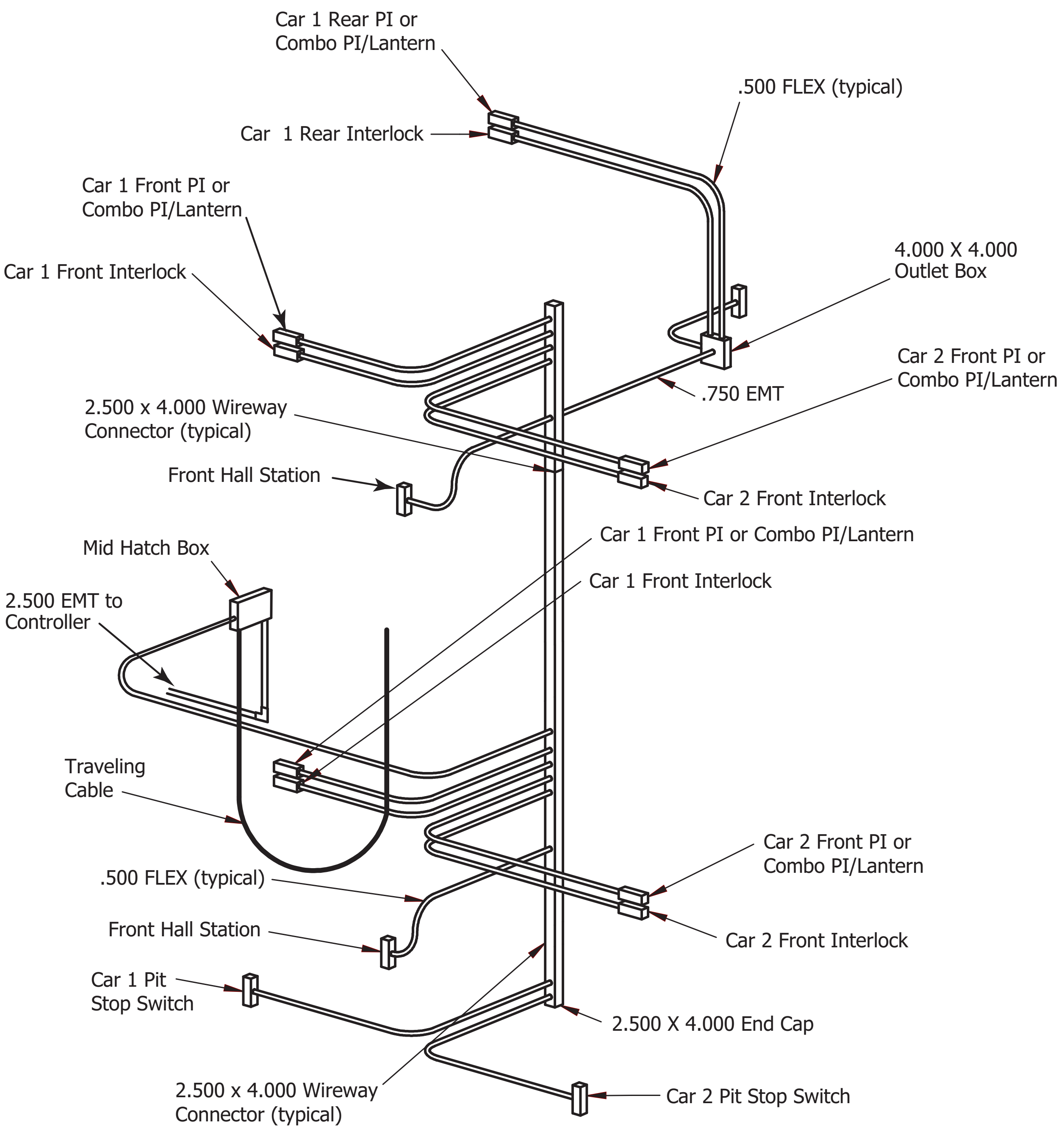
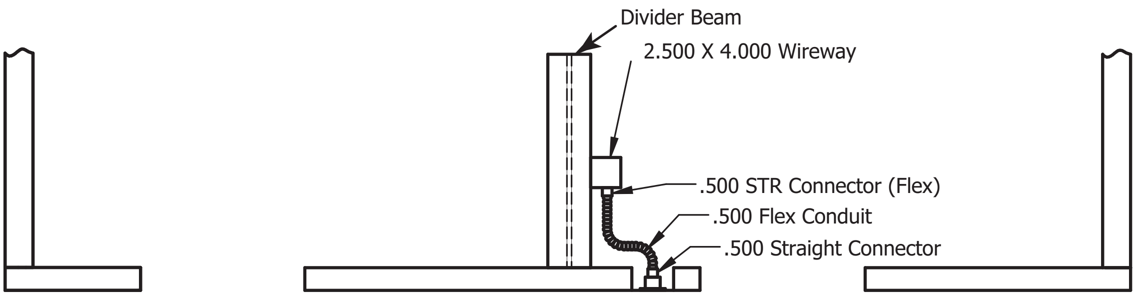
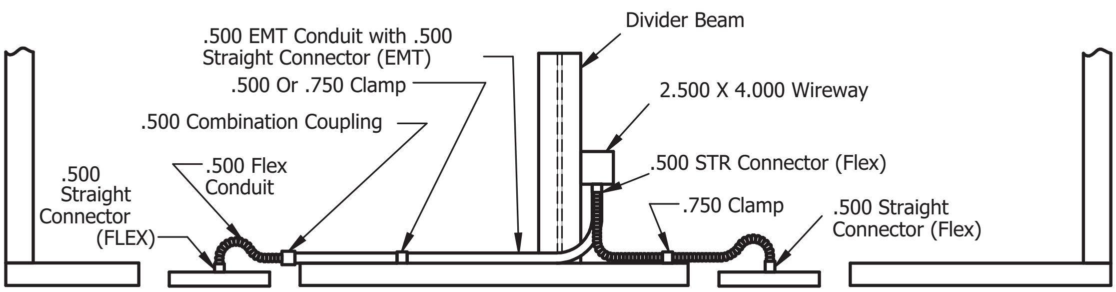
Typical Hoistway Conduit/Duct Layout



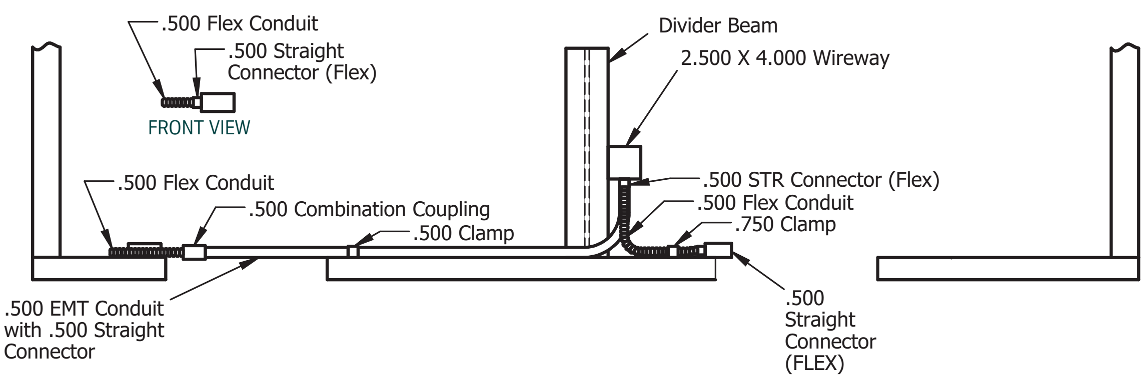
Front Hall Station Conduit Installation



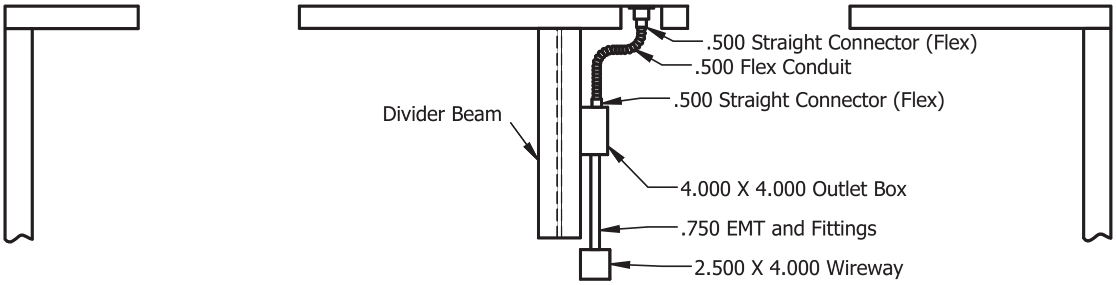
Front Hall Lantern/Position Indicator Conduit Installation



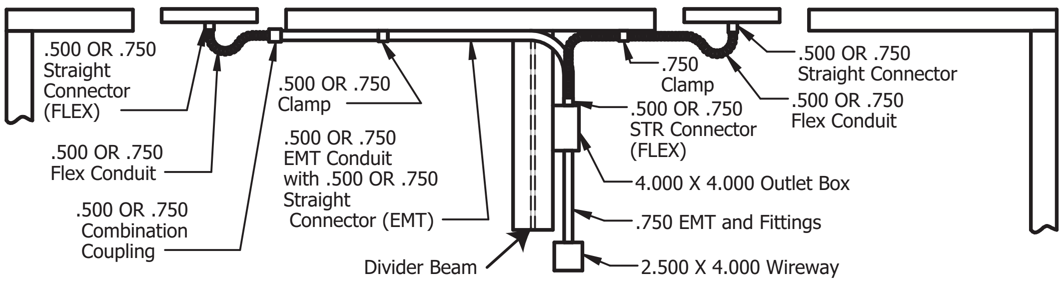
Front Door Interlock Conduit Installation



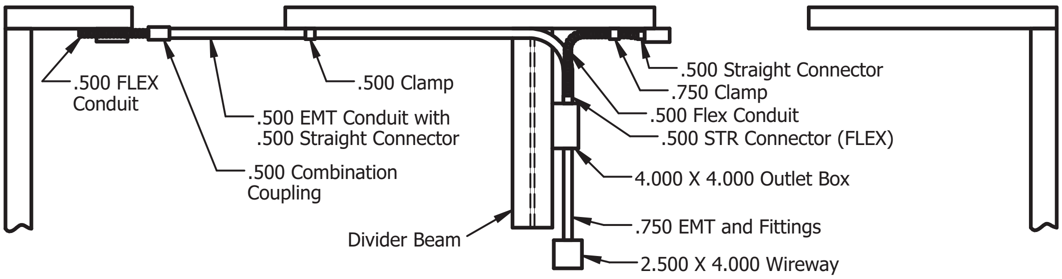
Rear Hall Station Conduit Installation



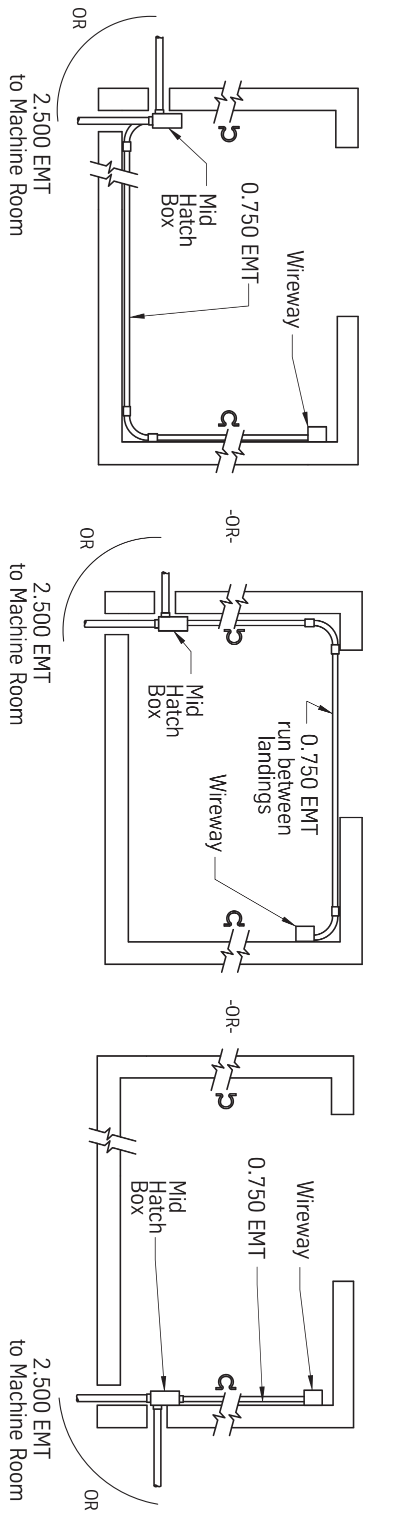
Rear Hall Lantern/Position Indicator Conduit Installation



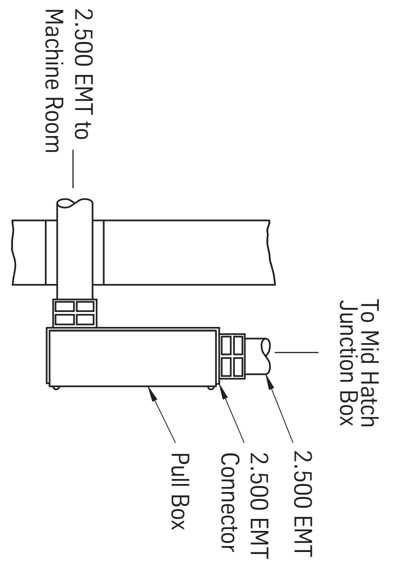
Rear Door Interlock Conduit Installation



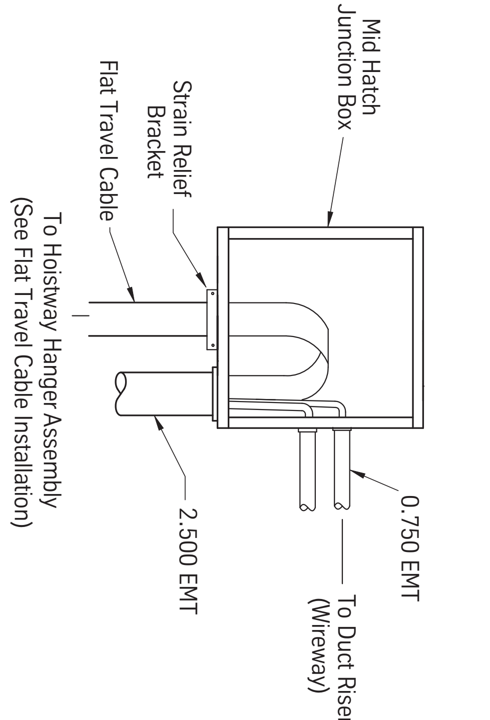
Pull Box Installation
Mid Hatch Box Installation
Mid Hatch Box to Wireway Installation



Mid Hatch Box to Wireway Installation



Pull Box Installation
(2.500 EMT from Machine Room to Mid Hatch Box)



Mid Hatch Junction Box Installation

ICON CONTROLLER

ICON CONTROLLER

(12) ICON® Controller Contents

Installation Section

Adjustment Section

Contents

(continued)

Adjustment Section (cont.)

Diagnostics Section

Contents

(continued)

Troubleshooting Section

Service Information Section

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Preliminary Installation

See the *Vertical Express Installers Manual* to install the following components:

- Rail brackets and rails.
- Pit channels, jack, and buffers.
- Car sling and platform.
- Power unit / Controller.
- Oil line.

CAUTION **Do not apply power to the controller until so instructed.**

Notes:

- The controller cabinet height can be adjusted at the job site.
- Use the proper door operator manual for the job specific type operator.

Prepare For Temporary Operation

Requirements

- Mainline supply wired with disconnect, circuit breaker, or fuses.
- Temporary run box.

1. With the power OFF, measure the voltage on the incoming side of the mainline disconnect.
2. Check the controller nameplate for design voltage and compare this to the voltage from Step 1. If they do not match ±5%, do not continue until the problem is resolved.
3. Ensure that the XFMR1 transformer taps match the mainline voltage. See Figure 1and Table 1 on page 2.
4. Verify that the output side of the mainline disconnect is wired to L1, L2, and L3 on the starter. See the job wiring diagrams.

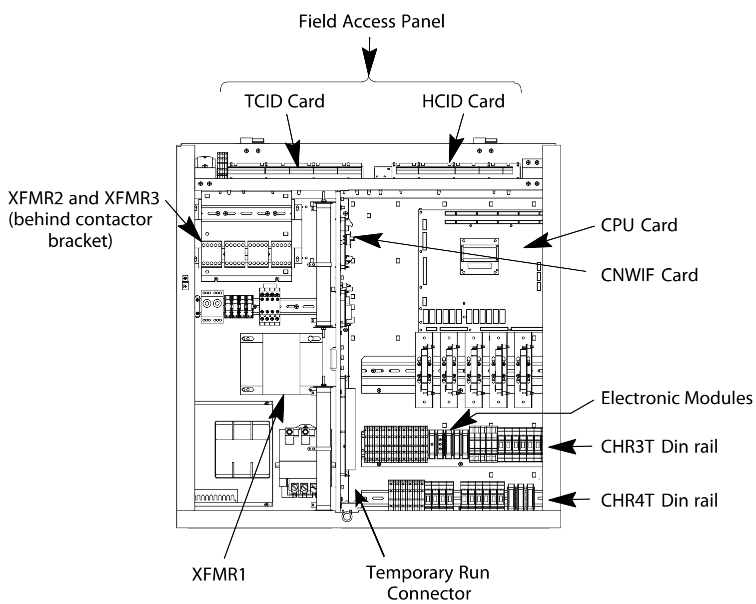


Figure 1 - Controller Component Layout

Prepare For Temporary Operation
(continued)

Print No.	Primary			Secondary		
	Voltage	Connections	Configuration	Voltage	Connections	Configuration
874DA1	208	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
874DA2	240	H1 & H4	H1-H3, H2-H4	120	X1-X4	X1-X3, X2-X4
	480	H1 & H4	H2-H3			
874DA3*	240	H1 & H4	H1-H3, H2-H4	120	X1-X4	X1-X3, X2-X4
874DA4*	380	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	400	H1 & H3				
	416	H1 & H4				
874DA5	600	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
874DA6**	200	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	220	H1 & H3				
874DB1	208	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
874DB2	240	H1 & H4	H1-H3, H2-H4	120	X1-X4	X1-X3, X2-X4
	480	H1 & H4	H2-H3			
874DB3	600	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
874DC1*	200	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	220	H1 & H3				
874DC3*	380	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	400	H1 & H3				
	415	H1 & H4				
874DJ1	208	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	575	H1 & H2				
874DJ2*	380	H1 & H2	None	120	X1-X4	X1-X3, X2-X4
	400	H1 & H3				
	415	H1 & H4				
874DK1	230	H1 & H4	H1-H3, H2-H4	120	X1-X2	None
	460	H1 & H4	H2-H3			
874DL1	230	H1 & H4	H1-H3, H2-H4	120	X1-X2	None
	460	H1 & H4	H2-H3			
874DL2*	208	H1 & H2	None	120	X1-X3	None
874DL3*	575	H1 & H4	None	120	X1-X3	None

* Used for 50 Hz and 60 Hz applications.

** Used ONLY for 50 Hz applications.

Table 1 - XFMR1, XFMR2, and XFMR3 Transformer Adjustment Wiring

Prepare For Temporary Operation
(continued)

5. On jobs with battery lowering, verify the following connections. See Figure 2.
   If connected, unplug,
   - The UPS line cord from the cord marked "XFMR1."
   - The cord marked "Control" from the UPS output.
6. Plug the cord (male) marked "Control" into the cord (female) marked "XFMR1."

Note: The UPS line cord remains unplugged.

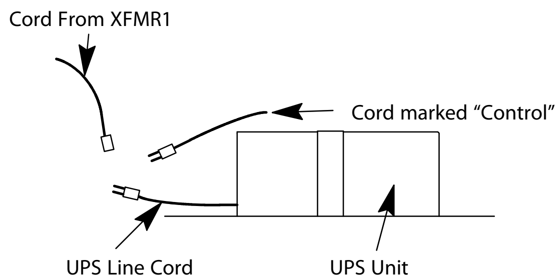


Figure 2 - UPS Unit Connections

Temporary Run Box

During temporary operation, the 188E CPU card is not energized.

Note: This procedure is for controllers equipped with a temporary run connector mounted near the bottom of the center panel.

1. Make sure manufacturing has removed the fuse from the P24 fuse holder on the CHR3T Din Rail. If not, remove and bag it. This action removes P24 power from the control logic.

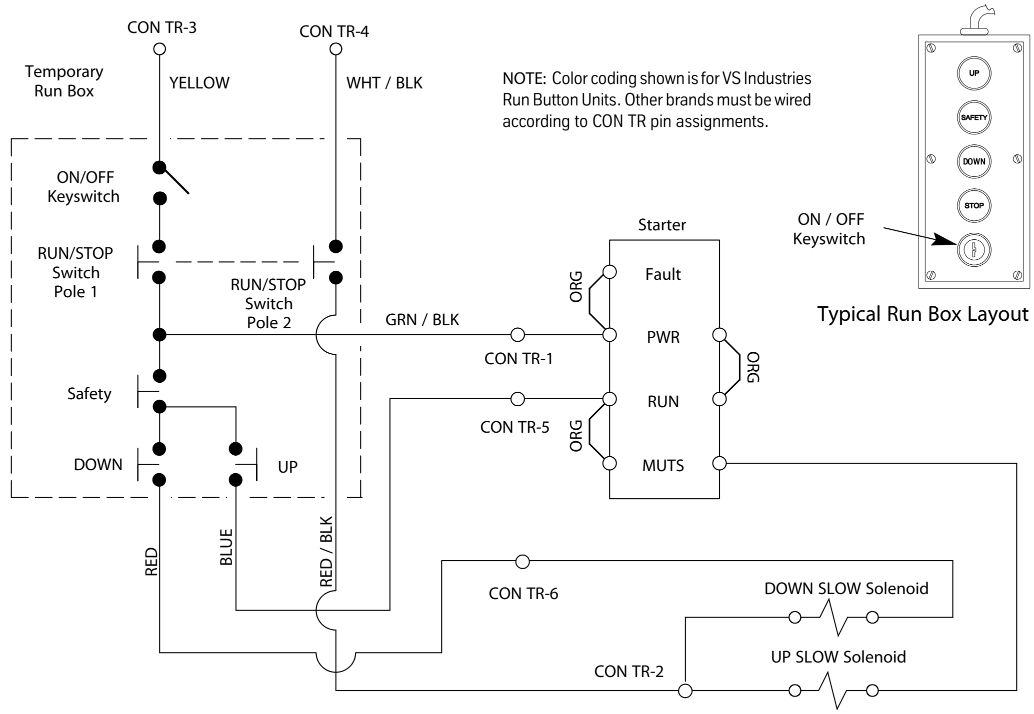
WARNING **Do not connect the selector harness to the CWID card with P24 power ON and temporary jumpers in place. Doing so may allow the car to move unexpectedly.**

2. Disconnect Connectors 9, 11, 17, and 18 on the 188E CPU card.
3. Remove the jumper between CON5-6 and CON5-7 on the CNWIF card.
4. Verify the temporary orange jumpers. See the wiring diagrams and Figure 3 on page 4,
   - Electronic Starters: On the starter and on terminals TR101, TRUS, TRUS1, and TRSCG2.
   - Across-Line Starters: On terminals TR101, TRUS, TRUS1, and TRSCG2 (TRUS to TRUS1 on two contactor arrangement only).
5. Connect the temporary run box (as shown in Figure 3) to temporarily run the connector in the controller.
6. Place the RUN/STOP switch in the RUN position.
7. Turn ON the mainline disconnect.
8. Verify that LED2 (115VAC) on the CNWIF card is ON.
9. Verify that AC1 (115VAC) LED is ON. The LED is located on the AC1 Electronic Module on the CHR3T DIN Rail.

Temporary Run Box

(continued)

Electronic Starting



Across-Line Starting

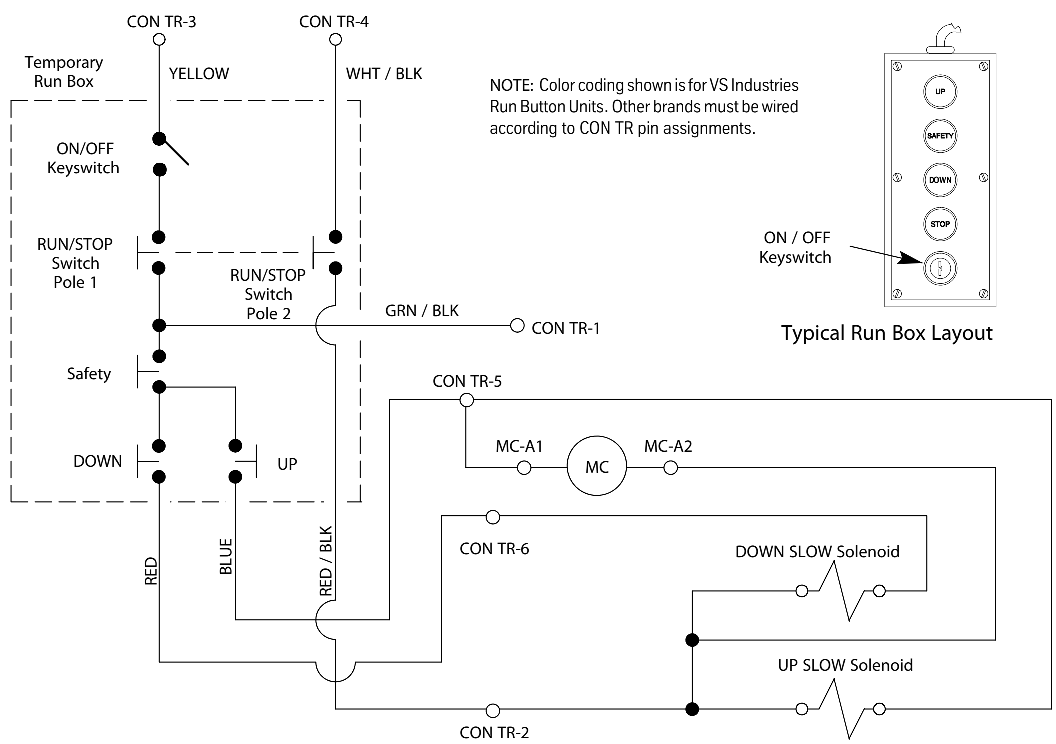


Figure 3 - Temporary Operation Connections

Electronic Starter Setup

Prior to energizing the power unit motor, verify the electronic starter overload and starting current.

Verify the Overload and Starting Current Adjustment

1. Confirm that the electronic starter is energized and the LCD displays **MOTOR STATUS STOPPED**. See Figure 4.

2. If the LCD displays any message other than **MOTOR STATUS STOPPED**, consult the *Troubleshooting* section of the *72DV Starter* manual.

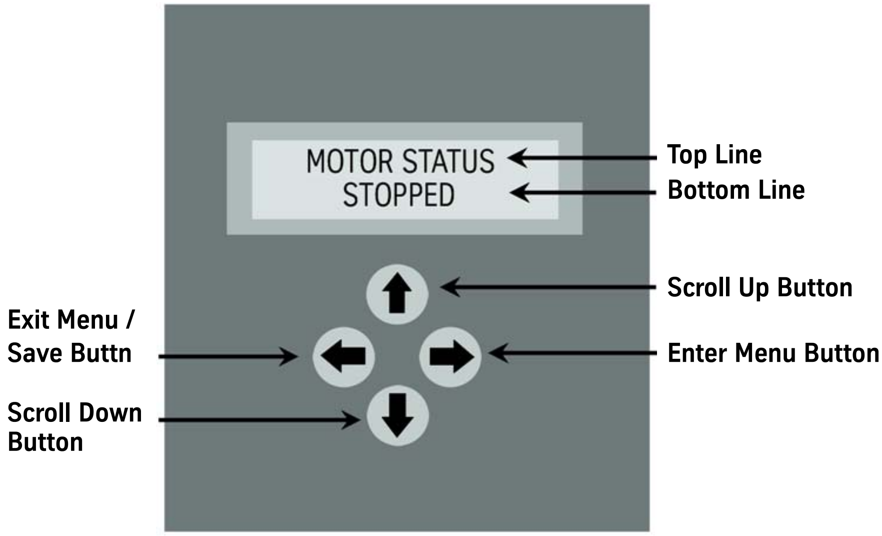


Figure 4 - Electronic Starter Menu

Setup the Starting Current Adjustment

Note: The Starting Current is 3 X Nameplate Full Load Amps (FLA).

1. From the **MOTOR STATUS** menu, press the LEFT ARROW. The **STATUS** menu displays.

2. Press the DOWN ARROW twice to display the **PARAMETERS** menu.

3. Press the RIGHT ARROW. **STARTING AMPS** displays,
   - If the value is correct, continue with Step 5.
   - If the value is not correct, continue with Step 4.

4. Press the RIGHT ARROW again to access the value. Press the UP or DOWN ARROW to adjust the value of the flashing digit. Press the RIGHT ARROW to move to the next digit.

5. Press the LEFT ARROW to exit, the UP ARROW to accept changes (exit and save), or the DOWN ARROW to reject changes (exit without saving). If necessary, repeat steps 4 and 5.

Electronic Starter Set Up
(continued)

Setup the Overload Current

Note: The Overload Current should equal the nameplate Full Load AMP's (FLA).

1. From the **MOTOR STATUS** menu, press the LEFT ARROW. The **STATUS** menu displays.
2. Press the DOWN ARROW twice and **PARAMETERS** displays.
3. Press the RIGHT ARROW and **STARTING AMPS** displays.
4. Press the DOWN ARROW until **OVERLOAD AMPS** appears in the display,

- If the value is correct, continue with Step 6.
- If the value is not correct, continue with Step 5.

5. Press the RIGHT ARROW. Press the RIGHT ARROW again to access the value. Press the UP or DOWN ARROW to adjust the value of the flashing digit. Press the RIGHT ARROW to move to the next digit.
6. Press the LEFT ARROW to exit, the UP ARROW to accept changes (exit and save), or the DOWN ARROW to reject changes (exit without saving). If necessary, repeat steps 5 and 6.

Mechanical Starter Set Up with ESP100 Overloads

ESP100 Overload Current settings are preset by manufacturing. The following initial adjustment can also be used during temporary operation for jobs that trip overloads, but the actual overload current will be set during final adjustment.

1. See Table 1 or Table 2 on page 7 to determine the overload current setting based on motor horsepower and voltage or nameplate amps.
2. Set the full load amps adjustment dial to the overload current setting from Step 1.
   See Figure 5.

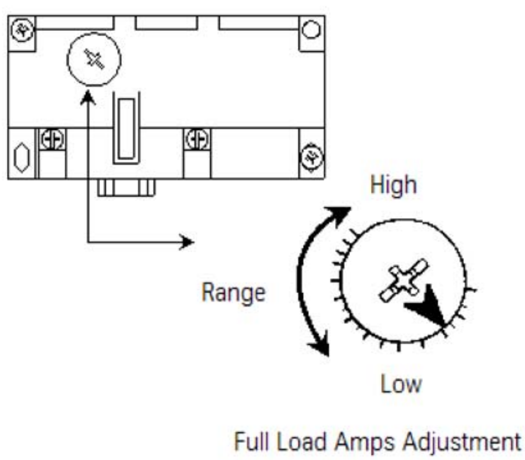


Figure 5 - ESP100 Overload Adjustment

Overload Specifications

Motor HP	Motor Voltage	Nameplate Amps	Line or Phase Wiring Configuration	Overload Current Setting	Overload Current Range	ThyssenKrupp Overload No.
7.5	200V/208V	46	Special (See Wiring Diagrams)	50.0	30-60	660BB6
	230V	40	Special (See Wiring Diagrams)	43.0	30-60	660BB6
10	200V/208V	58	Special (See Wiring Diagrams)	62.0	45-90	660BB7
	230V	50	Special (See Wiring Diagrams)	54.0	45-90	660BB7

Table 1 - Overload Specifications For Single Phase Motors

Motor HP	Motor Voltage	Nameplate Amps	Line or Phase Wiring Configuration	Overload Current Setting	Overload Current Range
5	200V/208V	17.5	LINE	25.0	13-27
	220V	15.9	LINE	22.8	13-27
	230V	15.2	LINE	21.7	13-27
	380V	9.2	LINE	13.2	9-18
	415V	8.4	LINE	12.1	9-18
	460V	7.6	LINE	10.9	9-18
	575V	6.1	LINE	8.7	5-10
7.5	200V/208V	25	LINE	35.8	20-40
	220V	23	LINE	32.9	20-40
	230V	22	LINE	31.5	20-40
	380V	13	LINE	18.6	13-27
	415V	12	LINE	17.2	9-18
	460V	11	LINE	15.7	9-18
	575V	9	LINE	12.9	9-18
10	200V/208V	32	LINE	45.8	30-60
	220V	29	LINE	41.5	22-45
	230V	28	LINE	40.0	22-45
	380V	17	LINE	24.3	13-27
	415V	15	LINE	21.5	13-27
	460V	14	LINE	20.0	13-27
	575V	11	LINE	15.7	9-18
15	200V/208V	48	LINE	68.6	45-90
	220V	44	LINE	62.9	45-90
	230V	42	LINE	60.1	45-90
	380V	25	LINE	35.8	20-40
	415V	23	LINE	32.9	20-40
	460V	21	LINE	30.0	20-40
	575V	17	LINE	24.3	13-27
20	200V/208V	62	LINE	88.7	45-90
	220V	56	LINE	80.1	45-90
	230V	54	LINE	77.2	45-90
	380V	33	LINE	47.2	30-60
	415V	30	LINE	42.9	22-45
	460V	27	LINE	38.6	20-40
	575V	22	LINE	31.5	20-40
25	200V/208V	78	LINE	111.5	67-135
	220V	71	LINE	101.5	67-135
	230V	68	LINE	97.2	67-135
	380V	41	LINE	58.6	30-60
	415V	37	LINE	52.9	30-60
	460V	34	LINE	48.6	30-60
	575V	27	LINE	38.6	20-40
30	200V/208V	92	LINE	131.6	67-135
	220V	84	LINE	120.1	67-135
	230V	80	LINE	114.4	67-135
	380V	48	LINE	68.6	45-90
	415V	44	LINE	62.9	45-90
	460V	40	LINE	57.2	30-60
	575V	32	LINE	45.8	30-60
40	200V/208V	120	PHASE	99.1	67-135
	220V	109	PHASE	90.0	45-90
	230V	104	PHASE	85.9	45-90
	380V	63	LINE	90.1	67-135
	415V	57	LINE	81.5	45-90
	460V	52	LINE	74.4	45-90
	575V	41	LINE	58.6	30-60
50	200V/208V	150	PHASE	123.8	67-135
	220V	136	PHASE	112.3	67-135
	230V	130	PHASE	107.3	67-135
	380V	79	LINE	113.0	67-135
	415V	72	LINE	103.0	67-135
	460V	65	LINE	93.0	67-135
	575V	52	LINE	74.4	45-90
60	200V/208V	177	PHASE	146.0	90-180
	220V	161	PHASE	132.9	67-135
	230V	154	PHASE	127.1	67-135
	380V	93	LINE	133.0	67-135
	415V	85	LINE	121.6	67-135
	460V	77	LINE	110.1	67-135
	575V	62	LINE	88.7	45-90
75	200V/208V	221	PHASE	180.0	90-180
	220V	201	PHASE	166.0	90-180
	230V	192	PHASE	158.0	90-180
	380V	116	PHASE	95.8	67-135
	415V	106	PHASE	87.5	45-90
	460V	96	PHASE	79.3	45-90
	575V	77	LINE	110.1	67-135

Table 2 - Overload Specifications For ESP 100 Overload Applications

Pump Motor Rotation

IMPORTANT! For Electronic Starters: Swapping motor leads to correct motor rotation will result in a motor wiring fault. Motor rotation is controlled through adjustments in the starter and the line input to the starter.

1. Turn ON the mainline disconnect.
2. Momentarily press UP and SAFE on the temporary run box, and observe the direction of the motor rotation (clockwise rotation is standard for ThyssenKrupp equipment when viewed from the shaft end).

   ABC = Standard Dry (AP) units (CW rotation when viewed from the shaft end). The motor is mounted to the left of the pump.

   CBA = Standard Wet (EP) units (CCW rotation as viewed from the pump end).

   - If the motor rotation is correct, continue to Step 7.
   - If the rotation is incorrect, complete the appropriate procedure below.
3. For Mechanical Starters - Reverse L1 and L2 on the starter.
4. For Electronic Starters - Change the line rotation setting in the starter.

   a. Press the LEFT ARROW once. The **STATUS** menu displays.

   b. Press the DOWN ARROW twice. The **PARAMETERS** menu.

   c. Press the RIGHT ARROW once. **STARTING AMPS** displays.

   d. Press the DOWN ARROW until **LINE ROTATION** displays.

   e. Press the RIGHT ARROW to access the value.

   f. Press the UP ARROW for CBA, or the DOWN ARROW for ABC.

   g. Press the LEFT ARROW to select the value displayed.

   h. Press the UP ARROW to accept the value, or the DOWN ARROW to reject the change.
   Note: If the wrong value is accepted, repeat Steps e. through h.

Pump Motor Rotation
(continued)

5. Verify the correct motor wiring. See Figure 6.

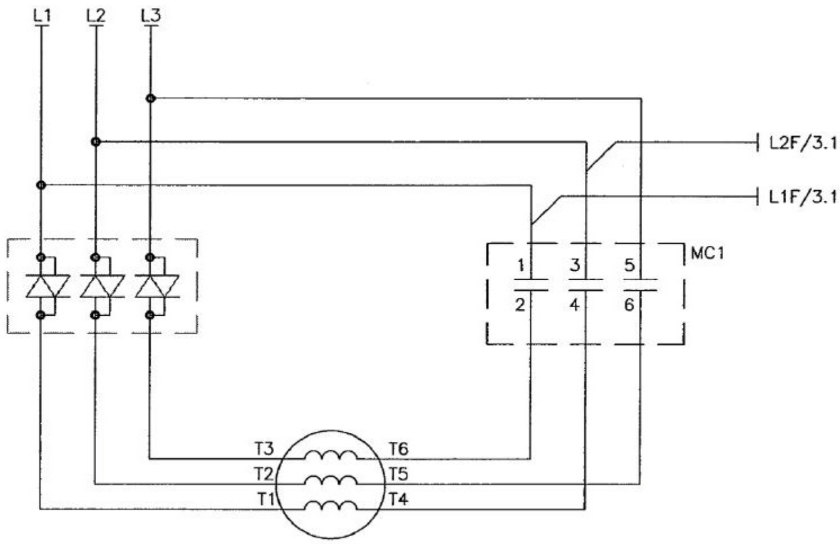


Figure 6 - Electronic Starter Pump Motor Wiring Diagram

6. Check the motor rotation direction. If the direction is incorrect or if the motor is making loud sounds, swap two phase leads at the top of the controller's main line fuses (FL1 - FL3).

7. Confirm the motor rotation.

Note: It may take multiple attempts to get the incoming line phase relationship correct.

Selector Tape Mounting

Required Material

- 1 - Selector tape (net travel + 12" long).
- 2 - Tape support brackets.
- 2 - Spring plates.
- 2 - Selector tape plates.
- 2 - Selector tape springs, 1.0" x 10.0" long.
- 6 - Rail clips.
- 9 - 3/8" bolts, washers, lockwashers, and nuts.
- 6 - 1/2" bolts, lockwashers, and nuts.

WARNING **The selector tape is constructed of spring steel. Use extreme caution when cutting the band that holds the selector tape onto the spool.**

CAUTION **The selector tape must be handled carefully. One kink ruins the entire tape.**

1. Install the top tape support bracket. See the job layout for the proper quadrant and position, and Figure 7 on page 11 for all steps in this procedure.

2. Attach the selector tape to the top tape support bracket; loop the tape over the bracket as shown.

Note: The loop should be a minimum of 6" at the widest point.

3. Move to the bottom of the hoistway, and attach a spring plate and tape plate to the selector tape at a point that will be no less than 6" below the selector box when the car is on the buffers.

4. Install the bottom tape support bracket on the guide rail 18 1/2" below the bottom of the spring plate.

5. Install the other spring plate on the tape support bracket.

Note: Ensure that the selector tape is between the spring plate and bracket.

6. Stretch the two (2) selector tape springs between the spring plates. If properly installed, the springs will be 1 1/2 times their normal length, e.g., a 10" spring will be stretched to 15".

7. Check the bow in the selector tape for the dimension given in Figure 7. If the bow is incorrect, adjust the tape at the bottom support bracket.

8. Ensure that the selector tape is even with the bottom spring plate, and then cut off the excess selector tape.

9. Verify that the centerline of the selector tape is aligned within 1/16" of the guide rails centerline, and also make certain that the tape is free of kinks throughout the hoistway.

Selector Tape Mounting
(continued)

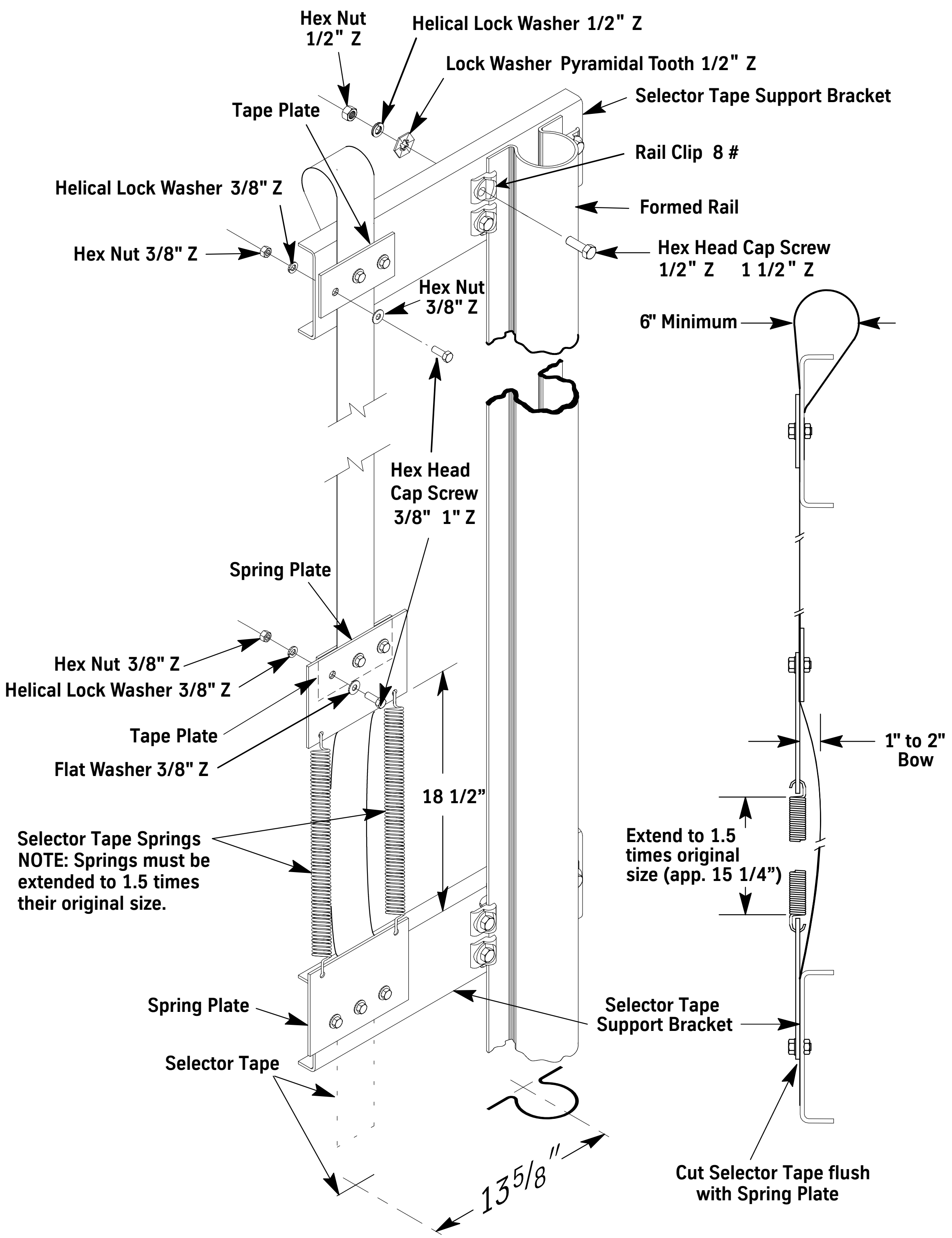


Figure 7 - Selector Tape Installation

Hoistway Wiring

Wireway and Conduit Layout

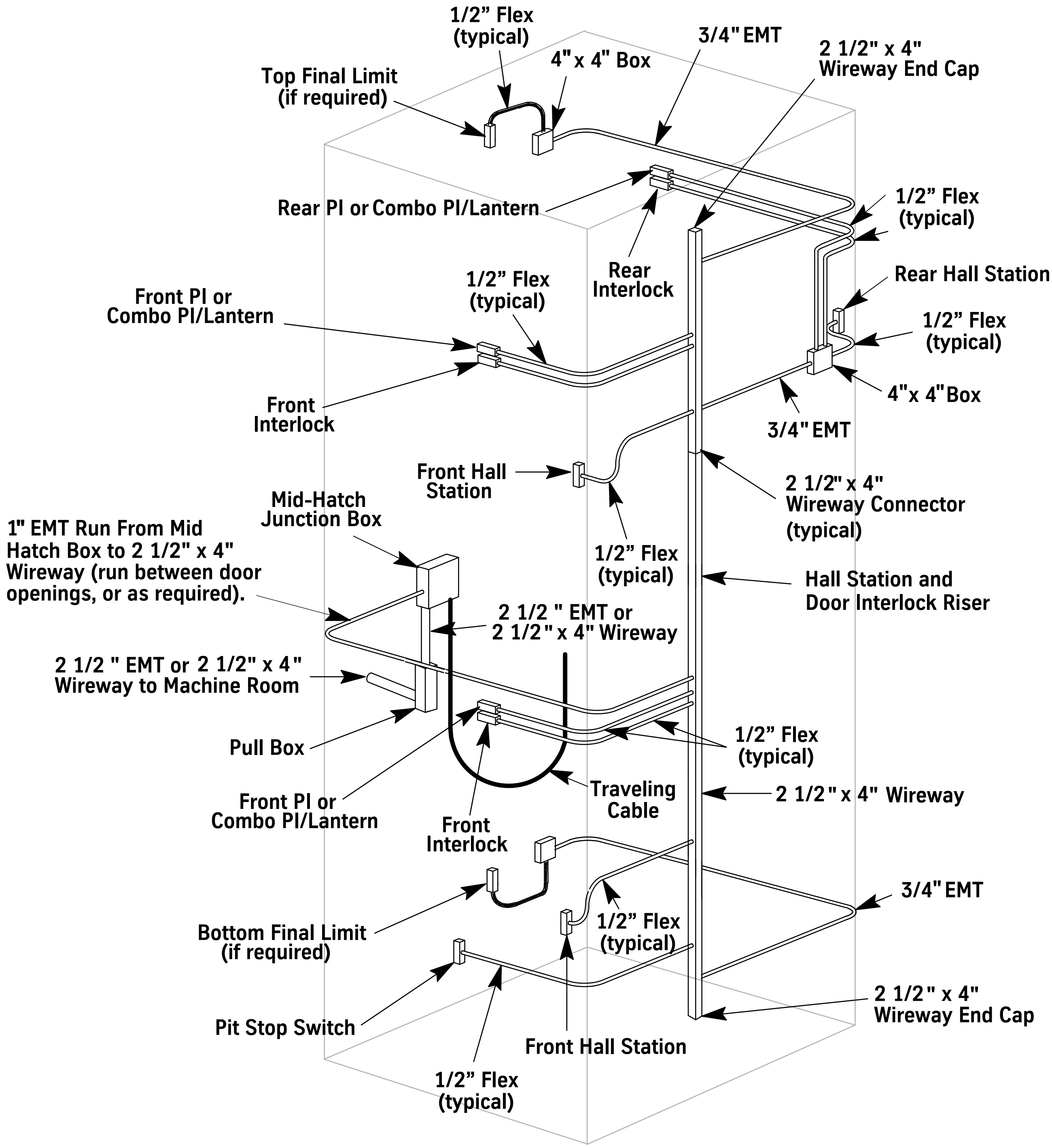
This procedure is a suggested method of installation. See the job wiring diagrams, and the wiring diagrams on the following pages.

Required Wireways / Conduits,

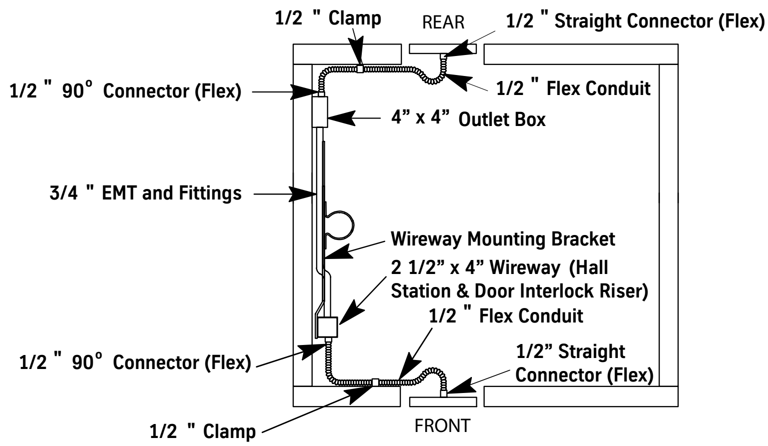
- Hall station and door interlock riser.
- Machine room to junction box.
- Hoistway access and final limits (if required).
- Controller cross-connects (group jobs only).

1. Mount the junction box to the guide rail at a point above the center point of car travel and also above the entrance header. See the job layout for the proper quadrant.
2. Run conduit or wireway from the power unit/controller in the machine room to the junction box.
3. Install the hall station and the door interlock riser.
4. Run conduit and mount the hall signal fixture boxes.
5. Run conduit and mount the boxes for position indicators, lanterns, and the pit stop switch.
6. Run conduit for final limits as required.

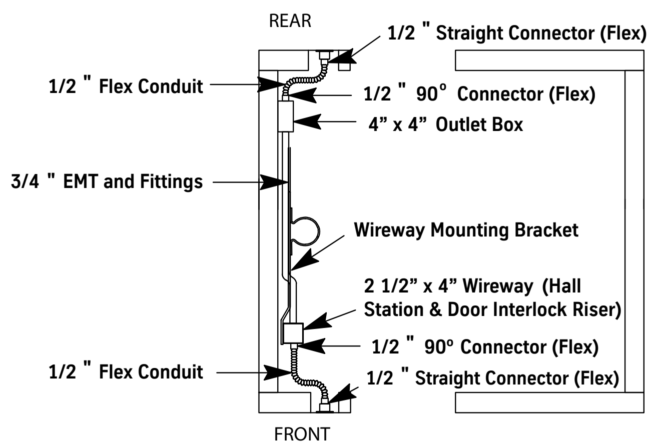
Simplex Hoistway Wiring



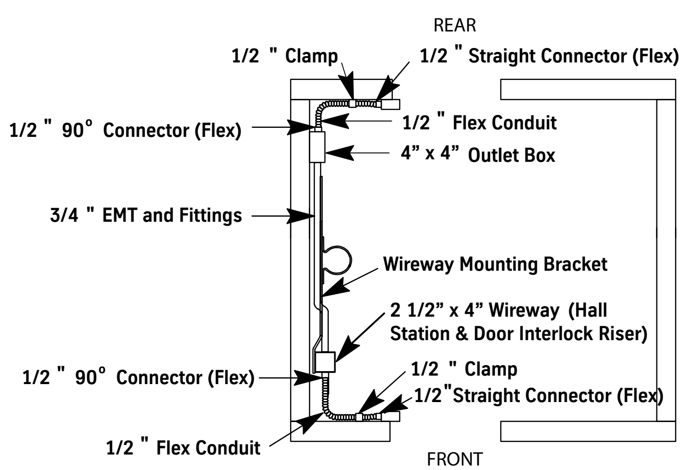
Simplex Hoistway Wiring Details



HALL LANTERNS or POSITION INDICATORS



HALL STATION or FIRE SERVICE SWITCH



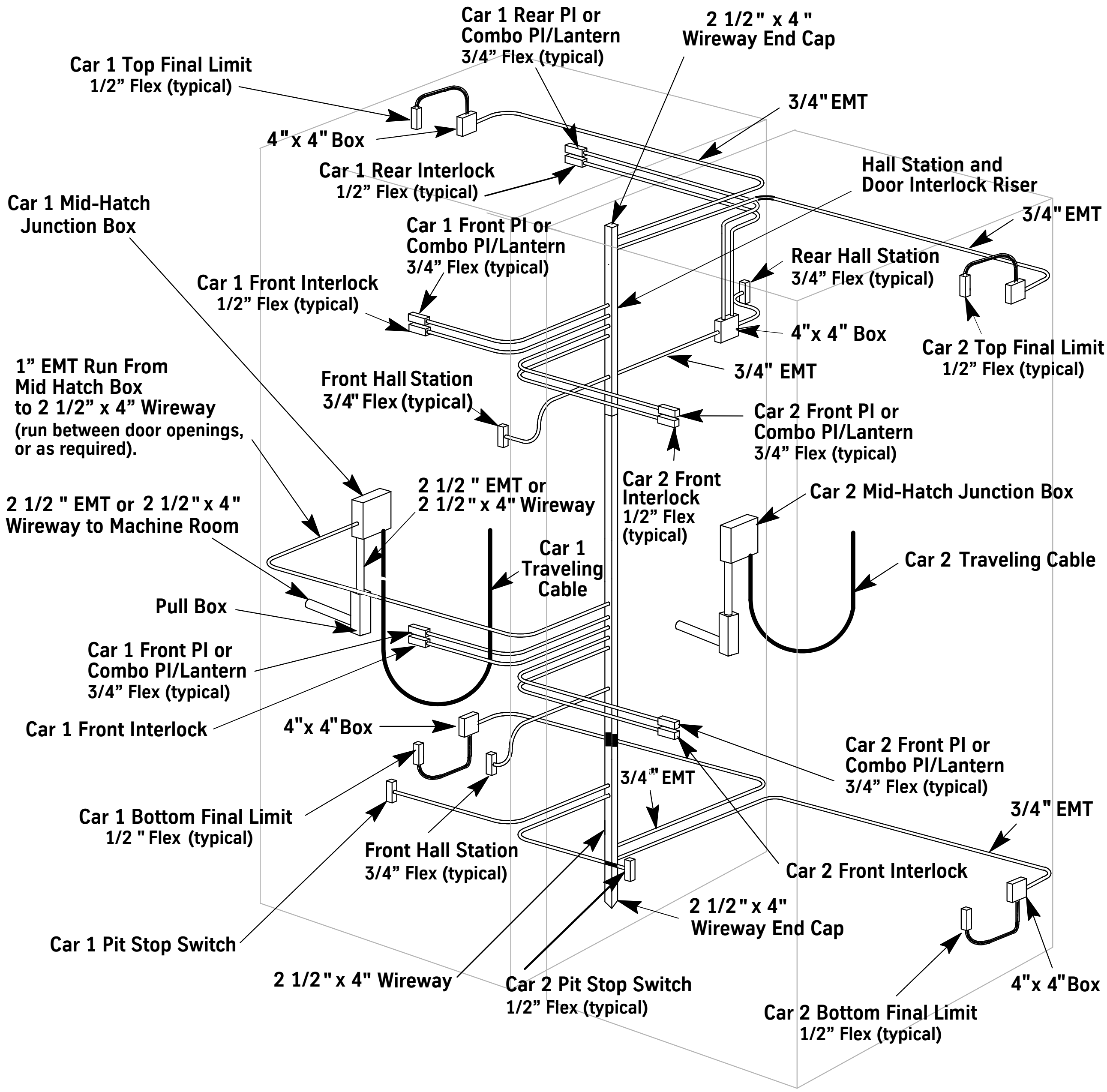
NOTE: Rear openings are optional.

DOOR INTERLOCK

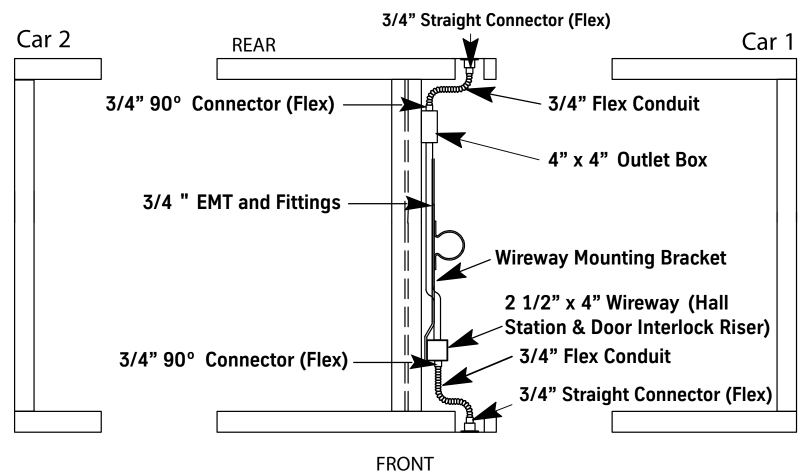
VERTICAL EXPRESS

ICON CONTROLLER

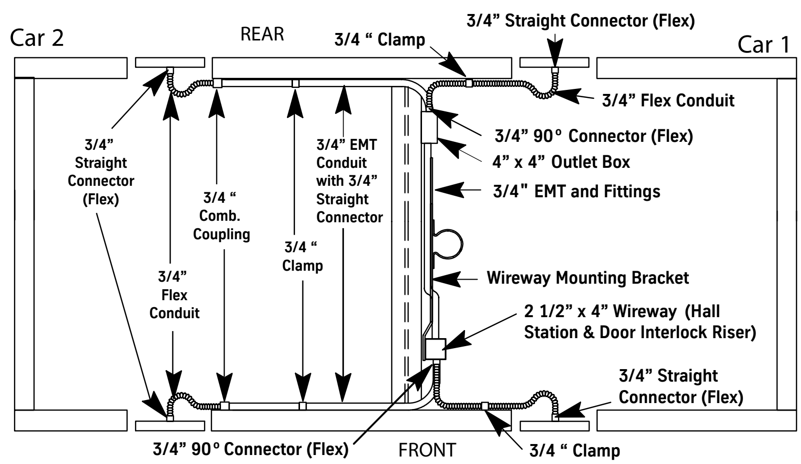
Duplex Hoistway Wiring



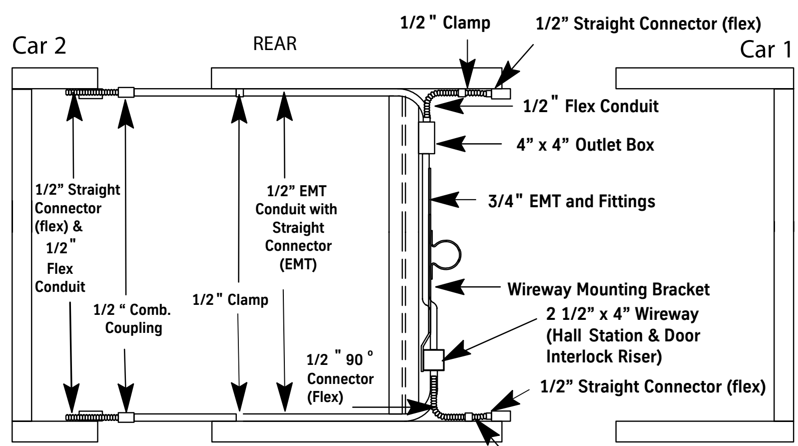
Duplex Hoistway Wiring Details



HALL STATION or FIRE SERVICE SWITCH



HALL LANTERNS or POSITION INDICATORS

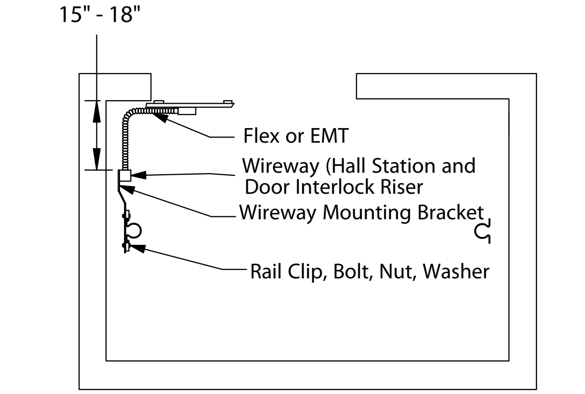


Note: Rear Openings are optional.

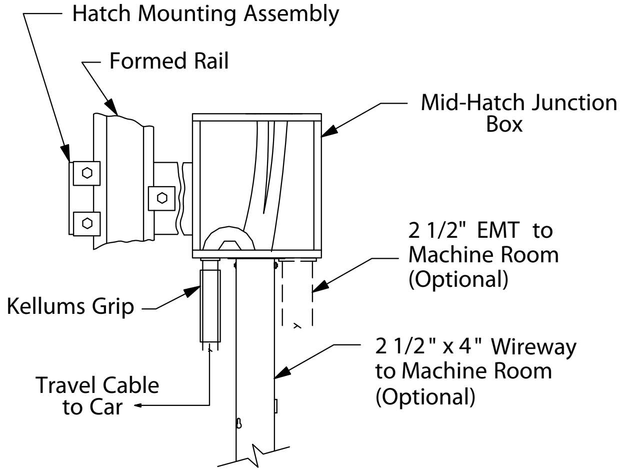
FRONT

DOOR INTERLOCK

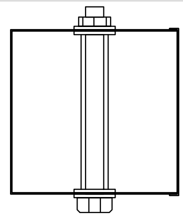
Hoistway Wiring Details



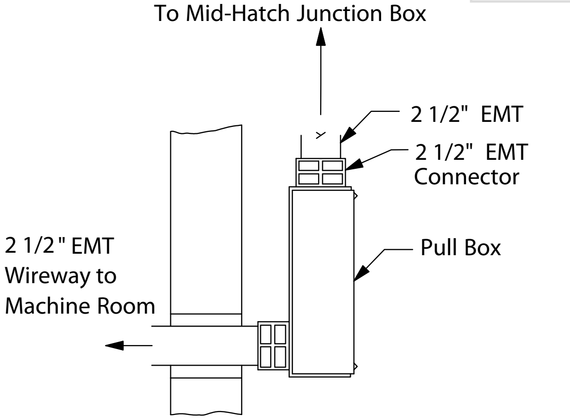
Wireway and Wireway Bracket Mounting Detail
(one bracket per 10 foot stick of wireway or as required)



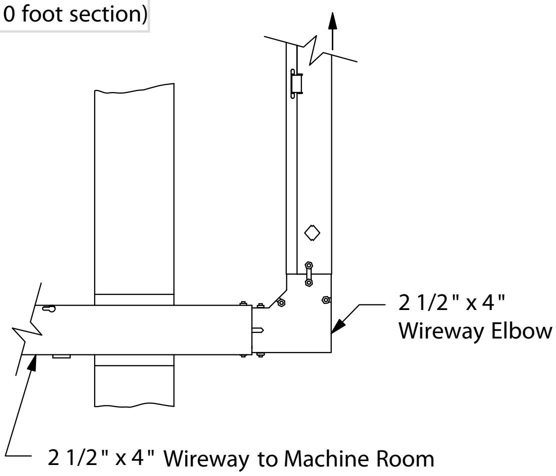
Junction Box Mounting



Strain Bolt Detail
(one bolt per 10 foot section)



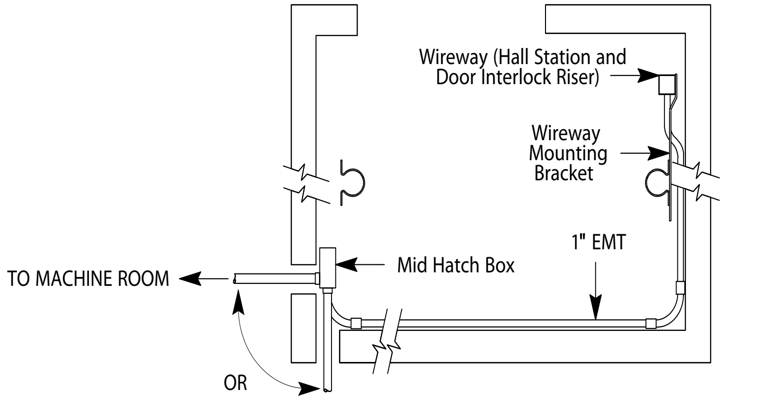
2 1/2" EMT to Machine Room Pull Box Installation (optional)



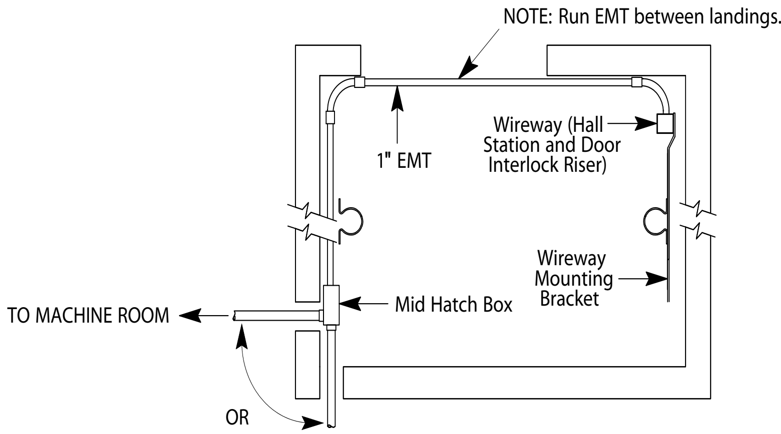
Wireway to Machine Room Installation (optional)

ICON CONTROLLER

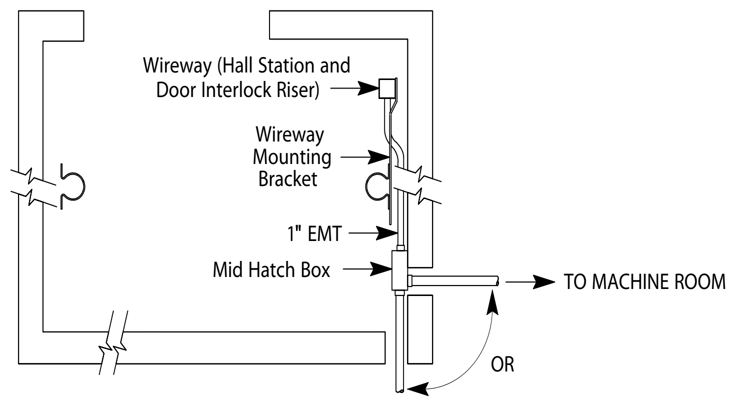
Mid-Hatch Box To Wireway and Machine Room Wiring



OR



OR



Hoistway Entrance Frames & Doors

Install the Entrance Frames and Hoistway Doors. See the Vertical Express *Entrance* component manual for instructions.

Cab

See the Vertical Express *Installation* manual for instructions.

Door Operator

Mount the door operator(s) and complete the external mechanical adjustments. See the job wiring diagrams and the *HD-11 with UIT* or the *LD-03 with UIT* Door Operator component manuals (included in this book) for instructions.

Selector Box Mounting and Alignment

Required Material

- 1 - Selector stile bracket.
- 1 - Selector assembly.
- 4 - 5/16" bolts, lockwashers, and nuts.

1. Place the car at or near the top of the hoistway.

2. Use two (2) 5/16" hex bolts, nuts, and lockwashers to mount the selector stile bracket to the stile. See Figure 8 on page 20 and Figure 9 on page 21 for all steps in this procedure.

Note: Mount the bracket as high as possible to provide access to the magnets from the car top, and leave the bracket loosely attached.

3. Before mounting the selector, check that the plate nuts are on the correct side of the selector box for mounting to the selector stile bracket. If not, do the following:
   a. Loosen the nine (9) screws holding the selector box and the selector harness covers.
   b. Remove the selector box and the harness covers.
   c. Remove the plate nuts from their slots and place them in the corresponding slots on the opposite side of the selector.
   d. Replace the covers, and tighten the screws.

4. Turn the selector over and loosen the four (4) thumb-screws holding the auxiliary sensor assembly.

5. Carefully separate the auxiliary sensor assembly from the main sensor assembly.

Note: The connector (and sometimes the guides) between the two cards will offer resistance so that the auxiliary sensor assembly cannot be removed evenly.

6. Ensure that four (4) tape guide halves are attached to the auxiliary sensor card, and four (4) tape guide halves are attached to the main sensor card.

7. Use two (2) 5/16" hex bolts and lockwashers, carefully hold the parts in place, and mount the selector box to the selector stile bracket.

Note: Leave the selector box loosely attached and pulled back away from the tape.

8. Adjust the selector mounting bracket so that the selector box is centered side-to-side, vertically, and parallel to the tape. Tighten the bracket to the stile.

9. Move the selector box toward the tape until all the guide halves just touch the tape. Tighten the selector box to the bracket.

10. Align the selector box with the selector tape so that the tape will go through the guides in a straight path.

Note: The guides must not bend the tape.

11. Align the auxiliary sensor assembly with the selector box alignment pins and the connector on the main sensor assembly.

Selector Box Mounting and Alignment

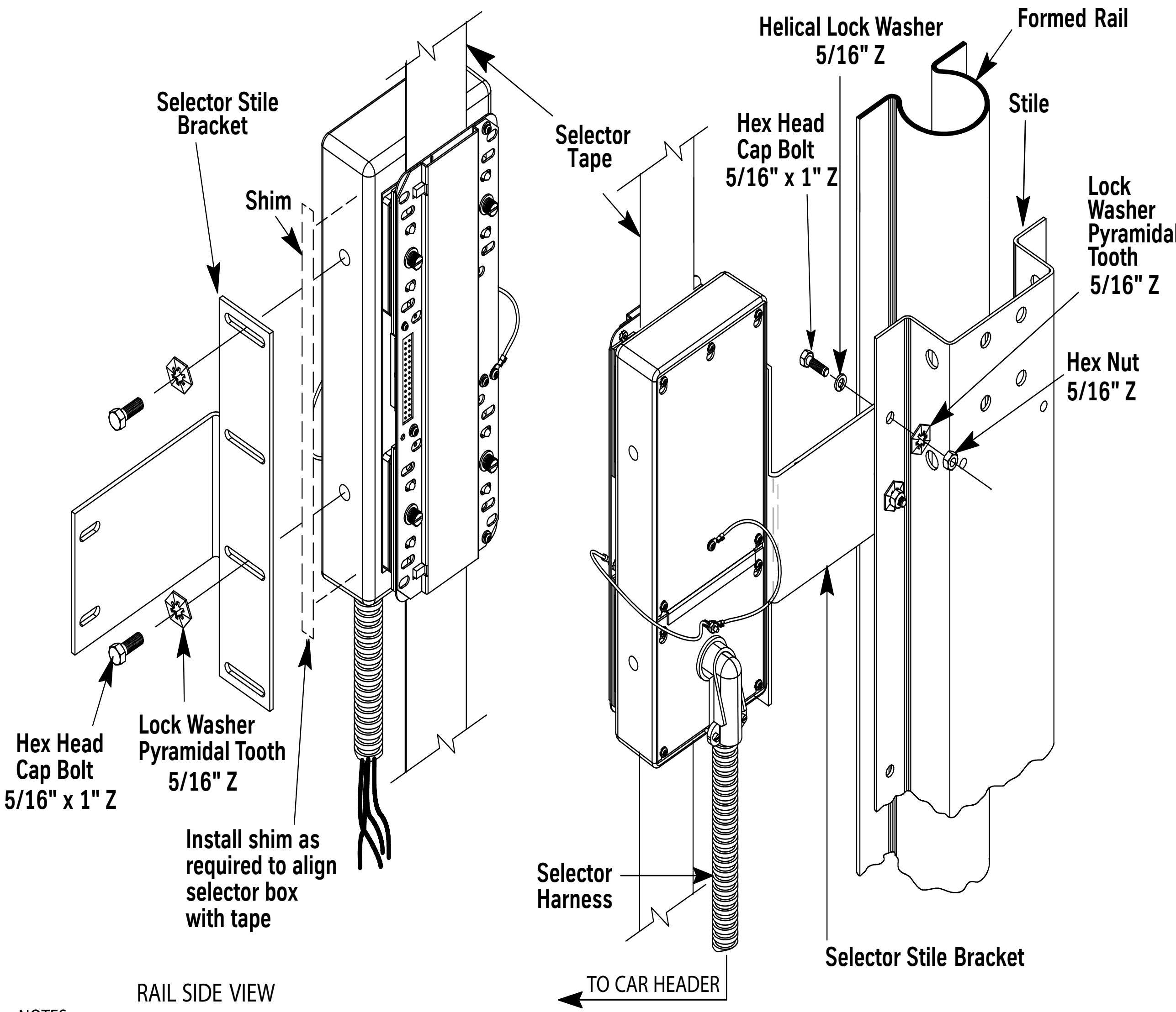
(continued)

12. Be careful not to cross thread the thumbscrews, and turn the thumbscrews into the box about four (4) turns.

13. Press the auxiliary sensor assembly into place. Tighten the thumbscrews enough to compress the lockwashers.

14. Verify the following and, if necessary, readjust,

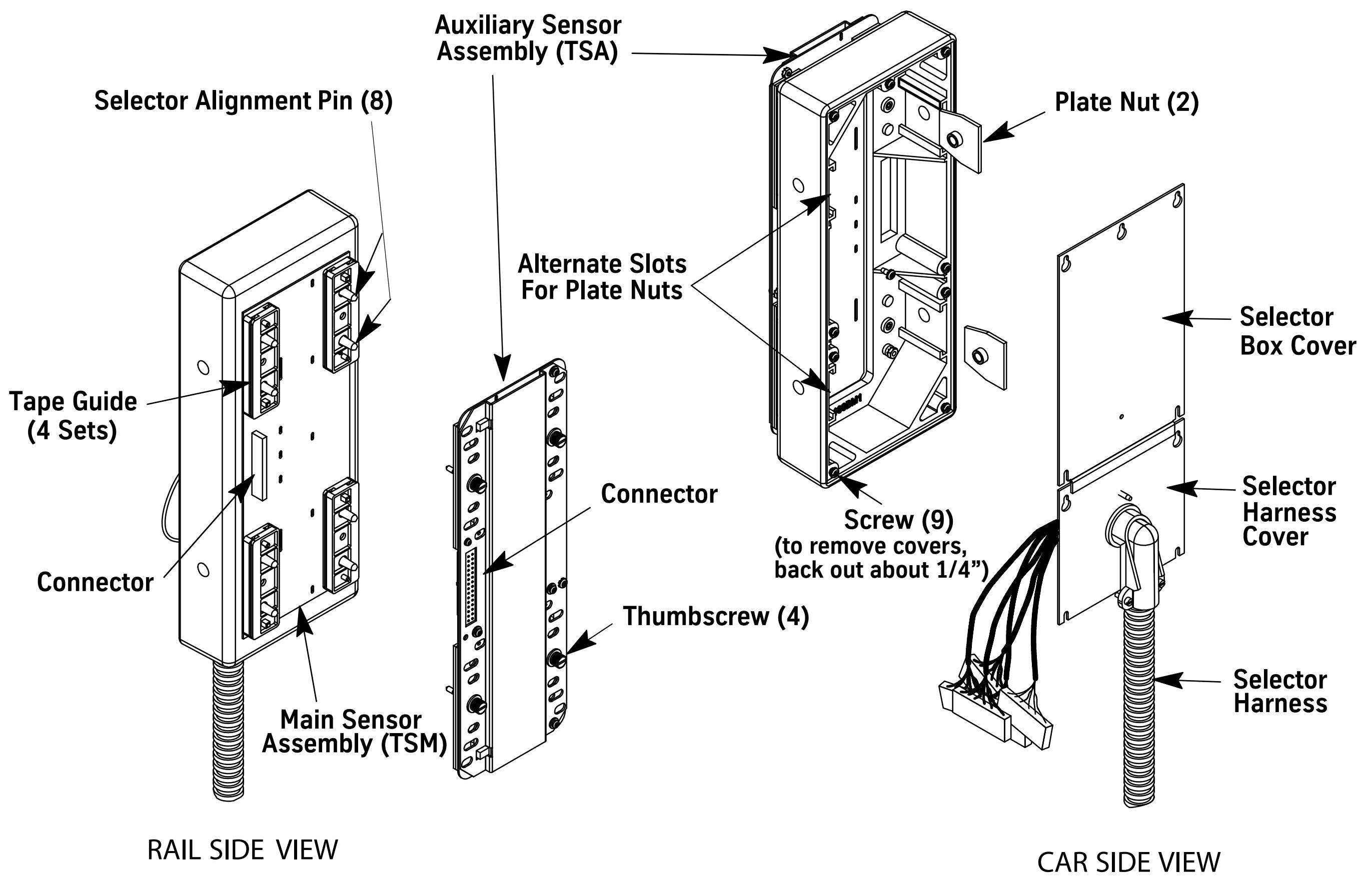
- The selector box is centered on the tape.
- The guides are not deflecting the tape from front to back.
- The guides are not pressing against the sides of the tape.



NOTES:
For opposite hand mounting, move selector stile bracket to other side of selector.
Align selector with the tape when the car is at the top of the hoistway.

Figure 8 - Selector Box Mounting

Selector Box Mounting and Alignment
(continued)



CAUTION! When removing the Selector Card from the Selector Assembly, do not excessively bend or put undue stress on either card.

Figure 9 - Selector Box Components

Close Landing Equipment
(if required)

Note: The close landing floor is the upper floor of the close floor pair.

1. From the car top, install the switch stile bracket into an available quadrant. See Figure 10 for this and all additional steps in this procedure.
2. Mount the leveling vane bracket on the rail at the upper floor of the close floor pair.
3. Mount the leveling vane mounting strut to the leveling vane bracket.
4. Mount the leveling vane to the leveling vane mounting strut.
5. Mount the magnetic switch assembly to the switch stile bracket.
6. Make sure that the car is level with the close landing floor, and adjust the leveling vane and the magnetic switch assembly so that the leveling vane will be vertically and horizontally centered within the magnetic switches.

Notes:

- Additional leveling vane or magnetic switch adjustment may be required before turning the car over to the customer.
- The magnetic leveling unit takes the place of the BPs and leveling magnets at the landing in question.

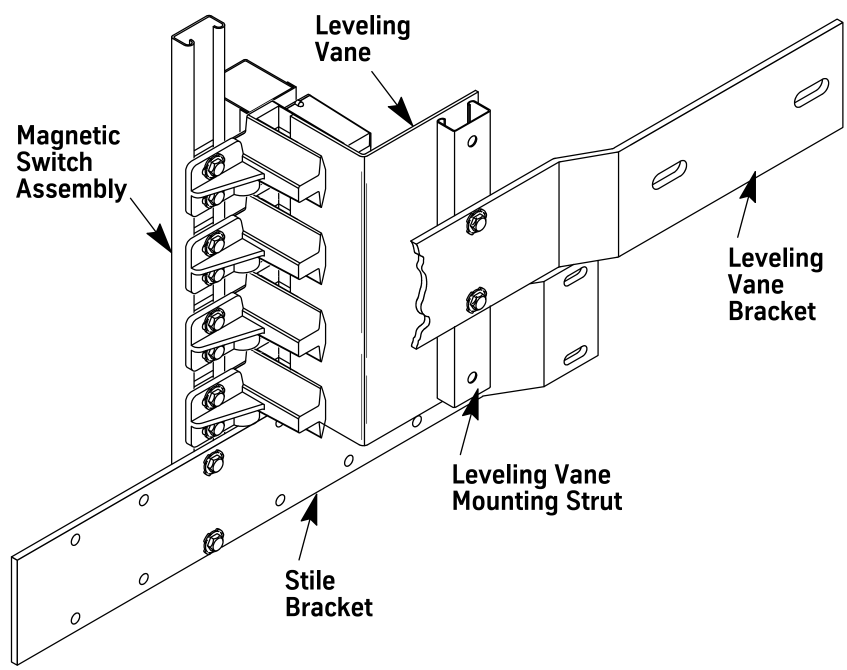


Figure 10 - Close Landing Equipment

Car Top Wiring

Required Material

- Door operator harness (front and rear, as required).
- Fan and lights harness.
- Slotted end cap(s).
- Slotted cover plates.
- 2 1/2" Wireway (rear doors only).
- 1/2" Flex conduit and fittings.
- Auxiliary swing return harness (as required).

Notes:

- Slotted end caps and cover plates are shipped from manufacturing in the wiring package.
- In all steps, leave any excess wire in the header.
- Unless stated otherwise, all of the following steps are for all jobs.

1. Insert the end of the selector harness (with the MTA connectors) through the end of the header and into the main swing return. Connect the flex conduit to the car header end cap, or where the selector harness enters the car. Leave the wires disconnected in the swing return. See Figure 11 on page 24 or Figure 12 on page 25 for this and all additional steps in this procedure.
2. Connect front door operator harness to the slotted cover plate, and pull MTA connectors through the header and into the main swing return. Leave disconnected in swing return.
3. On jobs with selective doors, wire the rear door operator harness as follows:
    a. Begin in the rear header nearest the door operator, and connect the flex conduit from the rear door operator harness to the slotted cover plate.
    b. Pull the rear door operator harness out through the rear header cover plate to the 2 1/2" wireway that runs along the side of the car top.
    c. In the second hole of the 2 1/2" wireway, attach the flex conduit onto the harness.
    d. In the opposite end of the 2 1/2" wireway cover, start at the second hole and attach the next section of flex conduit to the cover plate of the front header.
    e. Route the harness cable through the front header and pull the connectors into the main swing return. Leave disconnected in the swing return.
4. Connect the wires from the door protective device to the door operator terminal strip.
5. Install conduit, and pull the lights and fan wiring to the main swing return terminal strip.
6. Pull the front auxiliary swing return harness through the header and into the main swing return. Connect the MTA connectors.
7. On jobs with selective doors, wire the rear auxiliary swing return harness as follows:
    a. Pull the rear auxiliary swing return harness through the rear header to the end cap nearest the 2 1/2" wire way that runs along the side of the car top.
    b. Attach the flex conduit to the rear header end cap and also to the first hole in the 2 1/2" wireway cover.
    c. Attach the flex conduit to the other end of the wireway cover and also to the end cap of the front header.
    d. Route the harness cable through the front header and into the main swing return. Connect the MTA connectors.

Car Top Wiring
(continued)

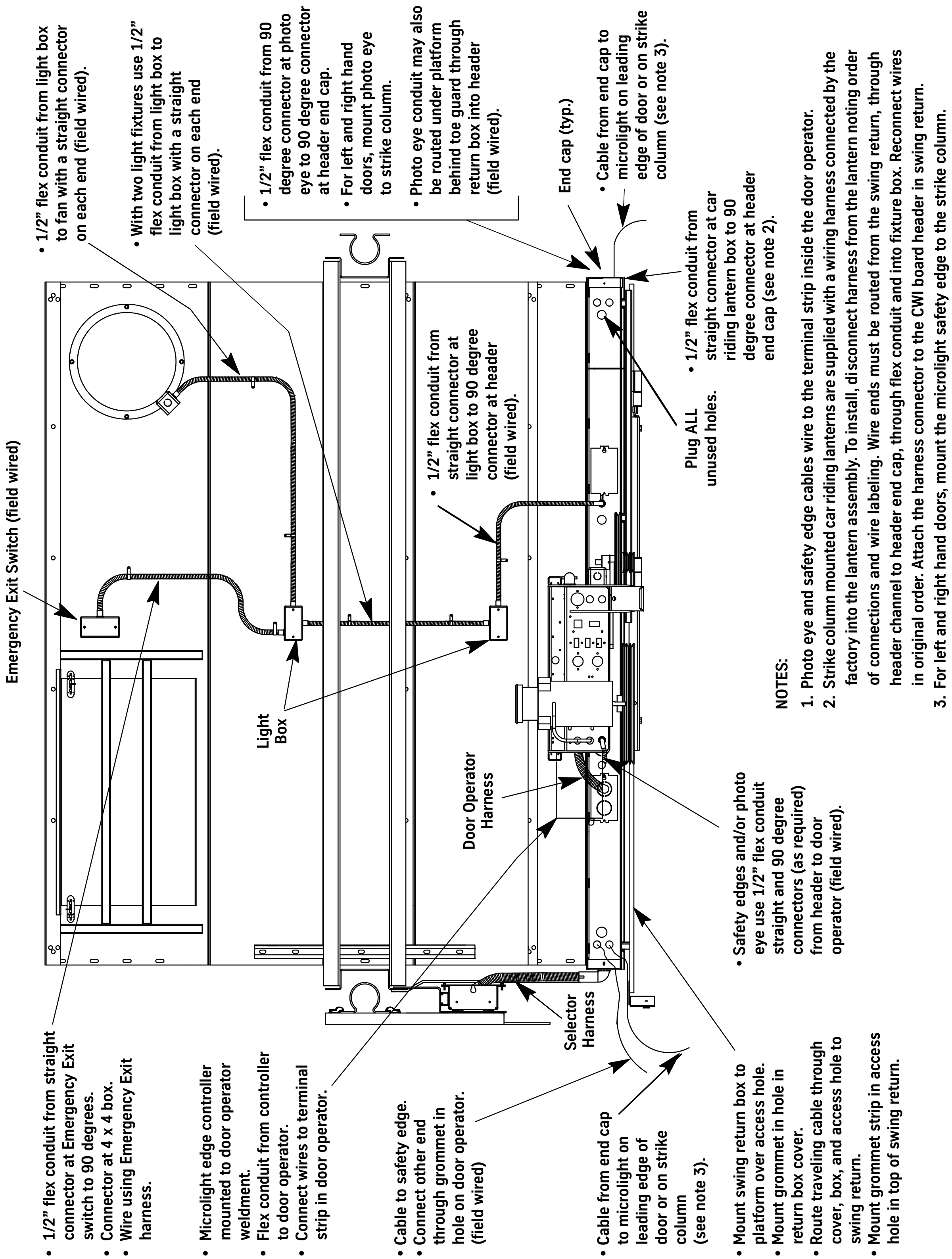


Figure 11 - Typical Car Top Wiring (shown with Vertical Express HD-11 Door Operator)

Car Top Wiring
(continued)

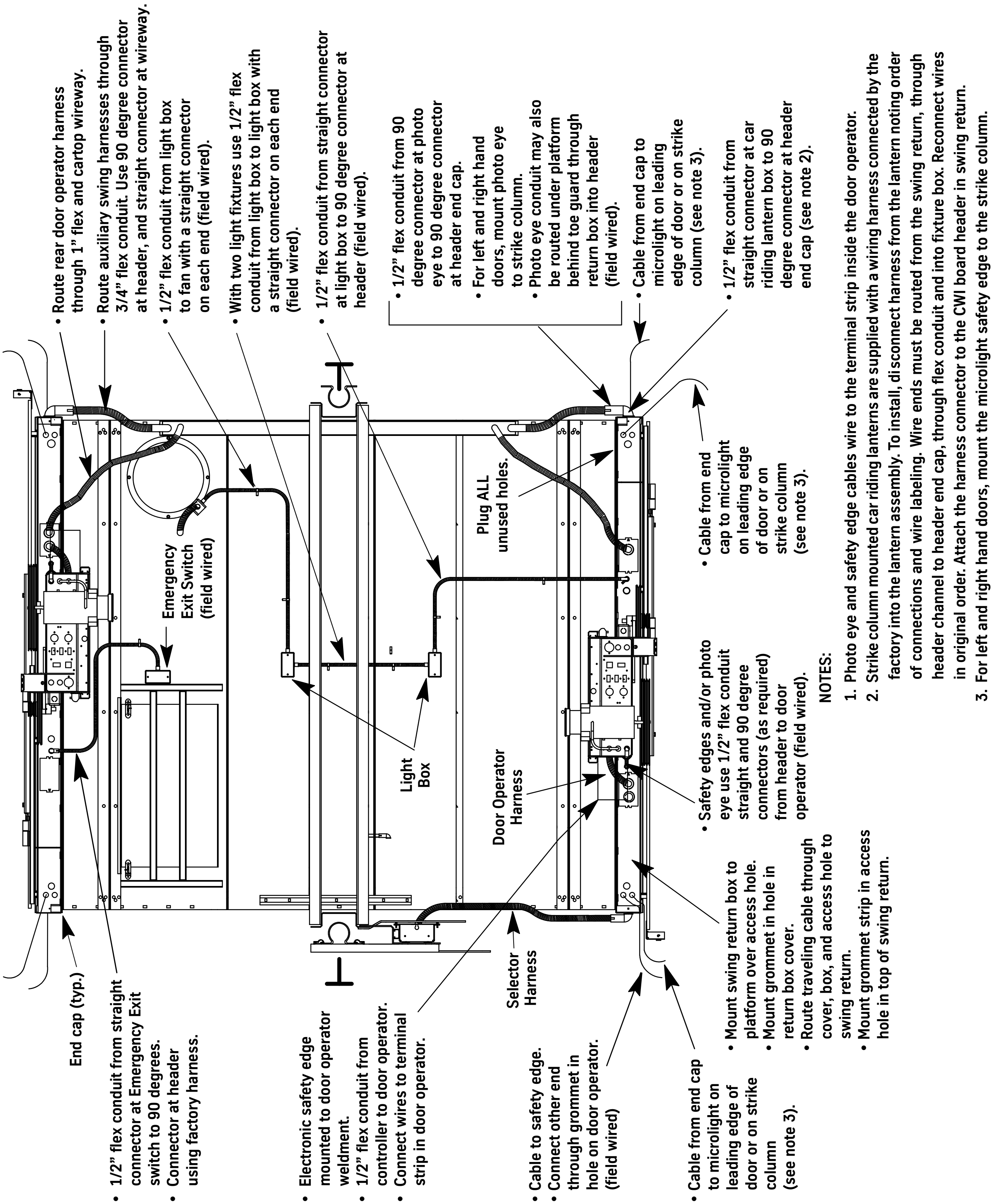


Figure 12 - Car Top Wiring—Front and Rear Doors (shown with Vertical Express HD-11 Door Operator)

Car Top Wiring
(continued)

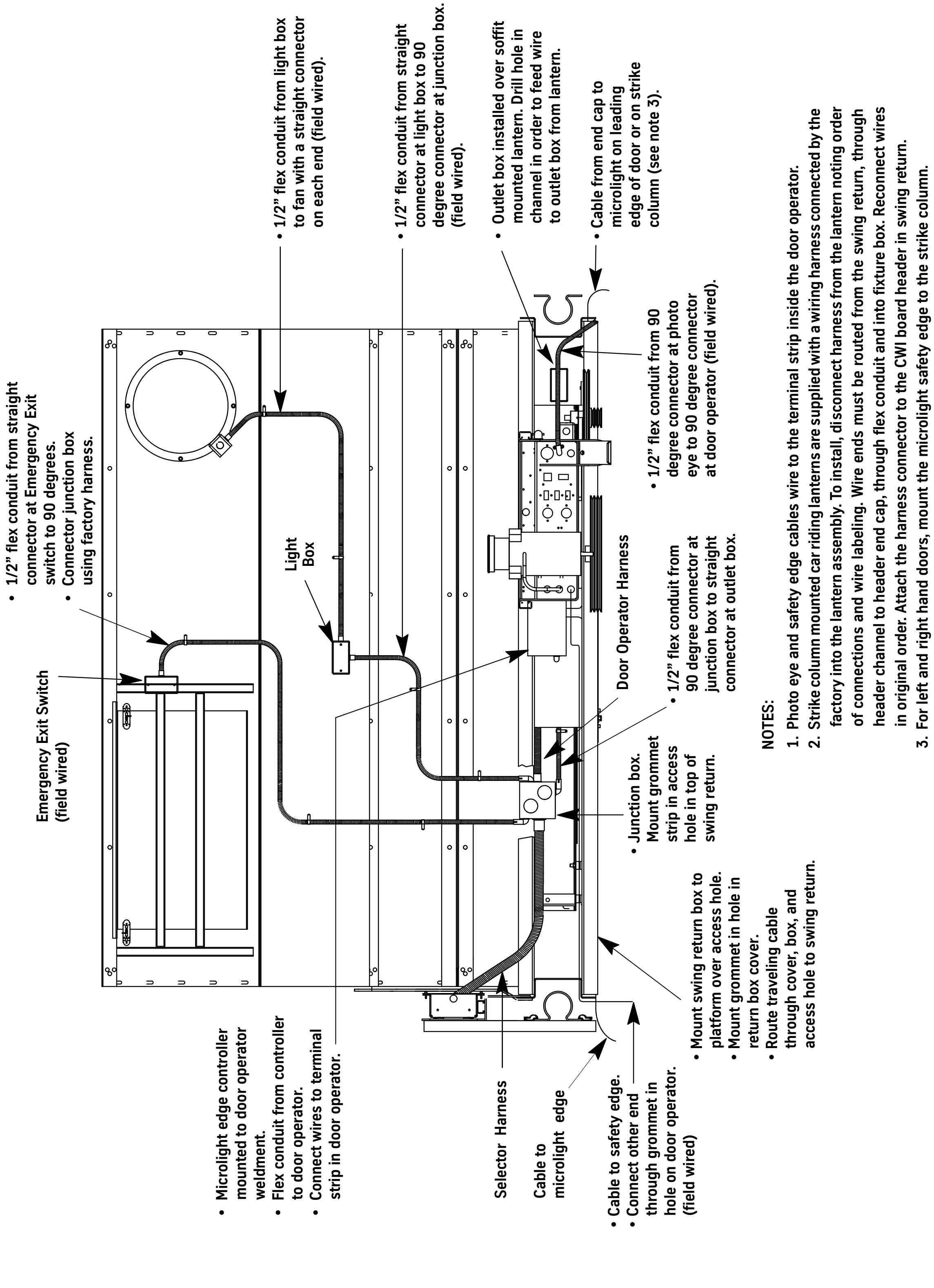
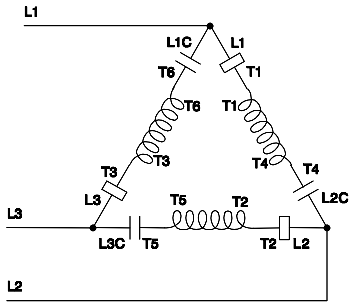
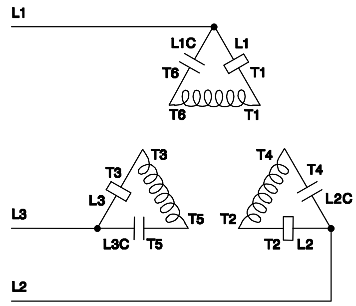


Figure 13 - Cimarron Car Top Wiring

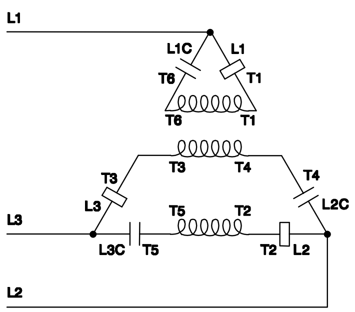
Car Top Wiring
(continued)



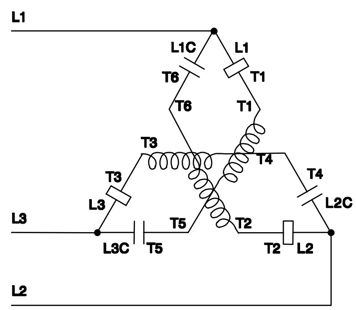
CORRECT



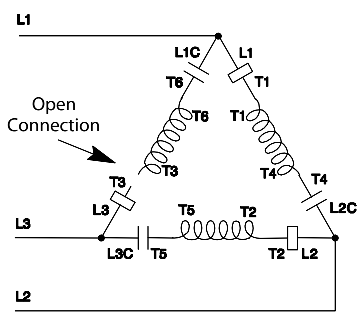
3 WINDINGS DEAD
Incorrect



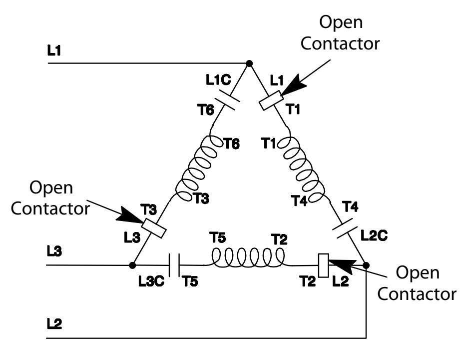
1 WINDING DEAD
Incorrect



SWAPPED MOTOR LEADS
Incorrect



OPEN CONNECTION
Incorrect



OPEN CONTACTOR
(Power Applied)
Incorrect

Figure 14 - Delta Wiring Configurations

Swing Return Wiring

1. Connect the traveling cable to the CWID card. See the swing return terminal label, the job wiring diagrams, and Figure 15 for all steps in this procedure.
2. Turn OFF, Lock, and Tag out the lights and fan disconnect.
3. Connect the lights and fan wiring (L10, L10s, L20, & ground) to swing return terminal strip.
4. Connect the following harnesses to the CWID card. See the labels on the harness to identify the correct plugs,
   - Selector.
   - Front door operator.
   - Rear door operator.
5. Ensure that all other MTA connectors in the main swing return are connected to the CWID card.
6. Verify that the SWAC (for door operator) and SWP24 (for swing return power) switches on the CWID card are turned OFF.
7. Configure the Inspection / Hoistway access wiring,
   - Jobs without in-car access: Place a header jumper across pins 3 and 4 of Connector 301 on the CWID card.
   - Jobs with in-car access: Plug the harness connector onto Connector 301 on the CWID card.

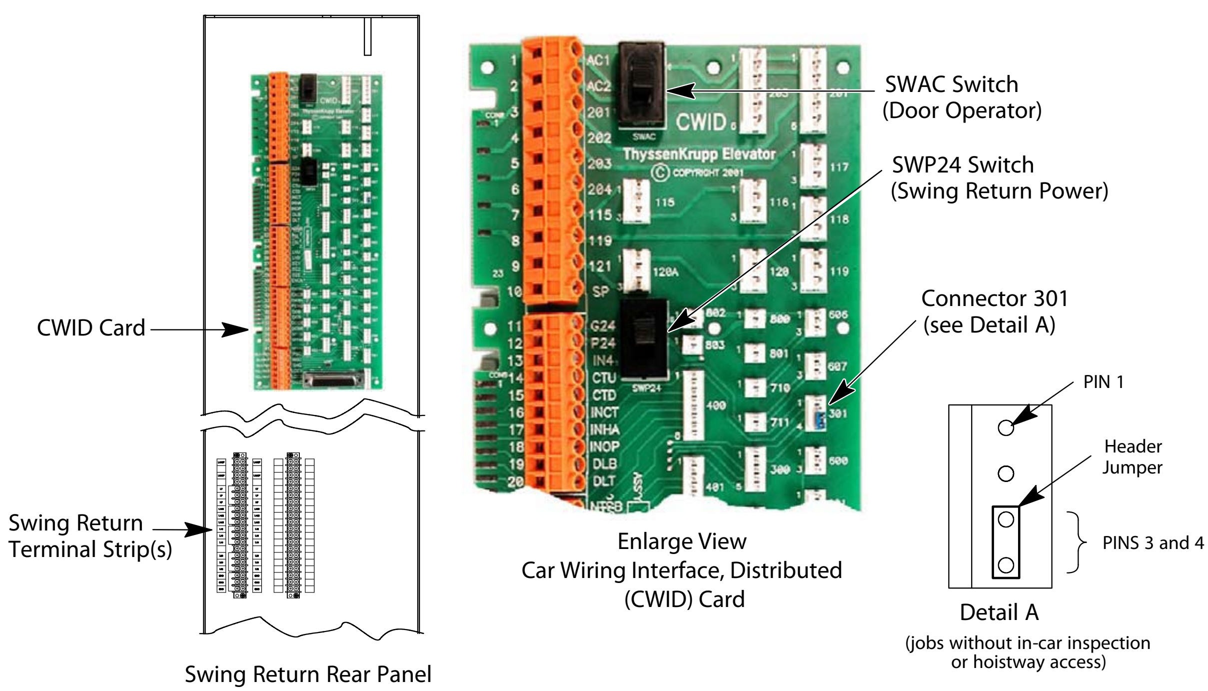


Figure 15 - Swing Return Terminal and MTA Locations

Machine Room

Controller Card Connections

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Start in the controller and connect the hall station, the position indicator, the door interlock, the limit switch, and the pit stop switch wiring to the HCID card and the field terminal strip (located behind the HCID card). See the job wiring diagrams and Figure 16 for all steps in this procedure.
3. Start in the controller and connect the traveling cable to the TCID card and the field terminal strip (located behind the TCID card).

Notes:

- Route the mainline power through the top left-hand corner of the controller.
- Route the hoistway wiring and traveling cable through the top right-hand corner of the controller.
- Only for group jobs: Wire the controller cross-connects between the field terminal strips.

4. Wire the building power and other necessary connections (emergency power, telephone, etc.) to the field access terminals.

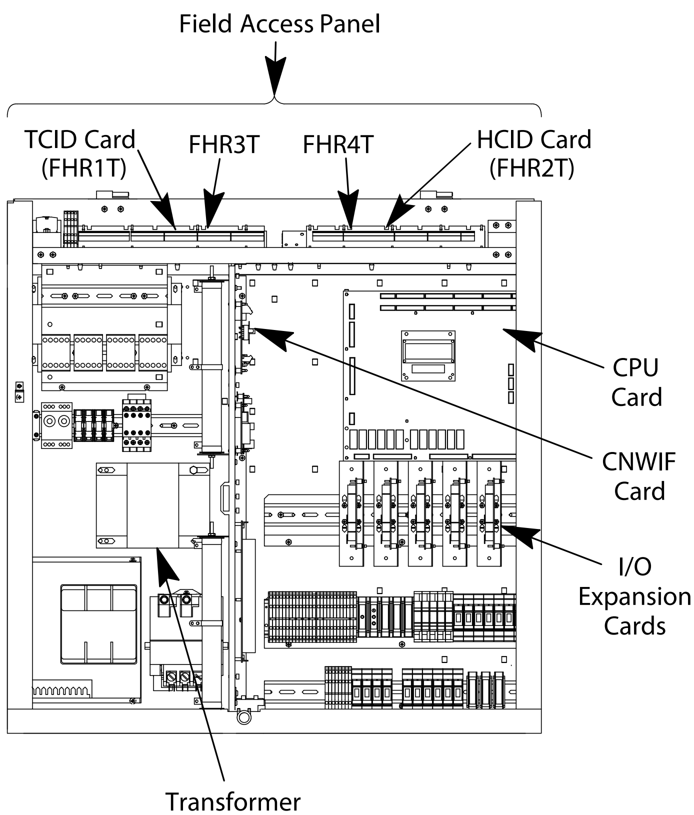


Figure 16 - Controller Card Locations

Preliminary Adjustment

Temporary Operation Removal

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Place the car top inspection switch in INSP position, and stop switch in STOP position.
3. If present, remove the temporary run box.
4. Remove all temporary orange jumpers to terminals TR101, TRUS, TRUS1, and TRSCG2.
5. Remove all orange jumpers from the electronic starter.
6. Connect CON9, CON11, CON17, and CON18 on the 188E CPU card. See Figure 17.
7. Make sure there is a permanent jumper between CON5-6 and CON5-7 on the CNWIF card.
8. Remove any remaining temporary jumpers.
9. Turn ON the mainline disconnect.
10. Verify these LED's on the CPU card. If the LED's do not act as described below, see *On-Card Diagnostics* in the Troubleshooting Section.
    - INIT and C4_INIT LED's will flicker then be ON solid.
    - WD LED will be ON solid after a short period.
    - F6K_STAT LED will be either ON solid or OFF solid, and C4_STAT LED will be OFF.
11. Turn OFF, Lock, and Tag out the mainline disconnect.

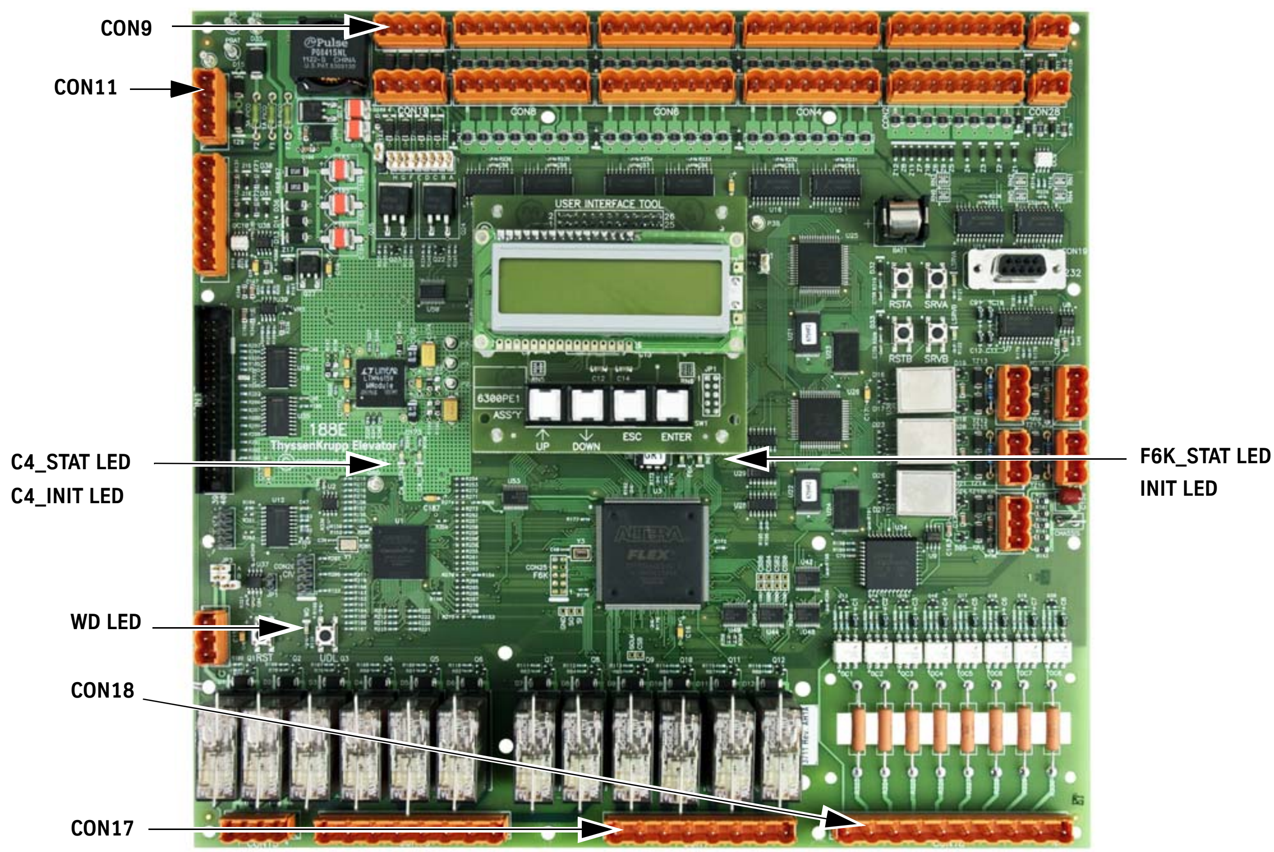


Figure 17 - 188E CPU Card

VERTICAL EXPRESS

Preliminary Adjustment
(continued)

Safety String Check Out

1. Remove any safety circuit jumpers that were installed for temporary operation.

2. Ensure that car door is closed, and all hoistway doors are closed and locked.

3. Turn on the mainline disconnect.

4. Check the car I/O screen in the UIT, and verify that the I/O matches the values in Table 3.

I/O Mnemonic	INSPECTION	
	NOT Running	UP Run
CSTOM	1	1
DZ1M	1	1
DZ2M	1	1
EPNP	1	1
HDIF	1	1
CDCF	1	1
GLM	0	0
IN	0	0
INCT	1	1
IND	0	0
INU	0	1
MCD	1	0
MCE	0	1
OLTO	1	1
OLTS	0	0
SAFE	1	1
VC1A	0	0
VC1B	0	0
VC2A	0	1
VC2B	0	1
VC3A	0	0
VC3B	0	0
VC4A	0	0
VC4B	0	0

Table 3 - UIT I/O State

I/O Expansion Card Setup

1. If I/O expansion cards are present, configure their addresses using either JP1 (low voltage) or JP5 (high voltage) jumpers. See Table 4 and Figure 18 on page 32 for details.

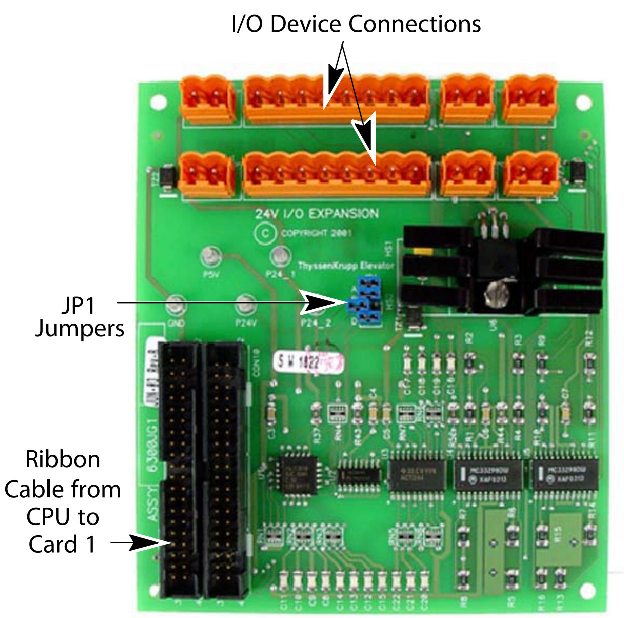
Note: For High Voltage Only: Verify jumpers JP1 through JP4. See the job's I/O assignment.

2. Use the EIO Command (if needed) to determine the job requirements for the I/O cards.

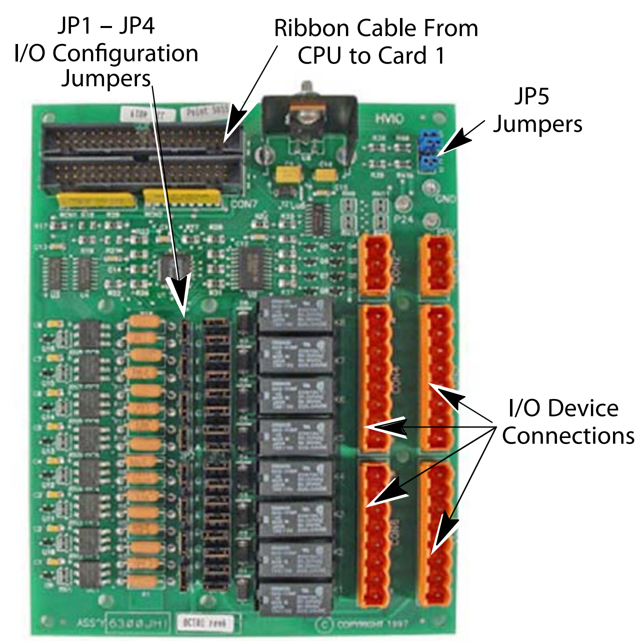
I/O Expansion Card Setup
(continued)

EIO(n)	Card No.	Jumpers ON
EIO0(zero)	1	A, B, D
EIO1	2	B, D
EIO2	3	A, D
EIO3	4	D
EIO4	5	A, B, C
EIO5	6	B, C
EIO6	7	A, C
EIO7	8	C
EIO8	9	A, B
EIO9	10	B
EIO10	11	A
EIO11	12	None

Table 4 - I/O Expansion Card Address Jumper Configuration



24V Low Voltage I/O Expansion Card (JP1)



High Voltage I/O Expansion Card (JP5)

Figure 18 - I/O Expansion Card Jumper Verification

Car Top Inspection Operation

1. Place the car top AUTO / INSP switch in the INSP position.

2. Place the swing return power switch in the ON position.

3. Verify that the car will not run with the car top stop switch in the STOP position.

4. Place the car top run/stop switch in the RUN position.

5. Verify that the car will only run up when the UP and SAFE buttons are pressed.

Note: If car does not move, use Figure 19 and Table 5 on page 34 to verify the I/O status.

6. Verify that the car will only run down when the DOWN and SAFE buttons are pressed.

Note: If car does not move, use Figure 19 (below) and Table 5 on page 34 to verify the I/O status.

7. Verify that the car will not run with the car or any hoistway door open.

8. Verify that the car will not run when any contact in the safety circuit is opened.

9. Place the AUTO / INSP switch in the AUTO position.

CAUTION **Be prepared for unexpected car motion when AUTO / INSP is placed in the AUTO position.**

10. Press the UP and SAFE buttons, and then the DOWN and SAFE buttons to verify the car will not run in either direction.

11. Place the AUTO / INSP switch in the INSP position.

```
                    CAR CONFIGURATION DATA REPORT                          MS17
JOB NUMBER: FU008107                                        BY: RMG    DATE: 11/08/04
NUMBER OF JOBS:   1                                                    ESB518 101104
CAR NUMBER: FU0081       CAR DESIGNATION 1        LAYOUT DESIGNATION    1
    CAR CONFIGURATION DATA:

VALVE_TYPE              = 1
MOTOR_STARTER_TYPE      =1
STOP_SWITCH_RELEVEL     = 1
CAR_IO_ASSIGNMENTS      =
INU     IND     INCT    INOP    INHA    INCN    IN      INHAM           END
MCD     MCE     DZ1M    DZ2M    DZ1     DZ2                             END
DLB     DLT     NTSB    NTST    TSL1    TSL2    LVD     LVU             END
CSTO    CSTOM   CDCFM   HDIFM   CDBM    HDBM                            END
FSM     FSX     FSE     EPNP    FSH1    FSH2    FSH5                    END
DOB     DCB     BUZ     ISC     FSC1    FSC2    FSCC    FSRI            END
BP1     BP2     BP4     BPP     CCIE            HLU     HLD             END
                                                                        END
VC1A    VC1B    VC2A    VC2B    VC3A    VC3B    VC4A    VC4B            END
MCC1    MCC2    MCC3    DZE                                             END
SAFE    CST                     CDCF            HDIF                    END
C2      C1      PI2     PI1                                             END
                                                                        END
                                                                        END
DAD     DAU                                             ;
```

Figure 19 - Car Configuration Data Report

Car Top Inspection Operation

(continued)

Car Top Inspection, Car at Floor Level, Electronic Starter			
Port Number	Port Status	Car Condition	Comments
Port 1	00100001	Car Idle	INCT on for Car Top Inspection, INU or IND on for direction.
	10100001	Car Running Up	
	01100001	Car Running Down	
Port 2	10110000	Car Idle	MCD off & MCE on for UP, MCD off for down.
	01110000	Car Running Up	
	00110000	Car Running Down	
Port 4	01001100	Car Idle	Door contact and Stop Switch monitors on.
	01001100	Car Running Up	
	01001100	Car Running Down	
Port 9	00000000	Car Idle	VC2A, VC2B on for UP. VC1A, VC1B on for down.
	00110000	Car Running Up	
	11000000	Car Running Down	
Port 10	10000000	Car Idle	MCC1-3 on for UP, MCC1 on at idle or down.
	11100000	Car Running Up	
	10000000	Car Running Down	
Port 11	11111111	Car Idle	Safety String, Stop Switch, Door Locks & Contacts made.
	11111111	Car Running Up	
	11111111	Car Running Down	

Table 5 - I/O Status

The following I/Os are optional and could be located in various positions for different jobs, but should be verified if there is some problem. Use the job's car configuration data report to identify the I/O port assignments (for verification with the UIT),

- EPNP = Emergency Power/Normal Power, should be on at all times (unless on Emergency Power).
- OLTO = Oil Temperature Over Limit, should be on at all times (unless the oil is too hot to allow a run).
- OLTS = Oil Temperature Set, indicates that the oil is cold and needs some heat for proper valve operation (should be OFF, but the car can still run if ON).

Selector Tape Magnet Installation

Selector Tape and Box Inspection

1. Inspect and clean the selector tape. Use a wire brush to remove cement, drywall, mud, etc., and use fine sandpaper (400 grit) to remove nicks and burrs.

2. After cleaning, wipe down the tape with a clean rag. If the tape cannot be completely cleaned, it MUST be replaced.

3. Inspect the selector box for damage or defects. The guides must be free of dirt, not binding on the tape, or be extremely loose.

Slowdown and Directional Magnet Placement

See Figure 20 for these notes,

- Slowdown and directional magnets are placed on the side of the tape facing away from the car (back side).
- Handed references are noted as if facing the tape from the car.
- Magnets have magnetic south marked with a bright yellow stripe.
- Install the directional and terminal magnets after the slowdown magnets.

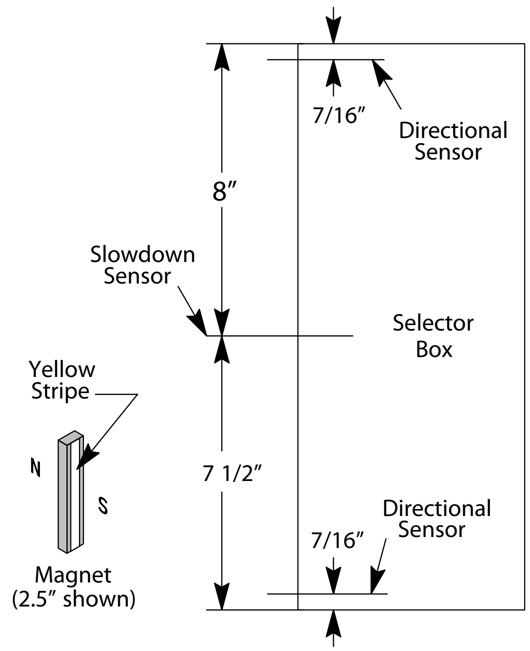


Figure 20 - Directional and Slowdown Sensor Locations

Bottom Slowdown (NTSB) Magnet Placement

1. Level the car at the bottom landing.

2. From the bottom of the selector box, measure down 11/16" and mark the tape with a marker (this is Mark A). See Figure 21 on page 37 for all steps in the bottom magnet placement procedures.

CAUTION **Using a metal scribe will damage the tape.**

3. Mark the tape level with the top of the selector box (this is Mark B).

Note: If necessary, move the car to gain access to the marked area.

4. Based on the down car speed, use Dimension X (from the table) to draw Mark C on the tape above or below Mark B.

5. Determine the number of 8" magnets needed for slowdown.

In the following step, the magnets are placed end-to-end, with no gap between them. The south side (bright yellow stripe) faces away from the tape. A mirror may be used to view magnets.

6. On the back side of the tape, start the slowdown magnets at Mark C, extending them downward until one overlaps Mark A.

7. Use the magnet alignment tool to align the magnets to the edge of the tape.

Bottom Directional Limit (DLB) Magnet Placement

1. Divide by 8 the amount of run-by, and round the result to the next highest whole number. This is the number of 8" magnets needed for the directional limit.

Note: Where a final limit switch is required, the directional limit magnets must overlap the final limit switch activation point.

2. On the back side of the tape, start the directional limit magnets at Mark A, extending them downward.

3. Use the magnet alignment tool to align the magnets to the edge of the tape.

4. Run the car onto the bottom directional limit and confirm that the car stops and has traveled 1" - 1 1/2" past the bottom floor.

Note: The car Input/Output screen in IMS can be used to view the activation of the directional limit.

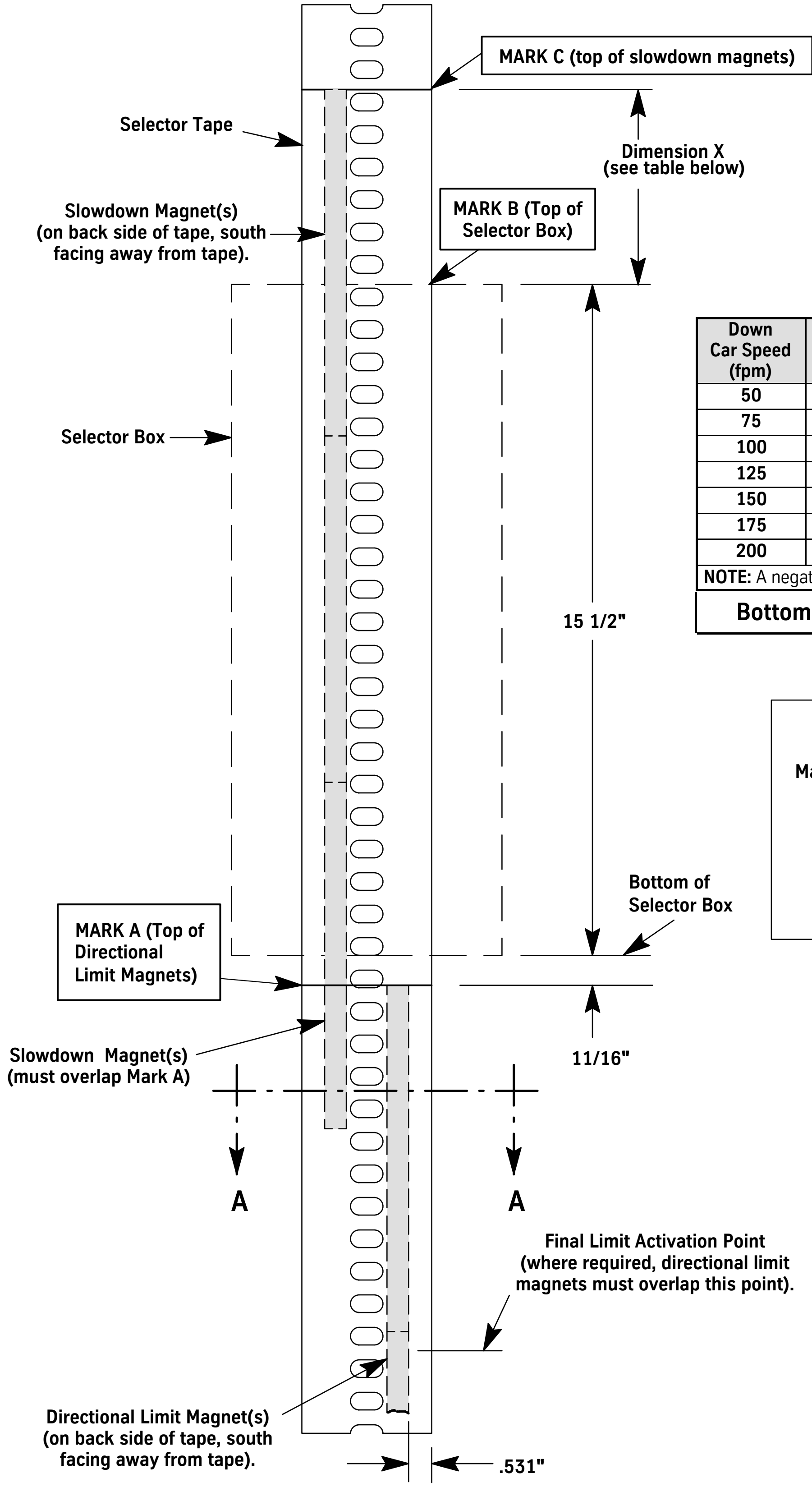
5. Run the car up to verify that it will move off the directional limit.

6. Verify that the final limit (if required) stops the car 4" past the floor.

Note: If necessary, directional limit function can be tested independently of normal selector operation.

Bottom Magnet Placement

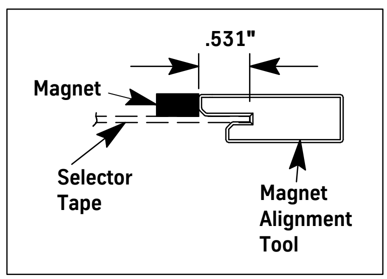
(continued)



Down Car Speed (fpm)	Dimension X	Total Slowdown Magnet Length (Minimum)	No. of 8" Magnets
50	-1.5"	14.7	2
75	-1.5"	14.7	2
100	4.5"	20.7	3
125	9.5"	25.7	4
150	14.5"	30.7	4
175	22.5"	38.7	5
200	22.5"	38.7	5

NOTE: A negative number indicates a downward measurement.

Bottom Slowdown Magnet Placement



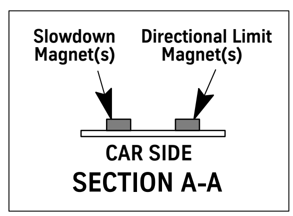


Figure 21 - Bottom Slowdown and Directional Limit Magnets (viewed from car side)

Top Slowdown (NTST) Magnet Placement

1. Level the car at the top landing.

2. From the top of the selector box, measure up 11/16" and mark the tape with a marker. This is Mark X. See Figure 22 on page 39 for all steps in the top magnet placement procedures.

CAUTION **Using a metal scribe will damage the tape.**

3. Mark the tape level with the top of the selector box. This is Mark Y.

Note: If necessary, move the car to gain access to the marked area.

4. Based on the car up speed, use dimension A to draw Mark Z.

5. Use the table to determine the number of 2 1/2" magnets needed for slowdown.

In the following step, the magnets are placed end-to-end, with no gap between them. Alternating polarity means to start with the south side out, then with the next magnet north side out, then south side out, etc. A mirror may be used to view magnets.

6. On the back side of the tape, start placement of the slowdown magnets at Mark Z with the yellow stripe (south pole) of the first magnet facing out. Extend the magnets upward, alternating polarity, until one overlaps Mark X.

Top Directional Limit (DLT) Magnet Placement

1. Divide by 8 the amount of run-by, and round the result to the next highest whole number. This is the number of 8" magnets needed for the directional limit.

Note: Where a final limit switch is required, the directional limit magnets must overlap the final limit switch activation point.

2. On the back side of the tape, start the directional limit magnets at Mark X, extending them upward.

3. Use the magnet alignment tool to align magnets to the edge of the tape.

4. Run the car onto the top directional limit and confirm that the car stops and has traveled 1" - 1 1/2" past the top floor.

5. Run the car onto the top directional limit, and confirm that the car stops and has traveled 1" - 1 1/2" past the top floor.

Note: The car Input/Output screen in the UIT can be used to view the activation of the directional limit.

6. Run the car down to verify that it will move off the directional limit.

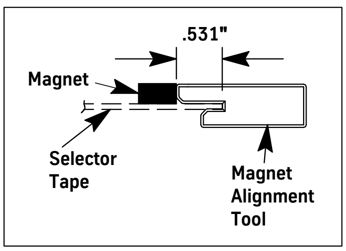
7. Verify that the final limit (if required) stops the car 4" past the floor.

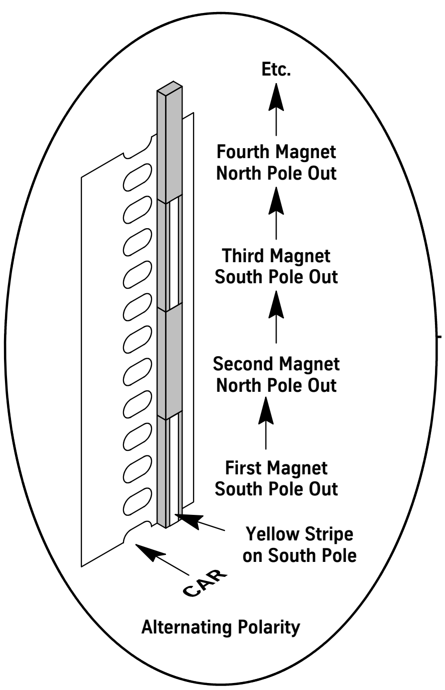
Note: If necessary, directional limit function can be tested independently of normal selector operation.

Top Magnet Placement
(continued)

Up Car Speed	Dimension A	Total Slowdown Magnet Length (Minimum)	No. of $2^1/_2$" Magnets
50	18.5"	19.2	8
75	18.5"	19.2	8
100	26.5"	27.2	11
125	31.5"	32.2	13
150	36.5"	37.2	15
175	44.5"	45.2	19
200	44.5"	45.2	19

Top Slowdown Magnet Placement





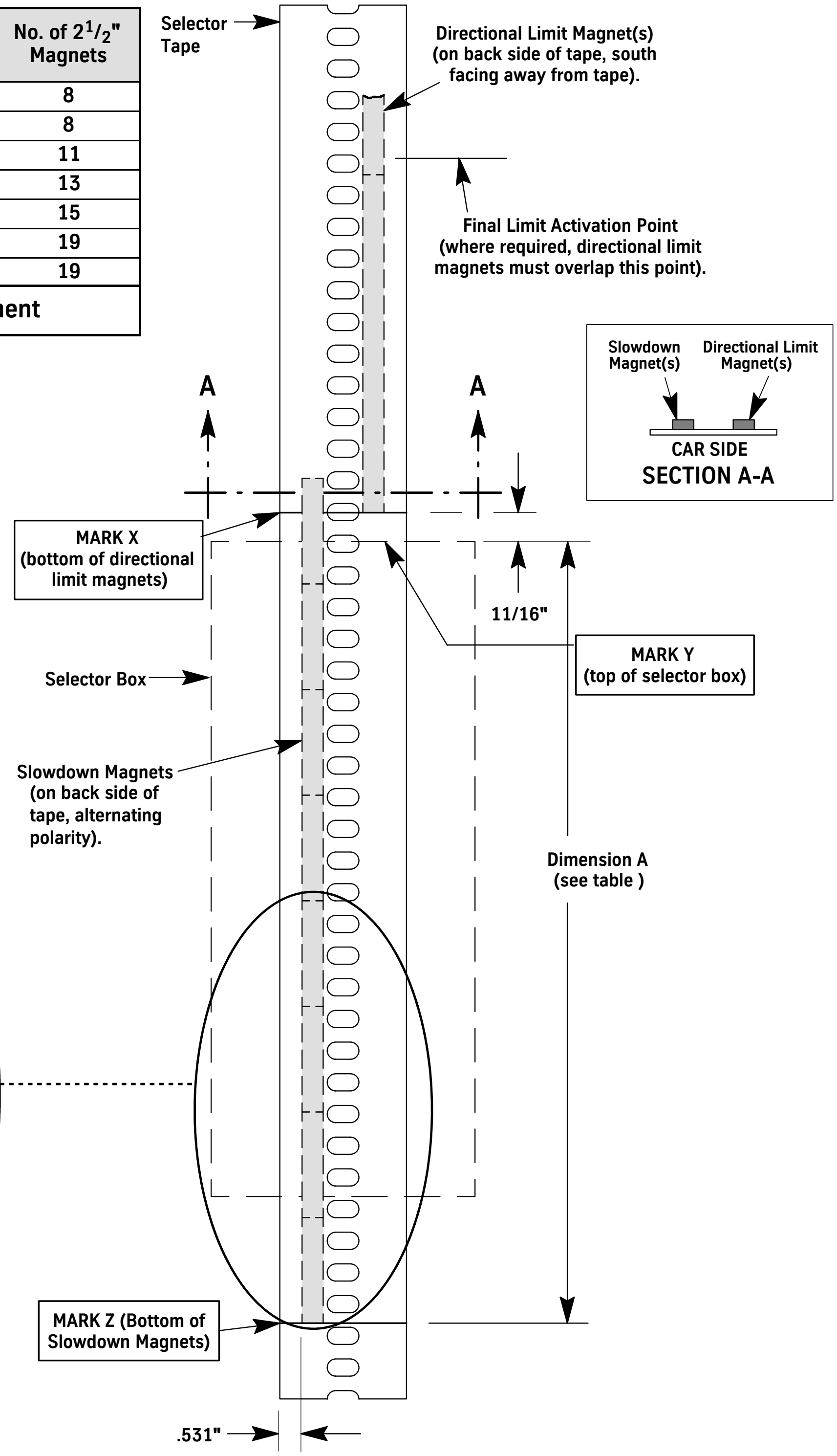


Figure 22 - Top Slowdown and Directional Limit Magnets (viewed from car side)

Selector Floor Magnet Placement

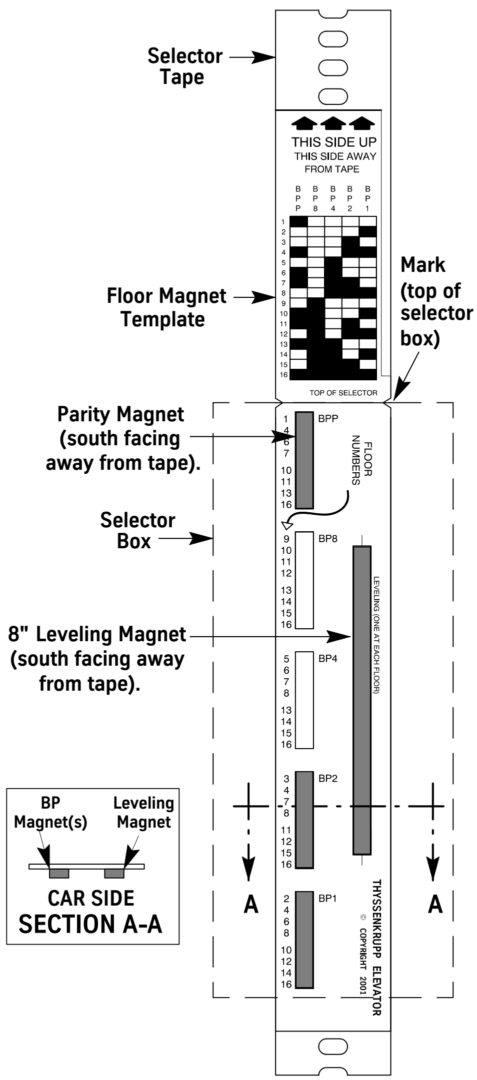
1. Place the car level with the top landing.
2. Mark the top of the selector box, and then move the car down a few feet.
3. Align the notches in the floor magnet template with the mark from Step 2, and place the 8" leveling magnet on the selector tape. See Figure 23 for all steps in this procedure.

Note: Floor magnets must be polarized correctly with the south pole (yellow stripe) facing away from the selector tape.

4. Place a 2 1/2" magnet in the appropriate BP1 through BP8 and parity slot(s).
5. Place the car level with each remaining landing, and repeat Steps 2 through 4.

Note: The number of the BP and parity magnets at each landing is always an odd number. There is always one leveling magnet at each landing. Example: Floor 6 = BP1, BP4, and parity (3 magnets).

6. In the UIT, adjust P17 and P18 to set the up and down slowdown adjustment counts listed in the table.



Speed (fpm)	Up Adjustment		Down Adjustment	
	Distance	Adjustment (counts)	Distance	Adjustment (counts)
50	11"	470	8"	342
75	16"	683	12"	512
100	22"	939	16"	683
125	28"	1195	22"	939
150	34"	1451	28"	1195
175	42"	1792	34"	1451
200	50"	2134	42"	1792

Slowdown Adjustment Counts

LANDING	BPP (Parity)	BP8	BP4	BP2	BP1
1	YES	-	-	-	-
2	-	-	-	-	YES
3	-	-	-	YES	-
4	YES	-	-	YES	YES
5	-	-	YES	-	-
6	YES	-	YES	-	YES
7	YES	-	YES	YES	-
8	-	-	YES	YES	YES
9	-	YES	-	-	-
10	YES	YES	-	-	YES
11	YES	YES	-	YES	-
12	-	YES	-	YES	YES
13	YES	YES	YES	-	-
14	-	YES	YES	-	YES
15	-	YES	YES	YES	-
16	YES	YES	YES	YES	YES

Floor Magnet Positions

Figure 23 - Floor Magnet Placement (fourth landing car side shown)

VERTICAL EXPRESS

Preliminary Hoistway Setup

Overview

1. The hoistway is scanned (in the procedure that follows) so that the system can locate the floor levels and have a record of them.
2. After the hoistway scan completes, the car may be placed on Automatic Operation for the first time.
3. The car levels down to the top floor, and the door operator attempts to scan the cab door width upon the first open command from the CPU.

Notes:

- The door card will not initiate door movement for the scan, only the CPU or the Learn Travel Command from the door's UIT can do this.
- The door travel limits, the mechanical setup, and the operators' configuration must be correct since the door operator attempts to scan the cab door width from the first CPU open command.
- Because the door scan occurs automatically and must be saved to FLASH memory, it is usually easier to do all of the setup at one time before performing the hoistway scan.

Door Operator

Refer to appropriate door operator component manual for job, and verify following sections:

- The mechanical setup.
- Power up and door card configuration jumpers.
- Limit setting.
- Direction check.
- Door scan.
- Auto null (HD-11 only).

Note: *HD-11 and LD-03 Door Operator* manuals are included in this book.

Hoistway Setup

Before the car can run on Automatic Operation, the selector must scan (count) the number of selector tape holes between floors. Any time a leveling magnet or terminal limit switch is moved, the hoistway must be scanned (set-up) again.

The Valve Preliminary Settings and Adjustments Procedures must be completed before starting a Hoistway Setup. See the *I-2®/I-3® Valve* manual for details.

Selector Setup with the STU Command

1. Place the car on Inspection Operation at the bottom landing with the doors closed.
2. Lower the car on Inspection Operation until it activates the bottom direction limit.
3. From COMMAND MENU of the UIT, use the up or down arrows to select the STU Command. Press ENTER to accept STU and display the message STU COMMAND - PRESS ENTER.
4. Press ENTER again to issue STU for the selector setup.
5. After STU is issued, run the car at inspection speed to the top direction limit without stopping. A message displays: SETUP FINISHED. To save the new values, perform a WRT Command from the COMMAND MENU.

Note: To abort this command after it has been issued (without running a setup), press the RST button on the CPU card to reset the system. Any previously unsaved values will be lost.

Prepare for Initial Automatic Operation

After completing the hoistway scan and door operator setups, the elevator may be operated on Automatic Operation for the first time. If the default (TKE Manufacturing) door speed profile is not acceptable, see appropriate door operator manual to make needed adjustments.

Valve Adjustments

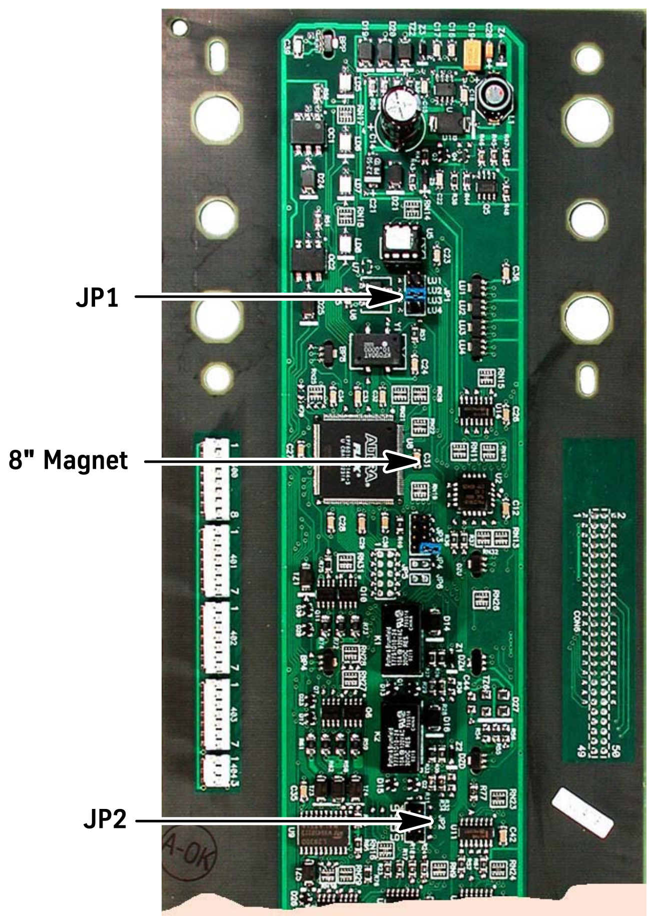
See the *I-2® / I-3® Valve* manual for final valve adjustments.

Selector Level Zone

Look on the TSM card (located on the selector box) to verify that the level zone jumpers are in the correct positions. See Figure 24.

Notes:

- Level zone travel is the amount a car will travel in either direction before releveling (six-tenths of an inch (0.6") is recommended).
- When the car is level at a floor, the LU and LD sensors on the TSM card are on the 8"magnet.



Jumper Positions		Level Zone Travel (in inches)
JP1 (LU)	JP2 (LD)	
LU1	LD1	0.2
LU2	LD2	0.4
LU3	LD3	0.6
LU4	LD4	0.8
Level Zone Jumpers		

Figure 24 - TSM Card

Floor Position and Leveling Magnet Adjustment

The valve must be fully adjusted before proceeding with the floor leveling adjustments.

1. Run the car to each floor in the up and down directions to check the floor levels. If the car is not level at a floor, reposition the 8" leveling magnet for that floor.

2. If the leveling magnet was moved, use the floor magnet template to restore the relationship of the BP and parity magnets to the leveling magnet.

3. If any leveling magnet required adjustment in Step 1, complete a new hoistway setup.

4. When the magnet placement is correct, glue each magnet with two small beads of silicon caulk. See Figure 25.

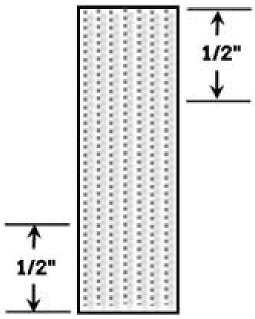


Figure 25 - Glue Floor Magnets

Terminal Slowdown Check

1. Adjust the terminal slowdown magnets so that they activate 2" to 4" after the selector slowdown. See Table 6 for all steps in this procedure.

   Example: Both up and down car speeds are 100 fpm. Table 6 shows that the up selector slowdown is 939 counts (each count = 1/40“). Therefore, up terminal slowdown activates 18" to 20" before the landing. The down selector slowdown is 683 counts, therefore, the down terminal slowdown activates 12" to 14" before the landing.

Car Speed (fpm)	Up Selector Slowdown Count	Down Selector Slowdown Count
50	469	341
75	683	512
100	939	683
125	1195	939
150	1451	1195
175	1792	1451
200	2133	1792

Table 6 - Selector Slowdown Distance

Terminal Slowdown Check
(continued)

2. Use the UIT to verify the proper setting of the up terminal slowdown switch as follows:
   a. Enter P17 to access the up slowdown adjustment and to display the current values. The displayed value represents the Up selector slowdown hole count adjusted under selector slowdown adjustments. Record this value.
   b. Change P17 to one-half of its current value.
   c. Place the car on Automatic Operation, and make a full speed run to the top terminal floor.

Note: TSL1, TSL2, and NTST should activate (go low), stopping the car short of the floor or within the leveling zone producing a selector fault. If the car stops past the relevel zone, adjust P17 so that slowdown magnets are encountered 2" to 4" before the selector slowdown.

   d. Change P17 to restore the original value recorded in Step 2a.

3. Use the UIT to verify proper setting of the down terminal slowdown magnet as follows:
   a. Enter P18 to access the down slowdown adjustment and display the current values. The displayed value represents the down selector slowdown count adjusted under Selector Slowdown Adjustments. Record this value.
   b. Change P18 to one-half of its current value.
   c. Place the car on Automatic Operation, and make a full speed run into the bottom terminal floor.

Note: TSL1, TSL2, and NTSB should activate, slow the car down, and stop it level with or slightly past the floor. If the car stops past the relevel zone, these magnets or the final setting of P18 should be adjusted to activate 2" to 4" after the selector slowdown.

   d. Change P18 to restore the original value recorded in Step 3a.

Final Adjustments

ESP100 Overload

Overloads MUST undergo this procedure before the elevator is turned over to the customer.

1. Run the car up with a full load, and measure the stabilized running current at each sensing loop.

Note: Take the measurements with a clamp-on AC ammeter connected directly below the sensing loops.

2. Calculate the full load amps adjustment. The full load amps adjustment equals the highest reading in Step 1 + 10%.

3. Set the full load amps adjustment dial equal to the value calculated in Step 2. See Figure 26.

4. Verify that the car will run the entire length of the hoistway with a full load.

CAUTION **The full load Amps adjustment must NOT be set outside the calibration range on the overload faceplate. To do so may prevent the overload from tripping and may also damage the motor.**

Final Adjustments
(continued)

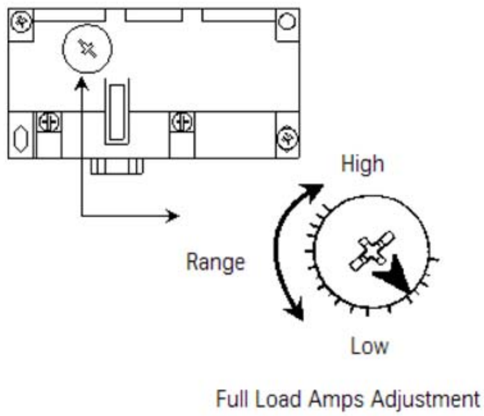


Figure 26 - ESP100 Overload Adjustment

Solid State Starter Overload

Notes:

- The starter's display should read **MOTOR STATUS STOPPED** when the system is normal. Reset the starter if it reads otherwise and, before continuing, correct any problem indicated on the display. See Figure 27 on page 46 for this and all following steps in this procedure.
- The starter's display will revert to **MOTOR STATUS** after 5 minutes of inactivity.

1. Verify that the Starting Amps = Motor Nameplate Amps.
2. From the **MOTOR STATUS** menu, press the LEFT ARROW. The **STATUS** menu displays.
3. Press the DOWN ARROW twice, and **PARAMETERS** displays.
4. Press the RIGHT ARROW, and **STARTING AMPS** displays.
   - If the value is correct, continue with Step 8.
   - If the value is not correct, continue with Step 5.
5. Press the RIGHT ARROW again to access the value. Press the UP or DOWN ARROW to adjust the value of the flashing digit. Press the RIGHT ARROW to move to the next digit.
6. Press the LEFT ARROW.
7. Press the UP ARROW to accept the changes and exit, or the DOWN ARROW to reject the changes and then exit.

Note: To make corrections to the values (if necessary), repeat this process starting from Step 5.

8. Press the DOWN ARROW until **OVERLOAD AMPS** displays, and verify that the values match the setting of the controller's nameplate full load amps.
   - If the value is correct, no action is required. The starter will timeout back to the Status Menu.
   - If the value is not correct, continue with Step 9.

Solid State Starter Overload
(continued)

9. Press the RIGHT ARROW to access the value. Press the UP or DOWN ARROW to adjust the value of the flashing digit. Press the RIGHT ARROW to move to the next digit.
10. Press the LEFT ARROW.
11. Press the UP ARROW to accept the changes and exit, or the DOWN ARROW to reject the changes and exit.

Note: To make corrections to the values (if necessary), repeat this process starting from Step 9.

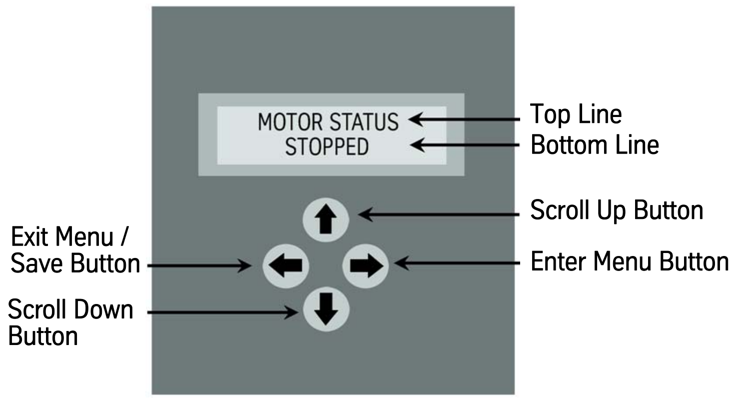


Figure 27 - Electronic Starter Display

Operational Adjustments

- Use the UIT to make the appropriate adjustments according to the job contract.
- To save the new adjustment values, issue the WRT command in the UIT menu: ADJUST Menu->COMMAND Common->WRT.

Group Adjustments

ICON group jobs have a redundant group function present in all controllers, but only one controller at a time uses group functions. Therefore, group set-up and adjustments should be made to each controller, if changed on any of them. Even a single car installation contains a group function that can be adjusted. Group parameters must be adjusted separately in ALL cars.

1. Verify cross connections between all cars (not required on single car jobs). See the job wiring diagrams and Figure 28 on page 47.
2. Verify that resistors R117 and R119 have been removed from the CPU card of the center cars of the group communications wiring run (resistors are to remain on the CPU's of the cars at the end of the wire run only). See Figure 28 and Figure 29 on page 47.

All ICON group cars are configured at manufacturing for proper group operation and should perform correctly. However, adjustments can be made for group options and hall call service. If the cars do not operate properly in response to hall calls, perform the following procedure:

1. On the CPU card, disconnect the CON21 plug from the CPU to isolate this car from the others (this action allows the group function to start in this CPU if wired to other cars).
2. Make appropriate group adjustments with UIT. See the *Diagnostics* section of this manual.
3. Issue the WRT command to save the new adjustment values.

Group Adjustments
(continued)

4. Re-install the CON21 plug on the CPU, and press the reset button to start the new settings.
5. Repeat Steps 3 and 4 for each car in the group.

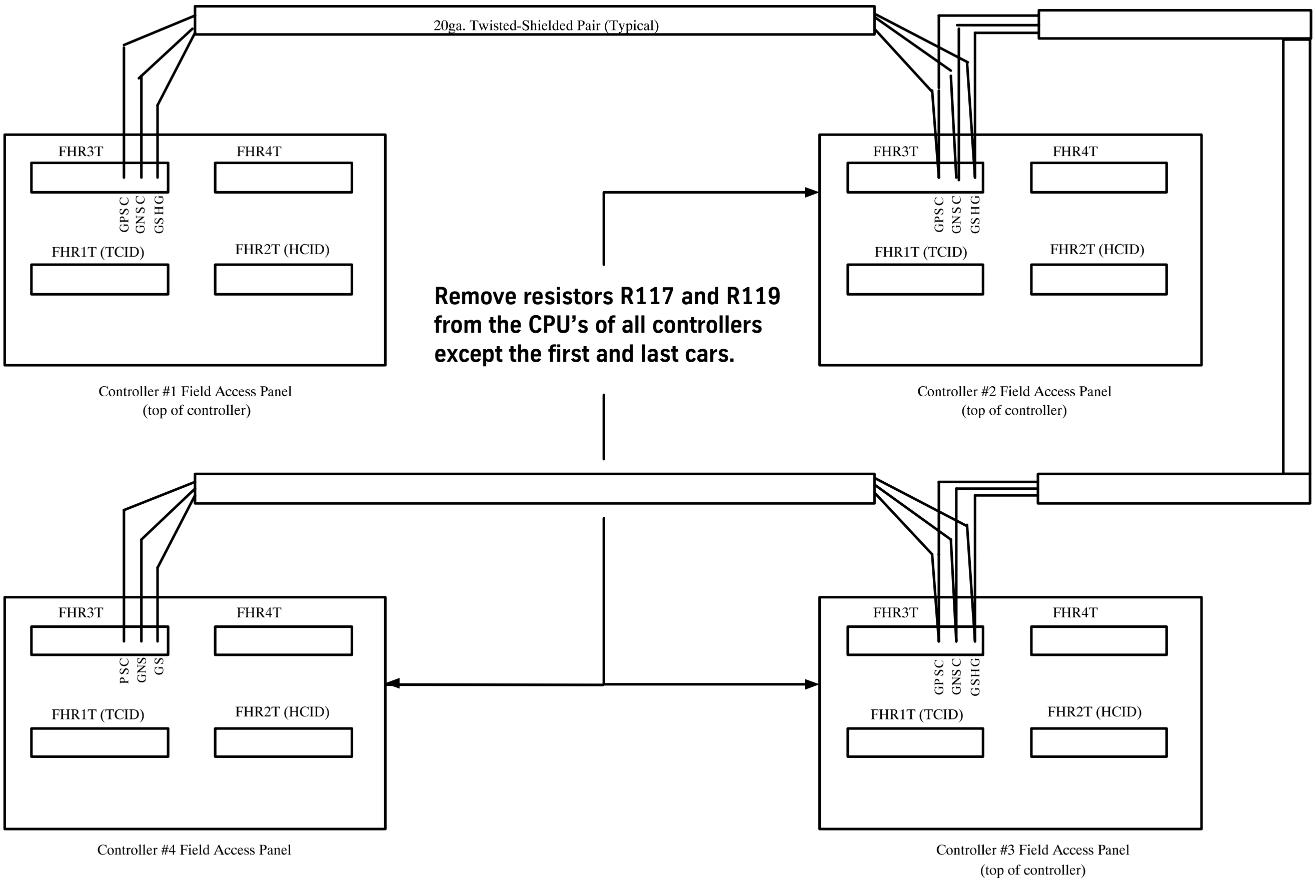
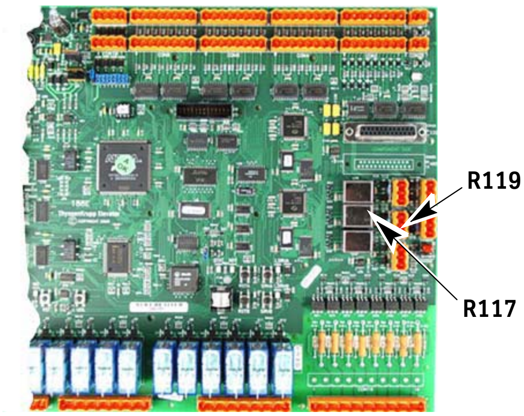


Figure 28 - ICON Group Communications Car-to-Car Cross Connections



CPU Card

Figure 29 - R117 and R119 Resistor Locations

Options Test

Test all options included with this job. See the job configurations sheets and use the following list:

- Battery Operated Lowering
- Car Calls
- Car Call Lockouts
- Car Riding Lanterns and Gongs
- Door Instant Close/Door Close Pushbutton
- Door Hold Open Switch
- Door Open Button
- Emergency Power - Type IV
- Floor Passing Tone
- Hall Calls
- Hall Lanterns and Gongs
- Hoistway Access
- Independent Service
- Limited Door Reversal
- Nudging Operation
- Parking Operation
- Phase I and II Fire Service

  - Flashing Signs
  - Call Cancel button
  - Return Light
  - Smoke Detectors
  - Fire Service Switches
- Photo Eyes
- Position Indicators
- Safety Edge
- Sequential Start
- Swing Return Inspection
- Viscosity Control
- Electronic Edge

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User Interface Tool (UIT)

Overview

The User Interface Tool (UIT) gives access to diagnostics and adjusting features of a specific system. It displays faults, I/O status, issues commands, and changes adjustments. The tool plugs directly into the CPU card, is programmed to function with a specified controller, and will not operate in any other controller.

At System Power Up (Start Up Screen), the UIT scrolls through the following screens:

- THYSSENKRUPP ELEVATOR
- NO FAULTS or FAULTS PRESENT
- FRONT DOOR STATUS
- REAR DOOR STATUS (if present)
- SERVICE / POSITION INFORMATION
- PRESS ENTER TO CONTINUE

Menu Navigation

Press any of the four buttons to display **MAIN MENU**.

The four keys at the bottom of the UIT access the various menus and items. See Figure 30.

1. Up Arrow - scrolls through menus, adjustments, or displays.
2. Down Arrow - scrolls through menus, adjustments, or displays.
3. ESC - moves to the next highest level of a selected menu, adjustment, or display.

Note: If an incorrect adjustment value is displayed, and ENTER has not been used, push ESC to restore the original value.

4. ENTER - select a menu, adjustment, or display.

Note: If an adjustment value has been changed, push ENTER to temporarily save the value until it can be saved permanently to Flash.

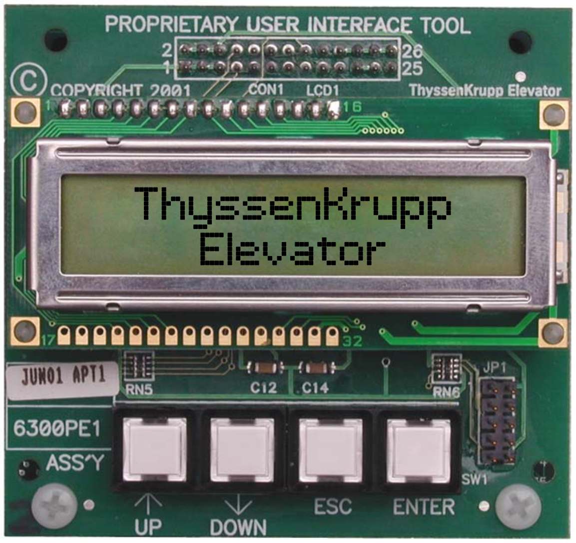
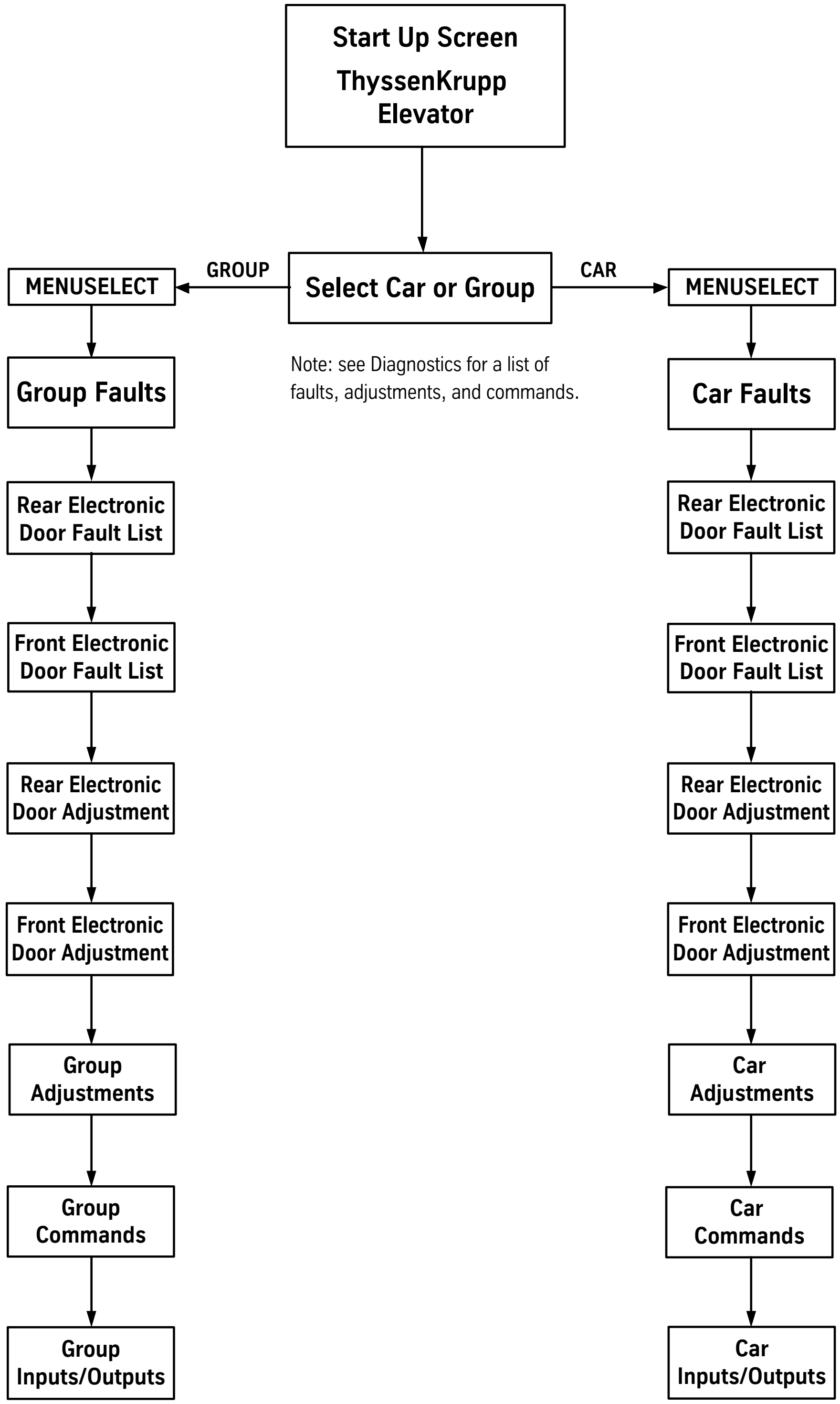


Figure 30 - UIT Startup Display Screen

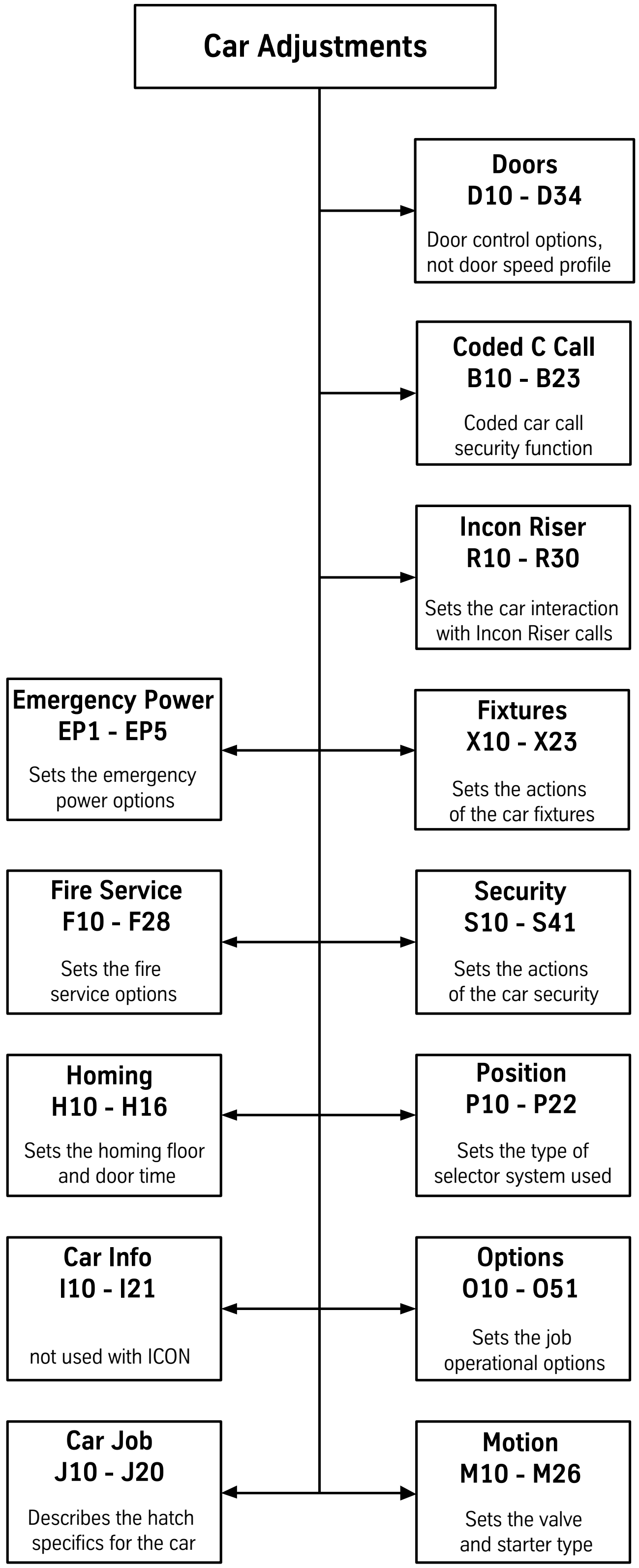
Service Code Reference Table

Display	Service Code	Display	Service Code
1	Safety String	46	Unit Shutdown
3	Inspection / Hoistway Access	47	Low Oil
6	Auto Shutdown	48	Viscosity Shutdown
18	Fire Service #2	49	Loadweigher Shutdown
19	Fire Service #1	50	B44 Canadian
20	Code Blue	51	Parking
21	Car Independent / Hospital Service	52	Car Cycling
22	Attendant Service	53	Jack Resynching
23	Door Disconnect	54	Inconspicuous Riser
25	Car Homing	55	Retiring Cam
26	Emergency Power	56	Auto Return
28	Lobby Recall	57	Next Up
29	Car Stop	58	Transfer Floor
33	Tenant Security	59	Front Door Hold
34	Automatic	60	Rear Door Hold
36	Massachusetts Medical Service	61	Front Door Communication Loss
37	Run Monitor	62	Rear Door Communication Loss
38	Selector	63	External Calls
39	Front HW Watchdog	64	External Front Door
40	Rear HW Watchdog	65	External Rear Door
41	Front Door Watchdog	66	OSI Security
42	Rear Door Watchdog	67	Shunt Trip
43	Front Door Nudging	68	Capture
44	Rear Door Nudging	69	Emergency Dispatch
45	Diagnostic Car Lockout	70	Neonatal Service
		71	Seismic Service

ICON UIT Quick Guide



ICON UIT Quick Guide
(continued)



UIT Menu Selections

Car/Group Menu Selection

1. From the Start Up (ThyssenKrupp Elevator) Screen, press ENTER to display **Select CAR/ GROUP**.

2. Press UP or DOWN to display either **CAR** or **GROUP** on the second line.
3. Press ENTER.
4. Press UP or DOWN to scroll through the available screens:
   - COMMANDS
   - FAULTS
   - I/O
   - ADJUSTMENTS

Note: Each time ESC is pressed, the MENU will move backward one level.

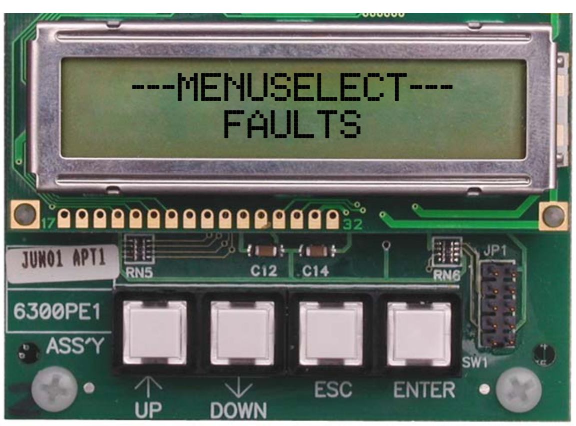
Car Menu

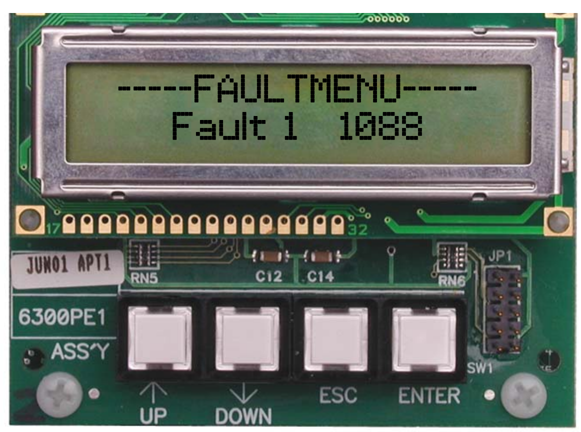
Faults Menu

1. Press UP or DOWN to display **MENUSELECT–FAULTS**.
2. To accept **FAULTS**, press ENTER.

Note: Faults are listed on the screen one at a time, beginning with the most recent.

3. Press the UP or DOWN to scroll through the last 24 faults.





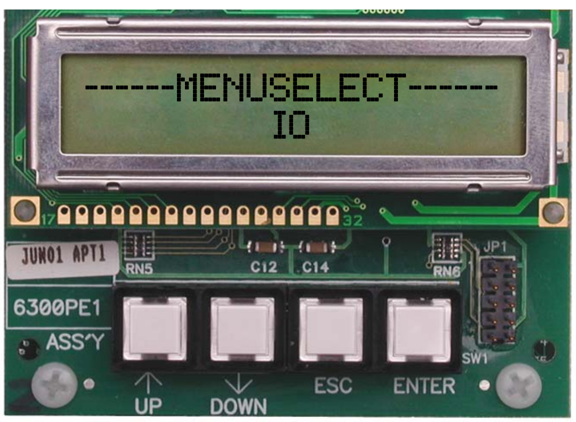
Car Menu
(continued)

To Reset Car Faults

1. Press ESC, and then press UP or DOWN to scroll to **COMMANDMENU**.
2. To accept **COMMANDS**, press ENTER.
3. Press UP or DOWN to scroll to **RFL COMMAND**.
4. To accept the RFL COMMAND, press ENTER. **RFL COMMAND PRESS ENTER** displays.
5. To clear ALL CAR faults, press ENTER. **RFL RESET** briefly displays.
6. Press ESC until **MENUSELECT** displays

I/O Menu

1. Press UP or DOWN to display **MENUSELECT–IO**, and press ENTER.
2. Press UP or DOWN to scroll through each port.



In this mode, the I/O is displayed by port number, followed by 8 characters. Each port can contain up to 8 signal designations. Even though 8 characters are always displayed, all of the characters may not be assigned a car I/O signal name in a given controller. Also, the character designations will not necessarily be the same from controller to controller. To determine the correct signal represented by each character, use the job serial number configuration sheets printed for each job.

Car Menu
(continued)

Car Configuration Data Report

The Car and Group Configuration Data Report by job serial number is furnished for each elevator. See Figure 31.

Line 2: JOB NUMBER: Job Serial Number, plus 07 (the controller section number).
Job Name
Design Date

Line 9: CAR_IO_ASSIGNMENTS

Line 10: Port 1, I/O signal names

Notes:

- The first signal name corresponds to the first numerical digit in the string of 8, reading from left to right on the UIT.
- Some of the 8 positions within a given port will appear as a blank; Disregard these digit(s) when viewing car I/O with the UIT.
- The number of ports displayed depends on the number of ports required by an individual job.

  Ports 1-8 are reserved for 24 VDC signals

  Ports 9-11 are reserved for 115 VAC signals

  Remaining ports are reserved for either discrete expansion ports or LON signals

```
                    CAR CONFIGURATION DATA REPORT                       SA31
JOB NUMBER:  BR549407  THYSSENKRUPP JOB                BY: DMM     DATE: 04/12/01
NUMBER OF JOBS:   1                                                ESB467 032801
CAR NUMBER:  BR5494      CAR DESIGNATION 1        LAYOUT DESIGNATION    4
    CAR CONFIGURATION DATA:

VALVE_TYPE                 = 1
MOTOR_STARTER_TYPE         =5
STOP_SWITCH_RELEVEL        = 1
```

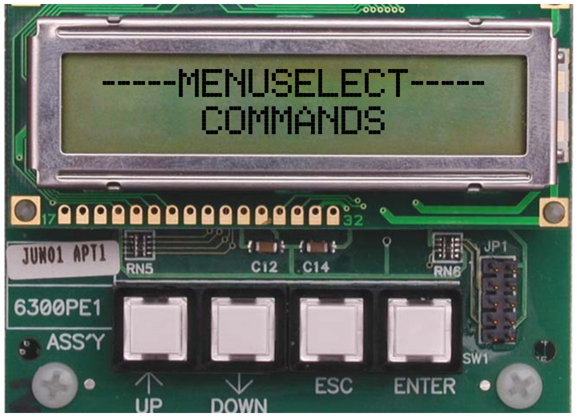
Heading	CAR_IO_ASSIGNMENTS =								
Port 1	INU	IND	INCT	INOP	INHA	INCN	IN		END
Port 2	MCD	MCE	DZ1M	DZ2M	DZ1	DZ2			END
Port 3	DLB	DLT	NTSB	NTST	TSL1	TSL2	LVD	LVU	END
Port 4	CSTO	CSTOM	GLM	MCF	PRSW	OLTS	OLTO		END
Port 5	FSM	FSX	FSE	EPNP					END
3 Blank Lines									END
									END
									END
Port 9	VC1A	VC1B	VC2A	VC2B	VC3A	VC3B	VC4A	VC4B	END
Port 10	MCC1	MCC2	MCC3	DZE					END
Port 11	SAFE	CST			CDCF		HDIF		END
Port 12	BP1	BP2	BP4	BP8	BPP	BU2	C1	C2	END
Port 13	CCIE	CL1	CL2	DCB	DOB	FSCC	FSC1	FSC2	END
Port 14	FSRI	ISC	PI1	PI2					END
Port 15	FSH1	FSH2				HLD2	HLU1		

Blanks indicate no car I/O signal is assigned (may be reserved for Group I/O signal or not used).

Figure 31 - Car I/O Assignments

Commands Menu

1. Press UP or DOWN to display MENUSELECT–COMMANDS.



2. Press ENTER.
3. Press UP or DOWN to view these commands:
   - RFL - Resets ALL Car Faults.
   - FJR - Forces Jack Resynch.
   - RRF - Resets Run Monitor Faults.
   - STU - Selector Setup (scans the hoistway for floor position information).

IMPORTANT! **Any existing hoistway position information will be overwritten.**

   - VER - Displays the current software version and revision.
   - WRT - Saves the contents of the CPU RAM memory to the card's FLASH memory, and also protects the data (adjustments, floor scans, etc.) if power loss occurs.

4. To accept the command, press ENTER.
5. To issue the command, press ENTER.
6. Press ESC until the COMMANDMENU or the MENUSELECT screen displays.

Selector Setup with the STU Command

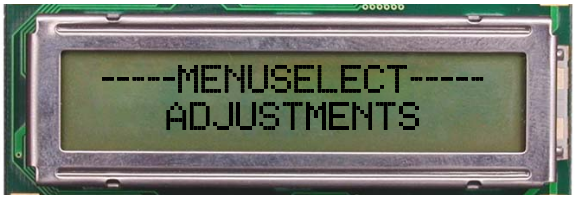
Note: Inspection speed of car should not exceed 15 fpm, or the hoistway scan may fail.

1. Place the car on Inspection Operation at the bottom landing with the doors closed.
2. Lower the car on Inspection Operation until it activates the bottom direction limit.
3. From the COMMANDMENU of the UIT, Press UP or DOWN to select the STU Command. Press ENTER to accept, and the message STU COMMAND displays. Press ENTER.
4. To issue the STU Command for the selector setup, press ENTER again.
5. After STU is issued, run the car at inspection speed to the top direction limit without stopping, and a message displays - SETUP FINISHED.
6. To save the new values, issue a WRT Command from the COMMANDSMENU.

Note: To abort this command after it has been issued, without running a setup, press the RST button on the CPU card to reset the system. Any previously unsaved values will be lost.

Adjustments Menu

1. Press UP or DOWN display MENUSELECT–ADJUSTMENTS.



2. Press ENTER.
3. Press UP or DOWN to view these adjustments:
   - ADJ - DOORS
   - ADJ - EMERG PWR
   - ADJ - FIRE SRV
   - ADJ - HOMING
   - ADJ - CAR INFO
   - ADJ - CAR JOB
   - ADJ - MOTION
   - ADJ - OPTIONS
   - ADJ - POSITION
   - ADJ - SECURITY
   - ADJ - FIXTURES
   - ADJ - INCON RISER
   - ADJ - CODED C (Car) CALL
4. Press UP or DOWN to scroll to the desired ADJUSTMENT, and press ENTER to accept. The first adjustment (and its value) displays.
   a. To change the current value, press ENTER and an asterisk appears in front of the value.
   b. Press UP or DOWN to change the value within the allowed range.

Note: The adjustments cannot be set beyond manufacturing programmed minimum and maximum values.

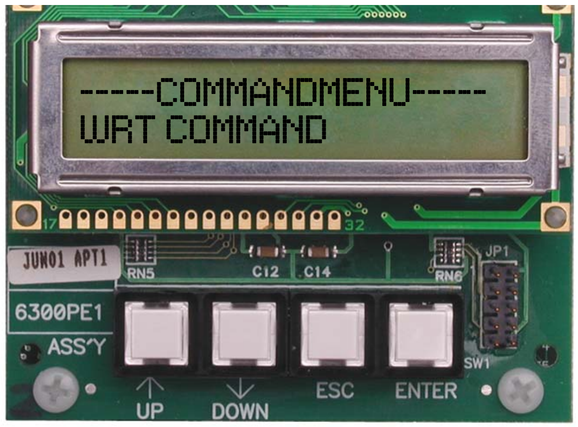
   c. After changing a value, press ENTER to save the new value to RAM (no message displays).
   d. Press ESC, and the asterisk will disappear.

5. After all desired changes are made and saved, press ESC until the **MENUSELECT** screen displays.
6. Press UP or DOWN to select COMMANDS, and to accept COMMANDS press ENTER.

Adjustments Menu
(continued)

7. Press UP or DOWN to display WRT COMMAND, and to accept the WRT Command press ENTER.

IMPORTANT! **Activating a menu item other than COMMAND will prevent the WRT Command from saving the new value.**



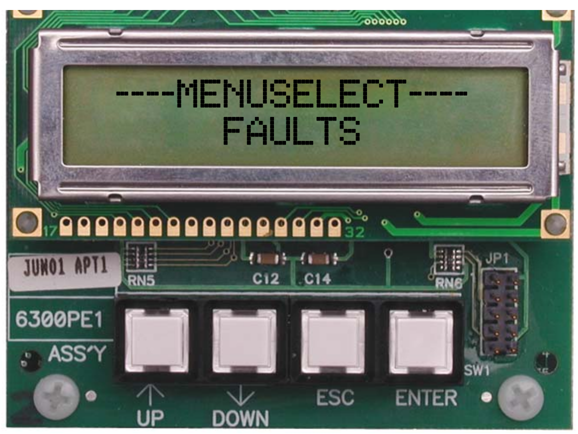
8. Press ENTER again to save all changed values to flash memory (**SAVED** will briefly display on the screen).

Note: Always reset the CPU after making any changes.

9. Press ESC until the **MENUSELECT** screen displays.

Group Menu

Fault Menu



1. To accept FAULTS, press ENTER.

Note: **NO FAULTS** displays if the group is fault-free, or existing faults are listed on the screen one at a time, beginning with the most recent.

2. Press UP or DOWN to scroll through the last 24 faults.

Group Menu
(continued)

Reset Group Faults

1. Press ESC, and then press UP or DOWN to scroll to COMMANDMENU.
2. To accept COMMANDS, press ENTER.
3. Press UP or DOWN to scroll to RFL COMMAND.
4. To accept the RFL COMMAND, press ENTER. RFL COMMAND PRESS ENTER displays.
5. To clear ALL CAR faults, press ENTER. RFL RESET briefly displays.
6. Press ESC until MENUSELECT displays

I/O MENU

1. While in GROUP Mode, press ENTER to accept MENUSELECT–IO.
2. Press UP or DOWN to scroll through each port.

   In this mode, the I/O is displayed by port number, followed by 8 characters. Each port can contain up to 8 signal designations. Even though 8 characters are always displayed, all of the characters may not be assigned a group I/O signal name in a given controller. Also, the character designations will not necessarily be the same from controller to controller. To determine the correct signal represented by each character, use the job serial number configuration sheets printed for each job.

   The Car and Group Configuration Data Report by job serial number is furnished for each elevator. See Figure 32 on page 60.

   Line 2: JOB NUMBER: Job Serial Number, plus 07 (the controller section number).
   Job Name
   Design Date

   Line 9: GROUP_IO_ASSIGNMENTS

   Line 10: Port 1, I/O signal names

Notes:

- The first signal name corresponds to the first numerical digit in the string of 8, reading from left to right on the UIT.
- Some of the 8 positions within a given port will appear as a blank; Disregard these digit(s) when viewing car I/O with the UIT.
- The number of ports displayed depends on the number of ports required by an individual job.

  Ports 1-8 are reserved for 24 VDC signals.

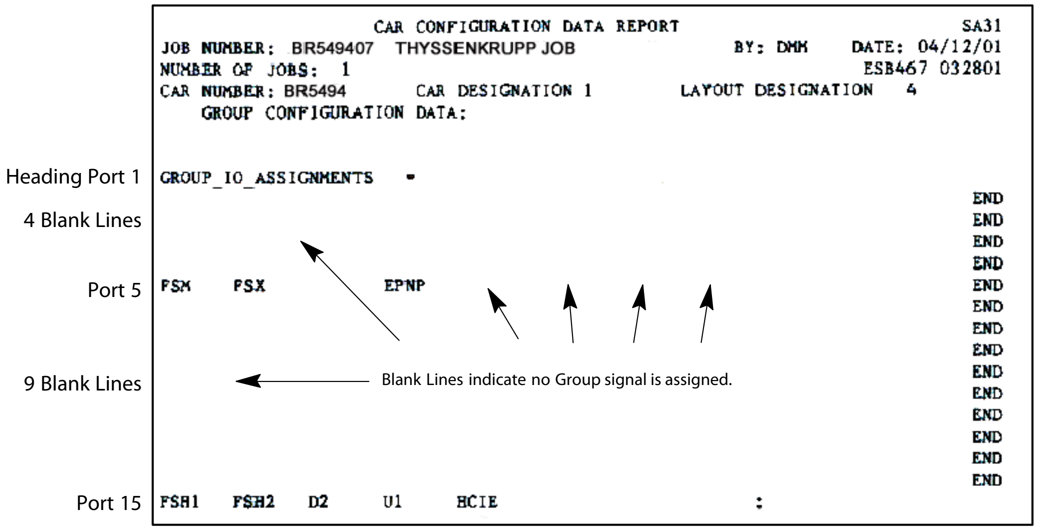
  Ports 9-11 are reserved for 115 VAC signals.

  Remaining ports are reserved for either discrete expansion ports or LON signals.

3. Press ESC until the MENUSELECT screen displays.

Group Menu

(continued)



```
                         CAR CONFIGURATION DATA REPORT                         SA31
JOB NUMBER: BR549407  THYSSENKRUPP JOB                    BY: DMH    DATE: 04/12/01
NUMBER OF JOBS: 1                                                   ESB467 032801
CAR NUMBER: BR5494        CAR DESIGNATION 1        LAYOUT DESIGNATION   4
    GROUP CONFIGURATION DATA:

GROUP_IO_ASSIGNMENTS   •
                                                                              END
                                                                              END
                                                                              END
                                                                              END
FSM      FSX              EPNP                                                END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
                                                                              END
FSH1     FSH2     D2      U1      HCIE                           :
```


Figure 32 - Group I/O Assignments

Commands Menu

1. Press ENTER to accept COMMANDS from the group MENUSELECT screen.
2. Press UP or DOWN to view these commands:

   RFL - Reset All Group Faults

   WRT - Save data to battery-backed flash memory

   a. To accept the command, press ENTER.

   b. To issue the command, press ENTER.
3. Press ESC until the COMMANDMENU or the MENUSELECT screen displays.

Adjustments Menu

1. Press ENTER to accept ADJUSTMENTS from the Group MENUSELECT screen. The following adjustments are available by pressing UP or DOWN:

   - CSW - Control Status Word
   - LBY - Lobby Ldg
   - LER - Number of Lobby Cars
   - NZN - Number of Zones
   - ZN1 - Zone Ldg #1
   - ZN2 - Zone Ldg #2
   - ZN3 - Zone Ldg #3
   - ZN4 - Zone Ldg #4

Adjustments Menu
(continued)

2. Press UP or DOWN to scroll to the desired ADJUSTMENT, and press ENTER to accept. The first adjustment (and its value) displays.
   a. To change the current value, press ENTER and an asterisk appears in front of the value.
   b. Press UP or DOWN to change the value within the allowed range.

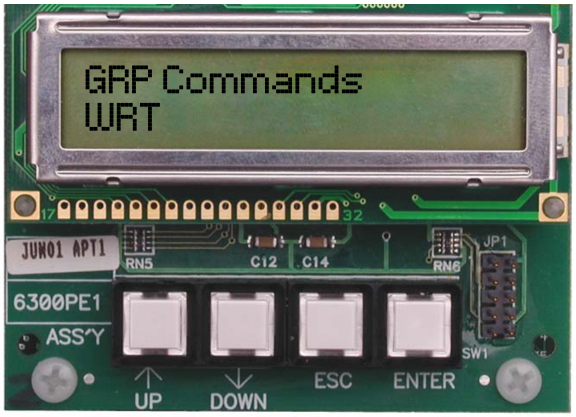
Note: The adjustments cannot be set beyond manufacturing programmed minimum and maximum values.

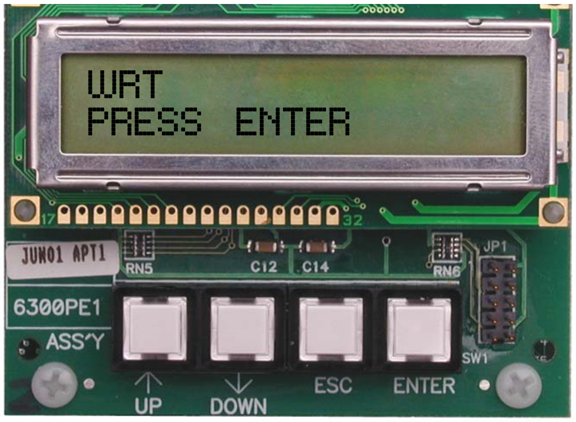
   c. After changing a value, press ENTER to save the new value to RAM (no message displays).
   d. Press ESC, and the asterisk will disappear.

3. After all desired changes are made and saved, press ESC until the **MENUSELECT** screen displays.

4. To accept COMMANDS, press ENTER. The screen displays **GRP Commands - WRT**.

5. Press ENTER again to display the **WRT - PRESS ENTER** message.





6. Press ENTER again to save the changed values to flash memory. **SAVED** briefly displays.

Note: Always reset the CPU after making changes.

IMPORTANT! **Activating a menu item other than COMMAND will prevent the WRT command from saving the new value.**

7. Press ESC until the **MENUSELECT** screen displays.

Prefix Categories

Adjustments and Commands

CAR			GROUP
Prefix	Adjustments		Adjustments
Bxx	Coded Car Call Entry Adjustments		CSW
Dxx	Door-related Adjustments		LBY
EPx	Emergency Power Adjustments		LER
Fxx	Fire Service Adjustments		NZN
Hxx	Homing Adjustments		ZN1
Ixx	Event Adjustments		ZN2
Jxx	Job Information Adjustments		ZN3
Mxx	Motion Adjustments		ZN4
Oxx	Option Adjustments		**Commands**
Pxx	Position System Adjustments		RFL
Sxx	Security Adjustments		WRT
Xxx	Fixtures Adjustments		**I/O**
Zxx	Emergency Dispatch Adjustments		

Adjustments and Commands

Adj.	Unit	Range	Default	Definition
B10	floor	0-nf (up to 10)	10	Code Digit 0 - This adjustment specifies which front car call button is used to enter the code value 0. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 10 in the car enters call C11 to the controller, set B10=10 to make car button 9 enter a code value of 0.
B11	floor	0-nf (up to 10)	1	Code Digit 1 - This adjustment specifies which front car call button is used to enter the code value 1. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 1 in the car enters call C2 to the controller, set B11=2 to make car button 1 enter a code value of 1.

Adj.	Unit	Range	Default	Definition
B12	floor	0-nf (up to 10)	2	Code Digit 2 - This adjustment specifies which front car call button is used to enter the code value 2. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 2 in the car enters call C3 to the controller, set B12=3 to make car button 2 enter a code value of 2.
B13	floor	0-nf (up to 10)	3	Code Digit 3 - This adjustment specifies which front car call button is used to enter the code value 3. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 3 in the car enters call C4 to the controller, set B13=4 to make car button 3 enter a code value of 3.
B14	floor	0-nf (up to 10)	4	Code Digit 4 - This adjustment specifies which front car call button is used to enter the code value 4. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 4 in the car enters call C5 to the controller, set B14=5 to make car button 4 enter a code value of 4.
B15	floor	0-nf (up to 10)	5	Code Digit 5 - This adjustment specifies which front car call button is used to enter the code value 5. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 5 in the car enters call C5 to the controller, set B15=6 to make car button 5 enter a code value of 5.
B16	floor	0-nf (up to 10)	6	Code Digit 6 - This adjustment specifies which front car call button is used to enter the code value 6. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 6 in the car enters call C7 to the controller, set B16=7 to make car button 6 enter a code value of 6.
B17	floor	0-nf (up to 10)	7	Code Digit 7 - This adjustment specifies which front car call button is used to enter the code value 7. Notes: • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 7 in the car enters call C8 to the controller, set B17=8 to make car button 7 enter a code value of 7.

Adj.	Unit	Range	Default	Definition
B18	floor	0-nf (up to 10)	8	Code Digit 8 - This adjustment specifies which front car call button is used to enter the code value 8. **Notes:** • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 8 in the car enters call C9 to the controller, set B18=9 to make car button 8 enter a code value of 8.
B19	floor	0-nf (up to 10)	9	Code Digit 9 - This adjustment specifies which front car call button is used to enter the code value 9. **Notes:** • Used only for coded car call entry. • If the building floor alignment makes the call input to the controller different from the button marking in the car, use the value seen by the controller. Example: If pressing button 9 in the car enters call C10 to the controller, set B19=10 to make car button 9 enter a code value of 9.
B20	sec.	0-15	0	Coded Car Call Code Entry Time - This adjustment sets the entry time for a security code through the car call buttons. This feature requires IMS security. When a passenger enters a car call at a locked out floor, the car station accesses the keypad code and allows a code to be entered with car call buttons C1 - C10. Adjustment B20 should be set to zero (0) on all jobs that do not have IMS security.
B21	—	4-8	4	Coded Car Call Code Entry Count - This adjustment specifies the number of digits in a code for coded car call entry.
B22	—	0-1	0	Coded Car Call Entry Sound Buzzer on Entry - If set to 1, the car station buzzer will activate each time a code button is pressed during coded car call entry operation.
B23	0.1 sec.	0-20	4	Coded Car Call Acknowledge Time - The amount of time that the coded car call entry acknowledgement buzzer or device stays active after each code digit is entered.
D10	—	0-2	0	Limited Door Reversal Type Values: 0 = Disabled 1 = Active with EE only 2 = Active with SE or EE
D11	—	0-2	0	Nudging Enable Values: 0 = Disable 1 = Enable 2 = Enable with DOB override **Note**: The door open button causes the doors to fully reopen during nudging

Adj.	Unit	Range	Default	Definition
D12	—	0-8	Job EEPROM	Front Door Type Values: 0 = No Door 1 = Electronic Door Operator 2 = Discrete Door Operator 3 = Freight Door (freight doors with auto open and auto close) 4 = Freight Manual (freight doors with no auto open, no auto close, no door times, and no door watchdog protection timer) 5 = Freight Auto Open (freight doors with auto open only, no door watchdog protection timer) 6 = Freight Auto Close (freight doors with auto close only, and with door watchdog protection timer) 7 = Electronic Door Operator with CAN serial link 8 = Electronic Door Operator with RS-485 serial link
D13	—	0-8	Job EEPROM	Rear Door Type Values: 0 = No Door 1 = Electronic Door Operator 2 = Discrete Door Operator 3 = Freight Door (freight doors with auto open and auto close) 4 = Freight Manual (freight doors with no auto open, no auto close, no door times, and no door watchdog protection timer) 5 = Freight Auto Open (freight doors with auto open only, no door watchdog protection timer) 6 = Freight Auto Close (freight doors with auto close only, and with door watchdog protection timer) 7 = Electronic Door Operator with CAN serial link 8 = Electronic Door Operator with RS-485 serial link
D14	0.1 sec	0-100	10	Safety Edge Door Time - This adjustment sets the length of time the doors will stay open after the safety edge is activated.
D15	0.1 sec	4-50	10	Electric Eye Door Time - This adjustment sets the length of time the doors will stay open after the electric eye is activated.
D16	0.1 sec	0-100	10	Door Open Button Door Time - This adjustment sets the length of time the doors will stay open after the door open push button activation.
D17	sec	5-900	10	Door Hold Button Door Time - This adjustment sets the length of time the doors will stay open after the door hold push button activation.
D18	0.1 sec	0-40	1	Open High Speed Time - This adjustment sets the amount of time delay after the doors start the opening cycle with OD and before picking the OHS Relay.
D19	sec	5-120	20	Nudging Door Time - This adjustment sets the length of time that the door must be held open before nudging is activated. **Note**: Before this timer will start, the car must have a reason to run.
D20	0.1 sec	0-60	30	Door Reversal Time (optional) - If the electric eye remains active, this adjustment is the length of time the doors will remain at the door reversal limit (DRL) switch before fully opening. **Note**: To enable this feature, the limited door reversal type must be non-zero. See Also: D10
D21	0.1 sec	0-600	200	Front Door Watchdog Time - If the doors do not reach the door close limit before this timer expires, the system assumes the doors have failed. The doors will be reopened and another close cycle attempted.

Adj.	Unit	Range	Default	Definition
D22	0.1 sec	0-600	200	Rear Door Watchdog Time - If the doors do not reach the door close limit before this timer expires, the system assumes the doors have failed. The doors will then be reopened and another close cycle attempted.
D23	0.1 sec	50-300	50	ADA Hall Call Door Time - This adjustment sets the length of time the doors stay open when answering hall calls with the ADA option enabled.
D24	0.1 sec	1-300	30	Car Call Door Time - This adjustment sets the length of time the doors stay open when answering car calls under normal operation.
D25	0.1 sec	1-300	50	Hall Call Door Time - This adjustment sets the length of time the doors stay open when answering hall calls under normal operation.
D26	—	0-2	0	Door Disconnect - Values: 0 = The door disconnect feature is de-activated. 1 = The door disconnect feature is active. 2 = Capture the car on door disconnect.
D27	—	0-1	1	ADA - To activate the ADA feature, set to 1.
D28	sec	30-600	300	Stuck Device Time - This adjustment sets the length of time a door opening device (such as the Door Open Button) must be active before it is recognized as being stuck.
D29	—	0-1	0	Extended Door Time Enable - To activate this feature, set adjustment D30.
D30	0.1 sec	10-250	30	Extended Door Time - This adjustment sets the length of time added to the standard door time when the car is at the Extended Door Time Landing.
D31	floor	1-nf	1	Extended Door Time Landing -
D32	—	0-4	0	Remote Car Station Door Operation - An I/O-driven feature (not applicable to the IMS feature of the same name). Values: 0 = The doors do not automatically open upon arrival at a car call. The doors will open fully with DOB/DOBR, but will re-close when DOB/DOBR is released. 1 = The doors do not automatically open upon arrival at a car call. The doors will open fully with DOB/DOBR, and will not re-close until DCB/DCBR is activated. 2 = The doors automatically open upon arrival at a car call and, after a delay, will close back (similar to door operation on normal automatic operation). 3 = The same operation as value 0 above. 4 = The doors do not automatically open upon arrival at a car call. • The doors will open with constant pressure on DOB/DOBR, but will re-close if DOB/DOBR is not maintained until the doors are opened fully. • The doors will not re-close until DCB/DCBR is activated, but will reopen if DCB/DCBR is not maintained until the doors are closed fully.
D33	—	0-150	0	Pre-Opening Door Enable - Values: 0 = Disable pre-opening doors. 1-150 = Requires DZ1 and DZ2; limit speed to 50 FPM.
D34	—	0-1	0	Non-simultaneous Door Enable. Values: 0 = Disable non-simultaneous doors. 1 = Enable non-simultaneous doors.

Adj.	Unit	Range	Default	Definition
EP1	—	0-2	0	Emergency Power Type Values: 0 = None 1 = Type-0 (battery lowering) 2 = Type-4 (alternate power source) **Note**: The system must be re-started before changes take effect.
EP2	floor	1-nf	1	Emergency Power Return Floor - During an emergency power return phase, this adjustment sets which floor the car will attempt a return to.
EP3	F/R	0-1	0	Emergency Power Door - For use with selective doors, this adjusts which door will open at the return floor (when returning to landing). Values: 0 = Front 1 = Rear
EP4	sec	10-300	300	Emergency Power Manual Select Time - When in manual select mode, this adjusts the time delay before the car is actually selected (Type-4 only). Values: 0 = Front 1 = Rear
EP5	—	0-1	0	Okay To Hold Doors Open on Emergency Power
F10	floor	1-nf	1	Main Fire Landing - This is the floor position number that is designated as the Main Fire Recall Floor. This should be set for the same floor where the Fire Phase 1 key switch is located.
F11	floor	1-nf	2	Fire Alt Landing - The floor position number that is designated as the Alternate Fire Recall Floor.
F12	F/R	0-1	0	Main Fire Landing Door - When in response to Phase 1 Fire Service, this adjusts which door opens at the Main Fire Landing. Values: 0 = Front Door 1 = Rear Door
F13	F/R	0-1	0	Fire Alt Landing Door - When in response to Phase 1 Fire Service, this adjusts which door opens at the Alternate Fire Landing. Values: 0 = Front Door 1 = Rear Door
F14	sec	0-60	30	Fire Override Time - This is the time delay that must expire before Phase 1 Fire Service is allowed to override attendant operated features such as Independent Service. **Note**: This feature is not allowed to operate on some Fire Service types.
F15	—	0-2	0	Fire Service Switch Type - Set this type of switch for a Secondary Phase 1 Fire Service switch. The value to be entered must be dictated by the Fire Service type (F16) and the provided hardware. Values: 0 = No Secondary Switch 1 = Two Position Secondary Switch 2 = Three Position Secondary Switch

Adj.	Unit	Range	Default	Definition
F16	—	0-20	Job EEPROM	Fire Service Type - This selection determines which type of Phase 1 and Phase 2 Fire Service Operation will be provided. Values: 0 = No Fire Service 1 = ANSI/ASME 1993 2 = Chicago Building Code 3 = California 4 = York City RS18 5 = Massachusetts 98 6 = ANSI/ASME 1988 7 = Houston 98 8 = Michigan 98, Detroit 9 = B44 10 = White Plains NY 11 = ANSI/ASME 2000, South Carolina 2000, Mass. 2000, Michigan 2000 12 = B44 2000 13 = ANSI/ASME 2004, South Carolina 2004, Mass. 2004, Michigan 2004 14 = B44 2004 15 = Korea 16 = ANSI 2005 17 = B44 2005 18 = EN81 2005 19 = ANSI 2007 20 = B44 2007
F17	0.1 sec	0-255	100	Hall Fire Door Open Time - This adjustment sets the value of the Phase 1 door open time for special (Houston) Fire Service. Notes: • Cars recalled to the fire floor on Phase 1, with corresponding doors held open, will close the doors after this time delay. • Additional door open push button (input FSDO) per car is required in the hall for this operation so that the doors may be reopened on demand by fire personnel.
F18	—	1-3	3	Phase 1 Safety Edge Operation - This adjustment determines how the safety edge and door operation interact during Fire Service Phase 1 Operation. This adjustment must be coordinated with applicable Fire Codes. Values: 1 = The safety edge is inactive, and the doors close at reduced door speed during Phase 2 Fire Service. 2 = The safety edge is inactive, and the doors close at normal door speed during Phase 2 Fire Service. 3 = The safety edge is active, and the doors close at normal door speed during Phase 2 Fire Service.
F19	—	1-3	3	Phase 2 Safety Edge Operation - This adjustment determines how the safety edge and door operation interact during Fire Service Phase 2 Operation. This adjustment must be coordinated with applicable Fire Codes. Values: 1 = The safety edge is inactive, and the doors close at reduced door speed during Phase 2 Fire Service. 2 = The safety edge is inactive, and the doors close at normal door speed during Phase 2 Fire Service. 3 = The safety edge is active, and the doors close at normal door speed during Phase 2 Fire Service.

Adj.	Unit	Range	Default	Definition
F20	—	0-1	0	Fire Lift - Use this adjustment to designate an elevator as a Fire Lift. Note: This adjustment only applies to fire service types that require the designation of Fire Lifts. Values: 0 = The elevator is not designated as a Fire Lift 1 = The elevator is designated as a Fire Lift
F21	—	0-1	1	B44 Phase 2 Activation Location - Only use this adjustment for B44 Fire Service Operation. **Note**: This adjustment will determine whether Phase 2 Operation is allowed to activate/deactivate only at the main return landing, or activate/deactivate at the main or alternate return landing. Values: 0 = Phase 2 can activate only at the main return landing. 1= Phase 2 can activate/deactivate at the main or the alternate return landing.
F25	—	0-1	0	This adjustment will set the Fire Service Return Indicator (Fire Hat). **Note**: The F25 setting has no effect on the 2004 Fire Service. The Fire Hat light will remain active while either Phase 1 or Phase 2 is active. Values: 0 = The Fire Hat light is active during Phase 1 Recall and, where applicable, during Phase 2 Recall. The light will deactivate when the car arrives at the fire floor. 1 = The Fire Hat light will remain active while Phase 1 or Phase 2 is active.
F26	—	0-4	0	This adjustment will set variations of Smoke Sensor Operation for Standard 2000 Fire Service (A17 and B44). Values: 0 = The Standard 2000 (A17 and B44) fire service sensor operation is active. 1 = The Maryland variation of 2000 fire service is active. Maryland allows the active recall floor to be changed from the main landing to the alternate landing if the main landing sensor is active, the secondary switch (if provided) is in the OFF position, and the primary switch is moved to the RESET position and then to the OFF position. 2 = The Ohio variation of 2000 fire service is active. Ohio allows the alternate landing recall on Phase 1 to be overridden: place either the primary or secondary switch in the ON position and the car will move to the main landing. The car will revert to the alternate landing recall if the primary switch and the secondary switch (if provided) are in the OFF position and the main landing sensor is still active. 3 = The Massachusetts variation of 2000 fire service is active. Massachusetts allows the alternate landing recall on Phase 1 to be overridden: place the primary switch in the ON position and the secondary switch will be ignored if the main landing sensor is active. 4 = The Manchester, NH variation of 2000 fire service is active. Manchester allows fire service initiated by sensors to be deactivated: reset all sensors and no required switch change is needed.

Adj.	Unit	Range	Default	Definition
F27	—	0-55 (HEX)	0	Phase 1 Fire Service Door Profile - This adjustment sets the door profile for use with Phase 1. **Format**: Tens place = Rear door profile (0 through door profile range) Units place = Front door profile (0 through door profile range) **Note**: Before use, the selected door profile must be adjusted in the correct door operator. **Range**: Valid door profile numbers depend upon the type of door board, controller, and door operator. CAN doors = 5 profile capability Linear doors = 2 profile capability See also: The SDP command and the door adjustment manual. Examples: •Set F27 = 0 Sets the door profile used for Phase 1 Fire Service to the same adjustments that are used for each individual floor when not on Phase 1. •Set F27 = 20 Sets the rear door to use profile 2 for Phase 1 Fire Service (regardless of the elevator floor location). The front door will use the same door profile adjustments that are used for each individual floor when not on Phase 1 (regardless of the elevator floor location). •Set F27 = 02 Sets the rear door to use the same door profile adjustments that are used for each individual floor when not on Phase 1 (regardless of which floor the elevator is located). The front door will use profile 2 for Phase 1 Fire Service (regardless of the elevator floor location). •Set F27 = 53 Sets the in-use door profile (while on Phase 1 Fire Service) to profile 5 for the rear door, and profile 3 for the front door (regardless of the elevator floor location).
F28	—	0-1	0	Phase 1 Fire Service Door Edge Control - Phase 1 Fire Recall during battery lowering operation or low oil operation (A17 Code 2000 and later). This adjustment is offered for locations (such as Maryland) who require further refinement to this recall operation. A car recalling under these circumstances is expected to recall to the appropriate floor, open automatic doors, close them within 15 seconds, and leave the door open button active. **Values**: 0 = Operation occurs as described above. 1 = Operation occurs as described above and, •The electronic door edge is ignored (F18) and the doors close at reduced speed. •Other door opening devices (electric eyes or door hold button/switch) are disregarded. •Bypass of the in-stop switch continues as if the car operation is on Phase 1 Recall.
H10	floor	1-nf	1	Homing Return Landing 1 - This adjustment changes the floor the car returns to during car homing operation. To activate, use Input HM1.
H11	F/R	0-1	0	Homing Return Door 1 - This adjustment assigns which door will open at return floor 1 (when the landing has selective doors). Values: 0 = Front 1 = Rear
H12	floor	1-nf	2	Homing Return Landing 2 - This adjustment changes the floor the car returns to during car homing operation. To activate, use Input HM2.

Adj.	Unit	Range	Default	Definition
H13	F/R	0-1	0	Homing Return Door 2 - This adjustment assigns which door will open at return floor 2 (when the landing has selective doors). Values: 0 = Front 1 = Rear
H14	floor	1-nf	3	Homing Return Landing 3 - This adjustment changes the floor the car returns to during car homing operation. To activate, use Input HM3.
H15	F/R	0-1	0	Homing Return Door 3 - This adjustment assigns which door will open at return floor 3 (when the landing has selective doors). Values: 0 = Front 1 = Rear
H16	0.1 sec	0-600	150	Homing Door Time - This adjustment sets the door time used when at the return landing (during car homing operation).
I10	—	0-1	0	Event Inhibit During Inspection - This adjustment inhibits IMS event logging while the car is on Inspection Operation. Values: 0 = Do not inhibit event logging during Inspection Operation. 1 = Inhibit event logging during Inspection Operation.
I11	—	0-1	0	Event Office Single - This adjustment reports office events to only one of the specified phone numbers for IMS Office Events. Values: 0 = Do not report events to only one phone number. 1 = Report events to only one phone number.
I12	—	0-1	0	Event Owner Single - This adjustment reports owner events to only one of the specified phone numbers for IMS Owner Events. Values: 0 = Do not report events to only one phone number. 1 = Report events to only one phone number.
I13	—	0-1	1	Remote Monitor Aux - This adjustment enables the controller to report all Aux Events. **Note**: Ensure that the Event Monitoring is also set up through IMS. Values: 0 = Do not report events 1 = Report events Event Monitoring List • Service Count • Monthly Service • Long Level Time (also AVG) • Low Oil • Stuck Car #1 (no DZ and no Safe String) • Stuck Car #2 (no DZ and no Gate/Interlock open) • Independent Service • Car Stop Switch • Reopen Device Failure • Door Watchdog • Excessive Relevels
I14	count	3-30	20	Relevel Service Count - This adjustment sets the number of relevels allowed in a five minute period before flagging an Excessive Relevel Event.
I15	0.1 sec	0-255	150	Long Level Time - This adjustment sets the maximum amount of time the car can level before reporting a Long Level Event.
I16	sec	1-600	5	Stuck Car #1 Time - This adjustment sets the time delay before reporting when the car is out of the door zone and the safety string is open.

Adj.	Unit	Range	Default	Definition
I17	sec	1-600	5	Stuck Car #2 Time - This adjustment sets the time delay before reporting when the car is out of the door zone and the gate or interlock is open.
I18	sec	1-1800	600	Car Stop Switch Time - This adjustment sets the amount of time that the stop switch can be activated before reporting an event.
I19	sec	1-1800	900	Independent Service Time - This adjustment sets the amount of time that the car can be on Independent Service before reporting an event.
I20	—	0-1	0	Event Door Drag Time - This adjustment sets the average time to close the doors. **Note**: If the time exceeds this adjustment, call Field Engineering and report Event 273.
I21	days	1-365	7	Event Am Alive - This adjustment sets the number of days between the elevator call to the Vista Center to report that it is running (when remote monitoring is active).
J10	pounds	500 - 65000	Job EEPROM	Capacity - The rated car capacity.
J11	—	1 -# of cars	Job EEPROM	Car ID - The car number within a group, beginning with 1.
J12	—	0-240	0	Car Comm Number Values: 0 = The controller computes the comm number from the car and group number. 1-255 = Force to that special comm number.
J13	—	1-8	Job EEPROM	Group ID - The group number within a multiple group network, beginning with 1.
J14	floor	1-nf	1	Lobby Floor - This adjustment sets the lobby to the proper car opening (beginning with 1 = bottom floor). **Note**: This floor number cannot be the building floor number.
J15	floor	2-nf	2	Number of Floors - The number of floors for this specific car. **Note**: This number may differ from other cars in the group.
J16	ports	1-27	34	Number of I/O Ports - The number of I/O ports on the main board and all expansion boards, with each port having 8 signals. **Note**: This value does not count the number of LON ports.
J17	ports	0-243	0	Number of LON Channel 1 Ports - The number of LON Channel 1 ports for this car, with each port having 8 signals.
J18	ports	0-243	0	Number of LON Channel 2 Ports - The number of LON Channel 2 ports for this car, with each port having 8 signals.
J19	—	0-1	0	Relevel on the Stop Switch - Values: 0 = No releveling while the Emergency Stop Switch is thrown. 1 = Up releveling only while Emergency Stop Switch is thrown.
J20	—	0-1	0	Stop Switch Type - This adjustment sets the value to the type of stop switch provided on this installation. Values: 0 = Keyed stop switch. 1 = Public access stop switch.
M10	—	1-5	Job EEPROM	Motor Starter Type - Values: 1 = Across Line - One Contactor 2 = Across Line -Two Contactor 3 = Delta One Contactor 4 = Wye-Delta -Two Contactor 5 = Electronic

Adj.	Unit	Range	Default	Definition
M11	0.1 sec	1-20	0	Motor Starter Time - Wye-Delta interval timer value.
M12	—	1-6	Job EEPROM	Valve Type - This adjustment sets the active solenoids during a high speed Up or Down run. Values: 1 = Up fast only, Down fast, and Down slow (TKE I2/I3 Valve) 2 = Up fast only, and Down fast only 3 = Up fast and Up slow, Down fast only 4 = Up fast and Up slow, Down fast and Down slow (Maxton Valve) 5 = Dump valve, Down fast, and Down slow 6 = Dump valve, and Down fast only
M13	0.1 sec	1-6000	30	Restart Delay - This adjustment sets the amount of delay time from the end of one run until the beginning of a new run (relevel runs do not count).
M14	0.1 sec	1-30	5	Motor Stop Time (previous label, TMS Timer) - This adjustment sets the time delay between the Up-valve deactivation and the motor deactivation.
M16	fpm	0-75	50	Inspection Speed (for traction cars)- This adjustment sets the top speed allowed while on Inspection Operation. *Special Operation* - (for hydro cars) The low pressure adjustment for the valve can be accomplished without removing any wires or the solenoid. The motor will start, but the Up Solenoid will not be energized. 1. Set the Inspection Speed to 1 (e.g. M16=1). **Note**: Do not save this value, or the car speed will require manual resetting. 2. Put the car on Inspection Operation. 3. Use the inspection buttons. 4. Either return the Inspection Speed to the normal value, or cycle the controller power to reset back to the defaults.
M17	0.1 sec	0-100	20	Brake Step #1 Duration - The time to issue Brake Step #1 current.
M18	0.1 sec	0-100	10	Brake Step #2 Duration - The time to issue Brake Step 21 current.
M19	0.1 sec	0-100	20	Brake Step Economy Duration - Time from the last brake step current to issue the Brake Step Economy current.
M20	—	1-3	3	This adjustment sets the number of brake steps to full lift current.
M21	0.1 amps	0-150	5	Brake Step #1 Current - The current dictated to the brake during Brake Step 1. **Note**: The primary brake adjustments are limited by the value of the maximum current adjustment, M70. This value will prevent accidental damage to the brake regulator while adjusting. See Also: Brake Dropping Resistance.
M22	0.1 amps	0-150	10	Brake Step #2 Current - The current dictated to the brake during Brake Step 1. **Note**: The primary brake adjustments are limited by the value of the maximum current adjustment, M70. This value will prevent accidental damage to the brake regulator while adjusting. See Also: Brake Dropping Resistance.
M23	0.1 amps	0-150	20	Brake Step #3 Current - The current dictated to the brake during Brake Step 1. **Note**: The primary brake adjustments are limited by the value of the maximum current adjustment, M70. This value will prevent accidental damage to the brake regulator while adjusting. See Also: Brake Dropping Resistance.

Adj.	Unit	Range	Default	Definition
M24	0.1 amps	0-150	15	Brake Step Economy Current - The current dictated to the brake after the brake step economy timer expired. Typically this value will reduce the current to the brake to prevent heating during a high speed run. **Note**: The primary brake adjustments are limited by the value of the maximum current adjustment, M70. This value will prevent accidental damage to the brake regulator while adjusting. See Also: Brake Dropping Resistance.
M25	0.1 sec.	0-30	10	Brake Current Rate (time) - The time required for the brake to reach the requested amp setting.
M26	fpm	50-1400	50	Wind Sensor Speed - When the wind sensor is activated, the speed of the car is reduced to this speed on the next run. This speed also includes the speed the car will run if Phase 2 reduced speed is required. See Also: F22.
O10	calls	0-nf	3	Anti-nuisance Car Calls - This adjustment sets the number of car calls answered (without passenger detection) before activating the anti-nuisance operation.
O11	inches	0-168	60	Hoistway Access Bottom Zone - When the car runs on hoistway access, this zone is the distance (in inches) above the bottom hoistway access floor. See Also: O21 and O22
O12	floor	0-nf	0	Car Cycle Floor 1 - This adjusts the car cycle for floor 1, and the car will cycle between floors 1 and 2. To deactivate this feature, set either O12 or O13 to 0 (zero). See also: CYC
O13	floor	0-nf	0	Car Cycle Floor 2 - This adjusts the car cycle for floor 2, and the car will cycle between floors 1 and 2. To deactivate this feature, set either O12 or O13 to 0 (zero). See also: CYC
O14	floor	0-nf	1	Hall Independent Return Floor - This adjustment sets the return landing of the car (when Hall Independent Service is activated).
O15	F/R	0-1	0	Hall Independent Return Door - This adjustment assigns which door will open at the return landing (when the landing has with selective doors). Values: 0 = Front 1 = Rear
O16	F/R	0-1	0	Low Oil Door - During low oil operation, this adjustment sets the selective doors to open when returning to a landing. Values: 0 = Front 1 = Rear
O17	sec	20-255	100	Low Oil Timer - This adjustment sets how long the motor is allowed to run before activating the low oil operation. **Note**: If the floor-to-floor run time exceeds the timer value, the low oil operation actives.
O18	floor	0-nf	1	Massachusetts Medical Floor - This adjustment sets which landing the car returns to when Massachusetts Medical Service is activated. **Note**: If a landing does not have front/rear openings (based on the value of O19), the adjustment will be refused.
O19	F/R	0-1	0	Massachusetts Medical Door - This adjustment sets the selective door to open landing return during Massachusetts Medical Recall Service Operation. Values: 0 = Front 1 = Rear

Adj.	Unit	Range	Default	Definition
O20	—	0-1	0	Independent Overrides Lockouts - This adjustment (when enabled) allows the Car Independent Service to override the Car Call Lockouts. Values: 0 = Disabled 1 = Enabled
O21	floor	2-nf	2	Hoistway Access Top Floor - This adjustment sets which landing is designated for the top landing of hoistway access operation. See Also:O11 and O22
O22	inches	0-168	144	Hoistway Access Top Zone - When the car runs on hoistway access, this zone is the distance (in inches) above the top hoistway access floor. See Also: O11 and O21
O23	floor	1-nf	1	Viscosity Return Floor - This adjustment sets which return floor is used for viscosity operation.
O24	—	0-1	1	Transfer Calls on Door Close - This adjustment (if enabled) allows call transfers to occur while the doors are closing. Values: 0 = Disabled 1 = Enabled
O25	—	0-2	0	B44 Type - If this adjustment is set to a non-zero value, B44 and B44 redundancy checks are enabled. Values: 0 = Disabled 1 = Invalid entry - defaults to Enabled 2 = Enabled
O26	—	0-1	0	A17 Type - Which type of A17 code to activate. Values: 0 = A17 Disabled 1 = A17 Enabled
O27	—	0-1	0	EN81 Type - Which type of EN81 code to activate. Values: 0 = Disabled 1 = Enabled
O28	sec	5-60	10	Non-Interference Time - The delay (in seconds) after the doors close, and before SAPB calls can be latched. This time delay gives priority to car calls.
O29	sec	5-30	6	Jack Resync Lower Time - This adjustment sets the time allowed for a jack resync to be completed once the car reaches the bottom and begins the resync operation.
O30	days	1-3	1	Jack Resync Interval - This adjustment sets the number of days between automatic jack resync operations. See also: FJR and JRT
O31	floor	1-nf	1	Jack Resync Landing - This adjustment sets the return landing for the jack resync return.
O32	F/R	0-1	0	Jack Resync Door - This adjustment sets the preferred door to open at the jack resync return landing during jack resync operation. Values: 0 = Front 1 = Rear
O33	floor	1-nf	1	Lobby Recall Return Landing - This adjustment sets the landing that lobby recall will return to during lobby recall operation.

Adj.	Unit	Range	Default	Definition
034	F/R	0-1	0	Lobby Recall Door - This adjustment sets the preferred door to open at the lobby recall landing during lobby recall operation. Values: 0 = Front 1 = Rear
035	sec	0-3600	300	Fan-Light Shutdown Timer - This adjustment sets the time that the fan and light turn off (after all demand for service from the car has ended).
036	floor	1-nf	0	Capture Return Landing - Value: 0 = Stop car at the first available landing. 1 = Specify the floor of the capture return landing.
037	F/R	0-2	0	Capture Door To Open - Values: 0 = Front 1 = Rear 2 = Both
038	—	0-1	0	Capture Door Operation - Values: 0 = The doors remain closed until opened with the CAPTD input. 1 = The doors open and stay open until deactivated.
039	—	0-1	0	Capture Override Independent Service - Values: 0 = No 1 = Yes
040	—	0-1	0	Capture Override Car Stop Switch - Values: 0 = No 1 = Yes
041	—	0-1	0	Attendant Service Call Latch - This adjustment allows the attendant service to latch car calls while the doors are open. Values: 0 = Disable the latch 1 = Enable the latch
042	—	0-1	0	This adjustment enables or disables the reverse car call cancel. Values: 0 = Enable 1 = Disable

Adj.	Unit	Range	Default	Definition
043	—	0-255	0	Use this adjustment to enable or disable CE fixtures and VISTA monitoring. **Note:** This adjustment also determines which communication protocol to use: 485, 232, or CAN. **Values:** 0 = Off 1 = Enable CE fixtures on the 485 port 2 = Enable VISTA monitoring on the 485 port (if supported on given controller) 3 = Enable CE fixtures and VISTA monitoring shared on the 485 port (if supported on given controller) 9 = Enable CE fixture on the car CAN channel 2 11= Enable CE Fixture and VISTA monitoring shared on the car CAN channel 2 41 = Enable CE fixtures for Destination Dispatch on the car CAN channel 2 **Bit Definitions:** 0 = (1) - Enable CE fixtures 1 = (2) - Enable VISTA monitoring 2 = (4) - Communications Protocol 0 = Pipe Vista to 485 port 1 = Pipe Vista to 232 port for use with TAC20-03 (VISTA is only on 232 FB782/784) 3 = (8) - Communications Protocol 0 = Pipe CE fixtures to 485 port 1 = Pipe CE fixtures to a CAN channel determined by the next bit 4 = (16) - CAN Channel 0 = Pipe CE fixtures to CAN Channel 2 (if not 485 or 232) 1 = Pipe CE fixtures to CAN Channel 1 5 = (32) - Destination Dispatch 0 = No DSC present 1 = DSC present; enable in-car destination display 6 = (64) - CE ADA audible announcements 0 = Enable CE ADA audible announcements for Destination Dispatch 1 = Disable CE normal audible announcements for Destination Dispatch 7 = (128) - CE normal audible announcements 0 = Enable CE normal audible announcements 1 = Disable CE normal audible announcements (only if the Destination Dispatch bit is set)
044	# of starts	100-65535	1500	Jack Resync Interval - This adjustment sets the number of motor starts necessary before the launch of automatic jack resync operations. See also: FJR, JRT, and O30
045	—	—	—	Enable Sabbath Operation -
048	—	0-1	0	Automatic Hospital Emergency Service (HES) Enable - On a code blue call, the car will automatically activate on HES. Values: 0 = Disabled 1 = Enabled
049	sec	0-300	7	Automatic Hospital Emergency Service (HES) Deactivation Timer - This adjustment sets the time (sec.) that the doors must be open and no calls registered before the car will go off of Automatic HES.

Adj.	Unit	Range	Default	Definition
O51	—	0-1	0	Jack Resynch Termination -This adjustment sets the preference on when the jack resynch function is finished when the car is on buffers. Values: 0 = When timer O29 expires. 1 = When low pressure activates.
P10	—	1-3	3 Job EPROM	Slowdown Type - Values: 1 = Hoistway Up and Down slowdown switches 2 = Not used 3 = Encoder or tape-derived continuous position count slowdown
P11	—	0-6	1 Job EPROM	Position Type - Values: 0 = No Position Count Measuring System 1 = Tape Position Count Measuring System 2 = Encoder Position Count Measuring System 3 = Tape Encoder (TAC50-04) 4 = ISIS Tape (ISIS 2) 5 = TAC32 CAN Selector 6 = Absolute Encoder
P12	—	0-1	0 Job EPROM	Rear Leveling Vane - Values: 0 = False (Front Selector only) 1 = True (both Front and Rear Selectors)
P13	—	0-1	1 Job EPROM	Front Leveling Type - Values: 0 = LVU and LVD both Off at floor level 1 = LVU and LVD both On at floor level
P14	—	0-1	Job EPROM	Rear Leveling Type - Values: 0 = LVU and LVD both Off at floor level 1 = LVU and LVD both On at floor level
P15	floor	0-1	0	Long Terminal Slowdowns - Values: 0 = Slowdown vane active only at slowdown points. 1 = Slowdown vane active at terminal landing floor levels.
P16	cpf	0-65535	128	Encoder Counts (per foot) - Position resolution of tape or encoder system. A typical value for TAC20 is 54. Other tapes and encoders will vary.
P17	dpp	0-65535	939	Up Slowdown Distance (for encoder and tape selectors) - The distance before the target floor where the Up slowdown begins. To cause an earlier slowdown, increase the P17 adjustment. Note: There are 512 dpp counts per foot.
P18	dpp	0-65535	939	Down Slowdown Distance (for encoder and tape selectors) - The distance before the target floor where the Down slowdown begins. To cause an earlier slowdown, increase the P18 adjustment. Note: There are 512 dpp counts per foot.
P19	cpf	0-512	21	Encoder Level Distance (for encoder selectors) - The distance away from the floor level count that will cause the car to relevel. Encoder leveling also requires adjustment P21=1. Note: There are 512 dpp counts per foot.

Adj.	Unit	Range	Default	Definition
P20	dpp	0-1024	90	Encoder Count Tolerance (for encoder selectors) - The encoder position count must be within the encoder count tolerance, when level at that floor. **Notes:** • The encoder recalibration at LVU and LVD vanes must not change the encoder count by more than the encoder count tolerance. • Failure of either the position count or the recalibration will result in the loss of encoder position with recovery of a floor hunt or terminal hunt. • There are 512 dpp counts per foot.
P21	—	0-1	1	Encoder Leveling - Values: 0 = No encoder leveling 1 = Encoder leveling enabled (operative only on encoder selectors)
P22	dpp	0-16	6	Encoder Leveling Hysterisis - This adjustment prevents dithering on the re-level activation point. **Notes:** • When the car is level, then the value of P22 is added to P19 encoded level distance to increase the level distance by P22. • When the car crosses the re-level distance then the hysterisis is removed. • The effect is to create a dead zone where the car will not re-level when sitting on the re-level point. See Also: P19, P21
RFL	—	—	—	This command clears the fault buffer and resets all of the fault data.
RRF	—	—	—	Reset Run Monitor Faults - This command resets all of the run monitor faults.
S10	—	1-10	0	Security Type - This adjustment (for car functions only) is a type of required Tenant Security. The Type # must be coordinated with the group security type and the group functions. Values: 0 = (TYPE 0) No security required, or the group invokes security and car homes, and shuts down if the return landing (S11) is set 1 = (TYPE 1) Car Call Lockouts in the group 2 = (TYPE 2) Car Call Lockouts in the group with override inputs in the car 3 = (TYPE 3-1) Car Call Lockouts in the group with override inputs in the car 4 = (TYPE 3-2) Security override output only 5 = (TYPE 4) Group Hall Card readers is an invalid selection for the car 6 = (TYPE 5) Security Override output only 7 = (TYPE 6) Car Call Lockouts at the car level 8 = (TYPE 7) Car Call Lockouts at the car level (no group function) 9 = (TYPE 8) Contract configurated security 10 = (TYPE 9) Contract configurated security
S11	floor	1-nf	1	Security Return Landing - The car will home to this floor when placed on Security Operation. The car call for this floor will not be locked out.
S12	F/R	0-1	0	Door to Open Upon Return - This adjustment selects which door (front or rear) opens when the car is homed to the Security Return Landing (see S11). Values: 0 = Front Door 1 = Rear Door

Adj.	Unit	Range	Default	Definition
S13	—	0-1	0	Allow DOB on Security - This adjustment determines whether or not the Door Open Button (DOB) is allowed to open the doors at a secured opening. **Note**: This adjustment affects both front and rear doors. Values: 0 = DOB is not allowed at secured floor. 1 = DOB is allowed at secured floor.
S14	—	0-1	0	One Car Call at a Time on Security - This adjustment allows registration of one car call at a time while on security. All subsequent car call registrations will be inhibited. Values: 0 = Car calls are not limited to one at a time. 1 = Car calls are limited to one at a time.
S15	sec	0-255	30	Security Homing Delay - When Security Homing is enabled, this adjustment is the delay that must expire before the car is forced to the security return landing.
S16	0.1 sec	0-255	50	Security Door Time - After security has homed the car, this adjustment is the amount of time the doors will stand open when the car has arrived at the security return landing.
S17	—	0-1	0	Security Exit Not Required - This adjustment allows all landings in a building to be secured, including the security return landing. Values: 0 = Security return landing can not be secured. 1 = Security return landing can be secured.
S18	—	0-1	0	Security Homing Enabled between Calls - This adjustment returns the car to the security return landing when it has no calls. Values: 0 = Security homing is not enabled. 1 = Security homing is enabled.
S19	—	0-1	0	Security Program A Lockout Activate - This adjustment will activate Program A Security Lockout for TYPE 8 or TYPE 9 only. Values: 0 = Security Program A lockout block is de-activated. 1 = Security Program A lockout block is activated.
S20	—	0-1	0	Security Program A Lockout Override Activate - This adjustment activates Program A Lockout Overrides for TYPE 8 or TYPE 9 only. Values: 0 = Security Program A lockout block is de-activated. 1 = Security Program A lockout block is activated.
S21	—	0-1	1	Security Program A Home On Init - Upon activation of Program A, this adjustment will cause the car to home to the security return landing for TYPE 8 or TYPE 9 only. Values: 0 = Do not home to return landing. 1 = Home to return landing.
S22	—	0-1	0	Security Program A Shuts Down Car - Upon activation of Program A, this adjustment will cause the car to shut down for TYPE 8 or TYPE 9 only. Values: 0 = Do not shut down 1 = Shut down

Adj.	Unit	Range	Default	Definition
S23	—	0-1	1	Security Program A allows the car to answer unsecured Floor Calls during Emergency Dispatch - While on Security Program A for TYPE 8 or TYPE 9 only, this adjustment allows the car to run to unsecured floors when it is on Emergency Dispatch. Values: 0 = Do not allow the car to answer unsecured calls. 1 = Allow the car to answer unsecured calls.
S24	—	0-1	0	Security Program A Independent Service Overrides - This adjustment activates Independent Service to override lockouts when the car is on Security Program A for TYPE 8 or TYPE 9 only. Values: 0 = While simultaneously on Independent Service and Security Operation Program A, Independent Service will only serve floors not secured. **Note**: If Independent Service is active before security, all calls remain unsecured. 1 = During Security Program A, Independent Service will override lockouts.
S25	—	0-1	0	Security Program A Independent Service Activates Security Override Output - When the car is on Security Program A for TYPE 8 or TYPE 9 only, this adjustment prompts the Independent Service to activate (SOO). Values: 0 = Independent Service will not activate the Security Override Output Security Program A. 1 = Independent Service will activate the Security Override Output.
S26	—	0-1	0	Security Program A Inconspicuous Riser Overrides - This adjustment activates the Inconspicuous Riser Operation to override the Security Program A for TYPE 8 or TYPE 9 only. Values: 0 = Inconspicuous Riser Operation will not override Security Program A. 1 = Inconspicuous Riser Operation will override Security Program A.
S27	—	0-1	0	Security Program A Lanterns Only on Hall Call - When the car is on Security Program A for TYPE 8 or TYPE 9 only, this adjustment prompts the lanterns to activate only on the transfer of a hall call. Values: 0 = Lanterns will operate normally during activation of Security Program A. 1 = Lanterns will operate only when a hall call is transferred by the car during activation of Security Program A.
S28	—	0-1	0	Security Program B Lockout Activate - This adjustment activates Program B Security Lockout for TYPE 8 or TYPE 9 only. Values: 0 = Security Program B lockout block is de-activated. 1 = Security Program B lockout block is activated.
S29	—	0-1	0	Security Program B Lockout Override Activate - This adjustment activates Security Program B Lockout Overrides for TYPE 8 or TYPE 9 only. Values: 0 = Security Program B lockout block is de-activated. 1 = Security Program B lockout block is activated.
S30	—	0-1	1	Security Program B Home On Init - Upon activation of Program B for TYPE 8 or TYPE 9 only, this adjustment activates the car to home to the security return landing. Values: 0 = Do not home to the return landing. 1 = Home to the return landing.

Adj.	Unit	Range	Default	Definition
S31	—	0-11	0	Security Program B Car Shuts Down - Upon activation of Program B for TYPE 8 or TYPE 9 only, this adjustment activates the car to shut down. Values: 0 = Do not shut down 1 = Shut down
S33	—	0-1	0	Security Program B Independent Service Overrides - This adjustment activates Independent Service to override lockouts when the car is on Security Program B for TYPE 8 or TYPE 9 only. Values: 0 = While simultaneously on Independent Service and Security Operation Program B, Independent Service will only serve floors not secured. **Note**: If Independent Service is active before security, all calls remain unsecured. 1 = During Security Program B, Independent Service will override lockouts.
S34	—	0-1	0	Security Program B Independent Service Activates Security Override Output - When the car is on Security Program B for TYPE 8 or TYPE 9 only, this adjustment prompts the Independent Service to activate (SOO). Values: 0 = Independent Service will not activate the Security Override Output Security Program B. 1 = During Security Program B, Independent Service will activate the Security Override Output.
S35	—	0-1	0	Security Program B Inconspicuous Riser Overrides - This adjustment activates the Inconspicuous Riser Operation to override the Security Program B for TYPE 8 or TYPE 9 only. Values: 0 = Inconspicuous Riser Operation will not override Security Program B. 1 = Inconspicuous Riser Operation will override Security Program B.
S36	—	0-1	0	Security Program B Lanterns Only on Hall Call - When the car is on Security Program B for TYPE 8 or TYPE 9 only, this adjustment prompts the lanterns to activate only on the transfer of a hall call. Values: 0 = Lanterns will operate normally during activation of Security Program B 1 = Lanterns will operate only when a hall call is transferred by the car during activation of Security Program B.
S37	sec	0-255	5	Security Program A Car Available Delay - While on Security Program A for TYPE 8 or TYPE 9 only, this adjustment sets the time delay that a car remains unavailable for hall calls after completion of a previous call. Values: 0 = Disable 1 = Enable
S38	sec	0-255	5	Security Program B Car Available Delay - While on Security Program B for TYPE 8 or TYPE 9 only, this adjustment sets the time delay that a car remains unavailable for hall calls after completion of a previous call. Values: 0 = Disable 1 = Enable

Adj.	Unit	Range	Default	Definition
S39	—	0-3	0	Car Call Lockout Override Registers Car Call - This adjustment activates a lockout override input to register the associated car call. Values: 0 = Lockout Override activation does not register the corresponding car call. 1 = Lockout Override activation registers the corresponding car call. 2 = While on Program A security, the Lockout Override activation registers the corresponding car call. 3 = While on Program B security, the Lockout Override activation registers the corresponding car call.
S40	floor	0-nf	0	Neo Natal Landing A.
S41	floor	0-nf	0	Neo Natal Landing B.
SNI	—	0-1	0	Set Non-Proprietary Interface - Manufacturing use only.
STU	—	—	—	Selector Setup Command - This command toggles the setup mode On and Off. **Notes:** • To allow car to learn appropriate front versus rear leveling vanes for each floor. During the setup mode, run the car on Inspection Operation from the bottom of the hoistway to the top. • The floor position counts will also be learned for encoder or tape selectors.
VER	—	—	—	Version - This adjustment displays the version/revision and part number of the car generic software, and the DSP and ETSD/L. Also displayed (if applicable): • Integral group • BETA S/W • Enhanced CPU • Word wide job EPROM • Custom Software: Shell, and contract generic package number/revision.
WRT	—	—	—	Write Parameters - This command saves working values in RAM memory to EEPROM (protects the working values in the event the controller's power is lost). **Note:** On power-up, or if the terminal is disconnected, the working values are read from EEPROM into RAM memory.
X10	—	0-1	1	Audible Car Call Enable - This adjustment provides an audible signal to alert a handicapped passenger that a car call has been accepted by the elevator. Values: 0 = Disable 1 = Enable
X11	—	0-2	1	Arrow Type - This adjustment sets the direction and preference arrows. Direction arrows indicate direction of actual car movement. Preference arrows indicate direction in which car has a preference to run. Values: 0 = Direction arrows 1 = Preference arrows 2 = Preference and direction arrows
X12	—	0-1	0	Car Lantern at Door Reversal Limit - This adjustment enables car lantern operation when the door reaches the reversal limit switch. Values: 0 = Disable 1 = Enable

Adj.	Unit	Range	Default	Definition
X13	—	0-1	1	Car Lantern at Lobby - This adjustment enables car lantern operation when the car reaches the lobby. Values: 0 = Disable 1 = Enable
X14	0.1 sec	1-48	5	Flasher Rate - This adjustment sets the flashing rate for the flashing jewels.
X15	—	0-4	2	Front Lantern Type - This adjustment sets type of lanterns used for front openings. Values: 0 = No Lanterns 1 = Car Lanterns only 2 = Hall Lanterns only 3 = Both Car and Hall Lanterns 4 = Arrival Lanterns
X16	0.1 sec	0-40	3	Lantern Delay at Lobby - This adjustment sets delay time of lantern activation at lobby.
X17	—	0-2	0	Lantern Fire Position - This adjustment sets when the lanterns activate during fire service. Values: 0 = At slow-down 1 = At leveling zone 2 = At floor level
X18	0.1 sec	0-20	4	Lantern Off Time - This adjustment sets the duty of the off time during on/off cycle of lanterns and gongs operation.
X19	0.1 sec	0-20	4	Lantern On Time - This adjustment sets the duty of the on time during on/off cycle of lanterns and gongs operation.
X20	min	0-10	0	PI Timeout Time - This adjustment sets the time delay before the position indicators (PI) will turn off (if allowed by other options that may be active). **Note**: If this value is not set, PI Timeout will not be allowed.
X21	—	0-4	2	Rear Lantern Type - This adjustment sets type of lanterns used for rear openings. Values: 0 = No Lanterns 1 = Car Lanterns only 2 = Hall Lanterns only 3 = Both Car and Hall Lanterns 4 = Arrival Lanterns
X22	—	0-2	1	Floor Passing Tone to Buzzer - This adjustment sets whether or not the buzzer in the car station will be used for the floor passing tone. Values: 0 = The car station buzzer not be used for the floor passing tone. 1 = The car station buzzer used for the floor passing tone (only if FPT does not exist). 2 = The buzzer in the car station will be used for the floor passing tone.
X23	—	3-4	4	Number of Display Characters - This adjustment sets the number of display characters available in the Digital PI. **Note**: For the Hall PI, see X28. Values: 3 = 3-character display 4 = 4-character display
X24	0.1 sec	1-20	3	GAL Tone Timer Adjustment - This adjustment sets the actual length of time that the floor passing tone signal will be active (to indicate that the car is passing or arriving at a new floor).

Car Error Codes

Code	Description	Possible Causes / Solutions
981	Terminal Slowdown was activated before normal slowdown; This fault does not shut the car down.	
1001	OS could not create a software time during power up. This fault is mainly used during software development, but proves useful to detect operational issues on installed units.	• Noise levels that affect CPU operation. • Defective CPU software allocates too many timers (only when installing a new software version).
1002	OS could not allocate memory - This fault is mainly used during software development, but proves useful to detect operational issues on installed units.	• Noise levels that affect CPU operation • Defective CPU software allocates too much memory (only when installing new software version)
1003	Manufacturing Use Only.	
1004	Gate and locks opened during a run - A car or hoistway interlock opened while the car was running.	• Car doors clipping interlocks • Defective I/O • Defective gate contact • Defective wiring
1005	DOL was detected while HW closed.	• A defective DOL input • A defective HDIF input
1006	The hoistway interlock failed to close.	• A defective I/O • A defective hoistway door contact • A blocked hoistway door
1007	The safety string opened during a run and caused an emergency stop.	• An open device in the safety string • A defective I/O
1008	The motor contactor is already energized (MCD/MCE) - A run initiation was issued, but either MCD was already inactive, or MCE was already active.	• A defective I/O • Software activation error • Defective relays
1009	• A valve contact error (MCD is open) • A Down run failure • Either the valves or MC are not ready • MCD is inactive, or MCE is active during a Down run	• A defective MCD input • A defective MCE input • Defective relays
1010	• Motor contactor error (MCD Open) • MCD failed to energize or MCE failed to de-energize after run	• Defective MCD input • Defective MCE input • Defective MC contact • Defective relays
1011	• The motor contactor failed to energize (MCD/MCE) • MCD is active, or MCE is inactive after a run • Motor Contactor Fault (MCF) input is activated	• A defective MCD input • A defective MCE input • A defective MC contact • Defective relays • A defective MCF input • A defective MCF output on the electronic starter Possible Solutions: • Verify the starting current on the solid state starter
1013	NV hardware failure - The software issued a command to modify non-volatile memory that was not completed, or completed with invalid results.	• A defective CPU Possible Solutions: • Replace the CPU
1014	NV checksum error - The data in non-volatile memory was lost.	• A defective CPU Possible Solutions: • Replace the CPU
1015	The software is making an invalid NV request.	

Code	Description	Possible Causes / Solutions
1016	The NV is full and cannot hold another client structure. There is no more room for data in non-volatile memory.	
1017	A change in run type occurred during a run. The car is not performing an emergency stop and the software has changed the type of run.	
1018	Normal limit error - Both of the top and bottom normal limits (DL, NTST, NTSB) are active at the same time.	• Defective wiring • A defective I/O
1019	• The normal limits and the car position do not agree • The selector is not lost • The car position is not at the top or bottom floor • The I/O DL, NTST, NTSB do not agree	• Defective wiring • A defective I/O
1020	The I/O database has been corrupted, or the checksum for the I/O has changed.	
1021	• A Safety Node is Offline • Inspection indicates an invalid I/O condition • The status of an I/O indicates a combination of active and inactive inputs that are not allowed	• A wiring error • A defective I/O: IN, INOP, INHA, INCN, INCT, INHAM
1022	Run monitor - The run protect timer has expired.	• Ran too long at leveling speed
1023	Run monitor - The wrong direction run. The software issued a command to run in one direction, but the car actually ran in the other direction.	• Defective wiring • Defective I/O
1024	Excessive number of re-levels - A fault is issued if the elevator re-levels more than 25 times within a 5-minute interval.	• A defective valve • A mis-adjusted valve
1025	BP parity error -	• A magnet issue or selector.
1026	Door Zone Sequence Error - The door zone input was not activated in expected sequence.	
1027	Door Zone Monitor Error - The door zone monitor input was not activated when expected. DZM should be only be inactive if DZ1, DZ2, and DZE are active. DZM should be active all other times.	
1028	The selector shows the level outside of the door zone - The inputs indicate that the car is level at the floor-at some location other than within the door zone.	
1029	LU and LD are active at same time - This fault indicates that both level up and level down inputs are active at the same time.	
1030	Leveling Sequence Error - The leveling inputs were activated in an invalid sequence.	
1031	Selector setup error - The selector was not properly setup.	• The incorrect number of leveling vanes was detected • A bad floor position setup • The selector setup is incomplete • Scanning the hatch too fast
1032	False slowdown interrupt - The slowdown interrupt was detected with no active slowdown input.	
1033	Selector position error - The selector position is out of step with either the encoder, the slowdown, or the BP position.	

Code	Description	Possible Causes / Solutions
1034	Expansion board error - The incorrect expansion board type was returned.	• The wrong type of expansion board was installed • A defective expansion board or cable • An expansion cable was installed back-wards • An incorrect expansion board type adjust-ment (see EIO adjustment)
1040	Door watchdog closing failure - The DCL input did not acti-vate within the expected time interval.	• An incorrect D21 and/or D22 adjustment
1041	Door watchdog opening failure - The DCL input did not acti-vate within the expected time interval.	• An incorrect D21 and/or D22 adjustment
1042	Viscosity shutdown (due to over temperature) - The OLTO input is/was active.	
1043	Low oil shutdown - The car did not complete a floor-to-floor run within the low oil timer interval.	• The O17 value was exceeded
1044	Both inputs are in the required state to activate and de-acti-vate Fire Service Phase 1 at the same time.	
1045	Both inputs are in the required state to activate and de-acti-vate Fire Service Phase 2 at the same time.	
1046	Failed to add I/O to the hardware assignments list - An invalid I/O name was found.	
1049	Open door protection failure - The doors failed to open in the allotted time.	• A defective I/O • A defective door operation
1050	Close door protection failure - The doors failed to close in the allotted time.	• A defective I/O • A defective door operation
1051	Stuck door opening device error - The SE, EE, DOB, or DHB I/O is stuck in the active state.	• A defective I/O • A defective door operation
1052	Stuck DCB error - A DCB I/O is stuck in the active state.	• A defective I/O • A defective door operation
1053	The Fire Service Phase 1 secondary switch I/O does not match the adjustment.	• An invalid adjustment F16 for the fire ser-vice type • An invalid adjustment F15 for the second-ary fire service switch type • The I/O provided does not match the requirements
1054	Down run time has exceeded 5 minutes - The down run request was longer than the time allowed for a full hoistway run in the down direction.	• A defective I/O • A defective valve adjustment • A defective valve
1055	The selector car position does not match with the BP sensors at the floor level - The BP magnets exist, and are valid, but do not agree with the position reported by the selector.	• A defective selector • Faulty or missing BP magnets Possible Solutions: • The selector car position does not match with the BP sensors at the floor level. • The BP magnets exist, and are valid, but do not agree with the position reported by the selector
1056	Floor tables of the encoder counts are not set up when attempting an auto run. Note: When the elevator is not on inspection operation, and the level reference in non-volatile memory for any floor is invalid.	• A defective hoistway scan • A defective CPU • A defective CPU battery • Loose battery connections • An improper power unit setup • Improper selector signals • Verify Pnn and/or Mnn adjustments

Code	Description	Possible Causes / Solutions
1057	The encoder is out of tolerance at the floor level - The car is at floor level, and the encoder position count is different than the floor position count by more than the value in adjustment P20.	• A defective encoder
1058	The selector position is wrong at the limit of travel - The car is at the bottom or top of its travel limit, and the selector has determined that the closest floor is not the corresponding bottom or top floor.	
1059	Bad encoder re-calibration - Two (2) consecutive encoder re-calibrations were out of range. **Note**: The encoder reported a count (while at two consecutive floors) that was different from each floor position count by more than adjustment P20.	• A defective encoder
1060	The selector setup was not completed - The selector setup either failed or was terminated before completion.	• A defective CPU • A defective selector
1061	Selector setup position count table error - The setup has determined that a value for a floor was invalid, and the setup is invalidated.	• A defective selector
1062	1. Encoder interrupt failure - A car passed a slowdown point without receiving confirmation from the encoder.	• A defective encoder • Defective encoder wiring Possible Solutions: • Check the slowdown magnets for gaps • Verify the P17 and/or P18 adjustments

	2. Improper normal terminal slowdown magnet placement	• The terminal slowdown (NTST input for top, NTSB input for bottom) is reached too early (before the corresponding selector slowdown is reached). See P17 for top, and P18 for bottom.
		• If the NTSB input deactivates (metered logic) at the top terminal, or if the NTST input deactivates (metered logic) at the bottom terminal:
		  • A 1086 error is generated
		  • A 1062 error is generated
		  • The car will run at slow speed to the next stop
		Possible Solutions:
		• Check the slowdown magnets for gaps

1064	LON resync fail channel A error - On power up, there is a failure to synchronize 188 with the channel A neuron. **Note**: Channel A is shut down and no communications can take place on channel A.	
1066	LON resync fail channel B error - On power up, there is a failure to synchronize 188 with the channel A neuron. **Note**: Channel B is shut down and no communications can take place on channel B.	
1067	Viscosity operation has detected activation of both low temperature and high temperature sensors at the same time.	• One or both sensors is out of adjustment • One or both sensors is defective • Input wiring error • A defective CPU card

Code	Description	Possible Causes / Solutions
1068	Dual post jack resync fault (racking error) - Attempts to re-synchronize the dual-post jack have failed. The jack cylinders are too far out of synchronization to allow operation, and the elevator shuts down.	• Defective hydraulic system components seeping oil, which leads to jack misalignment • Improper wiring • Defective jack position sensors • A defective CPU card
1069	False power failure error - The CPU received a false NMI interrupt, indicating an impending power failure, and the power did not fail.	• Electrical noise affecting the power fail detection signal and/or the power supply (check grounding and noise suppression) • Power supply adjustment • Defective power supply • A defective CPU card
1070	LVU-LVD error - Neither of the LVU or the LVD leveling sensors were active while the car was within the door zone. Minimum requirements: • One sensor active within the door zone • Both sensors active at the floor level	• Defective selector sensors • Improper wiring • A defective CPU card
1071	Bottom limit switch override error - The bottom limit switch override circuit (controlled by output BLO) has been detected faulty by its monitoring input BLOM. **Note**: When this fault occurs, the elevator shuts down.	• A defective BLO relay and/or output • A defective BLOM input • Improper wiring • A defective CPU card
1072	Gate-Locks monitor error - The car gate hoistway interlock circuit has been detected faulty by its monitoring input GLM, or by redundant monitoring inputs GL1M and GL2M.	• A defective gate contact or hoistway interlock • Defective or improper wiring • A defective GL relay, or defective GL1 / GL2 relays • A defective GLM, GL1M, or GL2M input • A defective CPU card
1073	Car/Gate door open limit error - A fault has been detected due to the simultaneous activation of the car gate contact and the door open limit.	• A defective gate contact and/or door open limit • Improper wiring • Defective communication between the CPU card and the electronic door operator • A defective CPU card and/or electronic door operator • A defective DOL or CDCF input
1074	Jack Low Pressure Error - The jack low pressure sensor has activated, and down motion is not permitted.	• The possibility that the car hangs up in the hoistway during down motion, which allows oil to drain out of the cylinder • The car settled onto the buffers in the pit • A defective pressure sensor • Improper wiring • A defective CPU card • The expansion board cable is reversed
1075	Car Stop Switch Override Error - The car stop switch override circuit (controlled by CSTO output) has been detected faulty by its monitoring CSTOM input, and the elevator shuts down.	• A defective CSTOM input • A defective CSTO output • Improper wiring • A defective CPU card
1076	Freight door interlock stuck error - The freight door interlock (FDI) has failed to close at the start of a run, or failed to open at the end of a run.	• A defective interlock • A defective retiring cam • Improper wiring • A defective CPU card

Code	Description	Possible Causes / Solutions
1077	Loss of encoder pulse train error - While the car was in motion, the encoder motion signal pulse train (furnished by either a tape or rotary encoder) was lost, and the elevator is shut down at a floor.	• A defective rotary encoder • Defective tape motion sensors • Improper wiring • A defective CPU card
1078	Low battery error - The 3-volt battery in the CPU card is either low or dead: • This battery is required to ensure retention of job configuration and adjustments. • If the job configuration and adjustments are lost, then the job configuration must be uploaded again from IMS. • Elevator adjustments may have to be repeated, including scanning the hoistway to learn the floor positions.	• A dead battery • The battery is missing, or installed backwards • A defective CPU card
1079	Down run attempted but velocity stayed zero - The position system specified determines the car velocity, and a down run is attempted. If the velocity returned by the position system remains zero, assume that the car has stalled.	• A defective position system (encoder/selector) • A car or jack is bound and not able to move • The position system adjustment does not match the provided hardware
1080	Bad group job data - The group software cannot run. Stored non-volatile data has invalid parameters in the group portion.	• An invalid configuration or adjustment • Corrupted memory: Install the previously downloaded backup copy of non-volatile memory (this file was generated previously by doing a Service / Transfer / Download from IMS) • A bad CPU card • This error can also be generated by the following information in the group memory: • The number of floors = 0, or is greater than the maximum number of floors permitted • The number of cars in the group = 0, or is greater than the maximum number of cars permitted • The number of I/O = 0, or is greater than the maximum number of I/O permitted • Rear operation is specified, but there are no rear openings specified
1081	Bad initialization of non-volatile memory - This fault can occur if a new section of non-volatile memory is allocated by software, but the memory was not available at that time. **Note:** This fault can also occur when updating software or performing an INIT or INIT ALL. The Remote FAST (if open) will display which section of non-volatile memory failed.	• Memory is temporarily unavailable - Reset the CPU • A software error • Corrupted memory - Install previously downloaded backup copy of non-volatile memory (this file was previously generated: Service>Transfer>Download from IMS) • A bad CPU card
1082	Bad save to non-volatile memory - This fault can occur if a save to non-volatile memory is attempted by software but the memory was not available at that time. **Note:** The Remote FAST (if open) will display which section of non-volatile memory failed.	• Memory is temporarily unavailable - Reset the CPU • A software error • Corrupted memory - Install previously downloaded backup copy of non-volatile memory (this file was previously generated: Service>Transfer>Download from IMS) • A bad CPU card

Code	Description	Possible Causes / Solutions
1083	Bad recall of non-volatile memory - This fault can occur if: • A recall from non-volatile memory is attempted by software, but the memory was not available at that time, or • If a memory segment is set to an invalid size, or • If a variable is set out of its valid range. The Remote FAST (if open) will display which section of non-volatile memory failed.	• Memory was temporarily unavailable - Reset the CPU • A job image error - Check for incorrect TAG sizes through the WRT Remote FAST command • A job image error - Check for variables set incorrectly through the GET Remote FAST command • Corrupted memory - Install previously downloaded backup copy of non-volatile memory (this file was previously generated: Service>Transfer>Download from IMS) • A bad CPU card
1085	An SPI error has been detected on an CN or HN node.	• An invalid configuration or adjustment • Corrupted memory - Install the previously downloaded backup copy of non-volatile memory (this file was generated through a Service / Transfer / Download from IMS) • A bad CPU card

1086	Normal terminal slowdown limit failure - This fault is normally caused by a sensor or magnet failure of NTST, NTSB, TSR1, TSR2.
	If the car is located at a Terminal Landing:
	• The sensors for that terminal did not operate as required to back up normal slowdown. The car is shut down, with a service status of SELECTOR.
	• The sensors for the other terminal are not in the proper state:
	    • A 1086 error is logged, but the car is not shutdown.
	    • A 1062 error will be generated (on the very next run away from that terminal) and the car will run at slow speed to the next stop.
	If the car is located at the Bottom Terminal:
	• Two consecutive failures of NTSB must occur before the car is shut down, and a 1086 fault is generated with each failure.
	If the car is located at the Top Terminal:
	• A single failure of NTST, TSL1, or TSL2 will cause the car to shut down.
		• An invalid configuration or adjustment of magnets or selector
		• Corrupted memory - Install the prior downloaded backup copy of non-volatile memory (this file was previously generated: Service>Transfer>Download from IMS)
		• A bad CPU card

1087	Valve Contact Off Error - This fault occurs when the car has no run request, but the MCD input indicates that the run circuit contacts were active.	• A stuck valve pilot relay • A stuck motor contactor auxiliary contact • A defective MCD input • A bad CPU card • Magnets at top are bad or in the wrong sequence
1088	Motor contactor Off - This fault occurs when the car does not have a run request, but the MCE input indicates that the motor contactor was still enabled.	• A stuck motor contactor auxiliary contact • A defective MCE input • A bad CPU card
1089	The car gate and door locks made, but the door close limit (DCL) was not activated.	• Faulty gate or locks • Jumpers on the gate or locks • A defective DCL or CDCF input • Improper timing between the DCL and CDCF inputs

Code	Description	Possible Causes / Solutions
1090	LON Channel A is not functioning properly. LON Channel A is not receiving any data from any LON devices on the network.	
1091	LON Channel B is not functioning properly. LON Channel B is not receiving any data from any LON devices on the network.	
1092	LON Host-A is not communicating with the 188/186 processor over the parallel-bus interface on the CPU card.	
1093	LON Host-B is not communicating with the 188/186 processor over the parallel-bus interface on the CPU card.	
1094	Hoistway access monitor failure - This fault occurs when INHA and INHAM are in the same state.	
1095	Dynamic sensor failure - This fault occurs when car runs to top landing and one of the dynamic sensors fails to activate.	• Check TPDL, TPDR
1096	CDCF failure - This fault occurs when CDCF and CDCFM are in the same state.	
1097	CDCR failure - This fault occurs when CDCR and CDCRM are in the same state.	
1098	HDIF failure - This fault occurs when HDIF and HDIFM are in the same state.	
1099	HDIR failure - This fault occurs when HDIR and HDIRM are in the same state.	
1100	Door bypass failure - This fault occurs when the bypass switches are activated and car does not go on inspection operation.	• A defective I/O (CDBM/HDBM) • Improper wiring • A defective CPU card
1101	The front gate made, and DCL did not activate.	• A defective I/O (CDCF, DCL, or CDCFM)
1102	The rear gate made, and DCLR did not activate.	• A defective I/O (CDCR, DCLR, or CDCRM)
1103	Door communication loss was detected.	
1104	Gate and lock error - The gate and lock circuit opened during a run.	• The car doors are clipping interlocks • A defective I/O (HDIF/HDIR) • A defective gate contact • Defective wiring
1105	Car door lock error - The car door did not close when DCL was made.	• A defective I/O (CDCF/CDCR or DCL) • A defective car gate contact • Defective wiring
1108	Start retry shutdown - The controller will shutdown after 6 consecutive attempts to start a run.	
1109	Normally, jack resync operation is completed when pressure switch activates or O29 expires (determined by O51setting). If pressure switch does not activate within 60 seconds of reaching the bottom limit, Fault 1109 is generated.	• Improper resynch • A defective pressure switch • A defective pressure switch input
1110	A17/B44 shutdown error - Inspection to reset.	
1120	The left dynamic jack sensor did not activate when it should have.	• Improper left dynamic sensor installation • A defective left dynamic sensor
1121	The right dynamic jack sensor did not activate when it should have.	• Improper right dynamic sensor installation • A defective right dynamic sensor
1122	The car was already in slowdown when the dynamic jack resynch sensors were activated. **Note:** Dynamic sensors should activate 12 inches before the slowdown point.	• Improper dynamic sensor installation • Defective dynamic sensors • The slowdown distance is too long
1123	Up run stalled due to a command to run up, but no encoder pulses were detected with Z44.	• Z44 value exceeded.

VERTICAL EXPRESS

Group Adjustments and Commands

These adjustments are always referred to as system adjustments (when REE = 0) or Car/Group adjustments (when REE= a Car Number) The system adjustments are used for operations or functions which affect all the cars in the group, while the Car/Group adjustments are for operations or functions which affect only that car.

Adj.	Unit	Range	Default	Definition
ALR	cars	0-n	0	Alternate Lobby Request - The number of cars required to park at the alternate lobby. CSW bit 9 must be set to activate.
ALY	floor	1-nfloor	2	Alternate Lobby Floor - The floor that is designated as the alternate lobby floor. To activate, the CSW bit 9 must be set.
AST	1/16 sec	255-62400	1000	Automatic Service Protection Time - This group adjustment must always be set a minimum of 15 seconds higher than the car AST. To disable the group AST, See CS1 bit 10.
BDP	1/16 sec	0-720	0	Blind-crossing Dispatch Penalty Time - This adjustment is valid only when there is an express zone and, when cars are available, this adjustment prevents assigning calls across the express zone.
BITD	—	—	—	Bit Display - This command displays a binary list of all the control status word values. See Also: BITR, BITS
BITR	—	—	—	Bit Reset - This command resets individual control status word bit values. Example: BITR1,4 will reset bit 4 of CS1. See Also: BITD, BITS
BITS	—	—	—	Bit Set - This command sets individual control status word bit values. Example: BITS1,4 will set bit 4 of CS1. See Also: BITD, BITR
CBH	sec	0-900	20	Code Blue Door Hold Time - The time the doors will remain opened at the code blue designated floor. If, after this time, the Hospital Service switch has not been activated, the doors will close and the car will return to normal operation. **Note**: If the AST timer expires before CBH, the car will return to automatic operation.
CB1-8	cars	0-ncars	1-8	Code Blue Priority 1-8 - Use this adjustment to establish priorities for the cars responding to Code Blue Operation. CB1 is the highest priority car followed by CB2, etc. A zero (0) for this adjustment turns Off the Code Blue Operation for the car. See related group adjustment CSW Bit 8 (determines the assignment scheme used in selecting cars for Code Blue calls).
CCP	sec	0-20	10	No Coincident Car Call Penalty Time - If carn has a coincident car call at a floor with a hall call, and if the ETA for carn is less than the ETA of the best car, carn will get the assignment.
CLA	—	0-240	0	Car Link Address - The address used by the CPU card for all communications on the J2 serial port. **Notes**: • To automatically generate an internal software value, set the CLA to 0. • To disable the J2 port, set the CLA to 240 and save with the WRT command (this action will occur after a power cycle). • For integral car/group CPU cards, the car CLA adjustment overrides the group CLA adjustment.
DDT	2 sec	10-255	90	Down-peak Duration Time - The minimum duration of down peak after down peak demand is no longer present.

Adj.	Unit	Range	Default	Definition
DES	ASCII Character	—	car no.	Designation - This adjustment sets the car character designation label displayed on the Car Diagnostic Screen. Example: DESn=xxx xxx = ASCII designation Enter the WRT command, cycle the CPU, and reload from the control panel.
DLB	floor	1-nfloors	2	Dual Lobby Floor - The floor position number designated as the dual lobby landing.
DLR	cars	1-ncars	1	Dual Lobby Request - The number of cars required to park at the dual lobby floor.
DZC	cars	1-15	1	Maximum Number of Cars on Simultaneous Low Zone Operation - This adjustment limits the number of cars that may be simultaneously dispatched to the lower portion of the hoistway. This adjustment should be typically set to 1 for smaller groups, or 2 for groups of six or more cars. • If this adjustment value is too small, lower floor service suffers. • If this adjustment value is too large, upper floor service suffers. To disable Down Peak Zoning Operation, set Adjustment DZC to zero (0).
DZF	floors	nfloors	4	Minimum Number of Floors in Low Zone - This adjustment enforces a minimum number of floors contained in the low zone, and should be set according to the number of floors that will typically almost fill up a car before it returns to the lobby. **Note**: It is generally undesirable to dispatch a car from the lobby to serve only two or three calls before returning to the lobby.
DZT	sec	0-600	180	Long-Wait Call Threshold - One long-wait down call will trigger down peak zoning to the low zone (if the time threshold is above this adjustment). The time threshold will also trigger for a shorter threshold of two long-wait calls, or a threshold of three long-wait calls. • If this adjustment value is too large, lower floor service suffers. • If this adjustment value is too small, upper floor service suffers. **Note**: If Down Peak Operation is being triggered by an average down call wait threshold, then this adjustment should be set greater than that threshold.
EAT	sec	0-100	Job EPROM	Emergency Power Auto Select Timer - If the groups are powered up on emergency power simultaneously, this adjustment sets the time for each group (in the lowering sequence) to initialize and begin lowering.
EL1-8	ncars	0-ncars	1-8	Emergency Power Lowering - This adjustment sets the automatic lowering sequence for Emergency Power Operation. **Note**: EL1 would be the first elevator to lower, and EL8 would be the last elevator to lower.
ELT	sec	0-60	Job EPROM	Emergency Power Lower Timer - This adjustment sets the time for each group in the lowering sequence. **Note**: If the groups are powered up simultaneously, the previous group has sufficient time to initialize and begin to lower.
EP1-8	ncars	0-ncars	1-8	Emergency Power Run -This adjustment sets the automatic select to run sequence for Emergency Power Operation. **Note**: EP1 would be the first elevator to lower, and EP8 would be the last elevator to lower.
EPF	floors	1-nfloors	1	Emergency Power Return Floor - This is the designated floor position number for the emergency power recall floor.

Adj.	Unit	Range	Default	Definition
FAL	floors	1-nfloors	2	Fire Alternate Floor - This is the designated floor position number for the alternate fire landing
FIR	floor	1-nf	Job EPROM	Fire Recall Landing - This adjustment sets the designated floor position number for the Main Fire Recall Floor. Note: This should be set to the floor location of the Phase 1 Fire Service key switch.
FL1	1/16 sec	1-48	8	Flashing Timer - This adjustment sets the flashing rate of flashing jewels.
FL2	1/16 sec	1-48	2	Flickering Timer - This adjustment sets the flickering rate of flickering jewels.
FLT	—	—	—	Fault Buffer Display - This command displays the contents of the fault buffer. The fault buffer contains a record of the previous 24 faults that have occurred, along with the number of occurrences of that fault. Format: FLT[n]n = The fault number to display (plus the next three faults). To display all 24 faults, type FLT and press Enter. To display faults starting with fault number n type FLTn, press Enter, and the following screen will appear:
GET	—	—	—	GET Parameters - This command retrieves the saved parameters from the EEPROM and moves them into RAM. **Notes**: • The CPU only works with parameter values that are stored in its RAM memory. • To display a parameter that caused an out of range error, type GET and press Enter. • To eliminate a parameter error, enter a value in the appropriate range, save with the WRT command, and recall with the GET command.
GLA	—	0-240	0	Group Link Address - The address used by the CPU card for all communications on the J1 serial port. **Notes**: • To automatically generate an internal software value, set GLA to zero (0). • To disable the J1 port, set GLA to 240 and save with the WRT command (the J1 port will be disabled after a power cycle).
GRP	—	1-8	Job EEPROM	Group ID - Set this number to the group number.
GSI	1/4 sec	0-160	0	Generator Sequence Interval - This is the required time interval between starting the MG sets.
HCT	sec	0-60	30	Hold Car Time - The time interval that the car remains at the lobby on Hold Car Operation.
HLD	cars	0-ncars	1	Hold Cars Not Up Peak - This adjustment sets the number of hold cars when NOT on Up-Peak Operation.
HLP	cars	0-ncars	1	Hold Cars During Up Peak - The number of hold cars when on Up Peak Operation.
HPT	1/16 sec	0-962	48	Hold Car Penalty Time - The amount of time added to the hold car's ETA bid time.
LBY	floors	1-nfloors	1	Lobby - This adjustment sets the designated floor position number for the lobby floor, and is also used as the homing floor for the lobby elevator request.

Adj.	Unit	Range	Default	Definition
LER	cars	0-nc	1	Lobby Elevator Request - This is the number of cars requested to park at the lobby. To disable the lobby parking, set this adjustment to zero (0). See also: CSW bits 6, 13, and 14
LRP	1/16 sec	0-960	0	Lobby Request Penalty Time - The time added to the ETA of the car returning to the lobby. This penalty time allows the group to assign hall calls to other cars in the group before it assigns them to this requested car.
MDM	—	—	—	Modem Command - This adjustment displays the IMS modem status. See Also: MDMB, MDMI, MDMP, MDMS
MDMB	—	—	—	Modem Baud Rate - The IMS modem baud rate **Note**: On ICG jobs, use the car adjustment: MDM, MDMB, MDMI, MDMP, MDMS See Also: MDMI, MDMP, MDMS, MDM
MDMI	—	—	—	Modem Initialization - Initializes the IMS modem settings to manufacturing default. **Note**: On ICG jobs, use the car adjustment: MDM, MDMB, MDMI, MDMP, MDMS See Also: MDMB, MDMP, MDMS, MDM
MDMP	—	—	—	Modem Prefix - Displays the dial prefix. **Note**: On ICG jobs, use the car adjustment: MDM, MDMB, MDMI, MDMP, MDMS See Also: MDMB, MDMI, MDMS, MDM
MDMS	—	—	—	Modem Setup String - Displays the IMS modem initialization commands. This command can also be used to set the Modem initialization string (e.g., MDMS, ATE0 V0 and S0). **Note**: On ICG jobs, use the car adjustment: MDM, MDMB, MDMI, MDMP, MDMS See Also: MDMB, MDMI, MDMP, MDM
MEP	cars	1-ncars	1	Maximum Elevators on Emergency Power - This is the maximum number of cars allowed to run simultaneously on Emergency Power Operation.
MID	sec	0-32	4	Minimum Differential Time (MID) Example: MID = 4 seconds Car A ETA = 22 seconds CAR B ETA = 10 seconds DIFF ETA = 11 seconds difference • If the DIFF ETA > MID, and Car A ETA/2 > Car B ETA, the call will be reassigned. • The difference between Car A and Car B ETA must be greater than MID. • The best ETA car must have double the ETA as the assigned car.
MLT	1/16 sec	0-960	350	Maximum Lobby Travel Time (ETA to Lobby) To Select a Next Up Car: If the car has a car call at the lobby and the ETA < MLT, assign this car to the lobby. **Notes**: • If ETA > MLT, the lowest ETA car is selected. • If MLT is set too low, no cars are selected to run to the lobby.
MXD	sec	0-60	15	Maximum Dispatch Time - The maximum difference of ETA in the scan to force hall call re-assignment.
NCO	calls	0-20	3	Next-Up Car Call Override - If the number of car calls exceed the NCO value, the car is removed from Next-Up Operation and allowed to service car calls.

Adj.	Unit	Range	Default	Definition
NDH	sec	3-30	8	Next-up Door Hold Time - The time the doors are held open on Next-Up Operation (if another car is waiting). Notes: • The time is reduced to zero (0) if the 50% loadweigher is activated, or if more than NCO car calls are registered. • This timer is added into the ETA calculation for this car.
NUN	cars	0-ncars	1	The number of Next-Up cars when not on Up Peak Operation.
NUP	cars	0-cars	1	The number of Next-Up cars when On Up Peak Operation.
NZN	zones	0-6	0	Number of Zones - The maximum number of zones or parking floors in the group. Notes: • If this number is set larger than the number of cars, the parking floors (or zone floors) will be rotated on each assignment. • This parameter is usually set to a value less than the total number of cars. See Also: ZN1, CSW Bits 4 and 5.
PAR	—	—	—	Parameters Use this command to review the current value of all parameters. The parameters are listed from left to right and top to bottom on the screen Shortcut keys: • CTRL S = To stop the parameters from scrolling off the screen. • CTRL Q = To resume the scrolling process. • CTRL C or CTRL Z = To end the process. See Also: PARA, PARD, PARI
PARA	—	—	—	Parameter Altered - Use this command to update all parameters, or to change the parameter mode display information. Type PARA, and press Enter. This action will list the parameters (one at a time) and display the current value. If the value needs to be changed, enter the new value and press Enter. If the parameter does not need to be changed, press Enter, and the next parameter is displayed. See Also: PARD, PARI, PAR
PARD	—	—	—	Parameter Download - This command is used to download (from the CPU card to a computer) all system parameters associated with the PAR command. Not supported in 32-Bit See Also: PAR, PARA, PARI
PARI	—	—	—	Parameter Initialize - This adjustment restores most parameters to the default values set by the job EPROM. Notes: • All of the parameters displayed by the PAR command are affected. • To save these parameters, use the WRT command. See Also: PARA, PARD, PAR
PFT	2 sec	0-60	8	Park Free Time - The adjustment sets the amount of time the car must be free in order to zone. See Also: ZN1
PHNx	—	—	—	The phone number dialed by the modem during remote monitoring. Enter the number with no dashes. Where a pause is necessary, a comma may be used to provide a 2-second delay.

Adj.	Unit	Range	Default	Definition
PIA	ASCII	—	—	Position Indicator Adjustment - Use this command to display or make changes to the floor marking for each floor, To change Floor Markings - Enter up to two characters (0-9, A-Z, or a space), and press Enter. If no changes are required, press Enter. Notes: • The computer will continue to display each floor in succession until all floors have been displayed. • Changes can only be made to the first 32 landings. • Any changes will automatically be saved. • Changes made in the group will affect only group-based IMS screens. • Changes must also be made to each car affected. • For the changes to be reflected on the IMS screens, ensure that the Reload button is clicked for each car affected. • The characters displayed in the tens place are limited to 1 through 3, or any two special characters (0, 4-9, A-Z) as allowed by the existing I/O. • When special characters are required in the tens place, see ATP. See Also: PIAI, PIAD
PIAD	floors	—	—	Position Indicator Adjustment Display - This adjustment displays the current floor markings for all floors. See Also: PIA, PIAI
PIAI	—	—	—	Position Indicator Adjustment Initialize - This command resets all floor markings to manufacturing default values. Use the PIA command to delete all changes made to floor markings. See Also: PIA, PIAD
RCB	—	—	—	Reset Code Blue Calls - This command resets all registered Code Blue calls.
RDC	—	—	—	Reset Down Calls - This command resets all registered Down calls.
REE	—	—	—	Reference Elevator - Set this command for the group (REE = 0), or for an individual car (REE = 1 to 8).
RFLn	—	—	—	Reset Fault - This command resets the related faults for the group system (n = 0), or the group car (n = 1-8).
RLB	floors	1-nfloors	2	Rear Lobby Floor - See LBY and CSW Bit 11.
RLR	cars	0-ncars	1	Rear Lobby Car Request - See LER and CSW Bit 11.
RRD	—	—	—	Reset Rear Down Call - This command resets all registered rear down hall calls.
RRU	—	—	—	Reset Rear Up Call - This command resets all registered rear up hall calls.
RTC	—	—	—	Real Time Clock - This command shows the time elapsed since the last power-up. Format: Day-hour:minute:second
RUC	—	—	—	Reset Up Calls - This command resets all registered up hall calls.
RUT	—	—	—	Reset Up Time - This command resets the stored, accumulated power-up time, and will also reset the clock display on the video monitor. Use the WRT command to save the changes.
SCA	—	—	—	Scan Call Assignment Table - This command finds a specific car as set by REE (1 thru 8), and reviews the Scan Assignment Table of all floors. Use the SCAA command to enter the following values (with their designa-tions): See Also: SCAA, SCAI

Adj.	Unit	Range	Default	Definition
				Value (Rear Calls / Front Calls) — Designation 0 / 0 — Do not accept Up or Down hall calls for that floor 1 / 1 — Accept only Up hall calls for that floor 2 / 2 — Accept only Down hall calls for that floor 3 / 3 — Accept both Up and Down hall calls for that floor
SCAA	—	—	—	Scan Call Assignment Alter - This command changes the floor scan assignment table for Car REE. See Also: SCA, SCAI
SCAI	—	—	—	Scan Call Assignment, Initialize - This command will initialize the floor scan assignment (for all cars) to manufacturing default. See Also: SCA, SCAA
SCBf	—	—	—	Set Code Blue Call - This command will set a Code Blue Call at Floorf.
SCBRf	—	—	—	Set Code Blue Rear Call - This command will set a Rear Code Blue Call at Floorf
SDCf	—	—	—	Set Down Call - This command will set a down hall call at Floorf.
SEC	floors	1-nfloors	1	Security Floor - When security is activated, the cars will home to this landing. See Also: CS3 Bit 2
SFL	—	—	—	Secure Hall Call Lockout - This adjustment will lock out access to a hall button for all cars in the group. Format: SFL U|D <[>R]<[>S/U] n U = Up calls D = Down calls R = Rear S = Secure U = Unsecure n = Floor Number Examples: • To lock out the tenth floor rear up hall call, type SFLURS10 and press Enter. • To unlock the third floor front up hall call, type SFLUU3 and press Enter. • To view secured calls, use the DSF command.
SRDf	—	—	—	Set Rear Down Call - This command will set a rear down hall call at Floorf.
SRUf	—	—	—	Set Rear Up Call - This command will set a rear up hall call at Floorf.
SSI	—	—	—	Special Security Initialization - Use this adjustment to restore the security status words and CS4/CS5 to Job EPROM defaults.
SUCf	—	—	—	Set Up Call - This command will set an up hall call at Floorf.

Adj.	Unit	Range	Default	Definition
TES	—	—	—	Type Elevator Service - Type of elevator service in HEX (for REE = 1-8). Value — Designation 0H — Automatic Operation 1H — Out of Service from Car Controller 2H — Loss of Communication 4H — Time-out Service from Group 8H — Code Blue Service 10H — Emergency Power Recall Service 20H — Loss of Hall Call Power Service 40H — Simplex or Inconspicuous Riser Service REE=0 — Displays the total number of cars in auto service
TF1	floor	0-nfloors	0	Transfer Floor 1 - This adjustment sets which floor is designated as Transfer Floor 1 (which will only accept Down hall calls). A zero (0) will disable the transfer floor operation. Notes: • If the Transfer Floor Operation is activated, and the car is below the transfer floor, the car call for the transfer floor cannot be registered. • If the Transfer Floor Operation is not active, or if the car is above the transfer floor, the car call for the transfer floor can be registered. • The TF1 adjustment in the car should be set to the same value as TF1 in the group.
TF2	floor	0-nfloors	0	Transfer Floor 2 - This adjustments sets the floor designated as the transfer floor (which accepts only Down hall calls). A zero (0) value will disable the Transfer Floor Operation. Notes: • If the Transfer Floor Operation is activated, and the car is below the transfer floor, the car call for the transfer floor cannot be registered. • If the Transfer Floor Operation is not active, or if the car is above the transfer floor, the car call for the transfer floor can be registered. • The TF2 adjustment in the car should be set to the same value as TF2 in the group.
TFC	—	—	—	Traffic Monitor - This command will activate and control traffic surveys through the Remote FAST. Syntax: TFC<[>B|E|In|M|S|R|T|VI] Examples: TFC = Display usage message TFCB = Begin collecting data E = End survey TFCI = View interval size TFCI=15, Set interval to 15 TFCM = Collection mode 0 = No wrap 1 = Wrap On TFCS = Display current status TFCR = Reset TFCT = Display system time TFCT = Change system time, (mm/dd/yy, hh:mm:ss) TFCVI = Display in-service data
TIM	—	—	—	Time - This adjustment sets the length of time (total number of days) since the last CPU power-up. Display: Days-Hours:mins:secs.

Adj.	Unit	Range	Default	Definition
UDP	1/16 sec	10-960	660	Up-peak Dispatch Penalty Time - Use this adjustment to set the penalty time added to the car ETA time. **Note**: The group will assign hall calls to other cars before it assigns them to the car at the lobby.
UDT	sec	10-255	60	Up-peak Duration Time - Use this adjustment to set the minimum duration of Up-peak Time (after being triggered).
ULC	trips	1-60	12	Up-peak Load Count - This adjustment sets the number of trips from the lobby in a three-minute time interval with the car loaded (which triggers Up-peak Operations). Loaded car indicators: • A discrete load switch input • An electronic loadweigher trip point activation • The car leaves the lobby with more than 2 car calls registered
VER	—	—	—	Version - The Version/Revision of the group generic software.
WRT	—	—	—	Write Parameters - This command saves the working values in RAM memory to the EEPROM (which protects the working values in the event the controller's power is lost). **Note**: On power-up, or if the terminal is disconnected, the working values are read from EEPROM into RAM memory.
XLT	min	2-10	2	Emergency Power Extended Lowering Time - Use this adjustment to set the time allowed for cars to arrive at the emergency power floor.
ZN1	floors	1-nfloors	1	Zone 1 Floor - This adjustment sets the car that stays at the last floor served for normal operation. **Notes**: • When parking is enabled and a car becomes free, it will be sent to one of the zone floors (after a time delay - PFT). • ZN1 through ZN6 allow for six different zone or parking floors. • The number of zone floors used is set by NZN. See Also: CSW Bits 4 and 5
ZN2	floors	1-nfloors	2	Zone 2 Floor - See ZN1.
ZN3	floors	1-nfloors	2	Zone 3 Floor - See ZN1.
ZN4	floors	1-nfloors	2	Zone 4 Floor - See ZN1.
ZN5	floors	1-nfloors	2	Zone 5 Floor - See ZN1.
ZN6	floors	1-nfloors	2	Zone 6 Floor - See ZN1.
ZPS	—	—	—	Zone Pilot Status - This command will display where the car zone is located relative to the car. Format: 0H = Zone is at the car 1H = Zone is above the car 2H = Zone is below the car

Car and Group Adjustments

The following Car/Group adjustments tune the Group's ETA calculations for each individual car in that group. Default values are acceptable in most instances. However, if a car (or multiple cars) in the group has different job parameters (car speed, door size, door open and closing speeds, blind hatch, etc.), then setting these adjustments should improve group service. REE must be equal to the car number to access the following adjustments.

Adj.	Unit	Range	Default	Definition
ACC	1/16 sec.	16-255	28	Acceleration time (Car/Group) - Average time it takes the car to accelerate to top speed.
ATT	1/16 sec	8-160	60	Average Transfer Time (Car/Group) - The average time the doors are fully opened.
BTT	1/16 sec	0-720	0	Blind Travel Time (Car/Group) - The time it takes to travel through the blind shaft at top speed. BTT = SPE x Number of floors in the blind shaft.
DCT	1/16 sec	16-160	40	Door Closing Time (Car/Group) - The average door closing time.
DEC	1/16 sec	16-255	28	Deceleration Time (Car/Group) - The average time it takes the car to decelerate from top speed.
DOT	1/16 sec	16-160	30	Door Opening Time - (Car/Group) - The average door opening time.
SPE	1/16 sec	4-48	18	Speed of Elevator (Car/Group) - One-floor run travel time in time units. If the average floor height (h) is 12 feet, and the speed of the car is 350 fpm, then the one-floor travel time in 1/16 second increments is 32. $SPE = \frac{h \times 16}{Speed \times 60}$ Example: $SPE = \frac{12 \times 16}{350/60} = 32$

Group Error Codes

Code	Description
0	No errors have occurred.
10	Invalid Hall Call Assignment Error - The group had a non-existent hall call to a car, or the car cancelled a hall call that was not assigned to it.
11	EEPROM Load Error - While attempting to write to EEPROM, one of the following problems occurred: 1. Write verify failed. 2. Checksum failed. 3. EEPROM stamp did not match (No EEPROM). 4. Group parameters were out of range (See Group Parameter Initialization). 5. Car/Group parameters were out of range (See Group Parameter Initialization). 6. EEPROM read error. **Note**: Each occurrence of one of these problems will cause the EEPROM Load Error number to be stored in the fault buffer. Group Parameter Initialization 1. Remove the comm connectors from J1 and/or J2 of the CPU (on the cars that are to be initialized). 2. Turn ON the I/O and the CPU switches. 3. Connect the IMS laptop to the car that is to be initialized. 4. Establish communications to the correct group and car number (as shown in the header of the Remote FAST window). Use the control panel to change the selection (if necessary). a. Enter parameter REE=0: b. Enter the PARI command. c. Enter the SCAI command. d. Enter the WRT command. 5. Set parameter REE=1. a. Enter the PARI command. b. Enter the WRT command. 6. Repeat Steps 2 through 6 for all cars with the Group I/O. 7. Reinstall communication connectors back into J1 and/or J2 of each CPU.
12	Real Time Clock Counting Error - Real time clock or sequence clock counter did not change within an allowable time period. Possible Cause: A defective CPU
14	Sequence clock re-entry error - in Tick 0.
15	Sequence clock re-entry error - in Tick 1.
16	Sequence clock re-entry error - in Tick 2.
17	Sequence clock re-entry error - in Tick 3.
19	PMI Configuration RAM Database Error - The checksum for the PMI database did not match the RAM computed checksum value stored in EEPROM. The PMI configuration table is rebuilt, and the checksum in EEPROM is updated. Possible Causes: A defective CPU or a defective RAM chip.
20	NMI Timeout - NMI interrupt was not a true power failure.
22	Traffic Survey was in progress during power down.
23	Traffic Survey Software Error.
24	Invalid Traffic Command (should never occur) - Contact manufacturing.
25	Invalid Shutdown Command.

Code	Description
60	Communication Receive Parity Error.
61	Communication Receive Framing Error.
62	Communication Receive Overrun Error.
63	Communication Wake-up Signal from the Car is Intermittent or Noisy.
64	Communication Error During Decoding the Record of Data Received from the Car. Possible Causes: The car is not connected to the group controller, or defective communication wiring
66	Communication Receive Error - Data was received from the car with invalid information: start character, length, command character, checksum, or end of text character. Possible Causes: Noise on the communication line, or defective communication wiring
67	Communication Receive Time-out Error - No data was received from the car, and this occurred only once. The next communication cycle was successful.
68	Communication Transmit Interrupt Enabled Error - The transmit interrupt was enabled without having a transmit command. Possible Causes: Communication wiring is disconnected, or the car controller is powered down.
73	Communication Transmit Interrupt Enabled Error - This error occurred during verify test, normal reception, parity, overrun, or framing error.
76	Communication Transmit Time-out Error - The car was not able to complete transmission to the group within an allowable time period.
77	Communication Receive or Transmit Time-out Error - The receive or transmit protection timer expired, and communications to the group was not enabled.
78	Communication - Invalid receive sequence error.
79	Communication - Invalid transmit sequence error.
80	Invalid I/O Mnemonic Error - The generic software found an invalid I/O mnemonic. The number of I/O names not recognized in the generic software does not match the number of contract I/O added in the contract shell.

Group Control Status Words

Bit CSW	Default	Function
CSW-0	R	**Set** = Cross-cancellation is enabled. • During modernization installations, it is useful to cross-cancel the hall calls with the existing dispatch controller. • With this bit set, hall calls will not be latched by this group. **Reset** = The hall calls will be latched normally. • Requires Job EPROM enable if the software is earlier than 675HE12. See Also: CS8-6, XAT, and XIT
CSW-4	R	**Set** = The free cars will zone. **Reset** = Parking is disabled.
CSW-5	R	**Set** = The free cars park at specific floors by priority. • ZN1 through ZN6, where ZN1 is the highest priority. **Reset** = The car parks at or close to any available zone.
CSW-6	R	**Set** = Extra cars will be parked at the lobby during their periods of no activity. • This bit is valid only if LER is greater than 1.
CSW-8	R	**Set** = A Code Blue call is assigned in a pre-established order as defined by the commands CB1 thru CB8. **Reset** = A Code Blue call is assigned to the closest available car.
CSW-9	R	**Set** = Use the Alternate lobby floor (ALY) parameter instead of the normal lobby floor (LBY).
CSW-10	R	**Set** = Dual Lobby Operation is enabled.
CSW-11	R	**Set** = Rear Lobby Operation is enabled.
CSW-13	R	**Set** = If LER is greater than 0, the group will not assign a lobby request to a car until it is free (with no calls and the parking timer has expired). **Reset** = The group will immediately assign a lobby request to a car any time the lobby request is not met. • The lobby has a higher priority. • Down calls will be bypassed because cars dispatching to the lobby will have extended ETAs.
CSW-14	R	**Set** = The Nextup Door Operation is enabled. **Reset** = The auto return to main is enabled. LER must be greater than 0 for this BIT to have any effect.
CSW-15	R	**Set** = The rear hall call cross-cancellation is enabled. • During modernization installations it is sometimes useful to cross-cancel the rear hall calls with the existing dispatch controller. • With this bit set, rear hall calls will not be latched by this group. Requires Job EPROM enable if the software is earlier than 675HE12. **Reset** = The rear hall calls will be latched normally.

Group Control Status Words
(continued)

Bit CS1	Default	Function		
CS1-0 CS1-1	R	This allows changes to the terminal to CPU baud rate.		
		1	0	Baud Rate
		R	R	1200 (normal mode)
		R	S	300
		S	R	9600
		S	S	2400
Note: Bits 0 and 1 are normally reset for 1200 baud. Alternate baud rates are selectable.				
CS1-7	R	**Set** = Pulse fire light during fire service.		
CS1-9	R	**Set** = Do not latch Code Blue Calls if no cars are available to service the call.		
CS1-10	R	**Set** = The automatic service protect timer (AST) is disabled.		
CS1-11	R	**Set** = Cars which are unavailable for hall calls (due to option activation), will be bypassed or deselected during Emergency Power Automatic selection. **Note:** This is not recommended on jobs with express zones or Code Blue operation.		
CS1-12	R	Job EPROM Set = The group has Type 3 Emergency Power.		
CS1-13	R	Job EPROM Set = Activation of Emergency Power will select cars on Hospital Emergency Service to lower and run.		
CS1-14	R	Job EPROM Set = Manual selection of cars during Emergency Power Operation is inhibited until the lowering process is complete.		
Bit CS2	**Default**	**Function**		
CS2-0	R	**Set** = The events are only sent to the first available IMS (an owner configuration).		
CS2-1	R	**Set** = The events are only sent to the first available IMS (an office configuration).		

VERTICAL EXPRESS

Group Control Status Words
(continued)

Bit CS3	Default	Function
CS3-0	S	Security SCAN Enable - This flag applies only to Security Types 2, 3-1, 3-2, and 5. **Set** = The cars will be assigned one hall call from the security landing. **Reset** = The cars will be assigned hall calls as if on automatic operation.
CS3-1	S	Security Inter-floor Car Call - This flag applies only if CS3 bit 0 is set. **Set** = The cars are not allowed to answer inter-floor car calls. **Reset** = The cars are allowed to answer inter-floor car calls.
CS3-2	S	Security Homing Enable - This flag applies only to Types 1, 2, 3-I, and 3-II Security. **Set** = The cars will home to the security landing (SEC) when Tenant Security is activated. **Reset** = The cars will park at the last landing served. **Note**: For Types 2 and 3, if the Security SCAN Enable bit is set, homing will be enabled and this bit will have no affect.
CS3-3	S	Rear Security Landing **Set** = The security landing is a rear landing.
CS3-4	S	**Set** = Down Peak operation will override Nextup operation. **Reset** = One car will remain on Nextup.
Notes: • CS3 bits 5-9 control interactions with Tenant Security Types 1, 2, 3-I, and 3-II. • If CS3 bit 0 is set, these bits are ignored and the group options are disabled during security.		
CS3-5	S	**Set** = Zone Parking is enabled during security operation. **Reset** = Zone Parking is disabled during security operation.
CS3-6	S	**Set** = Lobby Request (auto return to main) is enabled during security operation. **Reset** = Lobby Request (auto return to main) is disabled during security operation.
CS3-7	S	**Set** = Next Up is enabled during security operation. **Reset** = Next Up is disabled during security operation.
CS3-8	S	**Set** = Up Peak is enabled during security operation. **Reset** = Up Peak is disabled during security operation.
CS3-9	S	**Set** = Down Peak enabled during security operation. **Reset** = Down Peak is disabled during security operation.

Group Control Status Words

(continued)

Notes:

- CS4 is used for Program A of Tenant Security Type 8 or 9.
- Type 8 Defaults for these bits are shown below.
- Type 9 Defaults for these bits will be determined by Job EPROM flags. See Special Security Initialization (SSI) - Use this adjustment to restore the security status words and CS4/CS5 to Job EPROM defaults.

Bit CS4	Default	Function
CS4-0	R (Type 8)	**Set** = The car call lockout block is activated. **Reset** =The car call lock-out block is deactivated.
CS4-1	R (Type 8)	**Set** = The car call lockout override block is activated. **Reset** = The car call lockout override block is deactivated.
CS4-2	R (Type 8)	**Set** = Only one hall call assignment per car is allowed during Security Operation. **Reset** = Hall calls will be assigned as normal during Security Operation. **Note:** This CSW bit is valid only if hall call service is set to allow hall calls.
CS4-3	R (Type 8)	**Set** = A hall call assignment will be made only to a car at the security landing during Security Operation. **Reset** = A hall call assignment will be made to a car at any landing during Security Operation. **Note:** This CSW bit is valid only if hall calls allowed is set to one hall call assignment at a time.
CS4-4	R (Type 8)	**Set** = Only one car call at a time may be registered with the car at the security landing during Security Operation. **Reset** = Multiple car calls at a time may be registered with the car at any landing during Security Operation. **Note:** This CSW bit is valid only if the number of hall call assignments allowed is set to one, and the hall call assignment is allowed only at the Security landing.
CS4-5	R (Type 8)	**Set** = Parking is disabled during Security Operation. **Reset** = Parking is enabled during Security Operation.
CS4-6	R (Type 8)	**Set** = Lobby Request (automatic return to main) is disabled during Security Operation. **Reset** = Lobby Request (automatic return to main) is enabled during Security Operation.
CS4-7	R (Type 8)	**Set** = Nextup Operation is disabled during Car Call Lockout Security Operation. **Reset** = Nextup Operation is enabled during Car Call Lockout Security Operation.
CS4-10	R (Type 8)	**Set** = Nextup Operation is disabled during Hall Call Lockout Security Operation. **Reset** = Nextup Operation is enabled during Hall Call Lockout Security Operation.
CS4-11	R (Type 8)	**Set** = If the car is communicating with the group, Emergency Dispatching will be disabled upon loss of hall call power (during Hall Call Lockout Security Operation). **Reset** = The car will Emergency Dispatch (as set in the Car CS6-Bit 4/CS7-Bit 4 Status Words) when the loss of car/group communication or hall call power occurs during Car Call Lockout Security Operation.
CS4-12	R (Type 8)	**Set** = Emergency Dispatching will be disabled upon loss of hall call power during Hall Call Lockout Security Operation. **Reset** = The group will Emergency Dispatch cars to unsecured floors set in the group.
CS4-13	R (Type 8)	**Set** = Hall Call Lockout Security Operation is activated. **Reset** = Hall Call Lockout Security is deactivated (Hall Call Lockout Security can also be activated by the HCLA input).
CS4-14	R (Type 8)	**Set** = The Hall Call Lockout Table per car is enabled. **Reset** = The Hall Call Lockout Table per car is disabled.
CS4-15	R (Type 8)	**Set** = Program B Security Operation is enabled. **Reset** = Program A Security Operation is enabled.

Group Control Status Words

(continued)

Notes:

- CS5 is used for Program B of Tenant Security Type 8 or 9.
- Type 8 Defaults for these bits are shown below.
- Type 9 Defaults for these bits will be determined by Job EPROM flags. See Special Security Initialization (SSI) - Use this adjustment to restore the security status words and CS4/CS5 to Job EPROM defaults.

Bit CS5	Default	Function
CS5-0	R (Type 8)	**Set** = The car call lockout block is activated. **Reset** =The car call lock-out block is deactivated.
CS5-1	R (Type 8)	**Set** = The car call lockout override block is activated. **Reset** = The car call lockout override block is deactivated.
CS5-2	R (Type 8)	**Set** = Only one hall call assignment per car is allowed during Security Operation. **Reset** = Hall calls will be assigned as normal during Security Operation. **Note**: This CSW bit is valid only if hall call service is set to allow hall calls.
CS5-3	R (Type 8)	**Set** = A hall call assignment will be made only to a car at the security landing during Security Operation. **Reset** = A hall call assignment will be made to a car at any landing during Security Operation. **Note**: This CSW bit is valid only if hall calls allowed is set to one hall call assignment at a time.
CS5-4	R (Type 8)	**Set** = Only one car call at a time may be registered with the car at the security landing during Security Operation. **Reset** = Multiple car calls at a time may be registered with the car at any landing during Security Operation. **Note**: This CSW bit is valid only if the number of hall call assignments allowed is set to one, and the hall call assignment is allowed only at the Security landing.
CS5-5	R (Type 8)	**Set** = Parking is disabled during Security Operation. **Reset** = Parking is enabled during Security Operation.
CS5-6	R (Type 8)	**Set** = Lobby Request (automatic return to main) is disabled during Security Operation. **Reset** = Lobby Request (automatic return to main) is enabled during Security Operation.
CS5-7	R (Type 8)	**Set** = Nextup Operation is disabled during Car Call Lockout Security Operation. **Reset** = Nextup Operation is enabled during Car Call Lockout Security Operation.
CS5-10	R (Type 8)	**Set** = Nextup Operation is disabled during Hall Call Lockout Security Operation. **Reset** = Nextup Operation is enabled during Hall Call Lockout Security Operation.
CS5-11	R (Type 8)	**Set** = If the car is communicating with the group, Emergency Dispatching will be disabled upon loss of hall call power (during Hall Call Lockout Security Operation). **Reset** = The group will Emergency Dispatch (as set in the Car CS6-Bit 4/CS7-Bit 4 Status Words) when the loss of car/group communication or hall call power occurs during Car Call Lockout Security Operation.
CS5-12	R (Type 8)	**Set** = Emergency Dispatching will be disabled upon loss of hall call power during Hall Call Lockout Security Operation. **Reset** = The group will Emergency Dispatch cars to unsecured floors set in the group.
CS5-13	R (Type 8)	**Set** = Hall Call Lockout Security Operation is activated. **Reset** = Hall Call Lockout Security is deactivated (Hall Call Lockout Security can also be activated by the HCLA input).
CS5-14	R (Type 8)	**Set** = The Hall Call Lockout Table per car is enabled. **Reset** = The Hall Call Lockout Table per car is disabled.

Group Control Status Words

(continued)

Bit CS8	Default	Function
CS8-0	R	**Set** = Owner IMS events are sent to first available owner system. **Reset** = Send event to all owner systems selected (e.g., Phone A/B/C, direct connect).
CS8-1	R	**Set** = Office IMS events are sent to first available office system. **Reset** = Send event to all office systems selected.
CS8-2	R	**Set** = Machine room inspection, when active, will disable event logging. **Note:** Applies when car event monitoring is enabled - will not disable group-enabled event monitor.
CS8-3	R	**Set** = A car recalling to the alternate fire floor on Phase 1 will open the opposite side specified by CS3 bit 12. If the alternate fire floor has only one opening, this bit will be ignored.
CS8-4		**Set** = The Door Open PB will be allowed to reopen the doors at a locked out opening if those doors have already cycled at the floor.
CS8-5		**Set** = The generic software is compatible with CE Electronics version P191 software. **Reset** = The generic software is compatible with CE Electronics version P191.1 software. **Note:** If a CE Electronics interface board exists on the job, and the software on the board is P191, this bit should be set (see also car Bit CS2-9).
CS8-6	R	**Set** = Events will be logged only for services being monitored. No event will be logged for a service type which follows a service type that is monitored, unless the new service is also monitored. **Reset** = All service type changes will be logged.
CS8-7	R	**Set** = Power up events will not be logged.
CS8-8	R	**Set** = For A17 and B44 2000 Fire Service - Phase II Recall will take the car to the current active fire floor. **Reset** = Phase II Recall will take the car to the main fire floor.
CS8-9	R	**Set** = The Fire Hat Light will remain active while Phase I or Phase II is active. **Reset** = The Fire Hat Light will deactivate when the car arrives at the fire floor.
CS8-10	R	**Set** = The Maryland variation of 2000 Fire Service will be active. **Note:** The Maryland variance allows the active recall floor to be changed from the main landing to the alternate landing if: • the main landing sensor is active, • the secondary switch (if provided) is in the OFF position, and • the primary switch is moved to RESET position and then to the OFF position (see Group CS2 bit 4).
CS8-11	R	**Set** = The Ohio variation of 2000 Fire Service will be active. **Note:** The Ohio variance allows alternate landing recall on Phase I to be overridden: • Place either the primary or secondary switch in the ON position, causing the car to move to the main landing. • The car reverts to alternate landing recall if the primary switch and the secondary switch (if provided) are in the OFF position and the main landing sensor is still active (see Group CS2 bit 5).
CS8-12	R	**Set** = The Massachusetts variation of 2000 Fire Service will be active. **Note:** The Massachusetts variance allows alternate landing recall on Phase I to be overridden: • Place the primary switch in the ON position, and the secondary switch is ignored if the main landing sensor is active (see Group CS2 bit 6).
CS8-13	R	**Set** = The Manchester, NH variation of 2000 Fire Service will be active. **Note:** The Manchester variance allows fire service initiated by sensors to be deactivated by resetting all sensors. • No switch change is required, unless a Phase I switch has been placed in the ON position prior to the sensor reset (see Group CS2 bit 7).

On-Card Diagnostics

CPU - WD LED On-Card Diagnostics

WD LED State (Green LED)	Occurs	Condition
Flickers once or twice, then ON continuously.	Power-up / Reset	• If the LED does not stay on after a minute or so, the CPU Card is bad and must be replaced. • If the LED does not stay ON after a new software upload, there may be a software error.

CPU - INIT LED On-Card Diagnostics

INIT LED State (Green LED)	Occurs	Condition
Brief flicker, then ON continuously	Power-up / Reset	• The INIT LED is primarily used for manufacturing purposes. However, if it does not come on after repeated power-ups and CPU resets, replace the CPU Card. **Note:** The INIT LED indicates a properly initializing Altera FLEX which controls the on-card hardware selection and timing for proper software operation. A failure of the Altera FLEX to load can also leave the LED ON.
C4 INIT LED State (Red LED)	**Occurs**	**Condition**
ON continuously	Power-up / Reset	• Indicates a proper Cyclone FPGA initialization. • OFF could indicate a corrupted card memory (eprom) or a card power problem.

CPU - F6K STAT LED On-Card Diagnostics

LED State (Red LED)	Condition
50/50 duty-cycle; 1500ms/OFF, 1500ms/ON, repeated (slow blink)	• The job image is missing and may, in some cases, be restored with either a BKPR command and CPU reset (restores battery backed RAM from flash memory). Otherwise, upload job configuration file and reset the CPU.
50/50 duty-cycle; 100ms/OFF, 100ms/ON, repeated (fast blink)	Transfer Error–the CPU is not functioning– ZModem upload timeout or card failure. • If a CPU ZModem upload is initiated and the generic software is not uploaded by the time the STAT LED stops flashing a Morse Code Z (2 long, 2 short), the CPU will timeout and the STAT LED will blink rapidly. • If the rapid blink occurs immediately at power-up, remains on continuously, and there was no attempt to ZModem upload, then the card is bad and must be replaced. **Note**: Before card replacement, cycle power and reset the CPU to attempt to clear the condition.
Morse-Code "Z" (2 long, 2 short) repeated	Ready for ZModem transfer of software.
Morse-Code "B" (1 long, 3 short) repeated	Ready for Boot Block Upgrade Software transfer.
ON or OFF solid	Indicates proper operation.
Erratic ON to OFF	Door communication link packet error. Check door communication.
Morse-Code "SO" (3 long, 3 short)	Special Operation Feature included in microprocessor software (V1R2 or later) and used during temporary operation.

CPU - F6K STAT LED On-Card Diagnostics

(continued)

C4 STAT LED State (Green LED)	Condition
Brief flash upon power up/reset, then OFF continuously.	• When ON, indicates the Cyclone FPGA is undergoing initialization. • Normal power up sequence: This LED flashes briefly, then goes out and the C4 INIT Red LED turns ON.

LSRVA/LRSVB LED On-Card Diagnostics

LSRVA/LRSVB LED State	Condition
Blink, then OFF continuously	• Job is LON, and the node is on-line and operating normally. • The Host has .nxe node software installed (this software is mfg. loaded at manufacturing and enables communication between the CPU processor and the Host). • The CPU processor is configured for 1 or more LON ports via the Job Config.file for Host A or B. • The node has a LON configuration file installed.
Blink, then ON continuously	• The node software is not loaded. • Upload the .nxe file, bind the channel, then transfer the LON configuration file into the node.
OFF	The Host and the CPU have synced up.
50/50 duty-cycle; 1000ms/OFF, 1000ms/ON, Repeated	There is no Host .nxe node software loaded into the channel.
90/10 duty-cycle; 900ms/OFF, 100ms/ON, Repeated	1. CPU Card: a. There is a Host.nxe loaded, but the Host and the CPU have not synced up. Possible cause: Job configuration file (_07c000.dat) says there are no LON ports on the channel. Check J17 (Channel A) and J18 (Channel B). b. Upload node software file (*.nxe) and then transfer the LON configuration file into the node. c. The job is not LON, but is using a LON CPU Card (normal operation for non-LON jobs). 2. LN or LPIC: a. The device has either a corrupt node software file (*.nxe) or defective hardware. b. Upload node software file (*.nxe) and then transfer the LON configuration file into the node. c. Replace the card.
Continuous ON or OFF - Does not blink at all on power-up.	Defective hardware - replace the node.

On-Card Diagnostics
(continued)

Selector Assembly Cards, TSM and TSA

LED Name	Color	Displays	Indicates
LD5	Green	Blinking pattern = 2 seconds off, 2 seconds on, 4 seconds blink-to-blink.	No detected errors.
LD5	Green	Turned OFF.	Error during power-up.
			If the TSA is installed upside down on the selector, its connector will not mate with the connector on the TSM.
			Response to LD6 error: Internal check of quadrature encoder in the PGA IC on the TSM.
			Response to LD6 error: Failure of hall effect backup sensor used with a reed switch. See Notes.
LD6	Red	Turned ON briefly.	During power-up.
		Turned OFF.	No detected errors.
		Turned ON and stays ON.	• The TSA Card is not connected to the TSM. • The type code that is hard-wired on the TSA Card is not compatible with the particular TSM Card.
		Blinking pattern = 2 seconds ON, 2 seconds OFF.	On power-up, there is an internal check of part of the quadrature encoder in the PGA IC on the TSM. If this check fails, this pattern displays.
		Blinking pattern = 1/2 second ON, 1/2 second OFF.	Failure of hall effect backup sensor used with a reed switch. **Note:** There is a check of the hall effect backup sensor used with a reed switch for each terminal directional limit switch. When the car is moved far enough to actuate the reed switch directional limit (DLTR or BLTR), the backup hall effect sensor should have also actuated.
LD7	Green	Turned ON.	The output of Phase A of the quadrature encoder that detects the tape holes.
LD8	Green	Turned ON.	The output of Phase B.

Inputs / Outputs

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
AFI	AT FLOOR INDICATOR	O	L	HW	C
ALBA	ALARM BUTTON ACTIVATED	I	L	CAR	C
ALBI	ALARM BUTTON ACTIVATED INDICATOR	O	L	HW	C
ALBL	ALARM BELL (FIRE BELL)	O	L	HW	C
ARL1-ARL16	ARRIVAL LANTERN - PER FLOOR	O	L	HW	C
ATB	ATTENDANT BYPASS PUSHBUTTON	I	L	CAR	C
ATBI	ATTENDANT BYPASS INDICATOR	O	L	CAR	C
ATDB	ATTENDANT DOWN PUSHBUTTON	I	L	CAR	C
ATDC	ATTENDANT DOOR CLOSE SPEED	O	L	CAR	C
ATDI	ATTENDANT DOWN INDICATOR	O	L	CAR	C
ATT	ATTENDANT SERVICE	I	L	CAR	C
ATUB	ATTENDANT UP PUSHBUTTON	I	L	CAR	C
ATUI	ATTENDANT UP INDICATOR	O	L	CAR	C
AUTOI	AUTOMATIC OPERATION INDICATOR	O	L	HW	C
BLO	BOTTOM LIMIT OVERRIDE	O	L	CTRL	C
BLOM	BOTTOM LIMIT OVERRIDE MONITOR	I	L	CTRL	C
BP1	BINARY POSITION 1	I	L	CAR	C
BP2	BINARY POSITION 2	I	L	CAR	C
BP4	BINARY POSITION 4	I	L	CAR	C
BP8	BINARY POSITION 8	I	L	CAR	C
BPP	BINARY POSITION PARITY	I	L	CAR	C
BUZ	BUZZER - FLOOR PASSING, FIRE & NUDGING	O	L	CAR	C
C1-C16	CAR CALL - COMB. I/O	I/O	L	HW	C
CB1-CB16	CODE BLUE CALL - COMB. I/O	I/O	L	HW	G
CBAI	CODE BLUE ACTIVE INDICATOR	O	L	CTRL	G
CBEL	FREIGHT DOOR CALL BELL	O	L	CTRL	C
CBR1-CBR16	CODE BLUE CALL - REAR - COMB. I/O	I/O	L	HW	G
CCIE	CAR CALL INDICATOR ENABLE	O	L	CTRL	C

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
CDBM13	CAR DOOR BYPASS MONITOR	I	L	CTRL	C
CDCF	CAR DOOR CONTACT FRONT	I	ON	CTRL	C
CDCFM	CAR DOOR CONTACT FRONT MONITOR	I	L	CTRL	C
CDCR	CAR DOOR CONTACT REAR	I	ON	CTRL	C
CDCRM	CAR DOOR CONTACT REAR MONITOR	I	L	CTRL	C
CDI	CAR DELAYED INDICATOR	O	L	CTRL	C
CL1-CL16	CAR CALL LOCKOUT	I	L	HW	C/G/C&G
CLD	CAR LANTERN - DOWN	O	L	CAR	C
CLDR	CAR LANTERN - DOWN REAR	O	L	CAR	C
CLFS	CAR LIGHT/FAN SHUTDOWN	O	L	CAR	C
CLI1-CLI16	CAR CALL LOCKOUT INDICATOR	O	L	CAR	C/G/C&G
CLIR1-CLIR16	CAR CALL LOCKOUT INDICATOR - REAR	O	L	CAR	C/G/C&G
CLO1-CLO16	CAR CALL LOCKOUT OVERRIDE	I	L	CAR	C
CLOR1-CLOR16	CAR CALL LOCKOUT OVERRIDE - REAR	I	L	CAR	C
CLR1-CLR16	CAR CALL LOCKOUT - REAR	I	L	CAR	C/G/C&G
CLU	CAR LANTERN - UP	O	L	CAR	C
CLUR	CAR LANTERN - UP REAR	O	L	CAR	C
CR1-CR16	CAR CALL - REAR - COMB. I/O	I/O	L	CAR	C
CST	CAR STOP SWITCH MONITOR	I	ON	CTRL	C
CSTI	CAR STOP SWITCH INDICATOR	O	L	HW	C
CSTO	CAR STOP SWITCH OVERRIDE	O	L	CTRL	C
CSTOM	CAR STOP SWITCH OVERRIDE MONITOR	I	L	CTRL	C
D2-D16	HALL CALL - DOWN - COMB. I/O	I/O	L	HW	G
DAD	DIRECTION ARROW - DOWN	O	L	CAR/HW	C
DADH	DIRECTION ARROW - DOWN - HALL	O	L	HW	C
DAU	DIRECTION ARROW - UP	O	L	CAR	C
DAUH	DIRECTION ARROW - UP - HALL	O	L	CAR	C
DCB	DOOR CLOSE BUTTON - FRONT - MAIN COP	I	L	CAR	C
DCB2	DOOR CLOSE BUTTON - FRONT - FRONT AUX. COP	I	L	CAR	C
DCB3	DOOR CLOSE BUTTON - FRONT - REAR COP	I	L	CAR	C
DCB4	DOOR CLOSE BUTTON - FRONT - REAR AUX. COP	I	L	CAR	C
DCBH	DOOR CLOSE BUTTON HALL - FRONT	I	L	HW	C
DCBHR	DOOR CLOSE BUTTON HALL - REAR	I	L	HW	C
DCBR	DOOR CLOSE BUTTON HALL - REAR - MAIN COP	I	L	CAR	C
DCBR2	DOOR CLOSE BUTTON HALL - REAR - AUX. COP	I	L	CAR	C
DCBR3	DOOR CLOSE BUTTON HALL - REAR - REAR COP	I	L	CAR	C
DCBR4	DOOR CLOSE BUTTON HALL - REAR - REAR AUX. COP	I	L	CAR	C
DD	DOOR DISCONNECT	I	L	CTRL	C
DELETED	FIRE SERVICE SENSOR - EQUIPMENT	I	L	CTRL	C
DFI	DISPATCH FAILURE INDICATOR	O	L	HW	C
DHB	DOOR HOLD BUTTON	I	L	CAR	C
DHBR	DOOR HOLD BUTTON - REAR	I	L	CAR	C

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
DHBUZ	DOOR HOLD BUTTON - FRONT	O	L	CAR	C
DHBUZR	DOOR HOLD BUTTON - REAR	O	L	CAR	C
DHI	DOOR HOLD INDICATOR	I	L	HW	C
DHRI	DOOR HOLD INDICATOR - REAR	I	L	HW	C
DHS	DOOR HOLD SWITCH	I	L	CAR	C
DHSR	DOOR HOLD SWITCH - REAR	O	L	CAR	C
DISBR	DISTRESS BUZZER RESET	O	L	HW	C
DISBZ	DISTRESS BUZZER	I	L	HW	C
DISI	DISTRESS INDICATOR	I	L	HW	C
DLB	DIRECTION LIMIT - BOTTOM	I	L	CAR	C
DLB	DIRECTION LIMIT - BOTTOM	I	ON	HW	C
DLT	DIRECTION LIMIT - TOP	I	L	CAR	C
DLT	DIRECTION LIMIT - TOP	I	L	HW	C
DOB	DOOR OPEN BUTTON - FRONT - AUX. COP	I	L	CAR	C
DOB2	DOOR OPEN BUTTON - FRONT - REAR COP	I	L	CAR	C
DOB3	DOOR OPEN BUTTON - FRONT - REAR AUX. COP	I	L	CAR	C
DOB4	DOOR OPEN BUTTON - REAR - MAIN COP	I	L	CAR	C
DOBR	DOOR OPEN BUTTON - REAR - AUX. COP	I	L	CAR	C
DOBR2	DOOR OPEN BUTTON - REAR - COP	I	L	CAR	C
DOBR3	DOOR OPEN BUTTON - REAR - REAR COP	I	L	CAR	C
DOBR4	DOOR OPEN BUTTON - REAR - AUX. COP	I	L	CAR	C
DOI	DOOR OPEN INDICATOR	O	L	HW	C
DOIR	DOOR OPEN INDICATOR - REAR	O	L	HW	C
DR2-DR16	HALL CALL - DOWN - REAR - COMB. I/O	I/O	L	HW	G
DZ1	DOOR ZONE #1	I	H	CAR	C
DZ1M	DOOR ZONE #1 - MONITOR	I	L	CTRL	C
DZ1R	DOOR ZONE #1 - REAR	I	H	CAR	C
DZ1RM	DOOR ZONE #1 - REAR - MONITOR	I	L	CTRL	C
DZ2	DOOR ZONE #2	I	H	CAR	C
DZ2M	DOOR ZONE #2 MONITOR	I	L	CTRL	C
DZ2R	DOOR ZONE #2 - REAR	I	H	CAR	C
DZ2RM	DOOR ZONE #2 - REAR - MONITOR	I	L	CTRL	C
DZE	DOOR ZONE ENABLE -	O	ON	CTRL	C
DZER	DOOR ZONE ENABLE - REAR	O	L	CTRL	C
DZM	DOOR ZONE ENABLE - MONITOR	I	L	CTRL	C
DZMR	DOOR ZONE ENABLE - MONITOR - REAR	I	L	CTRL	C
EES	ELECTRIC EYE SHUTOFF SWITCH	I	L	CAR	C
EESR	ELECTRIC EYE SHUTOFF SWITCH - REAR	I	L	CAR	C
EPA	EMERGENCY POWER - AUTOMATIC	I	L	HW	G
EPAI	EMERGENCY POWER - ACKNOWLEDGE INDICATOR	O	L	HW	C
EPALI	EMERGENCY POWER - AT DESIG. LANDING IND.	O	L	HW	C
EPCS	EMERGENCY POWER - MAN. CAR SELECT - PER CAR	I	L	HW	C

ICON CONTROLLER

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
EPCS1	EMERGENCY POWER - MANUAL CAR SELECT - CAR #1	I	L	HW	G
EPCS2	EMERGENCY POWER - MANUAL CAR SELECT - CAR #2	I	L	HW	G
EPCS3	EMERGENCY POWER - MANUAL CAR SELECT - CAR #3	I	L	HW	G
EPSC4	EMERGENCY POWER - MANUAL CAR SELECT - CAR #4	I	L	MR	G
EPCSI	EMERGENCY POWER - CAR SELECTED INDICATOR	O	L	HW	C
EPEPI	EMERGENCY POWER - EMERG. POWER INDICATOR	O	L	HW	G
EPLI	EMERGENCY POWER LOWERING INDICATOR	O	L	HW	C
EPNP	EMERGENCY POWER - NORMAL POWER	I	L	MR	C&G
EPNPI	EMERGENCY POWER - NORMAL POWER INDICATOR	O	L	HW	G
EPW	EMERGENCY POWER WARNING	I	L	MR	C
EQD	EARTHQUAKE (SEISMIC) DETECTOR	I	L	HW	C
EQDR	EARTHQUAKE DETECTION RESET	I/O	L	CTRL	C
EQI	EARTHQUAKE SEISMIC INDICATOR	O	L	HW	C
ETSL1	EMERGENCY TERMINAL SPEED LIMIT - TOP #1	O	L	CAR	C
ETSL2	EMERGENCY TERMINAL SPEED LIMIT - TOP #2	I	L	CAR	C
F1-F16	FREIGHT SAPB CALL - COMB. I/O	I/O	L	HW	C
FALI	FAILURE INDICATOR	O	L	HW	C
FALNI	NOT FAILED INDICATOR	O	L	HW	C
FDIM	FREIGHT DOOR INTERLOCK MONITOR	O	L	CTRL	C
FHS	FLASHING HALL SIGNS	O	L	CTRL	C
FPT	FLOOR PASSING TONE	O	L	CAR	C
FR1 - FR16	FREIGHT SAPB CALL - REAR - COMB. I/O	I/O	ON	HW	C
FS1FI	FIRE SERVICE PHASE 1 SWITCH OFF INDICATOR	O	L	HW	G
FS1I	FIRE SERVICE - PHASE 1 INDICATOR	O	ON	CTRL	C
FS1NI	FIRE SERVICE PHASE 1 SWITCH ON INDICATOR	O	L	HW	G
FS1RI	FIRE SERVICE PHASE 1 SWITCH RESET INDICATOR	O	L	HW	G
FS2FI	FIRE SERVICE PHASE 2 SWITCH OFF INDICATOR	O	L	HW	C
FS2H	FIRE SERVICE PHASE 2 SWITCH HOLD (FRONT)	O	L	CTRL	C
FS2HI	FIRE SERVICE PHASE 2 SWITCH HOLD INDICATOR	O	L	HW	C
FS2HR	FIRE SERVICE PHASE 2 SWITCH HOLD (REAR)	O	L	CTRL	C
FS2I	FIRE SERVICE - PHASE 2 INDICATOR	O	L	CTRL	C
FS2NI	FIRE SERVICE PHASE 2 SWITCH ON INDICATOR	O	L	HW	C
FSAFI	FIRE SERVICE - ALT. FLOOR INDICATOR	O	L	HW	C
FSBZ	FIRE SERVICE BUZZER	O	L	HW	C
FSC1	FIRE SERVICE - CAR - ON	I	L	CAR	C
FSC2	FIRE SERVICE - CAR - OFF	I	L	CAR	C
FSCC	FIRE SERVICE - CALL CANCEL	I	L	CAR	C
FSDB	FIRE SERVICE - DOOR BYPASS	I	L	CAR	C
FSDFI	FIRE SERVICE - DOOR FAILED INDICATOR	O	L	CAR	C
FSDO	FIRE SERVICE - FIREMAN'S DOOR OPEN	I	L	CAR	C
FSE	FIRE SERVICE SENSOR - EQUIPMENT	I	L	CAR	C&G
FSH1	FIRE SERVICE - HALL - MAIN - ON	I	L	CTRL	C&G

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
FSH2	FIRE SERVICE - HALL - MAIN - OFF	I	L	HW	C&G
FSH3	FIRE SERVICE - HALL - AUX - ON	I	L	HW	C&G
FSH4	FIRE SERVICE - HALL - AUX - OFF	I	L	HW	C&G
FSH5	FIRE SERVICE - HALL - MAIN - RESET (BYPASS)	I	L	HW	C&G
FSI	FIRE SERVICE INDICATOR (PHASE 1 OR 2)	O	L	HW	C
FSM	FIRE SERVICE SENSOR - MAIN	I	L	CTRL	C&G
FSMFI	FIRE SERVICE - MAIN FLOOR INDICATOR	O	L	HW	C
FSRI	FIRE SERVICE RETURN INDICATOR	O	L	CAR	C
FSSR	FIRE SERVICE SENSOR RESET	O	L	CTRL	C
FST	FIRE SERVICE SENSOR - HIGH TEMP.	I	L	CTRL	C&G
FSX	FIRE SERVICE SENSOR - AUX.	I	L	CTRL	C&G
GLM	GATE & LOCKS MONITOR	I	L	CTRL	C
HCIE	HALL CALL INDICATOR ENABLE	O	L	CTRL	C
HCLD	HALL/CAR LANTERN - DOWN - FRONT	O	L	HW/CAR	C
HCLU	HALL/CAR LANTERN - UP - FRONT	O	L	HW/CAR	C
HCP	HALL CALL POWER MONITOR	I	H	HW	C
HCPI	HALL CALL POWER INDICATOR	O	L	HW	C
HDBM	HOISTWAY DOOR BYPASS MONITOR	I	L	CTRL	C
HDIF	HOISTWAY DOOR INTERLOCK - FRONT	I	ON	CTRL	C
HDIFM	HOISTWAY DOOR INTERLOCK FRONT MONITOR	I	L	CTRL	C
HDIR	HOISTWAY DOOR INTERLOCK - REAR	I	ON	CTRL	C
HDIRM	HOISTWAY DOOR INTERLOCK REAR MONITOR	I	L	CTRL	C
HES	HOSPITAL EMERGENCY SERVICE	I	L	CAR	C
HESI	HOSPITAL EMERGENCY SERVICE ACTIVE INDICATOR	O	L	HW	C
HLD2-HLD16	HALL LANTERN - DOWN - FRONT - PER LANDING	O	L	HW	C
HLDR2-HLDR16	HALL LANTERN - DOWN - REAR - PER LANDING	O	L	HW	C
HLU1-HLU15	HALL LANTERN - UP - FRONT - PER LANDING	O	L	HW	C
HLUR1-HLUR15	HALL LANTERN - UP - REAR - PER LANDING	O	L	HW	C
H1	HOMING - #1	I	L	HW	C
HM1I	HOMING - #1 - INDICATOR	O	L	HW	C
HM1NI	HOMING - #1 - NOT ACTIVE INDICATOR	O	L	HW	C
HM2	HOMING - #2	I	L	HW	C
HM2I	HOMING - #2 - INDICATOR	O	L	HW	C
HM3	HOMING - #3	I	L	HW	C
HM3I	HOMING - #3 - INDICATOR	O	L	HW	C
HMCLI	HOMING - CAR AT LOBBY INDICATOR	O	L	HW	C
HML	HOMING - LOBBY RECALL	I	L	HW	C
HMLI	HOMING -LOB RECALL OPER. ACTIVE IND.	O	L	HW	C
HMLNI	HOMING -LOB RECALL OPER. NOT ACTIVE IND.	O	L	HW	C
ID2-ID16	INCONSPICUOUS RISER CALL - DOWN - COMB. I/O	I/O	L	HW	C
IDR2-IDR16	INCONSPICUOUS RISER CALL - DOWN - R - COMB. I/O	I/O	L	HW	C
IN	INSPECTION	I	H	CTRL	C

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON **Active ON State**	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room **I/O Location**	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function **I/O Function Type**
INCN	INSPECTION - CONTROLLER	I	H	CTRL	C
INCT	INSPECTION - CAR TOP	I	H	CTRL	C
IND	INSPECTION - DOWN BUTTON	I	H	CTRL	C
INHA	INSPECTION - HOISTWAY ACCESS	I	H	CTRL	C
INHAM	INSPECTION - HOISTWAY ACCESS MONITOR	I	H	CTRL	C
INOP	INSPECTION - OPERATING PANEL	I	H	CTRL	C
INSP	INSPECTION - SPARE	I	H	CTRL	C
INU	INSPECTION - UP BUTTON	I	H	CTRL	C
IRO	INCONSPICUOUS RISER OPERATION	I	L	HW	C
IROI	INCONSPICUOUS RISER OPERATION - INDICATOR	O	L	HW	C
ISC	INDEPENDENT SERVICE - CAR	I	L	CAR	C
ISCI	INDEPENDENT SERVICE - CAR - INDICATOR	O	L	HW	C
ISH	INDEPENDENT SERVICE - HALL	I	L	HW	C
ISHI	INDEPENDENT SERVICE - HALL - INDICATOR	O	L	HW	C
IU1 - IU15	INCONSPICUOUS RISER CALL - UP - COMB. I/O	I/O	L	HW	C
IUL	IN USE LIGHT	O	L	HW	C
IUR1 - IUR15	INCONSPICUOUS RISER CALL - UP - R - COMB. I/O	I/O	L	HW	C
LVD	LEVEL DOWN	I	L	CAR	C
LVDR	LEVEL DOWN -REAR	I	L	CAR	C
LVU	LEVEL UP	I	L	CAR	C
LVUR	LEVEL UP - REAR	I	L	CAR	C
LWBI	LOADWEIGHER - BYPASS - INDICATOR	O	L	CAR	C
LWO	LOADWEIGHER -OVERLOAD	I	L	CAR	C
LWOI	LOADWEIGHER -OVERLOAD - INDICATOR	O	L	CAR	C
MCC1	MOTOR CONTACTOR CONTROL #1	O	ON	CTRL	C
MCC2	MOTOR CONTACTOR CONTROL #2	O	ON	CTRL	C
MCC3	MOTOR CONTACTOR CONTROL #3	O	ON	CTRL	C
MCD	MOTOR CONTACTORS DE-ENERGIZED	I	L	CTRL	C
MCE	MOTOR CONTACTOR ENERGIZED	I	L	CTRL	C
MCF	MOTOR CONTACTOR FAULT	I	L	CTRL	C
MEC	MEDICAL EMERGENCY - CAR	I	L	CAR	C
MEH	MEDICAL EMERGENCY - HALL	I	L	HW	C
MEHI	MEDICAL EMERGENCY - HALL INDICATOR	O	L	HW	C
MEI	MEDICAL EMERGENCY - INDICATOR	O	L	CAR/HW	C
NES	NON-EMERGENCY SHUTDOWN	I	L	CTRL	C
NTSB	NORMAL TERMINAL STOPPING - BOTTOM	I	L	CAR	C
NTST	NORMAL TERMINAL STOPPING -TOP	I	L	CAR	C
OFLNI	OFF LINE INDICATOR	O	L	HW	C
OLLI	OIL LEVEL LOW INDICATOR	O	L	HW	C
OLPO	OIL PRESSURE - OVER LIMIT	I	L	CTRL	C
OLPU	OIL PRESSURE - UNDER LIMIT	I	L	CTRL	C
OLTO	OIL TEMPERATURE - OVER LIMIT	I	L	CTRL	C

Inputs/Outputs
(continued)

Mnemonic	Name	Input / Output	H = ON when High/24V L = ON when Low/OV ON = On when relay or opto is ON Active ON State	HW = Hoistway CTRL = Controller CAR = COP/Car Top MR = Machine Room I/O Location	C = Car Function G = Group Function C/G = Car or Group Function C&G = Car and Group Function C/G/C&G = Car OR Group; Car & Group Function I/O Function Type
OLTS	OIL TEMPERATURE - SET CONTROL	I	L	CTRL	C
PI1 - PI16	POS IND. - LIGHT UP - CAR OR CTRL, CAR & H/W	O	L	CAR/HW	C
PIA1 - PIA16	POS IND. - LIGHT UP - ALT. LDG. H/W	O	L	CAR/HW	C
PIC1 - PIC16	POS IND. - LIGHT UP - CAR	O	L	HW	C
PIH1 - PIH16	POSITION INDICATOR - MAIN LDG. H/W	O	L	HW	C
PRSW	PRESSURE SWITCH	I	L	CTRL	C
SAFE	SAFETY CIRCUIT MONITOR	I	ON	CTRL	C
SAHI1	SPARE ACTIVE HIGH INPUT #1	I	H	CTRL	C
SAHI2	SPARE ACTIVE HIGH INPUT #2	I	H	CTRL	C
SDD	SLOWDOWN - DOWN	I	L	HW	C
SDDR	SLOWDOWN - DOWN - REAR	I	L	HW	C
SDU	SLOWDOWN - UP	I	L	HW	C
SDUR	SLOWDOWN - UP - REAR	I	L	HW	C
SOA	SECURITY OPERATION ACTIVATION	I	L	HW	C/G/C&G
SOO	SECURITY OPERATION OVERRIDE	I	L	HW	CF
SOTL	SECURITY OPERATION TOTAL LOCKOUT	I	L	HW	C/G/C&G
SOTLI	SECURITY OPERATION TOTAL LOCKOUT INDIC.	O	L	HW	C/G/C&G
SOTOA	SECURITY OPERATION TOTAL OVERRIDE ACTIVE	I	L	HW	C/G/C&G
SOTOAI	SECURITY OPERATION TOTAL OVERRIDE ACTIVE IND.	O	L	HW	G
STBC	SHUNT TRIP BREAKER CONTROL	O	L	CTRL	C
TMPI	TAMPER INDICATOR	O	L	HW	C
TMPIR	TAMPER INDICATOR RESET	I	L	HW	C
TPDL	TPT JACK DYNAMIC LEFT SENSOR	I	L	HW	C
TPDR	TPT JACK DYNAMIC RIGHT SENSOR	I	L	HW	C
TPSL	TPT JACK STATIC LEFT SENSOR	I	L	HW	C
TPSR	TPT JACK STATIC RIGHT SENSOR	I	L	HW	C
U1 - U15	HALL CALL - UP - COMB. I/O	I/O	L	HW	G
UR1 - UR15	HALL CALL - UP - REAR - COMB. I/O	I/O	L	HW	G
VC1A	VALVE CONTROL #1A (DOWN SLOW / DOWN)	O	ON	CTRL	C
VC1B	VALVE CONTROL #1B (DOWN SLOW / DOWN)	O	ON	CTRL	C
VC2A	VALVE CONTROL #2A (UP SLOW / UP)	O	ON	CTRL	C
VC2B	VALVE CONTROL #2A (UP SLOW / UP)	O	ON	CTRL	C
VC3A	VALVE CONTROL #3A (DOWN FAST / DOWN)	O	ON	CTRL	C
VC3B	VALVE CONTROL #3B (DOWN FAST/ DOWN)	O	ON	CTRL	C

VERTICAL EXPRESS

Door Communications Troubleshooting

Determine if there is a loss of communication between the CPU and the door card.

- The doors are not working,

  or

- The CON23 plug is removed from the CPU card while the system is powered up, and the F6K_STAT LED on the CPU does not blink 3 times. See Figure 33 on page 122.

Determine the cause of the communication loss.

1. Turn OFF, Lock, and Tag out the mainline disconnect.
2. Verify the fuses (1, 2, and 3) on the door card, and replace as necessary. See Figure 33 on page 122.
3. Remove the CON23 plug from the 188E CPU card.
4. Use an Ohm Meter and measure for 100 Ohms on the CPU card, CON23, pins 1-2. If any other measurement is seen, replace the CPU card.
5. Use an Ohm Meter and measure for 125-135 Ohms on the CON23 plug–as it hangs loose–pins 1-2.

   If the measurement is correct: Move to Step 9.

   If the measurement is not correct: Continue with Step 6.

6. Place a temporary jumper on the CON23 plug, pins 1-2.
7. Move to the car top with the Ohm Meter, then remove the CON7 plug from the door card.
8. Measure for a short (zero ohms) on the removedCON7 plug, pins 1-2.

   If the Ohm Meter does not display the short (zero ohms),

   a. Find the wiring problem. See Figure 34 on page 123.

   b. Reconnect the CON7 plug to the door card.

   c. Remove the temporary jumpers, and reconnect CON23 to the CPU card.

   d. Verify the door communications.

   If the Ohm Meter displays the short (zero ohms),

   a. Replace the CON7 plug on the door card, and return to the machine room.

   b. Remove the temporary jumper from the CON23 plug, and replace this plug on the CPU card.

9. Power up the disconnect.
10. Check for the proper door communications. If communications do not work, use a volt-meter on DC to measure voltage on the PSC and NSC terminals on the TCID Card (located at the top of the controller).

Notes:

- A correct measurement is 2.25vdc to 2.75vdc (meter-averaged values of proper 5vdc communications packet activity).
- If the correct measurement is not seen, replace the door card.

Door Communications Troubleshooting
(continued)

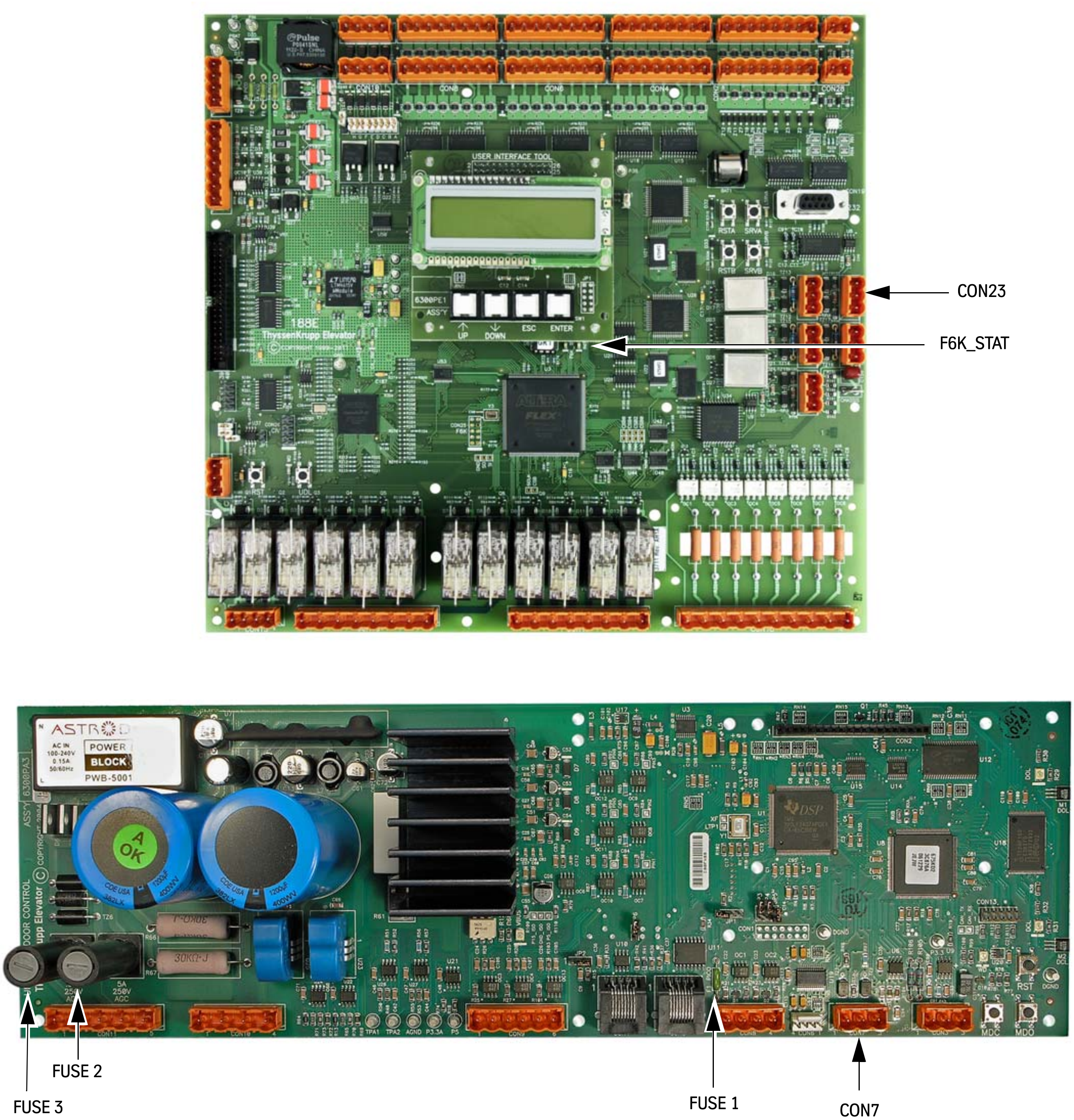


Figure 33 - 188E CPU Card (top) and Door Operator Card (bottom)

Door Communications Troubleshooting
(continued)

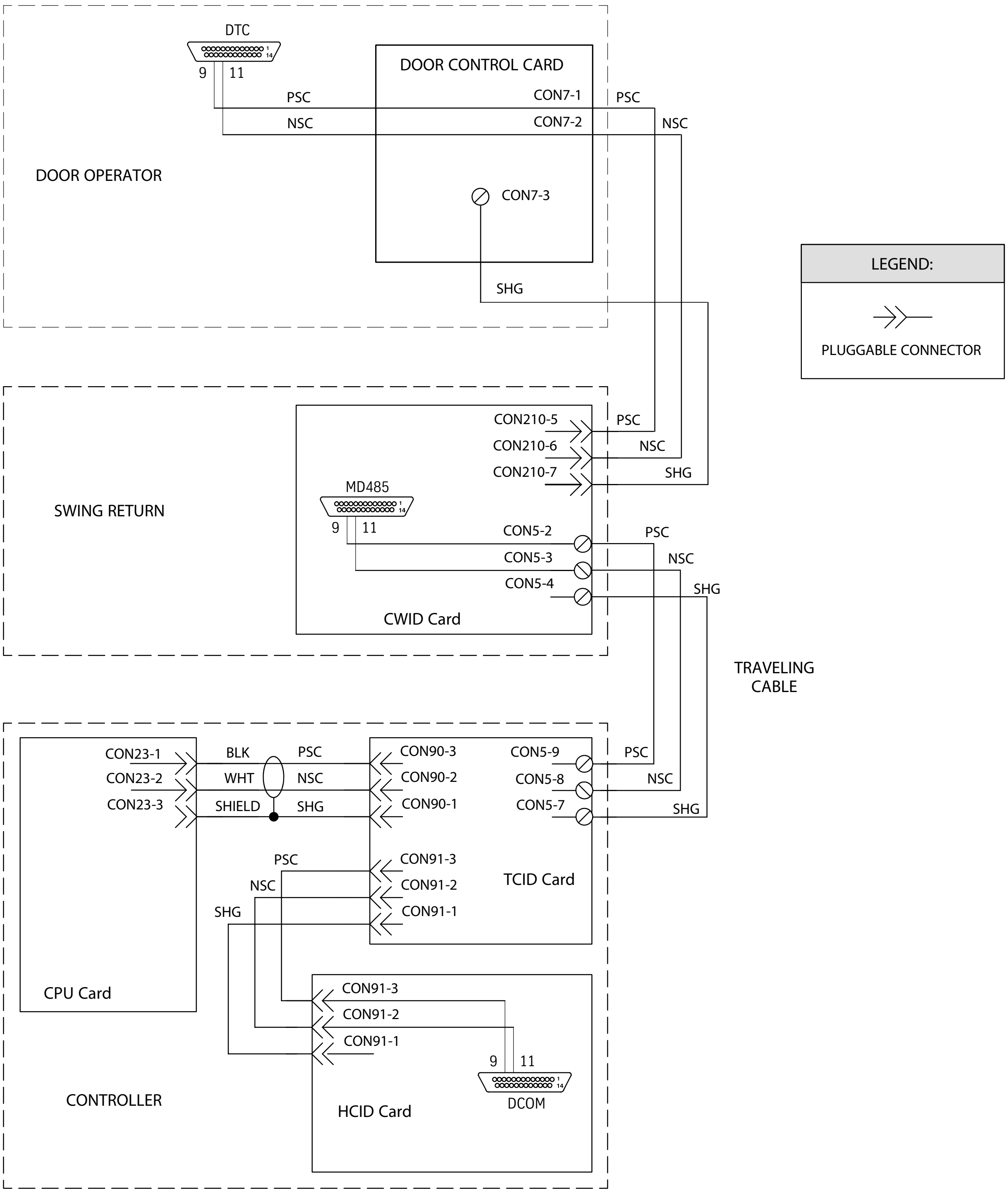


Figure 34 - Door Operator Communications Wiring

Solid State Starter Troubleshooting

This troubleshooting checklist does not represent an exhaustive list of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Refer these matters to the local sales office.

Note: See Figure 35 on page 130 for Delta Wiring Configurations.

LCD is not working		
LCD Indication	Problem	Verification
No characters are shown on the LCD screen	The supply voltage for the starter is too low.	• Inspect starter terminals for proper connections. • Check for loose terminations and wires terminated on insulation. • Dress connection as necessary. • Confirm 120 VAC between terminals 1 & 3 on the starter.
		If voltage is above 85 VAC replace the starter as it is defective.
		If no voltage is present between terminals 1 & 3 on the starter: • Verify MCC1 (I/O) is active and the MCC1 relay coil is energized. • The MCC1 contacts should be closed supplying 120 VAC to the starter (refer to system schematics).
		If MCC1 (I/O) is not active, stop and check the controller system for faults and troubleshoot the controller error.
The motor will not start		
LCD Indication	Problem	Verification
Status Ready	Voltage is too low or not present at Run Input, terminal 4.	• Inspect starter terminals for proper connections. • Check for loose terminations & wires terminated on insulation. • Dress connection as necessary. • Confirm 120 VAC between terminals 3 & 4 on the starter.
		If voltage is above 85 VAC, replace the starter as it is defective.
		If no voltage is present: • Verify MCC2 & MCC3 (I/O) are active and that their relay coils are energized. • Verify MCC2 & MCC3 contacts are closed (see system schematics). • If the MCC2 and/or MCC3 I/O are not active, stop and check controller system for faults and troubleshoot the controller error.
Control Voltage Powered Down Control Voltage Brown Out	Voltage too low at Control Power Input, terminal 1.	Confirm voltage between terminals 1 & 3. • If the voltage is less than 105 VAC, correct the voltage problem. • If the voltage is greater than 105 VAC, replace defective starter.
Control Voltage Over Voltage	Voltage too high at Control Power Input, terminal 1.	Confirm voltage between terminals 1 & 3. If the voltage is greater than 140 VAC, correct voltage problem.
		If the voltage is less than 140 VAC, and the starter is indicating this fault: Use an Oscilloscope to check for distortion at the peaks of the output waveform. Contact Siemens Technical Support at 800-323-5450 for further assistance

The motor will not start (*continued*)		
LCD Indication	**Problem**	**Verification**
Fault EEPROM Memory	The starter has detected a problem with the EEPROM Memory.	Press the RST button on the controller's CPU, (which will cycle power to the starter). If the EEPROM Memory Fault is still present, replace the starter.
Fault ROM Memory	The starter has detected a problem with the ROM Memory.	Press the RST button on the controller's CPU, (which will cycle power to the starter). If the ROM Memory Fault is still present, replace the starter.
Fault Watchdog	The starter has detected an internal fault with the software.	Press the RST button on the controller's CPU, (which will cycle power to the starter). If the Watchdog Fault is still present, replace the starter.
Wrong Rotation CBA set as ABC OR Wrong Rotation ABC set as CBA	Incoming 3 phase is opposite of the Line Rotation Setting.	1. Verify the correct motor wiring to the starter per the job schematics. 2. Set the Line Rotation in the starter. Begin in the Parameter Menu. Note: For step-by-step instructions, see *Pump Motor Rotation for Non-TKE Pumps*. a. ABC for standard Dry (AP) units • Standard Dry units have the motor mounted to the left of the pump. • CW rotation is standard when viewed from the shaft end. b. CBA for standard Wet (EP) units • CCW rotation as viewed from the pump end. 3. Check the starter status. If "wrong rotation" is displayed: a. De-energize the controller, and then Turn OFF, Lock, and Tag out the mainline supply to the controller. b. Swap any two of the incoming lines at the top of the starter. c. Restore power to the controller ("wrong rotation" is corrected). d. Verify proper operation by momentarily running the unit in the UP direction. Note: If the motor is not in view, have someone else available to listen to the power unit for proper operation. e. For Temporary Operation mode, use the Run Bug. f. For Automatic Operation mode, place the controller into Inspection Operation and use the inspection station control buttons. 4. If the unit runs in the proper direction, but makes unusual noise, check: a. For proper mechanical mating between the pump/motor. b. For binding issues with the pump. c. Ensure that the pump screen did not get sucked into the pump.

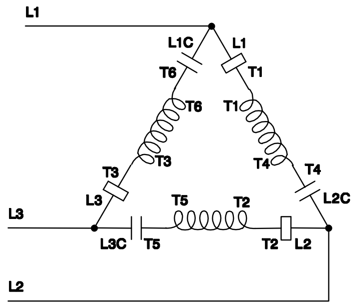
The motor will not start (*continued*)		
LCD Indication	Problem	Verification
Fault Motor Wiring	The motor is not correctly connected to the starter.	1. De-energize equipment, and then Turn OFF, Lock, and Tag out the mainline disconnect. 2. Confirm 10 ohms or less at the following locations: In Delta applications: T1 to MC1-4 (T4) T2 to MC1-6 (T5) T3 to MC1-2 (T6) Notes: • Restore power when checks are complete. • Each winding should be close in resistive value to the other two windings. • Confirm high resistance value from ground to each of T1-T3. • See Motor Wiring Check Out.
	The fault contactor (MC1) is not energized.	1. Verify the fault contactor (MC1) is being energized after power up. It should pull in, then drop out upon starter faulting. a. If not, measure voltage between terminals 9 and 12; Voltage should be 110 VAC. b. Refer to job schematics, verify wiring to fault contact on starter. c. Correct wiring as necessary. d. Connect voltmeter set to read VAC between terminals 9 and 12. e. Push the Up and Down arrows on the starter simultaneously and look for 110 VAC to appear briefly. 2. Verify the incoming Line Power a. Line to Line should be contract voltage. b. Line to GND = Line to Line voltage divided by 1.73.
Fault High Line Volts	The starter has detected a high line condition on the incoming voltage supply (L1, L2, L3).	1. In the Status Menu, check the Line Voltages. 2. With a voltmeter verify the incoming line voltages. a. If the incoming voltage exceeds 527 VAC for 460 VAC units, or 631 VAC for 575 VAC units b. Stop and correct the incoming line voltage. c. If the incoming voltage is acceptable, use the Reset Fault Command in the System Menu, and reset the starter. d. If the starter status comes up Motor Stopped and functions properly: Use a power analyzer, multimeter with a Min/Max function, or similar voltage monitoring instrument to monitor and record incoming power to the unit. Suspect building power.

The motor will not start (*continued*)		
LCD Indication	Problem	Verification
Fault Motor Wiring	The motor is wired correctly, but the starter still indicates Motor Wiring Fault.	1. De-energize equipment, and then Turn OFF, Lock, and Tag out the mainline disconnect. a. Mark the wire on starter terminal 9. b. Move the wire on the starter from terminal 9 to terminal 10. c. Energize the equipment. d. Verify MC1 (fault contactor) is energized and pulled in. e. Measure voltage AC across each set of contacts on the MC1 contactor. See MC1 (Fault Contactor) Check Out section. f. If any voltage is greater than 5 VAC (indicates bad contact(s)). 2. De-energize equipment, Turn OFF, Lock, and Tag out the mainline disconnect, and restore wiring to the original state. 3. Bad contact(s) on fault contactor (MC1) - replace contactor. 4. De-energize equipment, and then Turn OFF, Lock, and Tag out the mainline disconnect. a. With an ohmmeter, check across each motor winding: • T1 to T2, T3, T5, T6; • T2 to T1, T3. T4, T6; • T3 to T1,T2, T4, T5; • T4 to T2, T3, T5, T6 • T5 to T1, T3, T4, T6 • T6 to T1, T2, T4, T5 Notes: • The motor leads should be labeled 1-6 corresponding to T1-T6. • The readings should be several Mega-Ohms to infinite depending on the meter used. 5. Verify the Up To Speed (UTS) output and MUTS relay circuits, See the MUTS Troubleshooting Chart.

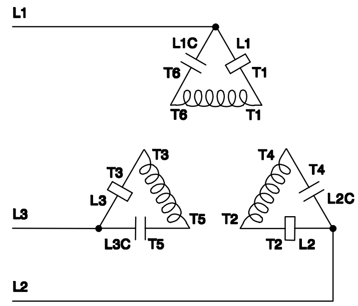
The motor will not start (*continued*)		
LCD Indication	**Problem**	**Verification**
Fault Shorted SCR A or Fault Shorted SCR B or Fault Shorted SCR C	The starter has a shorted SCR in the indicated phase	1. De-energize equipment, and then Turn OFF, Lock, and Tag out the mainline disconnect. a. Note the motor wiring terminations, marking wires as necessary. b. Disconnect the motor wires from the starter terminals T1, T2, and T3. c. With an ohmmeter, make the following resistance checks: L1 to T1 L2 to T2 L3 to T3 d. Restore motor wiring. e. Restore power to the controller. Notes: • Less than 3000 Ohms or 3K Ohms is considered shorted. • 8000 Ohms or 0.8M Ohms is average, and all three SCR's should have balanced resistance within 1000 Ohms of each other.
Status Maintain Start before switching to Status Ramp to 450%	Current limit is set too low or there is an excessive load on the system during the start.	1. In the Parameter menu, check the Starting Amps setting. This should not be set below 200%. Note: The TKE Manufacturing default is 3 x FLA rating. 2. Check the Overload Amps settings Note: The TKE Manufacturing default is FLA rating. 3. Verify the valves are not energized during the start. 4. Verify the pump/motor is not in a bind.
Fault Low Leg Amps	The starter has detected an imbalance in the motor currents.	1. Check the fault currents in the fault menu. 2. Look for the leg with severely lower current (Amps). 3. With an Ohmmeter, verify each of the motor's windings. (Expect ~0.5-2.0 Ohms). Note: All windings should have the same resistance. 4. Check each of the winding leads to all other winding leads, looking for two winds shorted together. Note: Either of these conditions are indicative of a bad motor. 5.Record the values for future reference (Warranty Claims, if applicable). 6. With an ammeter, verify the current draw of all three legs and compare to the starter's fault menu current listing for each leg. 7. With a voltmeter, across the line and load terminals of the starter, measure the voltage AC while the motor is up to speed. (There should not be any reading above 10 VAC). 8. With a voltmeter across one of the three sets of contacts on the fault contactor (MC1), measure the voltage while the motor is up to speed. Note: There should not be any reading above 10 VAC.

The motor will not start (*continued*)		
LCD Indication	Problem	Verification
Fault Phase Loss	The starter detected a problem with the incoming three phase power during a run condition.	This fault will reset when the power returns to normal. 1. View the current line to line voltage, go to Status Menu --> Line-Line Volts. 2. With a voltmeter, verify the starter's reading of the line to line voltages. • If the starter and voltmeter measurements agree, correct the phase loss condition. • If the starter and the voltmeter measurements do not agree, replace the starter.
The motor trips out on an overload fault after coming up to speed		
LCD Indication	Problem	Verification
Fault Overload	The overload setting is set too low.	1. Check the fault currents, Run Status, and Run Time from the Fault Menu for the last fault. Note: Displayed currents should be multiplied by 1.73 to get an approximate line value. 2. Verify that the starting Amps is set to at least 2 x FLA. 3. If the overload fault occurs during the "maintain 450%" and the run time is several seconds (verified from the FAULTS menu), there may be a mechanical issue preventing the motor from coming up to speed.
	The starter has detected an overload condition while up to voltage.	1. Verify the starter overload and starting current settings. 2. Correct to manufacturing defaults, if necessary. 3. If the overload settings are correct, verify that the currents displayed by the starter's fault menu agree with actual Ammeter readings. Notes: • If the fault currents multiplied by 1.73 are in excess of the job's FLA, there may be mechanical issues causing this problem. • If the overload mode is set for "All 3 Phases" and one winding's current is significantly higher than the other windings, nuisance overload trips may occur during long up runs near or at the rated up load.

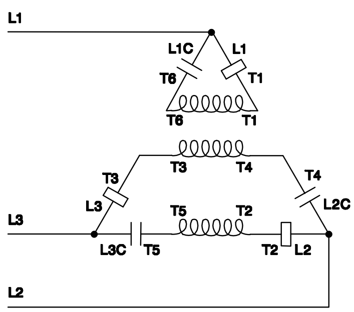
Solid State Starter Troubleshooting
(continued)



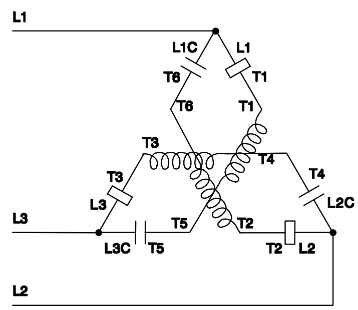
CORRECT



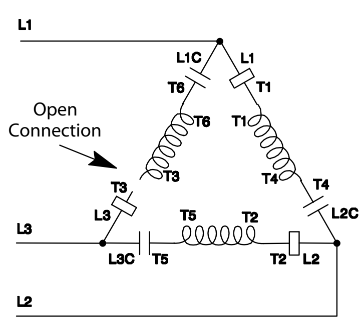
3 WINDINGS DEAD
Incorrect



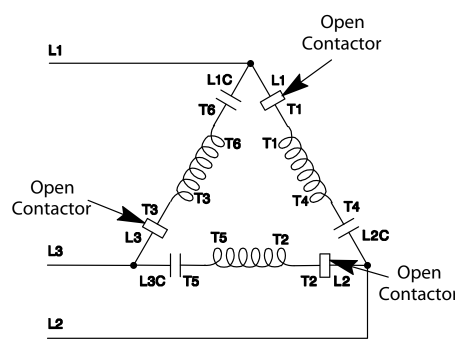
1 WINDING DEAD
Incorrect



SWAPPED MOTOR LEADS
Incorrect



OPEN CONNECTION
Incorrect



OPEN CONTACTOR
(Power Applied)
Incorrect

Figure 35 - Delta Wiring Configurations

Change or Replace Cards

CPU Card

Manufacturing installed software: Generic *.nxe, Boot block

Field installed software: Job configuration file, Generic OS, Car, and Group

Notes:

- Generic software files are not download-able and must be obtained from manufacturing.
- All cars within the same group must have the same version/revision generic software. To find the version/revision software used on a car, check the adjustment chart inside the controller cabinet, or enter the VER command.
- On a single car group, a CPU with the latest revision software can be installed as long as the version is the same as that being replaced.
- In order to work, the use of a generic software version that is different than originally supplied may require a system software update or other controller modifications.
- If necessary, obtain generic software from manufacturing with the appropriate version/revision. If the desired version/revision software is not available or has been discontinued, all cars in the group will need to be updated to a later revision, and possibly a later version.
- Record any change to the generic software version/revision (on a particular job) on the chart located inside the controller cabinet.

Install a Manufacturing Replacement Card or Exchange a CPU from One Group to Another

1. If a multi-car group, identify the required generic version/revision software. Check the chart located inside the controller cabinet, or enter VER in the UIT for any of the cars in a functioning group.
2. Locate the archived job configuration files that contain manufacturing default and field adjustments.
3. Remove the car from service.
4. If present, turn OFF the universal power supply (UPS) for battery lowering.
5. Turn OFF, Lock, and Tag out the mainline disconnect.
6. Note the locations of all wires and MTA connectors, and remove them from CPU Card.
7. Remove the existing CPU Card, and install the replacement.
8. Configure the jumpers on the replacement card the same as the old card.
9. Connect all wiring and MTA connectors that were removed in Step 6.
10. If a multi-car group, disconnect the CPU group communication Connector 21.
11. Turn ON the mainline disconnect.
12. Turn ON the UPS for battery lowering.

Note: A new CPU will wake up as G1C1 and remain so until the job configuration file is uploaded. If the CPU is from another job it will retain its previous identity until the job configuration file is uploaded.

13. Press Reset on the CPU Card, and, before proceeding, wait for the watchdog LED to come ON and stay ON.
14. Upload the required software. See “Upload CPU Software” on page 133.

Setup for ICON Communications with Windows HyperTerminal

Notes:

- ICON CPU cards do not store software and, if replaced, must be uploaded to the CPU.
- Uploading software is the only function in the HyperTerminal program.

1. Start at the laptop or PC and click Start.
2. Select Programs->Accessories->HyperTerminal->HyperTerminal. The Connection Description window opens.
3. Type in a name, such as "ICON COMM", select an Icon, and then click OK. The Connect To window opens.
4. Select the arrow beside Connect Using:, then select COM1 (or the laptop or PC port that will be used) from the list.
5. Click OK. The COM1 Properties window opens.
6. Type in the following properties:

- Bits per second: 38400
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow Control: Hardware

7. Click OK. This session will be activated.
8. Select File->Save.
9. Connect a standard RS232 cable (communications cable) to the CPU RS232 port.

Upload CPU Software

1. Record all settings because the elevator will need to be readjusted after this procedure.
2. Upload these files to the CPU:

   _0E4000.dat (OS file)

   _080000.dat (Car generic)

   _0C0000.dat (Group generic)

   _07C000.dat (job configuration file)

Note: On a multi-car group, the OS, Car, and Group generic files will be the same files for each car, but each car has its own job configuration file.

3. Connect the RS232 cable (from the laptop), to the CPU's 9-pin D-Shell connector.
4. Start the HyperTerminal.
5. In the HyperTerminal, select Transfer->Send File. The Send File window opens.
6. With all 4 (four) required files on a flash drive or CD, insert the media into laptop drive.
7. In the Send File window, enter A (or other appropriate drive name):*.dat.
8. Place the CPU in the upload mode.
   a. Verify if the JP2 jumper has been removed from the CPU card. Removing the JP2 jumper prevents accidentally writing over a critical data area of CPU memory,
      - If the jumper is removed: continue with Step 8c.
      - If the jumper is on: power down the CPU, remove it, and power up the CPU.
   b. Press and hold RST. While holding RST, press and hold UDL.
   c. With both buttons down, release RST.
   d. When the F6K_STAT LED on the CPU blinks 4 times (2 long, 2 short), release UDL.

Note: The CPU remains in the upload mode for about 30 seconds, and then resets itself to normal mode if no instructions are received from the laptop. If this happens, repeat Steps 8b through 8d.

9. In the Send File window, click Send. The Zmodem File Send For ICON Hyperterm window opens, and shows the upload progress.
10. When upload is complete, the Zmodem File Send For ICON Hyperterm window closes.

CAUTION **Manually resetting the CPU or any power down of the CPU before allowing the upload to finish could cause the CPU to lock up.**

11. Allow the F6K_STAT LED activity to cease for a couple of minutes before proceeding. The CPU will automatically reset.
12. When the Watchdog (WD) LED comes ON and stays ON, the new CPU is ready for readjustment. Use the list of recorded settings to make all changes to the job.
13. Perform a hoistway scan.
14. To insure proper operation, perform the functional tests of the system.

Selector Card

TSA (Auxiliary Sensor Card)

Note: For all steps in this procedure, see Figure 36 on page 136.

1. Remove the car from service.

2. Turn OFF, Lock, and Tag out the mainline disconnect.

3. Disconnect the ground wire from the auxiliary sensor assembly.

Note: Auxiliary sensor assembly = auxiliary sensor card + auxiliary sensor card cover.

4. Loosen the four (4) thumbscrews holding the auxiliary sensor assembly.

5. Carefully separate the auxiliary sensor assembly from the main sensor card.

Notes:

- The connector (and sometimes the guides) between the two cards will offer resistance so that the auxiliary sensor assembly cannot be removed evenly.
- Four (4) tape guide halves will remain attached to the auxiliary sensor card, and four (4) will remain with the main sensor card.

6. Separate the guide halves from the auxiliary sensor card.

7. Remove the four (4) thumbscrews, and then remove the auxiliary sensor card from the cover.

8. Use the four (4) thumbscrews to assemble the new auxiliary sensor card with the cover.

9. Install the four (4) guide halves on the new auxiliary sensor card.

10. Align the auxiliary sensor assembly with the selector box alignment pins and the connector on the main sensor card. Press the two connectors together.

11. Check the following, and readjust (if necessary),
    - The selector box is centered on the tape.
    - The guides are not deflecting the tape from the front to the back.
    - The guides are not pressing against the sides of the tape.

12. Turn ON the mainline disconnect.

13. Run the car up and down to verify proper selector alignment.

14. Return the car to service.

Selector Card
(continued)

TSM (Main Sensor Card)

Note: For all steps in this procedure, see Figure 36 on page 136.

1. Remove the selector box cover.
2. Remove all 40x connectors from the main sensor card.
3. Loosen the four (4) thumbscrews holding the auxiliary sensor assembly.

Note: Auxiliary sensor assembly = auxiliary sensor card + auxiliary sensor card cover.

4. Carefully separate the auxiliary sensor assembly from the main sensor card.

Notes:

- The connector (and sometimes the guides) between the two cards will offer resistance so that the auxiliary sensor assembly cannot be removed evenly.
- Four (4) tape guide halves will remain attached to the auxiliary sensor card, and four (4) will remain with the main sensor card.

5. Hold the tape away from the selector box, and remove the main sensor assembly.
6. Remove the guide halves from the old main sensor card, and install them on the new card.
7. Ensure that all JP jumpers on the new main sensor card are installed like the original card.
8. Install the new main sensor card on the selector box. Make sure the tape is positioned correctly between the guide halves.
9. Align the auxiliary sensor assembly with the selector box alignment pins and the connector on the main sensor card. Press the two connectors together.
10. Tighten the thumbscrews, but do not cross-thread them.
11. Check the following, and readjust (if necessary),
    - The selector box is centered on the tape.
    - The guides are not deflecting the tape from the front to the back.
    - The guides are not pressing against the sides of the tape.
12. Turn ON the mainline disconnect.
13. Run the car up and down to verify proper selector alignment.
14. Return the car to service.

Selector Card
(continued)

CAUTION! When removing either Selector Card from the Selector Assembly, do not put undue stress on or excessively bend the cards.

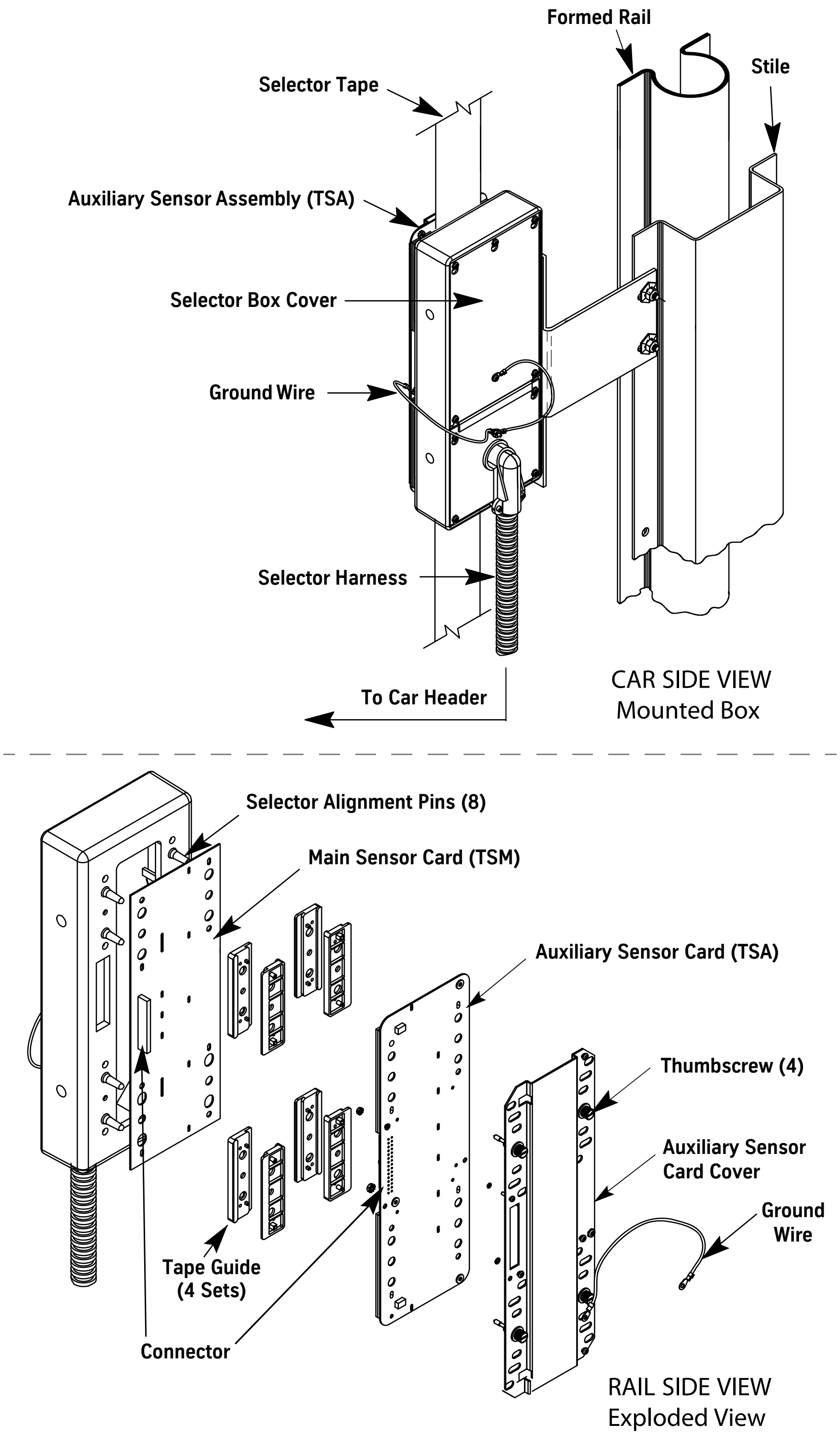


Figure 36 - Selector Box

VERTICAL EXPRESS

Change the CPU Battery

Group Car CPU

1. Remove the car from service.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Remove the old battery, and install the new battery.
4. Disconnect Connector 21 on the CPU card (to remove the car from the group).

Note: When a group car CPU is powered up after replacement of the battery, its identification defaults to Car 1.

5. Turn ON the mainline disconnect.
6. Reconnect Connector 21.
7. Restore the car to service.

Simplex Car CPU

1. Remove the car from service.
2. Turn OFF, Lock, and Tag out the mainline disconnect.
3. Remove the old battery and install the new battery.
4. Turn ON the mainline disconnect.
5. Restore the car to service.

Directional Limit Function Tests

Use the following procedures for testing the directional limit function independent of normal selector operation; See Figure 37 on page 138 for all steps in both procedures.

Bottom Directional Limit (DLB) Function Test

1. On Inspection, run the car up until there is more than 8" between the bottom of the selector and the top of the bottom floor slowdown magnets.
2. Place a temporary 8" magnet on the selector tape in the directional limit channel so that it is located above the normal slowdown magnets for the bottom landing.

Note: The magnet's yellow stripe (South Pole) must face away from the selector tape.

3. Use the magnet alignment tool to align the magnet to the edge of the tape.
4. Still on Inspection, run the car down until the selector engages the magnet. The car should stop.
5. Attempt to run the car down to verify that it will not run down.
6. Run the car up to verify that it will run up.
7. Remove the temporary magnet and store it with the alignment template.

Top Directional Limit (DLT) Function Test

1. On Inspection, run the car down until there is more than 8" between the top of the selector and the bottom of the top floor slowdown magnets.
2. Place a temporary 8" magnet on the selector tape in the directional limit channel so that it is located below the normal slowdown magnets for the top landing.

Note: The magnet's yellow stripe (South Pole) must face away from the selector tape.

3. Use the magnet alignment tool to align the magnet to the edge of the tape.
4. On Inspection, run the car down until the selector is below the temporary magnet.
5. Still on Inspection, run the car up until the selector engages the magnet. The car should stop.
6. Attempt to run the car up to verify that it will not run up.
7. Run the car down to verify that it will run down.
8. Remove the temporary magnet and store it with the alignment template.

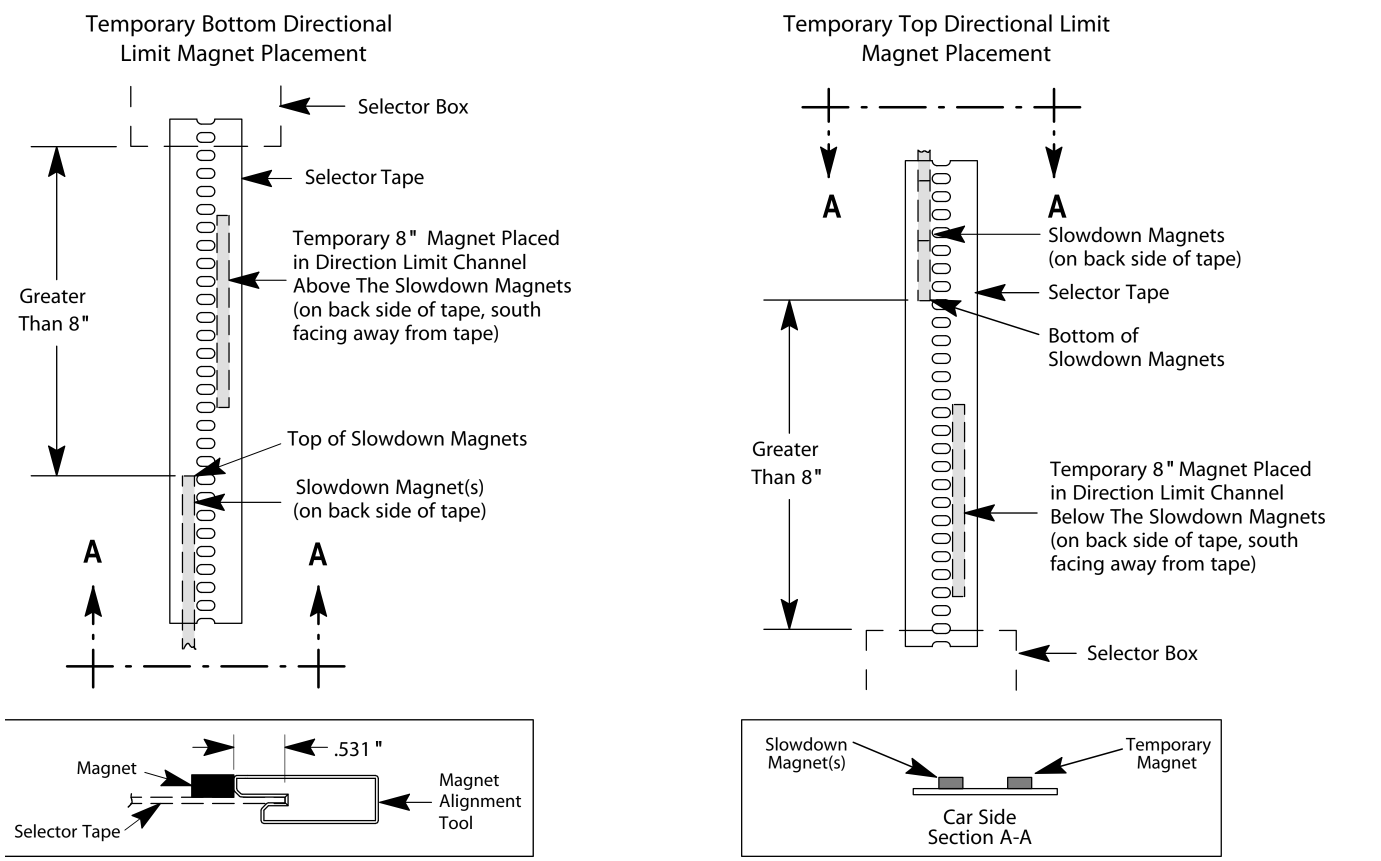


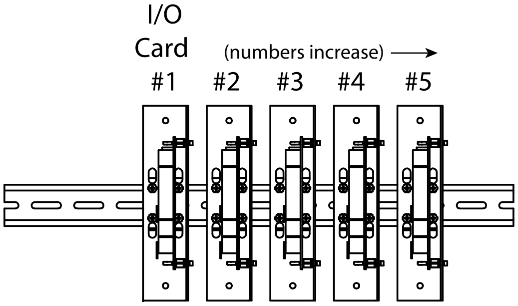
Figure 37 - Temporary Directional Limit Magnet Placement (car side)

I/O Expansion Card Configuration

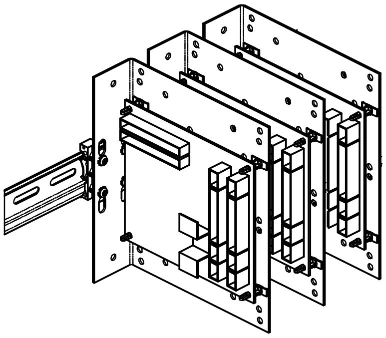
JP4 on 6300JG_ 24VDC Card
JP5 on 6300JH_ High Voltage Card

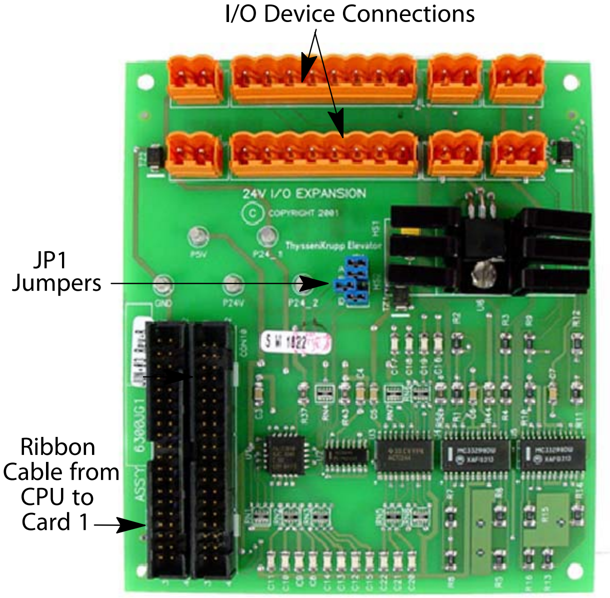
Card Number	Jumpers On
1	A, B, D
2	B, D
3	A, D
4	D
5	A, B, C
6	B, C
7	A, C
8	C
9	A, B
10	B
11	A
12	None

Address Jumper Positions

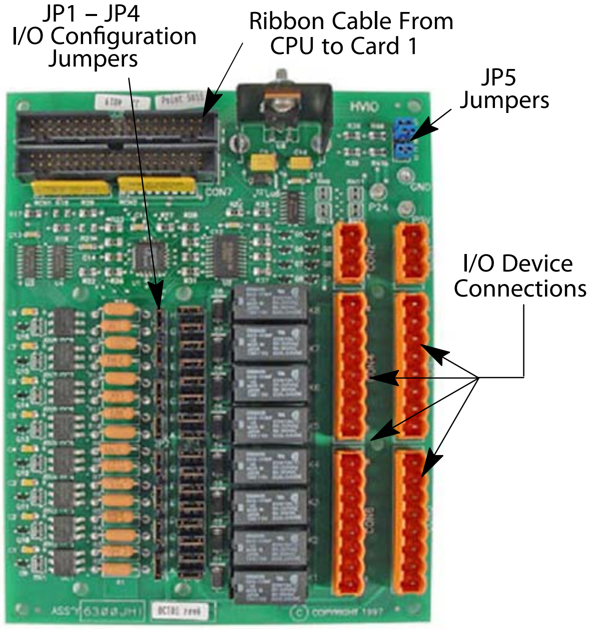


I/O Board to Face Center of Cabinet





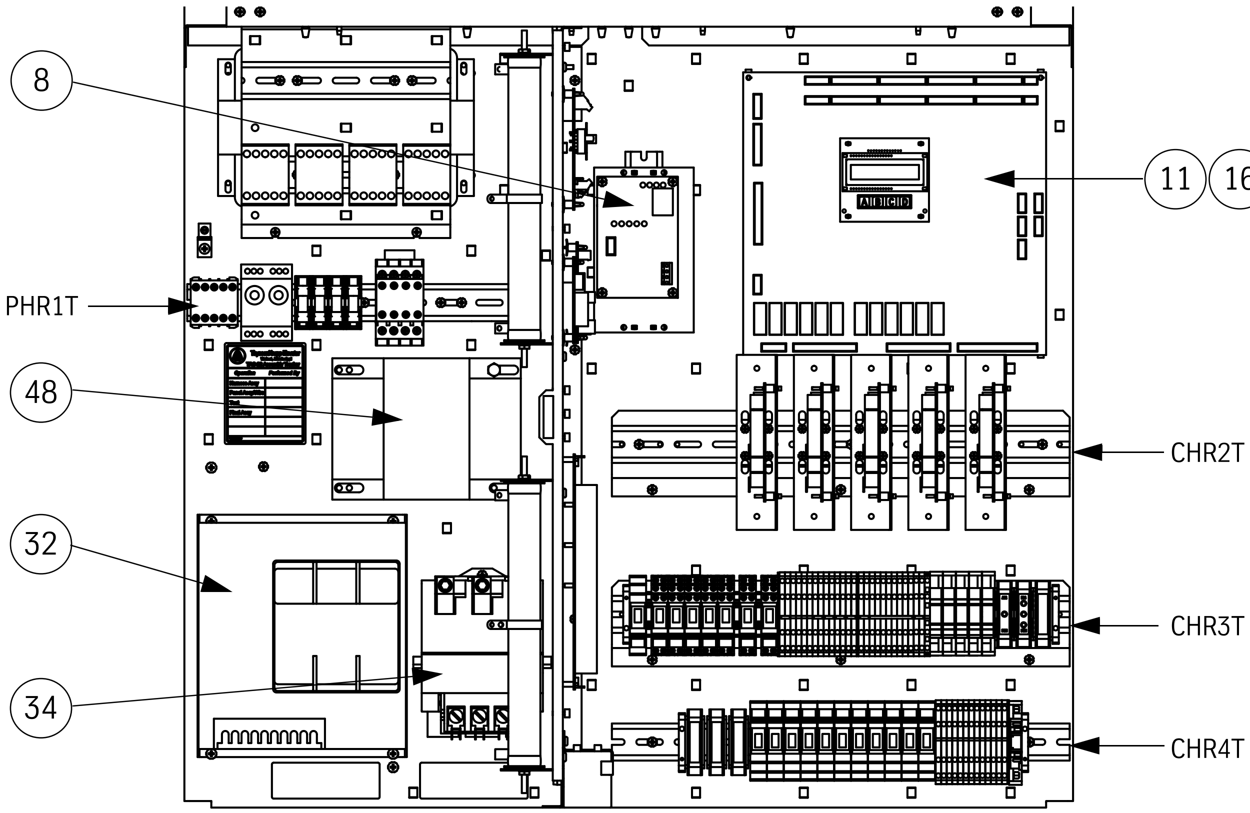
24V Low Voltage I/O Expansion Card

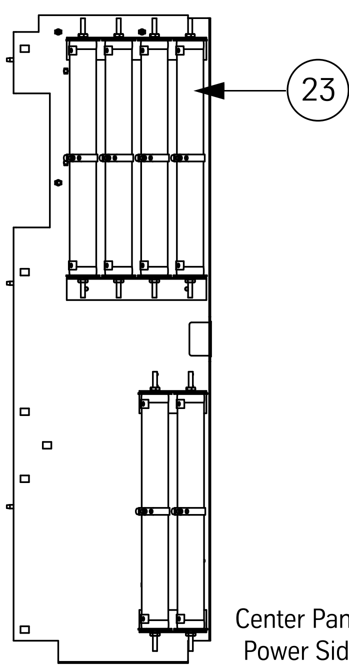


High Voltage I/O Expansion Card

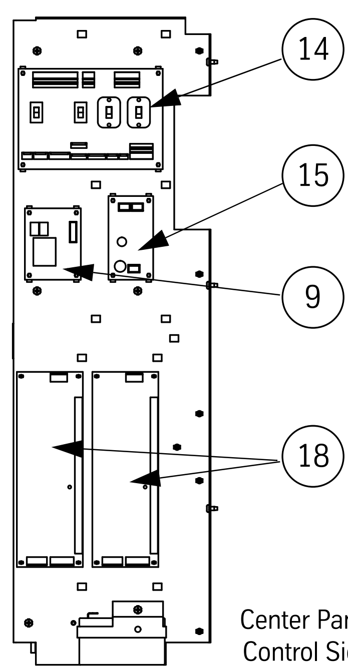
Replacement Parts

33-inch Controller Assembly



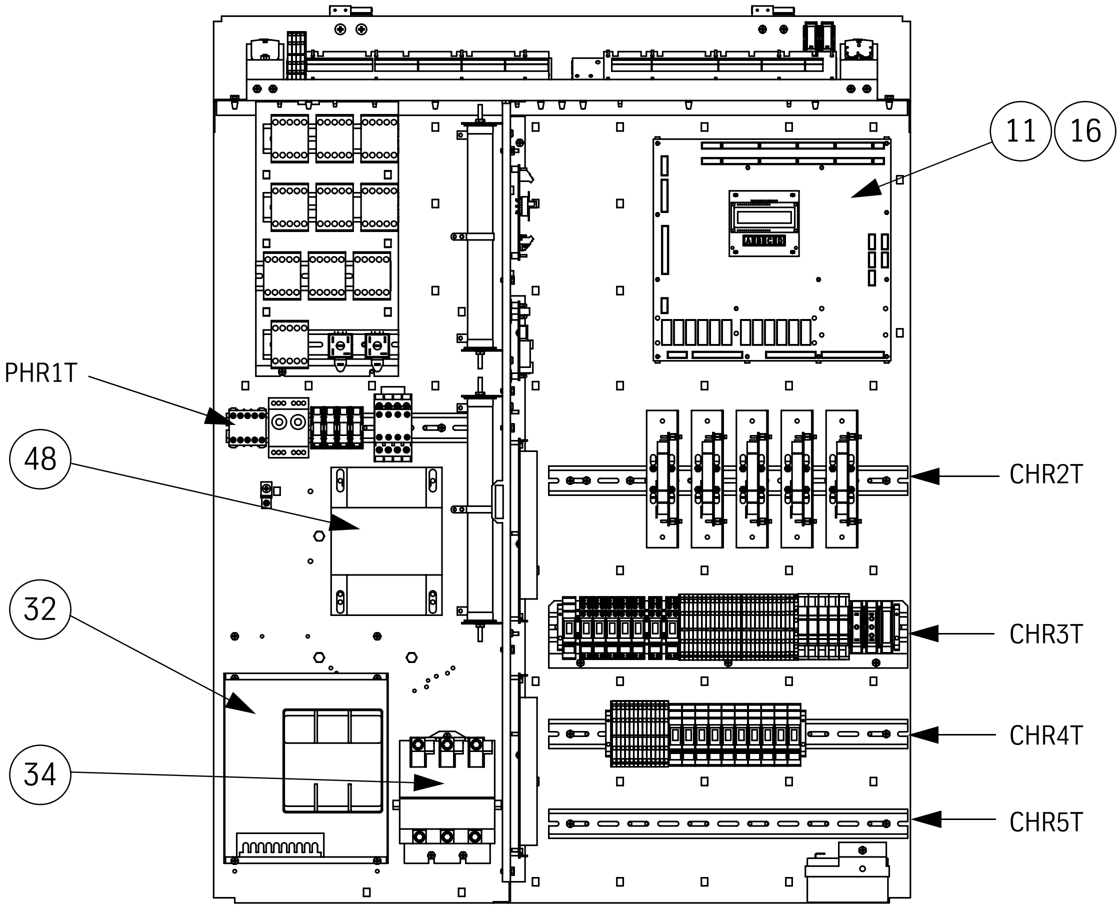


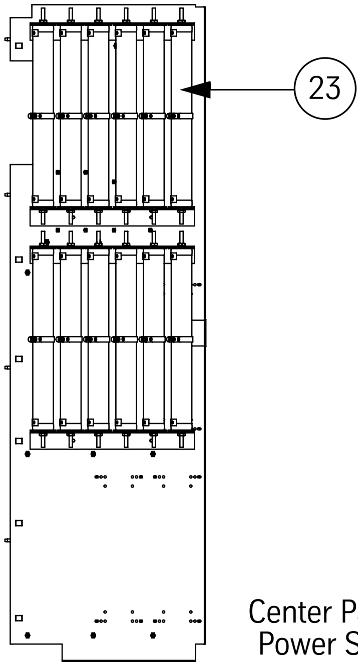
Center Panel
Power Side



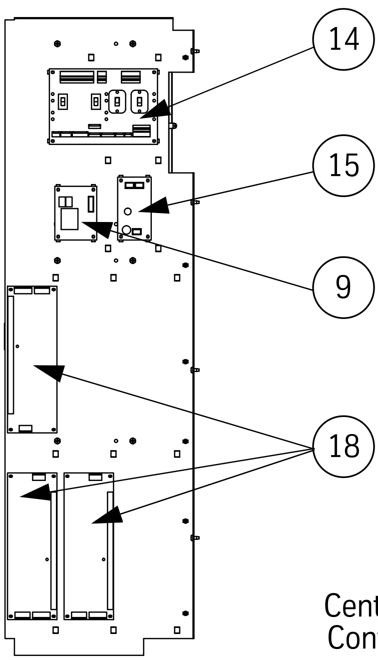
Center Panel
Control Side

42-inch Controller Assembly





Center Panel
Power Side



Center Panel
Control Side

Controller Parts List

ITEM	PART NO.	PRINT NO.	DESCRIPTION
1		834CJ1	Terminal Block
		834CJ2	Terminal Middle Block
		834CJ3	Terminal Block Support
2		834CE1	Terminal Block, DIN Rail, Green/Yellow
		834CC9	Terminal Block, DIN Rail, Gray
		834CF11	Terminal Block, DIN Rail End Plate, Black
3		890AF2	Suppressor Assembly
4		6300ACA1	Card, Interface, Micro Comm, CE Electronics
5	9867345	6300HT2	Card, Modem, Distance Monitoring
6	9782813	6300JG1	Card, 24VIO, I/O Expansion, 24 VDC
	9782825	6300JH1	Card, High Voltage I/O Expansion, 24/48 VDC
	9987652	6300JH2	Card, High Voltage I/O Expansion, 115 VAC/VDC
		6300JH3	Card, High Voltage I/O Expansion, 230 VAC/VDC
7	9782552	6300KY10	Card, 188E CPU
8	9782898	6300MD1	Card, Traveling Cable, Interface Distributed, (TCID)
9	9782874	6300MF1	Card, Hoistway Cable, Interface Distributed (HCID)
10		6300NP3	Card, Controller Wiring Interface Front, (CNWIF)
11	9898176		6300NJ112 Volt Battery Charger - 12VBC
12		6300PE1	Card, User Interface Tool, (job specific)
13		220DH3	Cable Assembly, I/O Expansion, 2 Receptacle, 16"
	9782588	220DH1	Cable Assembly, I/O Expansion, 2 Receptacle, 5"
14	9782722	672BW1	Power Supply, 24 VDC, 50W
	9816124	672BX1	Power Supply, 24 VDC, 100W
	9816136	672BY1	Power Supply, 24 VDC, 150W
		672CA1	Power Supply, 48 VDC, 50W
		672CB1	Power Supply, 48 VDC, 75W
	9816148	672CC1	Power Supply, 48 VDC, 150W
15		462FT1	Harness Wire, 18 GA, Power Supply
		462FT2	Harness Wire, 18 GA, Power Supply
		462FT3	Harness Wire, 18 GA, Power Supply
		462FT4	Harness Wire, 18 GA, Power Supply
		462FV1	Harness Wire, 20 GA, Power Supply
16	9752457	298AP1	Relay Contactor, 2 NC, 2 NO, 24VDC
		298BB1	Relay Contactor, 3 NO, 1 NC, 24VDC
		298BE1	Contactor, 24VDC, 2 NO, 2 NC
		298BE2	Contactor, 120VAC, 2 NO, 2 NC
		298BF1	Contactor, 24VDC, 4 NO
17		344AR1	Diode Assembly
18		381AF1	Filter Assembly

Controller Parts List
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
19	9720467	128069	Resistor, 25 OHM, 200W, Adjustable
	9720479	128070	Resistor, 50 OHM, 200W, Adjustable
	9720492	128072	Resistor, 100 OHM, 200W, Adjustable
	9744435	128074	Resistor, 250 OHM, 200W, Adjustable
	9744447	128075	Resistor, 500 OHM, 200W, Adjustable
	9744459	128076	Resistor, 1K OHM, 200W, Adjustable
	9746663	128077	Resistor, 1.5K OHM, 200W, Adjustable
		708BB1	Resistor, 3K OHM, 200W, Adjustable
20		545AF2	Jumper, Terminal, 2 Position
		545AF3	Jumper, Terminal, 3 Position
		545AF5	Jumper, Terminal, 5 Position
21		370AJ1	Module, Electronic, RRA
	9739373	370AJ2	Module, Electronic, PSM
		370AJ3	Module, Electronic, P24
		370AJ4	Module, Electronic, P48
		370AJ6	Module, Electronic, VS
22	9782618	409BR5	Fuse, Panel, MDA 250V 1A
	9782620	409BR7	Fuse, Panel, MDA 250V 2A
	9782631	409BR9	Fuse, Panel, MDA 250V 3A
	9782655	409BR11	Fuse, Panel, MDA 250V 5A
	9782667	409BR12	Fuse, Panel, MDA 250V 6A
	9782679	409BR13	Fuse, Panel, MDA 250V 7A
	9771246	409BR14	Fuse, Panel, MDA 250V 8A
	9865245	409BR15	Fuse, Panel, MDA 250V 10A
23		412BC1	Fuseblock, 1 Pole, 250V
24		412BD1	End plate, Fuseblock, DIN Rail
25		412BF1	Fuse holder, DIN Rail, CLASS CC
26	9834606	690AJ7	Relay, RPR, SPDT, 10A, 575VAC
	9834612	690AJ8	Relay, RPR, SPDT, 10A, 208VAC - 480VAC
27	9782321	690CA3	Relay, DPDT, 6A, 24 VDC
	9782333	690CA5	Relay, DPDT, 6A, 110VDC
28	9840540	690BB10	Relay, Overload, Series 48, 5.5 22A
	9840552	690BB1	Relay, Overload, Series 48, 10-40A
	9840564	690B12	Relay, Overload, Series 48, 13-52A
	9840576	690BB13	Relay, Overload, Series 48, 25-100A
	9840620	690BB14	Relay, Overload, Series 48, 50-200A
	9815200	690CJ1	Relay, DPDT, 120 VAC
29	9739397	770BK2	Socket, Relay, DPDT, Rail Mount
30	9815641	558AX2	Ejector, Relay

Controller Parts List
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
31	9739464	804BC1	Suppressor, 115 VAC (Used on AC Relay)
	9739452	804BC2	Suppressor, 24VDC (Used on DC Relay)
	9765656	804BF1	Suppressor, Relay Contactor, Diode, 24-60 VDC
		804BN1	Suppressor Assembly
32		787AF1	Starter, Electronic, 200-460V, 22A
		787AF3	Starter, Electronic, 200-460V, 55A
		787AF11	Starter, Electronic, 200-460V, 68A
		787AF12	Starter, Electronic, 200-460V, 80A
		787AF5	Starter, Electronic, 200-460V, 105A
		787AF7	Starter, Electronic, 200-460V, 130A
		787AF9	Starter, Electronic, 200-460V, 157A
		787AF14	Starter, Electronic, 200-230V, 252A
		787AF2	Starter, Electronic, 575V, 22A
		787AF4	Starter, Electronic, 575V, 55A
		787AF13	Starter, Electronic, 575V, 68A
		787AF6	Starter, Electronic, 575V, 105A
		787AF8	Starter, Electronic, 575V, 130A
		787AF10	Starter, Electronic, 575V, 157A
33	9782734	409BP20	Fuse, 3A, FNQ, 600V
	9782746	409BP23	Fuse, 4A, FNQ, 600V
	9782758	409BP24	Fuse, 5A, FNQ, 600V
	9782760	409BP25	Fuse, 6A, FNQ, 600V
	9782771	409BP28	Fuse, 8A, FNQ, 600V
	9782783	409BP30	Fuse, 10A, FNQ, 600V
	9782795	409BP31	Fuse, 12A, FNQ, 600V
	9853241	409BP32	Fuse, 15A, FNQ, 600V
34	9728351	298AH23	Contactor, 3 Pole, IEC, 43A
	9847653	298AR101	Contactor, 3 Pole, IEC, 78A
		298AR104	Contactor, 3 Pole, IEC, 157A
		298AH31	Contactor, 3 Pole, IEC, 252A
		298AV1	Contactor, 4 Pole, 200-220/60 & 200/50 VAC Coil
		298AV2	Contactor, 4 Pole, 208-240/60 VAC Coil
		298AV4	Contactor, 4 Pole, 230-240/50 VAC Coil
		298AV5	Contactor, 4 Pole, 380/60 VAC Coil
		298AV7	Contactor, 4 Pole, 400-415/50 VAC Coil
		298AV8	Contactor, 4 Pole, 440/50 & 480/60 VAC Coil
		298AV9	Contactor, 4 Pole, 600/60 VAC Coil
		298AW1	Contactor, Auxiliary, 700CF

Controller Parts List

(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
35	9853431	661BA2	Connector Plug, 2 Position, 5.08mm
	9725638	661BA3	Connector Plug, 3 Position, 5.08mm
	9870936	661BA4	Connector Plug, 4 Position, 5.08mm
	9831201	661BA7	Connector Plug, 7 Position, 5.08mm
	9852461	661BA8	Connector Plug, 8 Position, 5.08mm
	9787875	661BB8	Connector Plug, 8 Position, 7.5mm
	9816254	661BB10	Connector Plug, 10 Position, 7.5mm
36		687AE2	Receptacle, MTA, 20 GA, .156, 2 Position
		687AE3	Receptacle, MTA, 20 GA, .156, 3 Position
	9835649	687AE4	Receptacle, MTA, 20 GA, .156, 4 Position
		687AE5	Receptacle, MTA, 20 GA, .156, 5 Position
		687AE6	Receptacle, MTA, 20 GA, .156 6 Position
		687AE8	Receptacle, MTA, 20 GA, .156, 8 Position
	9721212	687BY3	Receptacle, MTA, 22 GA, .100, 3 Position
	9725544	687BY4	Receptacle, MTA, 22 GA, .100, 4 Position
	9832214	687BY5	Receptacle, MTA, 22 GA, .100, 5 Position
	9743325	687BY6	Receptacle, MTA, 22 GA, .100, 6 Position
	9854436	687BY7	Receptacle, MTA, 22 GA, .100, 7 Position
	9765547	687BY8	Receptacle, MTA, 22 GA, .100, 8 Position
37		220CN1	Cable Assembly, 16/3 Power Cord, Male
		220CN2	Cable Assembly, 16/3 Power Cord, Female
38		834CG1	Clamp, DIN Rail, Terminal Block
39		274BR1	Clamp, Flat Cable
40	9719180	378AE1	Fan, 110 CFM, AC, Muffin
41		378AD1	Fan Guard and Filter

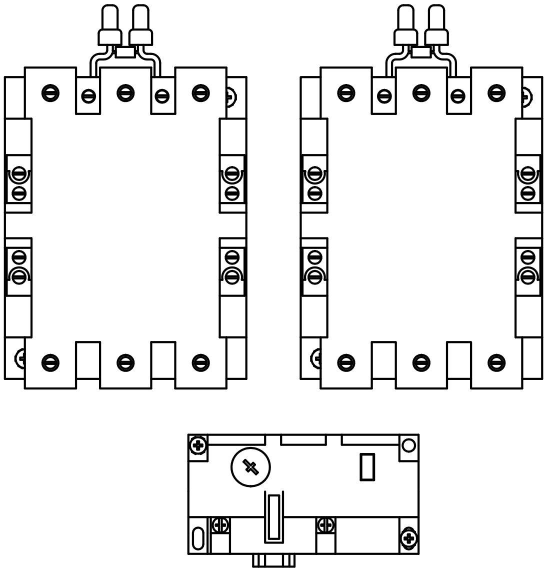
Wall Mounted Controller Material

ITEM	PART NO.	PRINT NO.	DESCRIPTION
42		265DX4	Unistrut 1-5/8” x 60”
43		72780	Unistrut Nut
44		396RW2	FS, Screw, CSBHS, 0.312-18UNC
45		196AWJ1	Controller Mounting Bracket

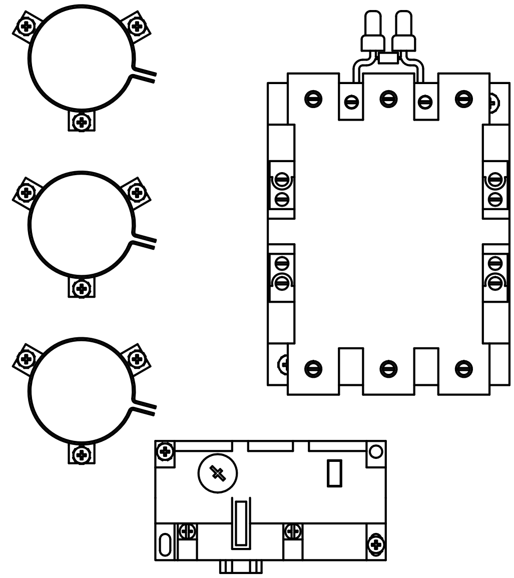
Controller Parts List
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
46	9754726	874DA1	Transformer, PRI 208V, SEC 115/115V, .5KVA, 1 Phase, 60Hz
	9754378	874DA2	Transformer, PRI 240/240V, SEC 115/115V, .5KVA, 1 Phase, 60Hz
	9756436	874DA4	Transformer, PRI 380/400/415V, SEC 115/115V, .5KVA, 1 Phase, 50/60Hz
	9867547	874DA5	Transformer, PRI 600V, SEC 115/115V, .5KVA, 1 Phase, 60Hz
	9754732	874DA6	Transformer, PRI 200/220V, SEC 115/115V, .5KVA, 1 Phase, 50Hz Only
	9854545	874DB1	Transformer, PRI 208V, SEC 115/115V, .75KVA, 1 Phase, 60Hz
	9709090	874DB2	Transformer, PRI 240/240V, SEC 115/115V, .750KVA, 1 Phase, 60Hz
	9810398	874DB3	Transformer, PRI 600V, SEC 115/115V, .750KVA, 1 Phase, 60Hz
	9888800	874DC1	Transformer, PRI 200/220V, SEC 115/115V, .750KVA, 1 Phase, 50/60Hz
		874DC3	Transformer, PRI 380/400/415V, SEC 115/115V, .750KVA, 1 Phase, 50/60Hz
	9754740	874DJ1	Transformer, PRI 208/575V, SEC 115/115V, .25KVA, 1 Phase, 50/60Hz
	9987640	874DJ2	Transformer, PRI 380/400/415V, SEC 115/115V, .25KVA, 1 Phase, 50/60Hz
	9754751	874DJ4	Transformer, PRI 240/240V, SEC 115/115V, .25KVA, 1 Phase, 60Hz
		874DK1	Transformer, PRI 230/230V, SEC 115V, .25KVA, 1 Phase, 60Hz
		874DL1	Transformer, PRI 230/230V, SEC 115V, .15KVA, 1 Phase, 60Hz
	9742852	874DL2	Transformer, PRI 208V, SEC 115V, .15KVA, 1 Phase, 50/60Hz
		874DL3	Transformer, PRI 575V, SEC 115V, .15KVA, 1 Phase, 50/60Hz
		874DP1	Transformer, PRI 208V, SEC 115/115V, .1KVA, 1 Phase, 60Hz
		874DP2	Transformer, PRI 240/480V, SEC 115/115V, .1KVA, 1 Phase, 60Hz
		874DP3	Transformer, PRI 600V, SEC 115/115V, .1KVA, 1 Phase, 60Hz
		874DW1	Transformer, PRI 200/220V, SEC 115/115V, .1KVA, 1 Phase, 50/60Hz
		874DW2	Transformer, PRI 380/400/415V, SEC 115/115V, 1KVA, 1 Phase, 60Hz
		874EM001	Transformer, PRI 208V, SEC 208V, .5KVA, 1 Phase, 50/60Hz
		874EM002	Transformer, PRI 240V, SEC 208V, .5KVA, 1 Phase, 50/60Hz
		874EM003	Transformer, PRI 480V, SEC 208V, .5KVA, 1 Phase, 50/60Hz
		874EM004	Transformer, PRI 600V, SEC 208V, .5KVA, 1 Phase, 50/60Hz
		874EN001	Transformer, PRI 208V, SEC 208V, 1KVA, 1 Phase, 50/60Hz
		874EN002	Transformer, PRI 240V, SEC 208V, 1KVA, 1 Phase, 50/60Hz
		874EN003	Transformer, PRI 480V, SEC 208V, 1KVA, 1 Phase, 50/60Hz
		874EN004	Transformer, PRI 600V, SEC 208V, 1KVA, 1 Phase, 50/60Hz

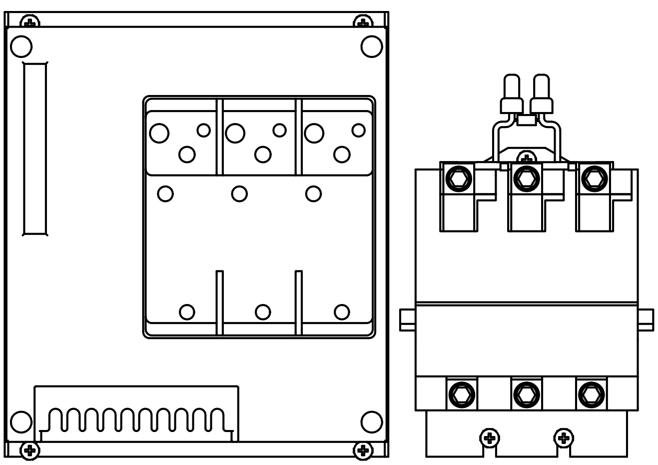
Starter Diagrams



IEC Starter

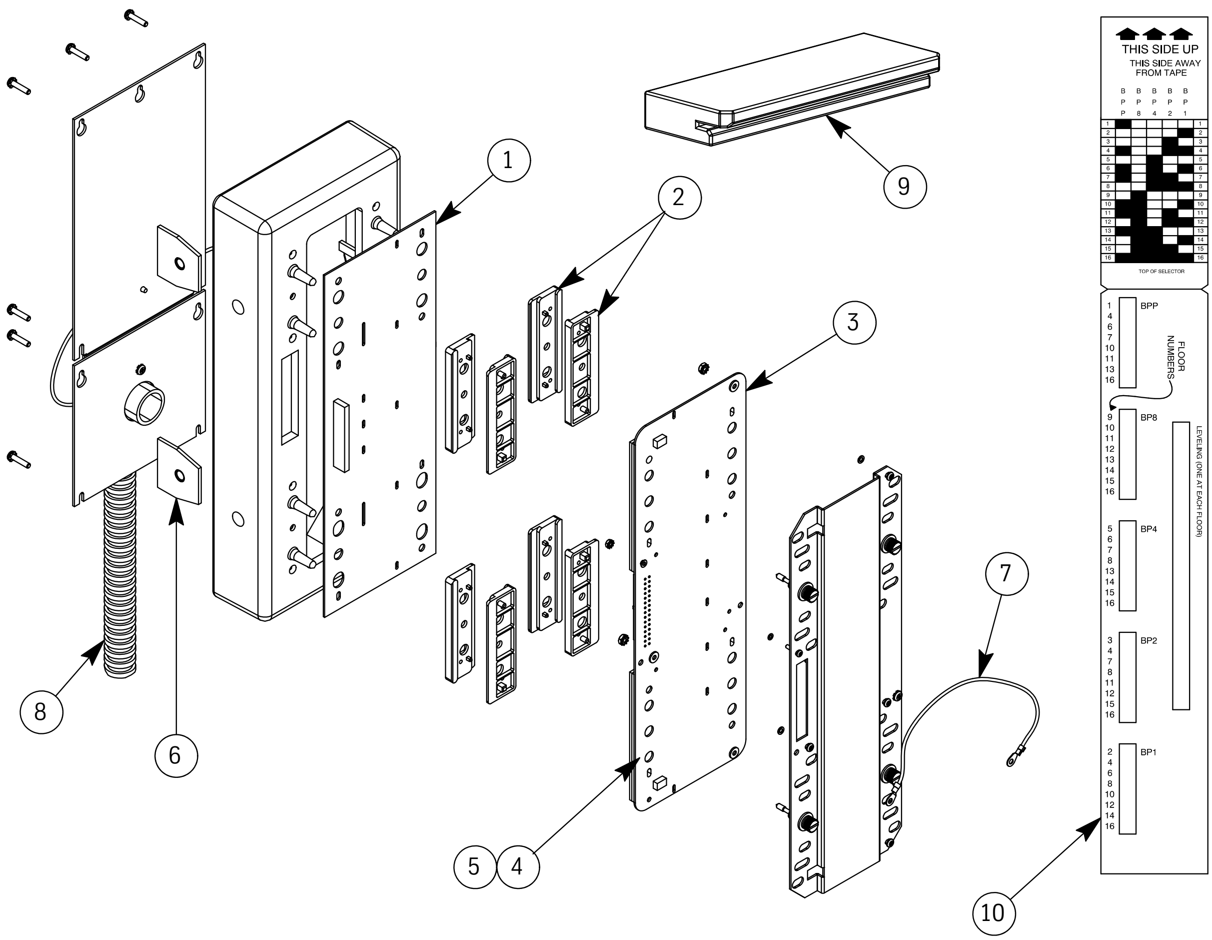


Single Phase Starter



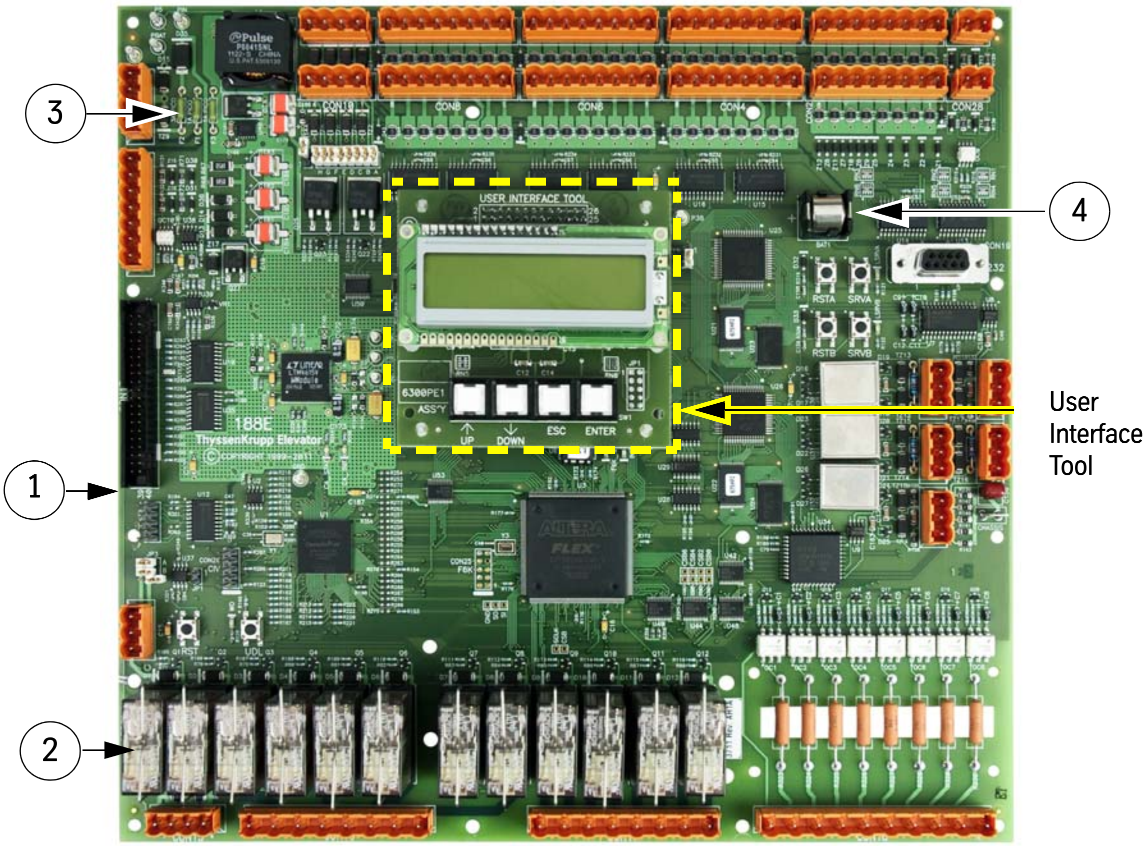
Electronic Starter

Selector



ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9882849	6300MJ4	Card, Main Sensor, Tape Selector, TSM
2	9841544	141549	Guide, Selector Tape
3	9782837	6300MK2	Card, Auxiliary Sensor, Tape Selector, TSA
4		760BF1	Shim, Aluminum, .093" x 1.25" x 5"
5	9987644	760BG1	Shim, Fiberglass, .093" x 1.25" x 5"
6	9987654	165RD1	Plate Nut Assembly
7		900AD60	Wire, 14 GA., Green, #8 Rings, 10"
8	9987653	462FW3	Harness, Selector
9	9987641	850PE1	Tool, Alignment, Magnet
10	9987642	814AF1	Template, Floor Magnets
11	9758318	568AG1	Magnet, Strip, 2.5"
12	9758320	568AG2	Magnet, Strip, 8"

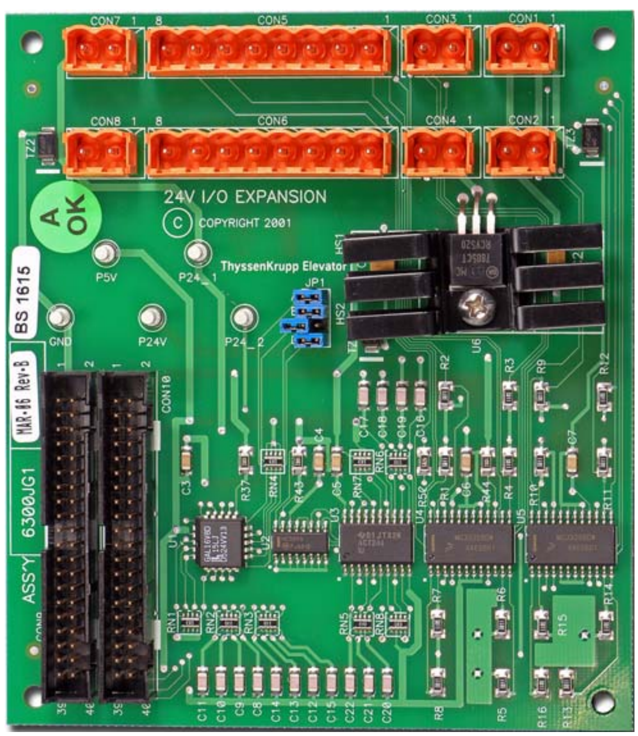
Replacement Cards



ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9782552	6300KY10	Card, 188E CPU, w/ 2 Serial Channels and Group (more than one car)
2	9782321	690CA3	Relay, DPDT, 24 VDC (K1 through K12)
3	9721366	409AE7	Fuse, 125V, 1A, (F1, F2, F3)
4	9752478	116AB2	Battery, 12V, 1.2 A-H
Parts not shown / not labeled in drawing			
5	9853431	661BA2	Connector Plug, 2 Position, 5.08 mm
6	9725638	661BA3	Connector Plug, 3 Position, 5.08 mm
7	9870936	661BA4	Connector Plug, 4 Position, 5.08 mm
8	9831201	661BA7	Connector Plug, 7 Position, 5.08 mm
9	9852461	661BA8	Connector Plug, 8 Position, 5.08 mm
10	9787875	661BB8	Connector Plug, 8 Position, 7.5 mm
11	9816254	661BB10	Connector Plug, 10 Position, 7.5 mm

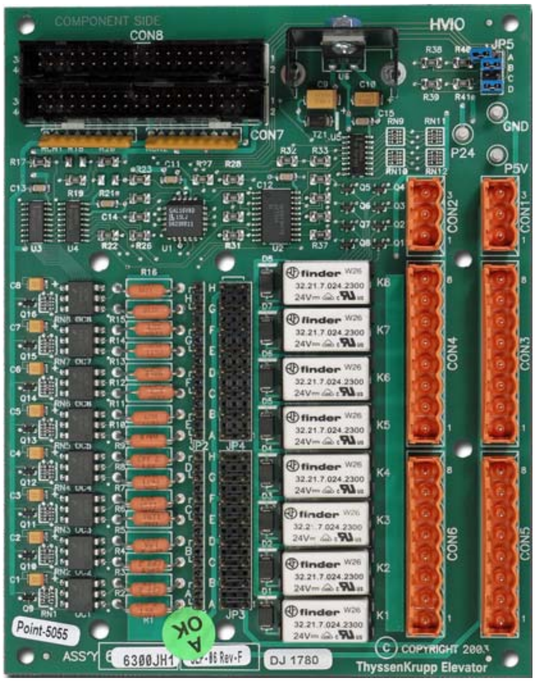
Cards
(continued)

ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9867345	6300HT2	Card, Modem, Distance Monitoring

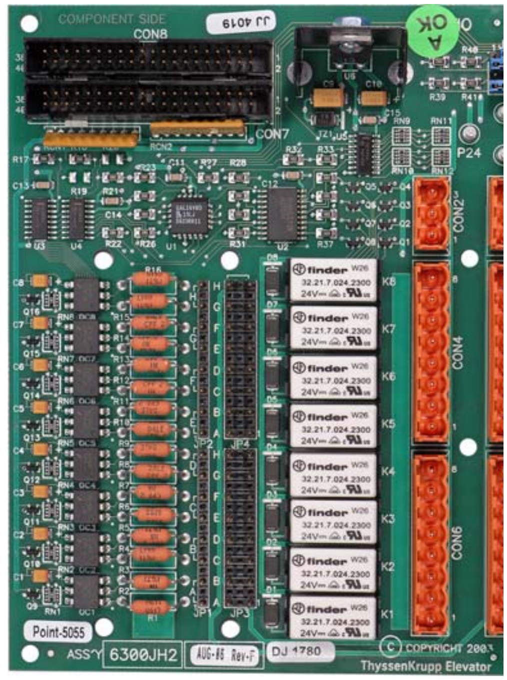


ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782813	6300JG1	Card, I/O Expansion, 24 VDC

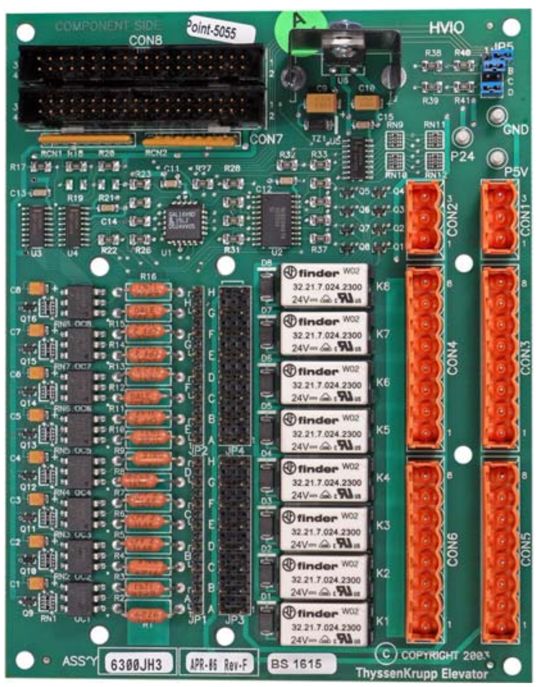
Cards
(continued)



6300JH1



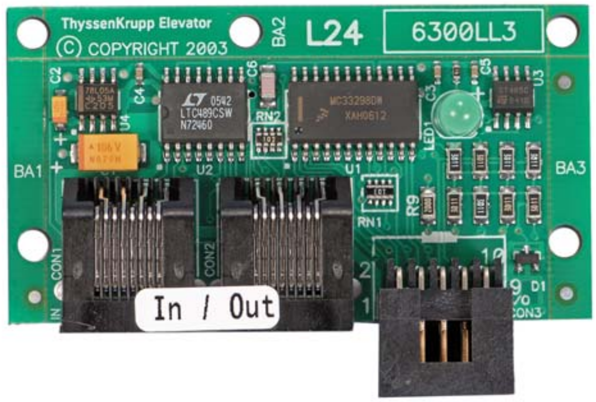
6300JH2



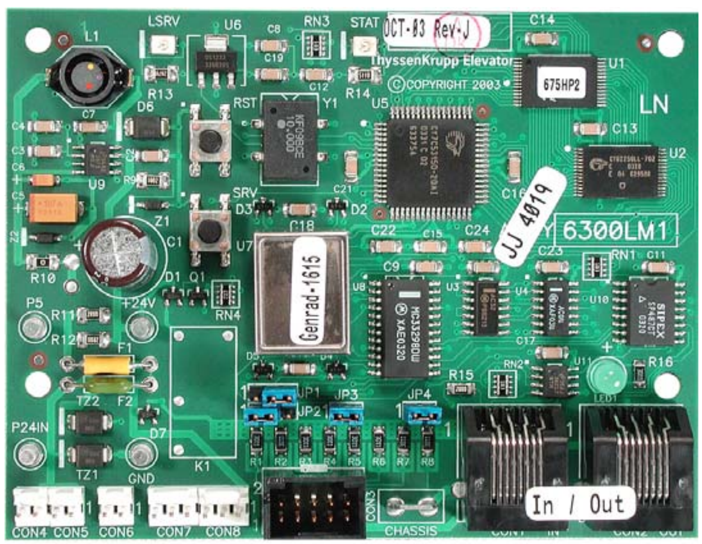
6300JH3

ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782825	6300JH1	Card, I/O Expansion, High Voltage, 24/48 VDC
	9987652	6300JH2	Card, I/O Expansion, High Voltage, 115 VAC/VDC
	9987651	6300JH3	Card, I/O Expansion, High Voltage, 230 VAC/VDC

Cards
(continued)

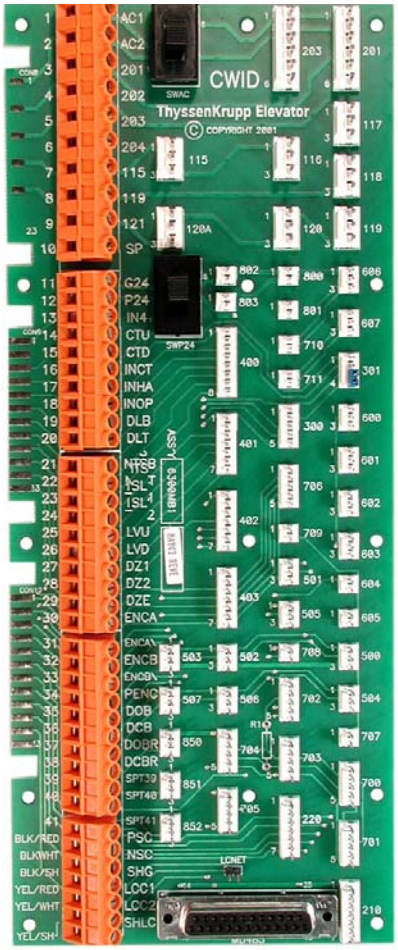


ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782916	6300LL3	Card, L24, I/O Expansion, 24V



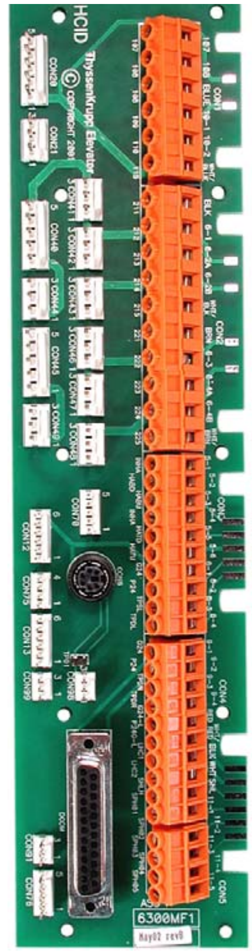
ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782928	6300LM1	Card, LN, 24V, I/O

Cards
(continued)



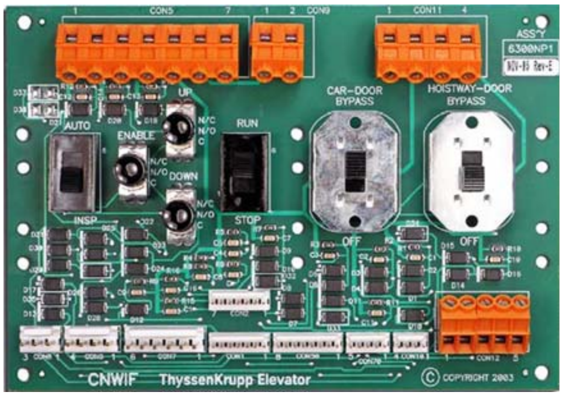
6300MB1

6300MB2



6300MB3

6300NP1

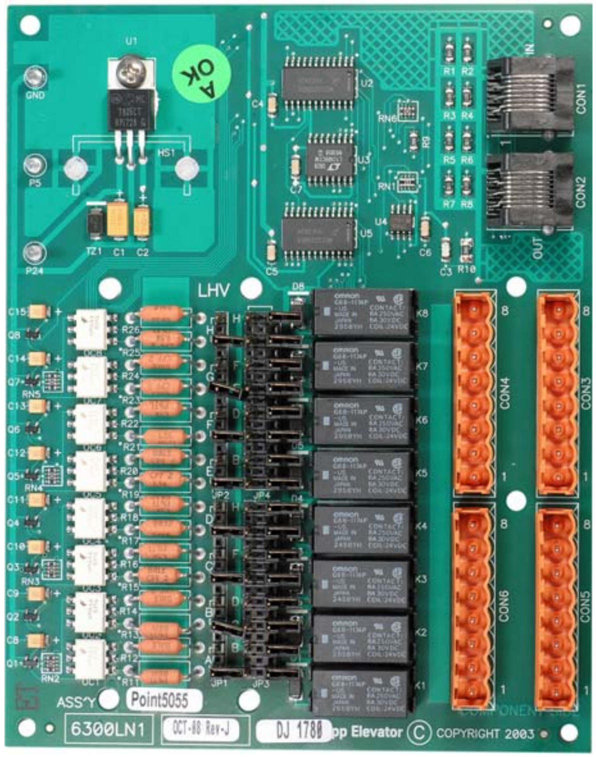


ITEM	PART NO.	PRINT NO.	DESCRIPTION
1	9738192	6300MB1	Card, Car Wiring Interface, Distributed, (CWID)
2	9782898	6300MD1	Card, Traveling Cable Interface, Distributed, (TCID)
3	9782874	6300MF1	Card, Hoistway Cable Interface, Distributed, (HCID)
4		6300NP3	Card, Controller Wiring Interface Front, (CNWIF)

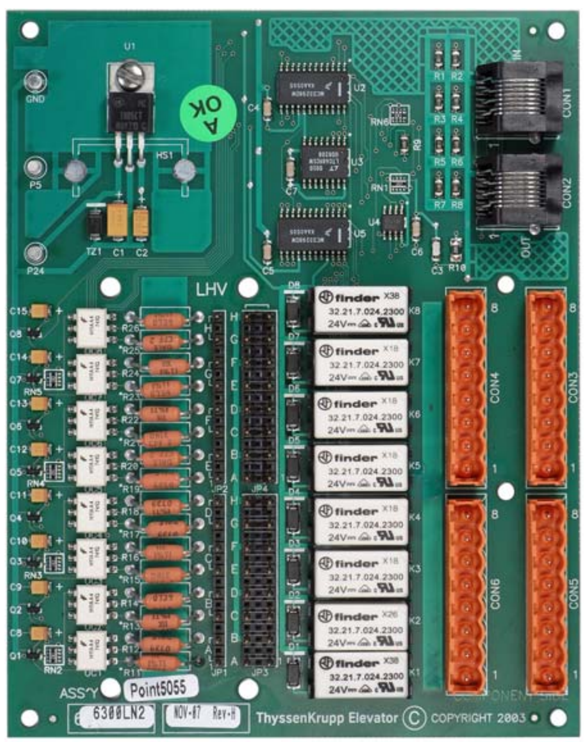
Cards

(continued)

6300LN1

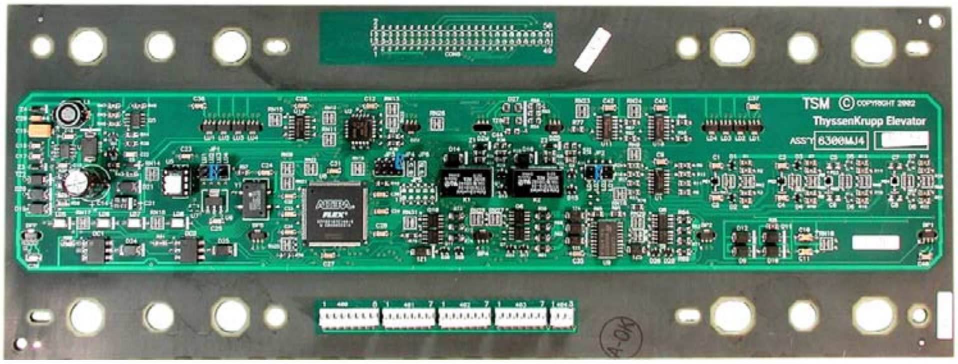


6300LN2

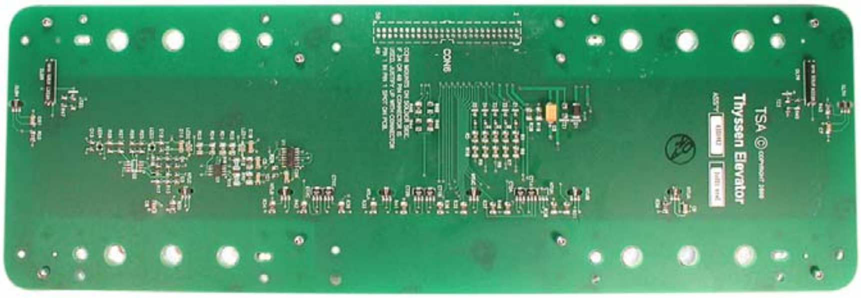


ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9729546	6300LN1	Card, High Voltage, 24V-48V
	9863549	6300LN2	Card, High Voltage, 120V
		6300LN3	Card, High Voltage, 240V (not shown)

Cards
(continued)



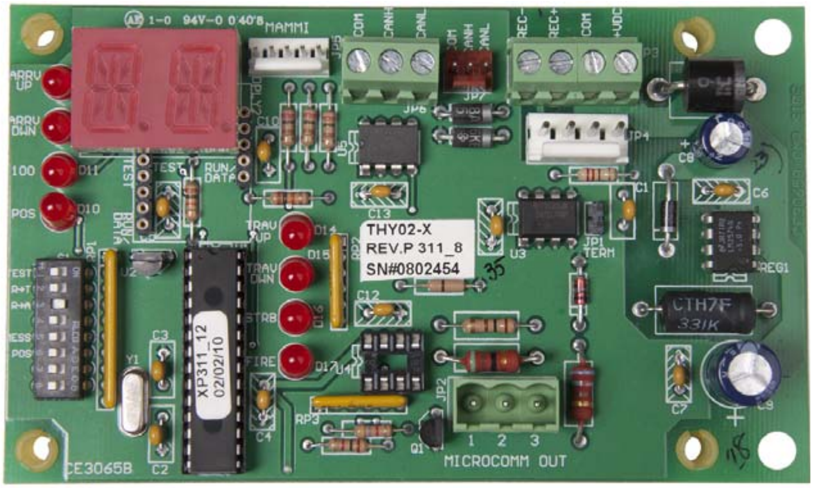
ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782849	6300MJ4	Card, TSM, Selector
		6300MJ2	Card, TSM, Selector, w/EN-81 Floor Level Sensor (not shown)



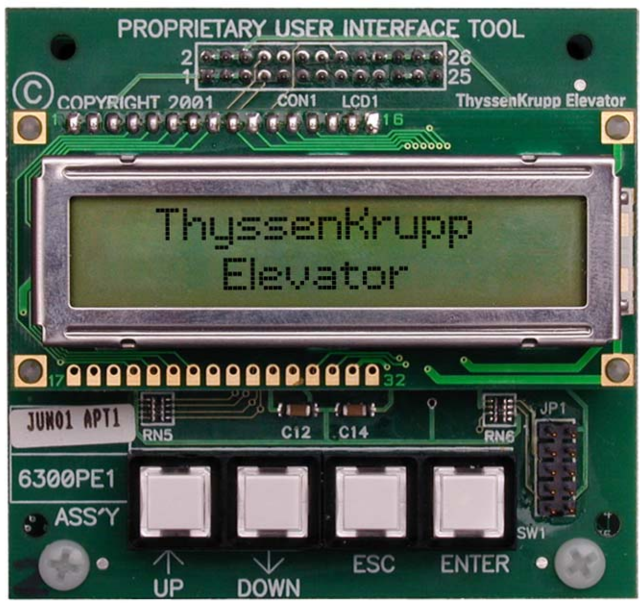
ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9782837	6300MK2	Card, TSA, Selector, Auxiliary Sensor

ITEM	PART NO.	PRINT NO.	DESCRIPTION
	9898176	6300NJ1	Card, Battery Charger

Cards
(continued)



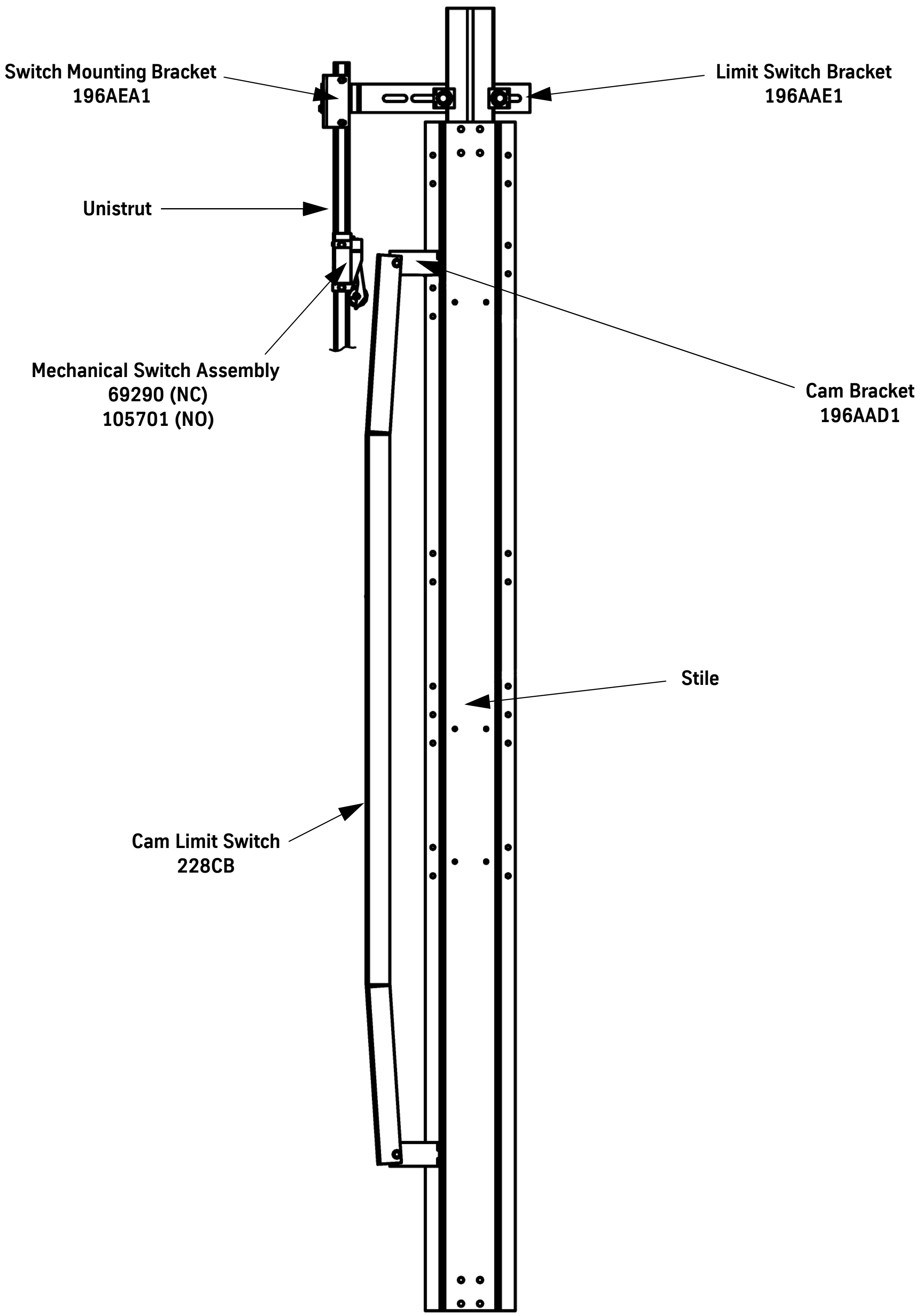
ITEM	PART NO.	PRINT NO.	DESCRIPTION
		6300ACA1	Card, Interface, MicroComm, CE Electronics



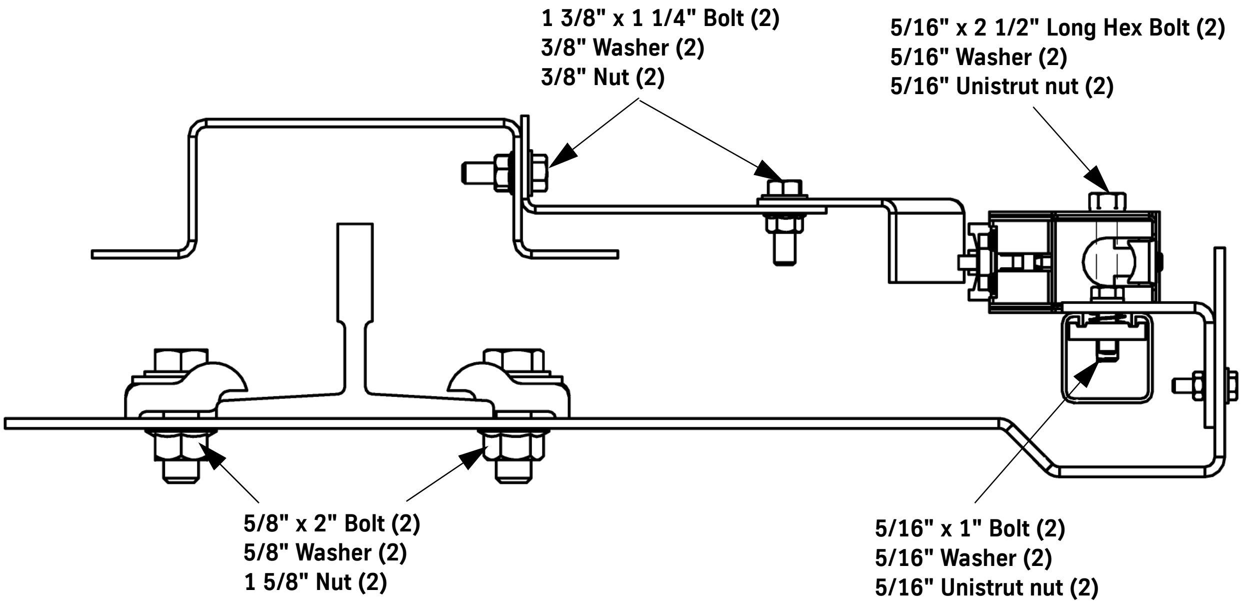
ITEM	PART NO.	PRINT NO.	DESCRIPTION
		6300PE1	Card, UIT, (job specific, consult manufacturing)

CAM INSTALLATION

Overview



Cam Installation



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