LUXURY LIFT

HYDRAULIC ELEVATOR

FIELD INSTALLATION

MANUAL



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MAY 2022

Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage.

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JOB SITE READINESS

Pre-Installation: Clock into the job and transfer to work order. Take Pictures of equipment before and after unwrapping.

Confirm pit depth, travel, overhead, width and depth of shaft, and door returns match the JSDS before beginning to install the elevator. When taking these measurements for the pit and overhead, consider how they will change when the finished flooring is installed if it is not already. Notify REI of any discrepancies regarding the hoist way or travel dimensions so that the calculations can be recalculated immediately. If the dimensions of the shaft are significantly less than the work order you need to determine whether the cab is going to work. This should be determined during the dropping of the plumb lines and cannot wait until the rails are installed and the platform is set.

The minimum pit depth is 8" on a Hydraulic Luxury Lift, unless there is occupied space below the shaft and then 14" is required as a minimum to allow room for the spring buffers which are required per code in these cases.

The minimum overhead for a Hydraulic Luxury Lift with a standard height cab is 96" (8'-0"). The minimum overhead for an 8' cab is 108" (9'-0"). All dimensions are to be taken from the finished top floor to the underside of the lowest portion of the finished shaft ceiling.

Verify that all the equipment has been delivered and the package has not been disturbed.

USE THE PACKING LIST AS A GUIDE WHEN VERIFYING THE INVENTORY.

Compare to the work order. If they do not match, then immediately contact REI to address the issue and/or shortages. This becomes a **Quality Assurance Report** (QAR) regardless of whether you have the stock to replace or not.

Do not scatter the material during your inventory verification. Once you have verified the material is correct then put the equipment back in the proper boxes until such time as you are ready to install.

Verify the job is ready for installation based on the pre-installation requirements of REI. (See HYD01 on Page 2)

1. Proper blocking is installed, and the layout is per REI specifications.

2. Pit floor is cleaned out and meets contractual terms for impact load requirements (3,900 lbs. impact load.)

3. Doors and frames are installed.

4. Electrical feeds, both 240 VAC with 10 gauge 10/3 and 120 VAC with 12 gauge 12/2 are provided and verify proper voltages.

5. A phone line is pulled to the machinery space long enough to make it to the controller.

If the job is not completely ready, then immediately call the sales rep to inform him/her of the issues so that the rep can get with the GC/HO to resolve them. The purpose of this call immediately at the beginning of the installation is so that the sales rep will be able to have the issue(s) taken care of before completion of the installation and will not require a return trip.

Fill out the jobsite arrival checklist on the Field Service app, note all issues and/or missing parts. If Sales Rep/GC/HO cannot resolve issues in a timely manner, then this will become a QAR. Submit QAR's through the Field Service app, add all related photos, and add parts to the parts requisition order if needed.

Typical Hydraulic Elevator Layout

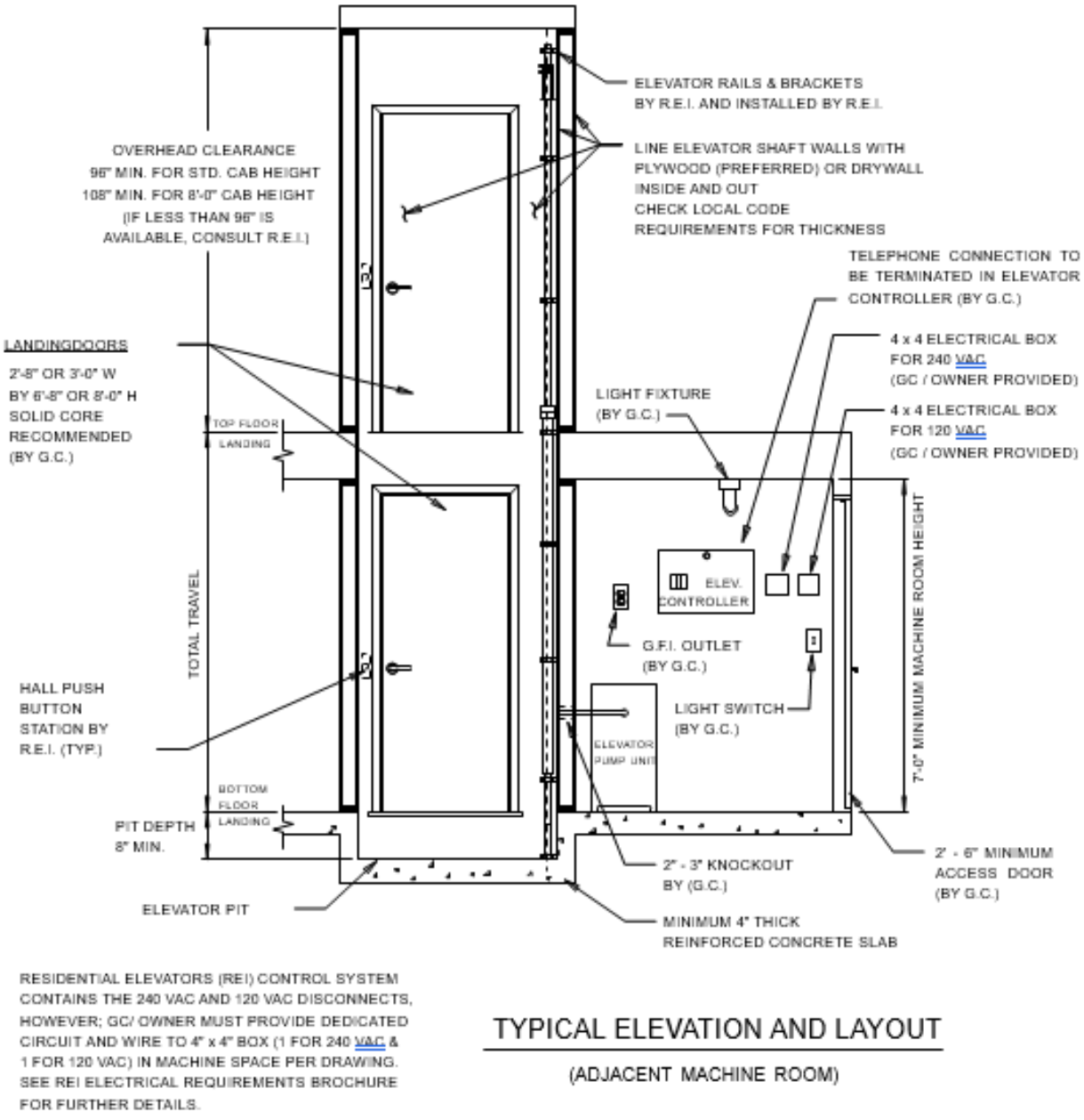


FIG. 5A

JSDS SAMPLE

LUXURY LIFT-HYDRAULIC PACKING LIST
PRODUCTION ORDER FORM

Residential Elevators, Inc.
Phone: (850) 926-6022 / (800) 832-2004
3/4x4

Job #: 124624-DAL-0102130 State: TX Type: **Hydraulic**
Contractor: Candy Munster - (210) 872-2206
Job Name: 4219 Park Ln

Type Of Shipment
Method: REI

Elevator Type:
 # Of Stops: 2 | **Style:** Hydraulic | **Capacity:** 950LB

STEEL DEPT

Length
Rail: 22ft 0in
Pedestal: 48.0 (1x96)
Pist. Proj: 10.00

REI Pump Unit: 35 LPM
Hoses: 5ft Hose
Other:

Brackets:
3 Std. Rail Brackets
2 Cylinder Brackets

SCH 80 / Pipe Fittings
QTY: 1 GA Nipple Pkg and 10 FT of Sch 80 Hardpipe

NOTES:

Jack Size: 2 ¾ " EECO
SL: 93
Single-Piece Jack

GA PAN: TX

REI Sling: 6'8"

CAB DEPARTMENT

CAB
Cab Walls:
Farmhouse Series Wall
Species:
Maple
Upgrades: Upper Rail Wall Mirror w/ Farmhouse Trim
Finish:
Primed White
Cab Ceiling:
Farmhouse Series Ceiling
Species:
Maple
Upgrades:
FINISH: **Primed White**
Cab Lighting: **Single LED - Standard Finish**
Handrail: **1 1/4" x 2" Satin SS #4 Flat Bar**
Handrail Finish:
Phone: **MAD COP/Phone**
Cab Height: **6'8"**
Stain Info:

OPTIONS

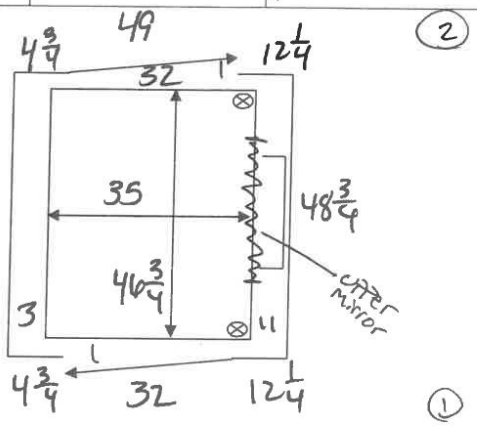
1) Automatic Car On/Off Light Option	2) Surge Suppressor Set	3) Audible Arrival Notification
4)	5)	6)

* REI LL 6'8" -

C/FL
46 3/4 X 35

SW
44 1/2

RW
40 3/4



CAB & GATE DEPARTMENT

Gate Type
Height: **6'8"**
QTY: **2.00**
Type: **Century Scissor 6'8"**
Style: **Silver**
Threshold Tone:
3/4" Silver Threshold

Gate Operator:
NO POWER GATE

Note:

Notes: 13.92--- --- **SILVER GATE TRACKS STACK TO RAIL WALL, UPPER WALL MIRROR RAIL WALL** Upper Mirror Opposite from COP, Gates Stack into Rail Wall.---, Send Positive Rail Stop,Surge Suppressor---Send Doorlock Face Plates --- Doorlock Face Plates,Send Pit Stop Switch

Cab Lighting:
Single LED - Standard Finish
Comments:

Car Station:
*Finish:***SS #4 Car Panel**
Options:
Comments:

Hall Stations:
*Finish:***2 SS #4 Hall Station**
Options:
Comments:
Needs 2 Hall Stations

Controller Type: REI
Controller Options:
1) Auto Lights
2) Surge Suppressor
3)
4)
5)
Auto Homing To:
Comments:

ELEVATED PLATFORM:
By: Elevated Platform Needed

Machine Room Location:
Adjacent to Rail Wall - 1
Comments:

Hoistway Construction
Wood Frame
Note: , , , ,

Door Locks
Type: 2 Standard Interlocks White Cover
Send Doorlock Face Plates
#R.H.- 0
#L.H.- 2

NOTES: Box Truck 210-872-2206
4219 Park Ln
Dallas
TX
75220
SILVER GATE TRACKS STACK TO RAIL WALL, UPPER WALL MIRROR RAIL WALL Upper Mirror Opposite from COP, Gates Stack into Rail Wall.
, Send Positive Rail Stop,Surge Suppressor
Send Doorlock Face Plates
Doorlock Face Plates,Send Pit Stop Switch
Ship Doorlock Face Plates,WoodFold Gate w/offset Pins/Rollers or Century Scissor Gate.

ELECT

Cable Lengths
3/8 x 7 x 19
34 Ft
(2) Cables

Wiring:
GREY-- Installer Provided
JC 17-- 70 FT

Overhead: 2 STOPS
Piston Proj.: **10.00**
O.H.: **96.00**
Travel: **133.000**
Pit: **35.00**

Reviewed by: **Stephen Gaston** Date: **2/9/2022**

PLEASE NOTIFY US IMMEDIATELY OF ANY ERRORS IN SHIPMENT, THANK YOU. (850) 926-6022

FIG. 6A

Piston Projection Formula

Pit depth (See note below) - 6” (the height of standard car sling base & platform thickness) + actual travel (distance from bottom finished floor level to top finished floor level) + 4” standard Top Over Travel (T.O.T.) = “X” divided by 2 which equals total travel/piston stroke required.

Take this value and subtract it from the jack model stroke and the difference equals the required piston projection.

Required Piston Projection Example:

12” = Pit

156” = Actual Travel

4” = Top Over Travel

93” Stroke = Jack Model

12” - 6” = 6” + 156” + 4” = 166” divided by 2 = 83” required stroke

93” (jack model stroke) - 83” (required stroke) = 10” Piston Projection

Note: Where a positive rail stop is required the pit depth is equivalent to the dimension that the rail stop is set below the bottom finished floor level.

Pedestal Length Formula

Pedestal Length = Total Calculation – Stroke of Jack – Jack Length

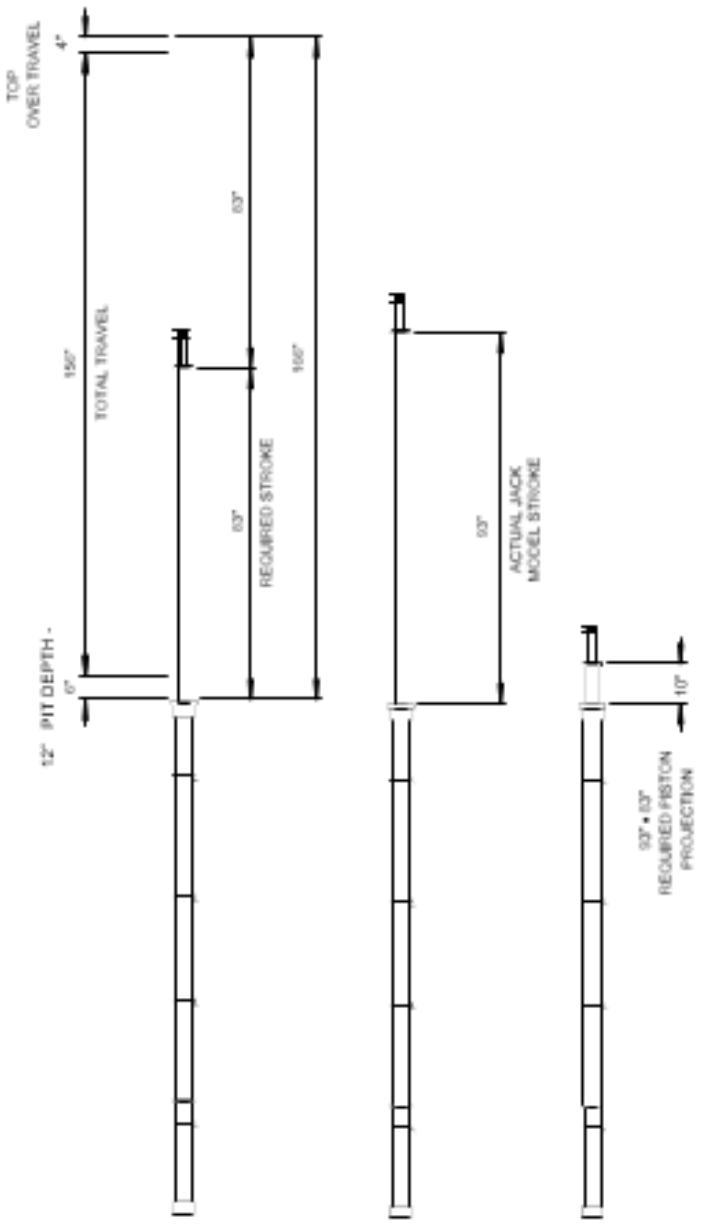


FIG. 7A

Preparation of Equipment

Rails

Clean the T-Rails, file any burs on the rails and in the joints where the rails mate. Preinstall the fishplates and cut the stubs for the T-Rails to the combined measurement of the Pit depth, Travel, and Overhead.

Note: The Stubs of the rails on a hydraulic elevator can be on the top or bottom of the rail system. Keep this in mind when planning the bracket locations.

Cables and Shackles

Prepare the cables for Pit Pan side, using the smaller shackles and the yellow end of the ropes, measure up 36" and mark the cables with electrical tape or sharpie. Install cable into shackle, install wedge, and bring 36" mark through the backside of shackle to ensure 36" tail. Tap shackle with hammer to seat the wedge. Temporarily zip tie or tape tail to secure. The tail end of the rope should be coming out of the dead side of the shackle.

Pit Pan

Install rubber isolators for shackle rods onto the bottom side of the pit base by using zip ties. Remove rail clips from the pit base. These are installed prior to shipping.

Hydraulic Cylinder

Remove all shipping brackets and packaging material. Loosen the head of the cylinder and ensure the packing is installed correctly. (See Fig. 8a) Tighten all bolts on the head of the cylinder.

Ensure the piston hits the stop ring when it is fully extended. Remove all cardboard placed for shipping process.

Remove the set screws in place of the bleeder valve and overflow outlet. Wrap the bleeder valve threads with Teflon tape and install it into the head of the piston. Install the overflow outlet.

If it is a two-piece jack, completely disassembly and clean piston and check for burs or nicks, sand if any are found. Remove all cardboard. (See Fig. 8b)

Rams Head

Remove the cover on top of the rams head to allow for cable installation. Remove the plate from the bottom that attaches to the hydraulic cylinder and place the ¾" nuts back on the bolts.

Loosen the guide shoe hardware on the rams head assembly.

Pedestal (Pillar)

Cut the pedestal to the given size from the hydro calculator.



FIG. 8A



FIG. 8B

Car Sling Preparation

1. Clean out the threads and install the thumb bolts and nuts for sling slide gib. – 4 locations.

Note: Clean out the threads using a 3/8" tap or bolt with WD-40.

2. Loosen bottom eccentric rollers and adjust for maximum clearance when installing sling into rail system later. (See Fig. 9a)

3. Install 1-1/4" shoulder bolt in car sling for safety activation arm spring. (See Fig. 9b)

4. Install the rubber isolation pad and metal plate in hitch beam using electrical tape to put the two together and a zip tie to secure them to the hitch beam. (See Fig. 9c)

5. Install the photo-eye bracket assembly and secure the 4x4 connection box assembly to the lefthand stile. If it's a touchscreen job, you will be mounting the encoder to the same location. (See Fig. 9d and Fig. 9e)

Note: Use caution when inserting sling into the shaft and be sure to not damage photo eye/encoder assembly. This can also be installed when the sling is already in the shaft.



FIG. 9A



FIG. 9B



FIG. 9C



FIG. 9D



FIG. 9E

Pumping Unit Preparation

Start by Checking the inside and outside of the tank for damaged or missing parts.

Check all the hardware on the pump and motor to ensure all connections are tight and in the correct place.

Install the four rubber isolation pads to the bottom of the tank, this will reduce vibration/noise coming from the unit.

Wipe the inside of the tank with a cloth that will not leave behind any debris. Ensure no metal shavings or dust is left in the tank.

Determine which side of the tank the hard pipe needs to be run on and then install pre-threaded pipe provided in the box inside tank. Start with the double-sided threaded nipple and a 90° fitting in the direction the pipe will have to be run. Add the 14” piece of hard pipe provided and then a straight/90 fitting. Then add the hose fitting. See Fig. 10a and 10b.

Install 90° flex fitting that will run the flex into the controller. Run the wires from wiring harness provided through the fitting.

Place tank in desired position in machine room. Once in final position add hydraulic oil provided up to (6.5) 5-gallon buckets. DO NOT fill the oil up past the electrical components. If the unit takes (7) buckets, run up bleed then add last half of 7th bucket.

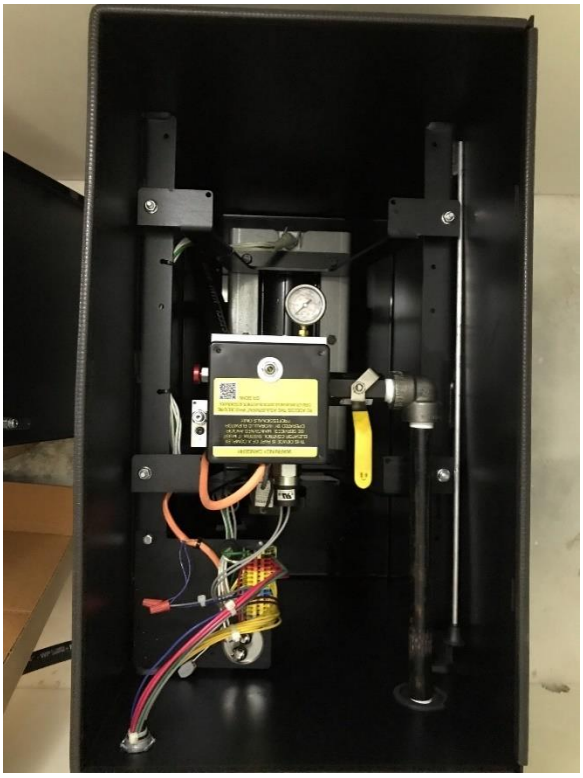


FIG. 10A



FIG. 10B

Brackets and Rails

Brackets

All LLH units will be supplied with a predetermined bracket layout located on the REI HYDRO CALCULATION FORM that is supplied in the job box. Accuracy of these measurements MUST be checked over, referencing the Hydro Calculator. The measurements provided from the calculator or form do not take into account fishplate locations.

Note: The T-rail stubs may be placed at the top or bottom of the rail system.

Install the top rail bracket at a minimum of 7'-0" for a standard height sling and 8'-0" for 8' sling (Above Finish Floor) AFF at the top floor. Verify that the top bracket is not going to be in the area of the top T-rail fishplate.

Note: There shall not be more than 3' of unsupported rail above the top bracket.

The minimum rail centerline off the inside front wall is to be 28" or 11-3/4" from the front wall to the face of the bracket. If your rail wall is not wide enough to allow a 28" centerline, check your platform to see how the gate stacks and set the brackets accordingly. This will ensure that there are no problems setting the platform. If you're having issues, contact your field manager for guidance.

On a rear mount application, you will use the center of the rail wall as your centerline for your bracket location for up to a 60" wide hoistway. If the hoistway is wider, contact your field manager.

Once the bracket is securely fastened to the wall and level, be sure to level the sub bracket to the main bracket. Then set the centerline of the bracket 6" off of the rail wall to the "V". Tighten the inside carriage bolts to hold the placement of the bracket.

Then verify the distance between rail mounts of 32-1/2" – 32-9/16". This is defined as "Facing".

Once the top bracket is properly installed drop the lines to establish the shaft is plumb, drop the lines to within 2"- 6" from the bottom of the shaft.

Once the lines are dropped you need to verify that you are maintaining the minimum 5-1/2" dimension from the plumb line to the rail wall at all bracket locations.

Once you have determined that all the minimum dimensions are met than you are ready to install the bottom bracket to match the plumb lines. Be sure to record the dimensions from the lines to the rail wall as well as the front and rear walls at a point 12"- 18" above the pit floor.

Note: Follow the paperwork provided for the bracket measurements if all measurements of the hoistway are correct. If not, recalculate all the measurements and layout the brackets accordingly, avoiding fishplates.

Note: When laying out brackets on the hydro, the maximum distance between the brackets is 8'. Be sure to not lay any brackets out on a fish plate location. Keep in mind that the rail stubs may be mounted on the top or bottom of the rail system and this will impact the fishplate locations.

When following the paperwork/hydro calc on the bracket, the pillar bracket may remain at the location given, however the jack bracket needs to be lowered 6" from the given measurement. If this is not correctly done the head of the jack will land on the bracket, and the jack will not be able to be secured.

Note: The U-Bolt on the jack/pillar bracket shall not be more than 12" away from the head of the jack/top of the pillar.

Install the bottom bracket to match the plumb lines. Be sure to record the dimensions from the lines to the rail wall as well as the front and rear walls at a point 12"- 18" above the pit floor.

Don't forget to mark the spot on the wall where you took the measurement. This will help when setting the bottom rails to ensure the rail system is plumb, verify with a level after the rails are set to the dimensions recorded from the string lines.

When the bottom bracket is leveled, faced, and set completely, then secure the string lines to your bottom rail bracket by placing the string line on the centerline or the "V" of the bracket. Now complete the rail bracket installation by installing the intermediate brackets by setting the centerline of the bracket by using the "V" to set

the string lines. The centerline of the “V” should be at 4-3/4” but always use a tape or stick ruler to verify that is accurate by measuring from the rear face of the bracket to the center of the “V”.

Note: Do not totally rely on the impact guns for adequate tightening of the hardware. The impacts can be used for “running up” the hardware, but it is typically not sufficient. You will need to use a 1/2” drive ratchet to properly tighten the hardware. A 3/8” drive ratchet should not be used in tightening any bolt size larger than 3/8”.

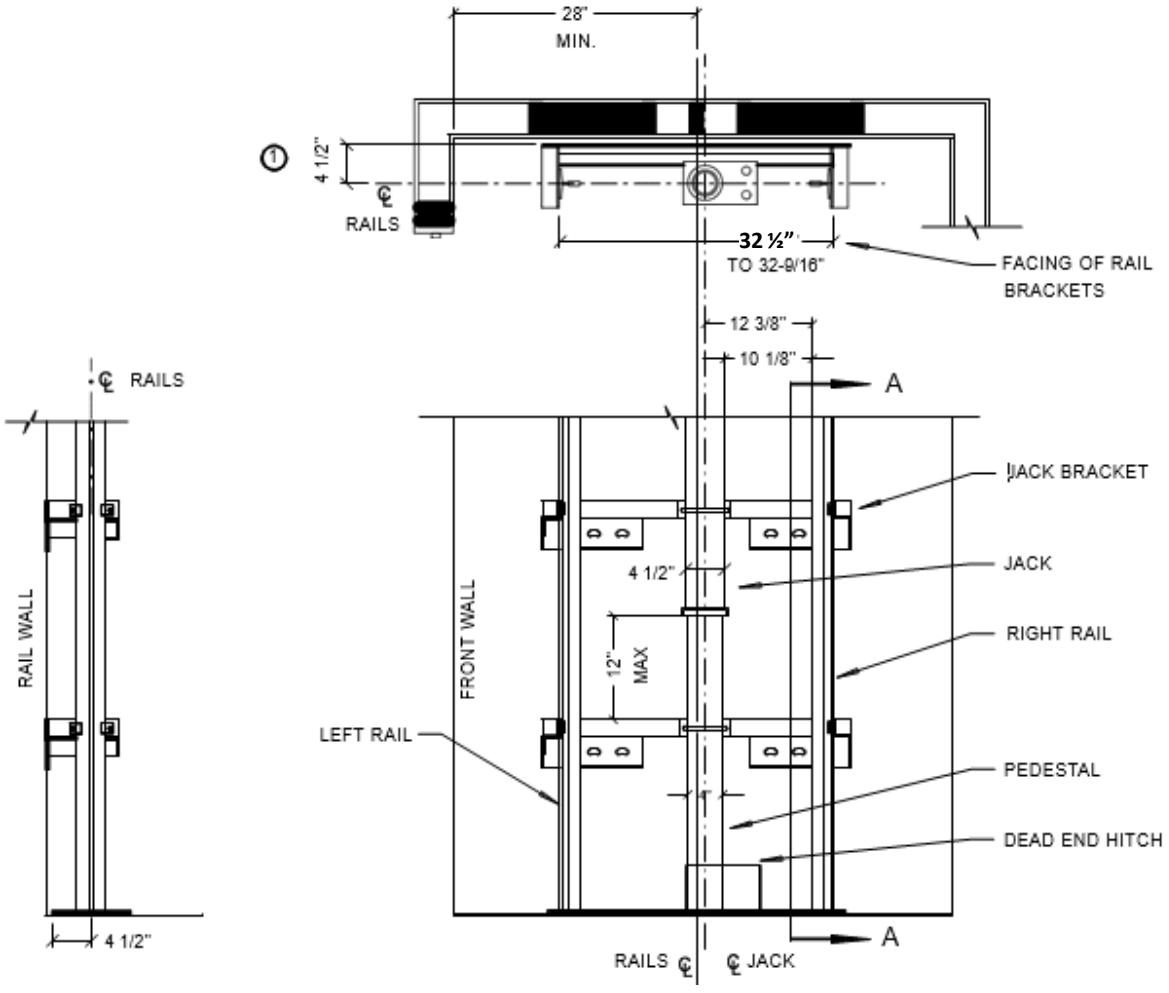


FIG. 12A

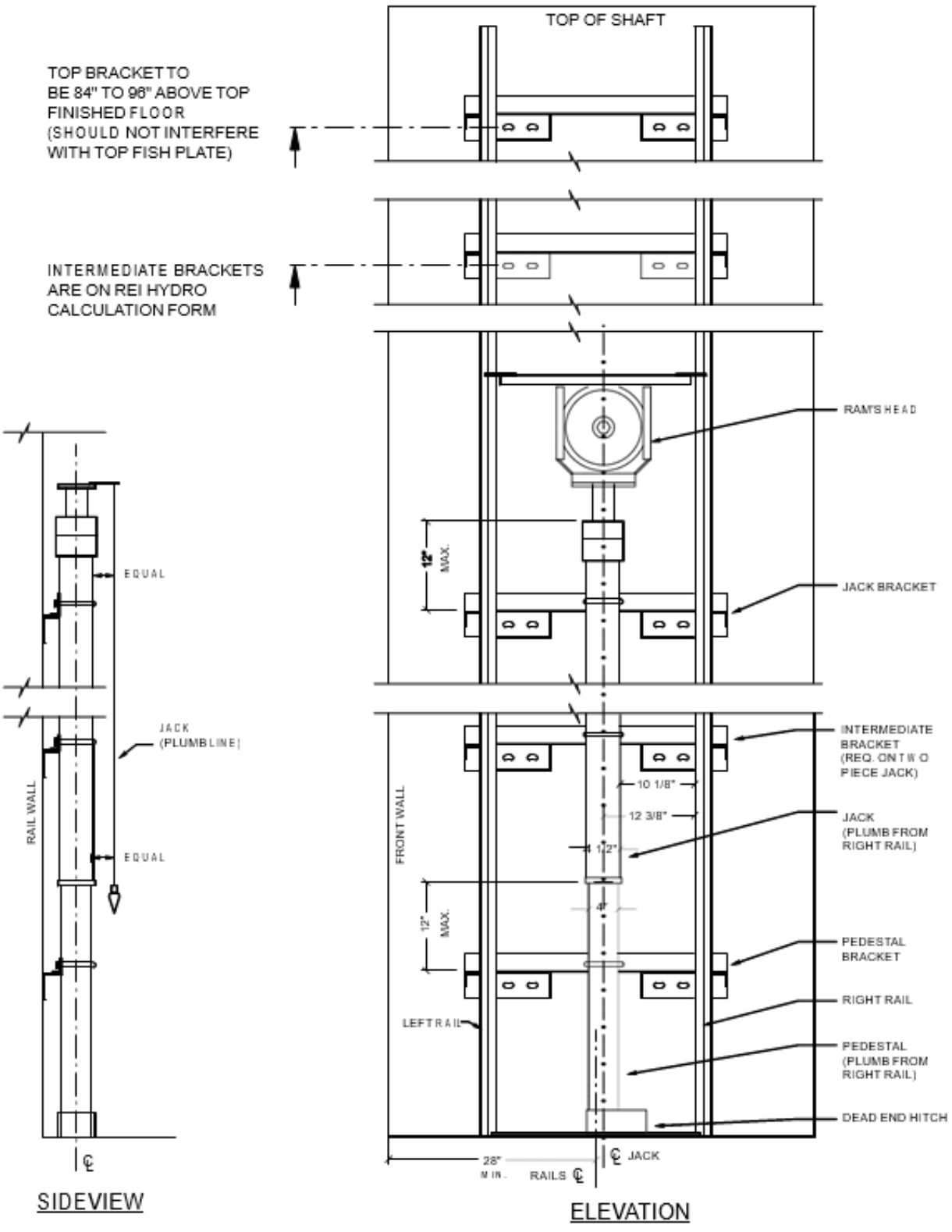

TOP OF SHAFT
TOP BRACKET TO BE 84" TO 98" ABOVE TOP FINISHED FLOOR (SHOULD NOT INTERFERE WITH TOP FISH PLATE)
INTERMEDIATE BRACKETS ARE ON REI HYDRO CALCULATION FORM
RAM'S HEAD
12" MAX.
JACK BRACKET
INTERMEDIATE BRACKET (REQ. ON TWO PIECE JACK)
10 1/8"
12 3/8"
1 1/2"
JACK (PLUMB FROM RIGHT RAIL)
4"
12" MAX.
PEDESTAL BRACKET
RIGHT RAIL
LEFT RAIL
PEDESTAL (PLUMB FROM RIGHT RAIL)
DEAD END HITCH
FRONT WALL
28" MIN.
RAILS
JACK
EQUAL
JACK (PLUMB LINE)
RAIL WALL
EQUAL
SIDEVIEW
ELEVATION

FIG. 13A

Winch Installation

The following installation process of the winch MUST be followed EVERY time the winch is being used. Winch is to be installed when hanging top bracket or after completing brackets.

Inspect winch assembly for damage to cable, cord, or winch before installing the winch.

Install the winch. (See example of the winch up Fig.14a) (See Installation Instructions Fig. 14b) Next, drop the cable down to the first floor by disengaging the clutch. Drop the run pendant to the first floor. Make sure the winch is plugged in with the proper size extension cord and ensure that all cords are clear of any obstructions in the hoistway. The winch on a hydro can be any height between the top bracket and ceiling of the shaft.



FIG. 14A

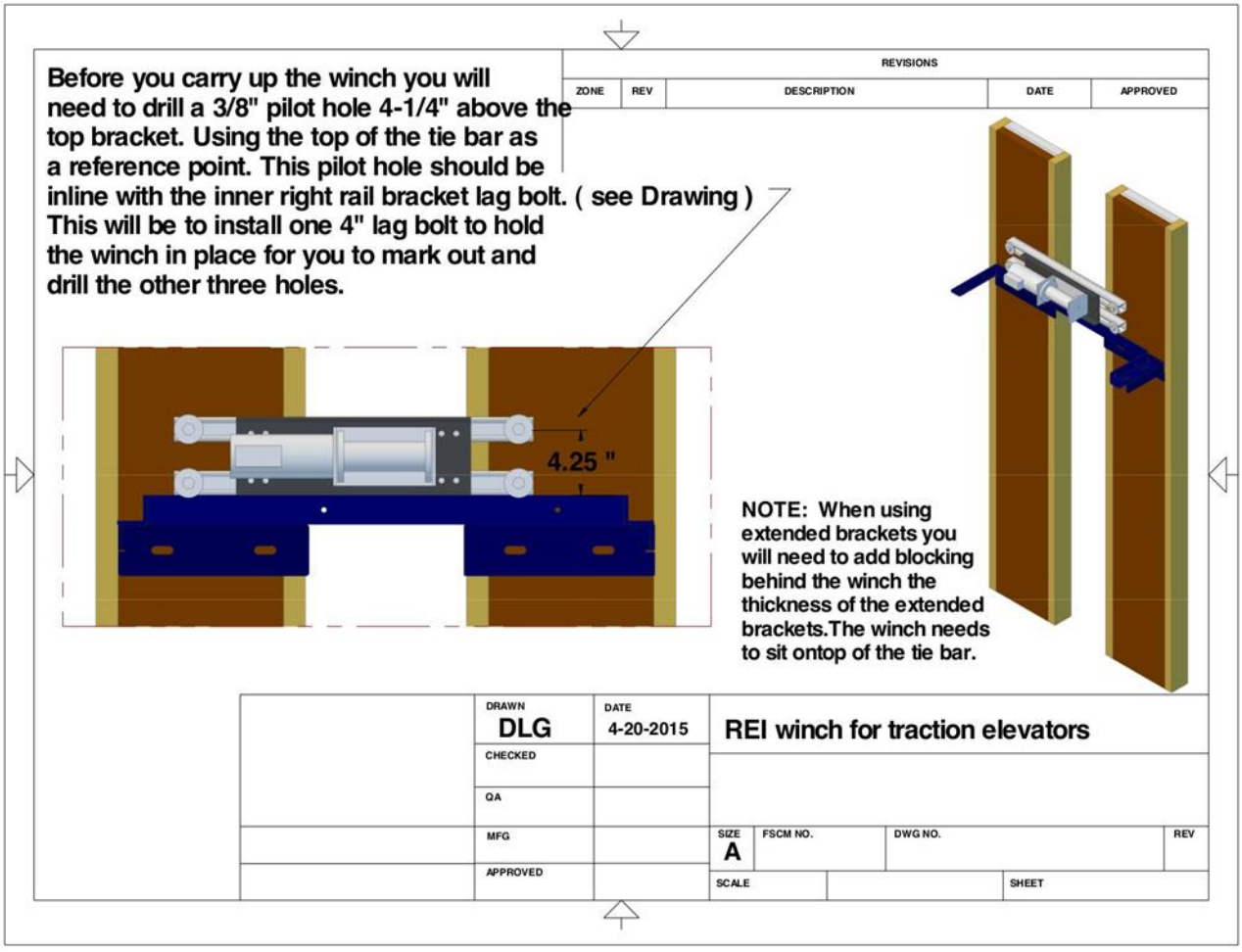


FIG. 14B

Rail Installation

Once all the brackets are completely installed then begin stacking the rails. It is recommended that, if the main rail stub length is less than the distance of the bottom main rail bracket off of the pit floor, to bolt the main rail stub to the first full section of main rail and install it as one section. You can align and tighten the stub to the rail section by placing them across a set of sawhorses and using a 4' level to align. Completely set and align the bottom section of rail prior to continuing with the rail stacking. The measurement to set the rails is 5" from bracket face to outer edge of blade. (See Fig. 15a)

Note: On a hydro installation, the rail stubs may be mounted on the top or bottom of the rail system.

Note: If the rail wall is out of plumb more than 1", verify the dimension from the line to the opposite wall to assure the cab will have proper cab to shaft clearance. This is extremely important on a rear mount rail system.

The pit base plate serves as a rail bracket. Ensure the pit base plate is faced. The pit base plate is required to be bolted to the pit floor with (4) each 1/2" anchors with the type of anchor depending upon the pit floor construction. It is recommended not to bolt the pit base plate to the floor until all the rails are stacked and aligned. The measurement to set the rail to the pit base plate is 2-15/16" from the from edge of the rail to the front edge of the pit base plate (Pit pan).

Once the rails are properly set and secured to the pit base assembly, position the pit base assembly as a unit to match the plumb line dimensions that were previously recorded just above the pit floor.

Continue stacking and aligning the rails using the winch assembly by attaching the rails to the cable using an eye bolt and lifting rails into position until the process is completed. When installing and tightening the rail clips make sure the rail clips are straight and square to the edge of the rail.

Once all the rails are aligned and the fishplate bolts tightened then file all rail joints. When the rail joints require filing, the joints should be filed over an area at a minimum of 12" above the joint to a point 12" below the joint. This will allow for the high spot to be "feathered" in rather than just at the joint. Lubricate the rails after this is completed.



FIG. 15A



FIG. 15B

Piston Installation

Pedestal

Set the pedestal in the pit pan and U-bolt on the pedestal bracket. The pedestal bracket should be withing 12” of the top of the pedestal. The rubber coating on the U-bolt should be behind the pedestal between the pedestal and the bracket.

At this time, install the pedestal cap.

Piston Installation

Hoist the jack into place using the winch and secure using the U-bolt provided on the jack bracket. Always ensure the rubber coating is used on the U-bolt and wrapped around the rear between the jack and the bracket.

Two-Piece Piston

Note: Two-piece jacks require an additional intermediate jack bracket to be mounted within 12” below the joint.

Start by placing both cylinders on sawhorses using something to prevent piston from rolling. Pull both pistons out of the cylinder casings, then remove cardboard and wax paper. Once completed wipe down both pistons and check for any burs or defects that may have occurred during shipping, if any burs are found remove with 220 grain sand paper. Once the two-piece piston is put together, sand the joint until you can no longer feel it. Look for any other defects on the cylinder casings and pistons (barber polling missing threads), if any issues are present, please contact REI for a resolution.

When the bottom half has been placed on pedestal and secured to the first jack bracket with provided U bolt, make sure casing is isolated from bracket by wrapping rubber provided on U-bolt completely around the entire cylinder casing and ensure it is between the bracket and casing. Next install the top half of the piston to the bottom half this must be done in hoist way using REI winch. Now tighten the pistons together using heavy duty strap wrenches, **NO PIPE WRENCHES OR CHAIN WRENCHES** are to be used during this process. They will damage the pistons.

Install the top half of the cylinder casing to bottom half using 2 people and a 36-inch pipe wrench and a 48-inch pipe wrench, make sure all o rings that need to be are present and are installed properly.

Attach the top half of the cylinder casing to the top jack bracket using same steps as the first time.

Reinstall the cylinder head and packing assembly. Replace the head of the piston and ensure all seals and packing are reinstalled in the same manner they were disassembled. Tighten all the cylinder head bolts evenly after installing. Make sure to use green slime when replacing the packing. A light coat will do. This will allow packing to break in properly.

Note: Once a two-piece jack is installed and running if there is a knock at the joint while the piston passes through, mark the piston with a sharpie at the front of the cylinder head and then turn the jack 90 degrees and run the unit from top to bottom several times to see if this eliminates the noise.



FIG. 16A

Piping

Every hydraulic installation requires running of Schedule 80 hard pipe from the hydraulic cylinder into the machine room. Hose is not allowed to be run into the hoistway.

A velocity fuse (PRV) shall be added in the pipe run installed as close to the hydraulic cylinder as possible. The arrow on the Velocity Fuse should be pointing towards the machine room and away from the piston.

A union shall be added in the as well, this should be close to the piston. The union can be installed right outside of the rails to avoid any issues, take the gate stack on the platform in consideration when placing union.

When routing the Schedule 80 piping to the left side of the hydraulic cylinder you will need to take into account the hitch beam on the car sling to ensure the proper clearances between the piping and the car frame.

Make sure when the pipe passes behind the rail that is securely strapped on each side of the rail to avoid contact with the sling when going up and down.

Clean pipe and remove shavings from pipe while performing the threading process to prevent contamination of the valve or tank after cutting and threading. Ensure the piping is clean to prevent contamination of the valve and pump.

Use a 1-1/8” bit to drill the hole for the piping to enter the machine room area from the hoistway. A 5’ certified hose will be provided to make the connection from the pipe to the pump tank assembly.

Use the proper thread sealant when using steel piping and fittings only. Only use approved pipe sealant when running hard pipe.

All piping and hoses should be securely strapped to the shaft wall at intervals of no less than every 5’. Use the proper fitting and hardware to secure the piping to the shaft wall. If the piping is not properly secured it could result in vibration and noise issues.

Install the escutcheon plates on the inside of the machine room over the hose to dress up the hole.

Note: Remember to inspect the ends of all hoses to assure that the fittings have been properly crimped to the hose prior to installing the hose.

Plumbing the Jack

Plumb the jack in both directions. Use the right-hand rail to plumb the jack side to side. Keeping the measurement consistent from jack to rail throughout the length of the piston.

Then plumb the jack from front to back. This can be done by using a magnetic hook at the top of the jack and dropping a plumb line down and ensuring that the measurement from the piston to the line stays consistent throughout the whole length of the piston.

Note: The dimension from the right-hand rail face to the right side of the jack should be the same at the top and bottom of the jack.

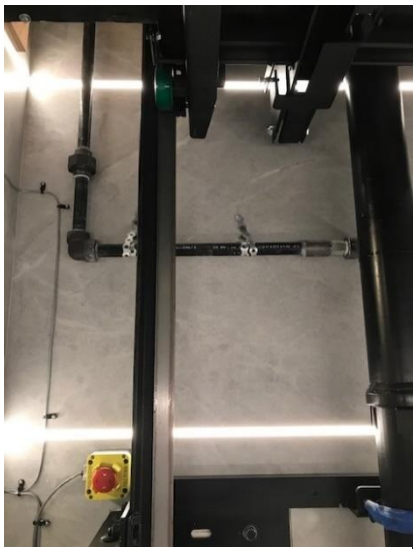


FIG. 17A



FIG. 17B

Rams Head and Roping

Rams Head

After the jack is installed and plumbed, securely tighten the platen plate to the top of the piston. Be sure to center the plate in both directions before tightening. Next set the Rams head onto the platen plate. You should never have to push/pull the rams head to line up the bolt holes in the bottom of the rams head and the platen plate.

Note: If you must push/pull the rams head to align the holes, this is an indicator that the jack is probably out of plumb in one or both directions.

After the bolts are in place, securely tighten the ¾" bolts. Be sure to square the guide blocks to the face of the t-rail. Move the guide blocks out towards the rails until they just slightly meet the rails and securely tighten the guide blocks at this point.

Note: The guide blocks should not have excessive pressure applied to the face of the T-Rail. At this point the bottom of the piston is centered in the bottom of the jack.

Hoist the rams head and piston up to a point to make room for the piston projection board. The piston projection dimension is found on the work order or the hydro calculator. On top of the rams head there is an access plate that can be removed to install the ropes. After you have installed the ropes, it is important to reinstall the access cover.

Roping

Pull the ropes tight and measure 14" off the ground to establish the top of the shackles. Make a mark on the wall and transfer to each cable at this time. Then shackle up the cables to match the mark (see cable prep on how to shackle cables) and add the clamps at 1" & 3". Cut the excess rope from the tail end, leaving a 2'-3' tail. Use electrical tape and zip ties to secure the tail. (See Fig. 18b)



FIGURE 18A



FIG. 18B

Sling

Hoist the sling into the shaft using the winch and a hoisting strap attached to the top header of the sling. With the sling suspended, install the right side first, make sure the t-rail is in the safety block, retainer, and rollers. Push the left side of the sling into place. Attach the safety block, retainer, and top roller to the left side to match the right side.

Install the slide gibs and adjust all four using the thumb bolts that have been pre-installed during prep so that the sling is centered between the rails at all four points. The slide gibs should be set to a point that they just slightly come into contact with the t-rails. The best way to do this is tighten the guides evenly on both sides until they touch the rails, then back each guide off the rail by half a turn to achieve 1/16" total clearance. (See Fig. 19a) The slide gibs should have no pressure on them. The setting of the slide gibs should be checked throughout the entire travel distance prior to building the cab. After the slide gibs have been centered, the jam nuts need to be tightened to secure thumb bolts.

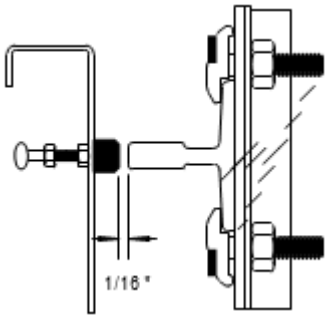


FIG. 19A

Note: Make sure when adjusting the thumb bolts, the bolts are full seated in the slide gib holes.

Use the winch to raise sling to a position it can be worked under. Adjust the bottom eccentric rollers in a downward direction until there is a 1/16" clearance between the back side of the t-rails and the safety blocks. Use a zip tie or a hotel room key card as a reference of distance to set the safeties of the rail. Make sure the safety blocks are level with the backside of the rail before adjusting. The gap at the top and the bottom of the safety blocks should be of equal distance. Once set, tighten the bolt on the roller while holding the roller in place. Verify that the proper gap is still present after tightening.

Connect the shackles to the car side hitch point. When inserting the shackles into the sling hitch point, ensure that the ropes are not tangled, and the shackles are being installed in the correct order. Hardware is installed in this order: Spring, shackle tube, two Belleville washers, flat washer, two nuts, and cotter pin. Run the nuts up 3-3/4" to the bottom of the washer above the top nut to the bottom of the shackle rod to obtain the proper distance 1/16" – 1/8" from the bottom of the shackle to the safety activation arm (the activation arm will be installed later in the install). Make sure the jam nuts are tight. Butterfly the cotter pins when finished. (See Fig. 19b)



FIG. 19B

Install the sling extension. Use a minimum of 6 fasteners on each side, 4 on each side and 2 in the bottom on each side. (See Fig. 20a) Measure the platform and make sure the platform does not extend more than 9” over the sling extension or a minimum of 2”.

If the sling extension is larger than the platform due to hoistway dimensions, the sling extension can be cut down on site.

Note: Slotted holes on the sling extension must have flat washers.

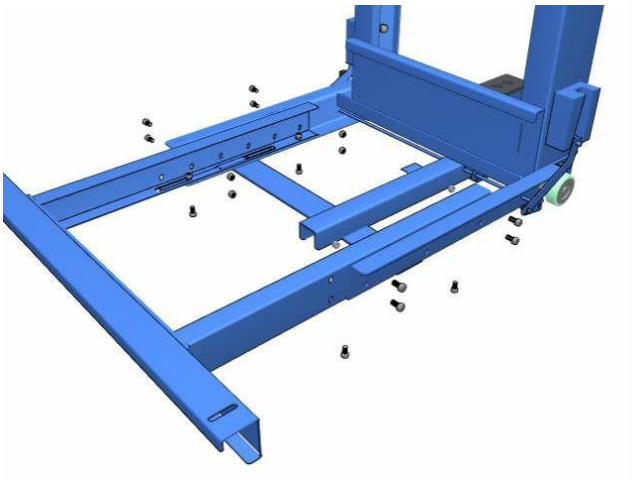


FIG. 20A

Upon sling completion, set the sling on the safeties. To do this, lower winch while pushing safety linkage arm up manually. This will engage the knurled rollers onto the t-rail. Disconnect the winch from the sling and spool up the winch cable. Then proceed to uninstall the winch, the winch is no longer needed for the installation.

Note: When spooling the winch, keep tension on the cable to prevent damage to the cable. It is important for the cable to wind evenly on the drum.

The structural portion of the installation is now complete, and ready to run upon completion of the machine room with use of the temporary run button.

Controller & Electrical Equipment

Controller Installation

When installing the machine room, layout is critical. It is important to keep in mind all the components that need to be wired and where they need to be located.

REI Provided Items:

Main Controller: The controller is the main electrical enclosure that contains the PLC, connection board, disconnects, and power supply. The disconnect on the enclosure should be reachable from a stable location to cut off power. If this is not possible, a separate disconnect will need to be installed.

Hydraulic Tank and Valve: The Hydraulic Tank is the reservoir that contains all the oil and the valve/pumping unit. The pump is wired to the main controller and is connected to the hard pipe using the 5' hose provided.

UPS (Backup Battery): The UPS needs to be reachable from the access point. The UPS will be wired into the main controller.

VatorLink (Optional): The remote diagnostics should not be below any other machine room components. The VatorLink gets wired to the main controller and the UPS.

Reset Key Switch (FL Only): The reset key switch should be reachable from the access hole. The reset key switch wires into the main controller.

Floor Wires (Low Voltage Wires): Floor wires should be run from the main controller to their respective floors. This also goes for the Pit Float switch and Pit Stop button.

Travel Cable: The travel cable will be run from the main controller to the cab, with kellum grips installed on each side.

Surge Suppressor Kit (Optional): A surge suppressor kit may be included with the job; this kit will take up two knockouts and should be installed on the left side of the controller.

Tank Stand (Optional): Used to elevate the Tank, usually to get the tank above base flood elevation.

Buck and Boost (Optional): If the home has 208v instead of 240v, the buck and boost may be provided to bring up the voltage.

GC Provided Items:

Power Wires: GC provided power wires will need to be ran to the main controller. This should include your Main wires (240v) and your cab light power wires (120v). These wires need to be ran properly per code in the home's respective jurisdiction.

Phone Line: The phone line needs to be wired to the main controller.

Machine Room Rules

When installing any electrical enclosure, there must be a minimum of 3' electrical clearance in front of the enclosure. This is a National Electrical Code and is for your safety.

There must be 2' much room above tank to service.

Flexible Conduit/Travel cable should be strapped every 12"-24".

Note: Flexible Conduit cannot be longer than 6'.

Low voltage floor wires should be flexed until they reach the hoist way.

The machine room will be installed in a separate machine room/attic. When penetrating walls to run wires into the hoistway, seal the holes properly using fire caulk.

Note: When wiring the machine room, treat every house feed as if it is always energized. Ensure that when wiring house feeds that power is off and the breaker is locked out.

Note: Never leave a circuit jumped out when operating the elevator. If it takes longer than 30 minutes to resolve an issue, contact your field manager.

Make sure to completely fill out the controller label on every job. Include the job number and the serial number on the data tag along with breaker panel location.

At the completion of the job the controller is to be cleaned and wiped down of all debris i.e., metal shavings, concrete dust, wire stripping, etc. All spare wires should be taped or laced with wire ties and positioned by cable.

Temporary Run Button

After completion of the machine room and structure, install the temporary run button to start the setting of the platform and doing the hoistway.

NOTE: Do not attempt to run the elevator until the tank has been filled with all of the oil provided, clean out any debris or metal shavings in the bottom of the reservoir prior to this.

NOTE: When using run button, the PLC Power Plug should be unplugged from controller.

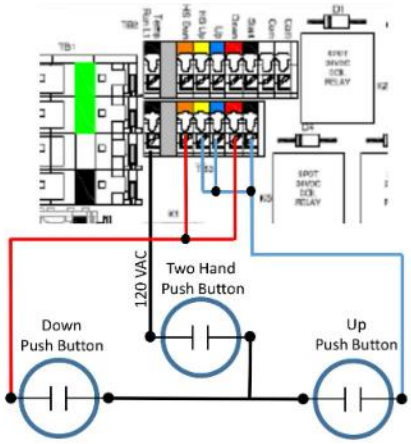


FIG. 22A



FIG. 22B



FIG. 22C



FIG. 22D

Hydraulic Tank Connections

These diagrams display the connection between the Tank and Connection Board.

FIGURE 1

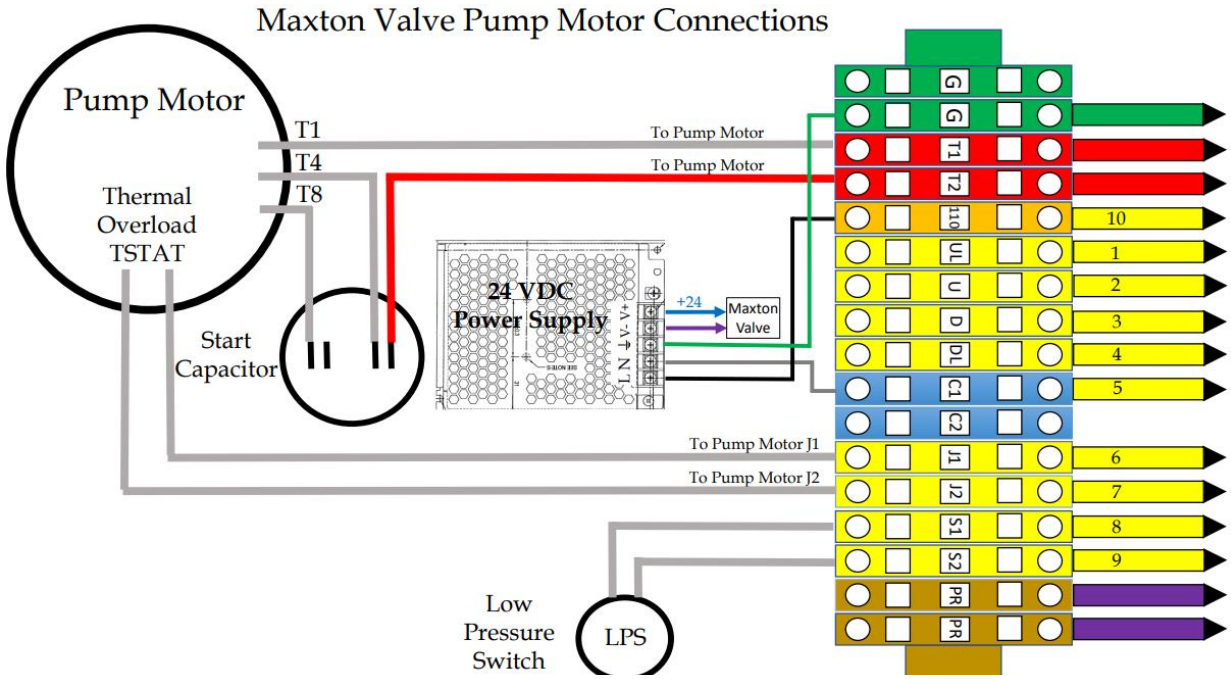


FIG. 23A

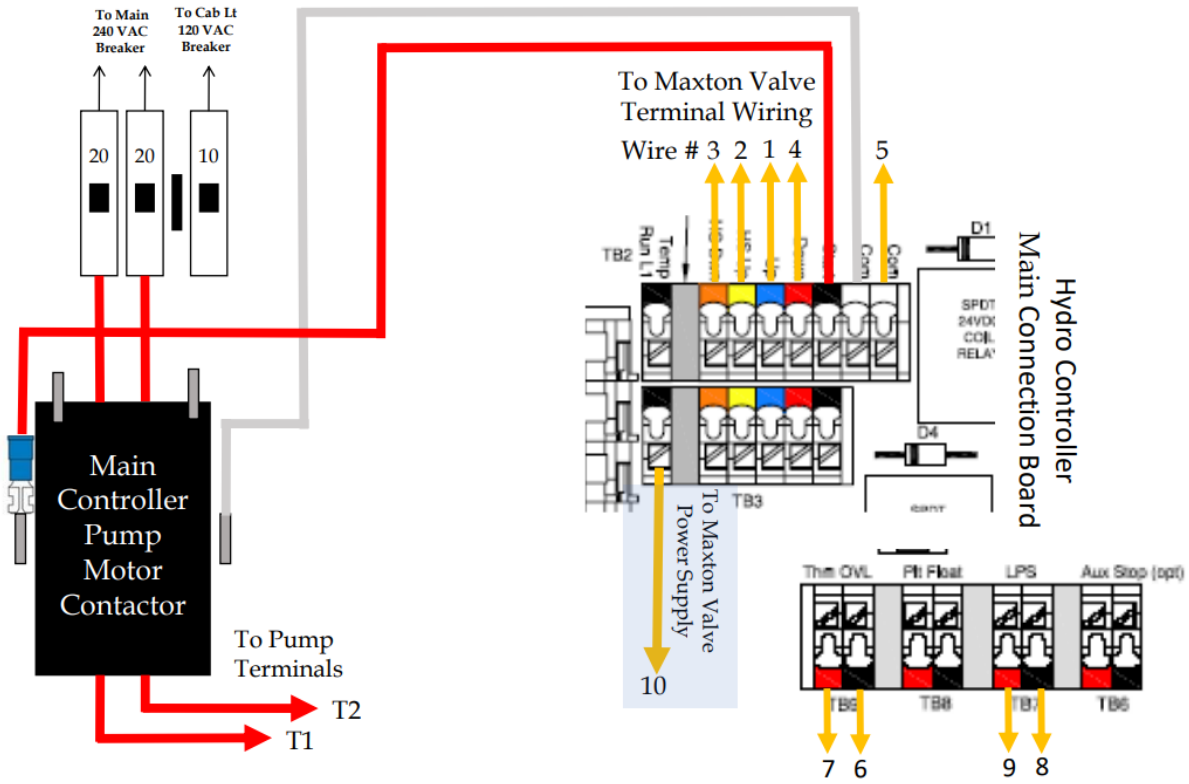


FIG. 23B

Main Controller Connections

This diagram displays Travel Cable, UPS, Pump, and Phone Line connections. (Fig. 25a)

The black shielded pair from the travel cable shall not me stripped more than 1 ½", and the red and white pair must be twisted.

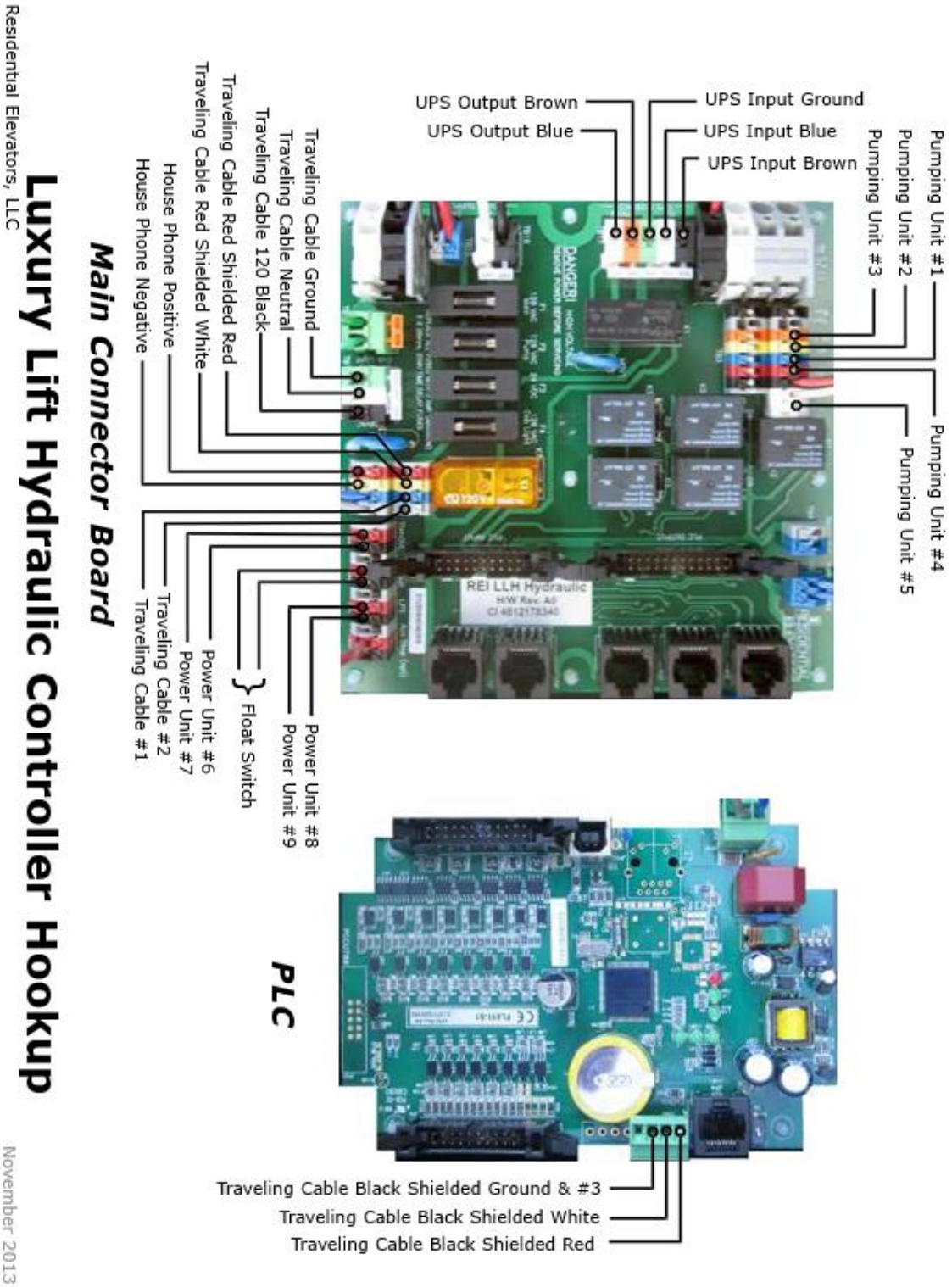


FIG. 23A

HYDRO Surge Suppressor Kit Installation

The Hydro Controller uses two Surge Suppressors for protection:

1.Main 240 Volt Power –DTK-120/240HW

2.Cab Light 120 Volt Power –DTK-120HW

The Main 240 Volt and Cab Light 120 Volt Surge Suppressors should be mounted as close to the circuit breakers as possible with the black wires connected on the bottom of the circuit breakers and have the suppressor leads cut and stripped as short as possible.

Note: If the Controller is an older version controller that does not have the long Red 12 Ga wires between the circuit breaker and the Circuit Board, the short wires must be removed and longer Red 12 Ga wires installed and routed as shown.

When installing the Surge Suppressors both Green Ground wires should be connected with the supplied compression / toggle clamp (do not use wire nuts) to the CAB Light Ground wire as shown in the picture.

When connecting the Cab Light Surge Suppressor White Neutral, use the supplied compression / toggle clamp (do not use wire nuts) should be used as shown in the picture.

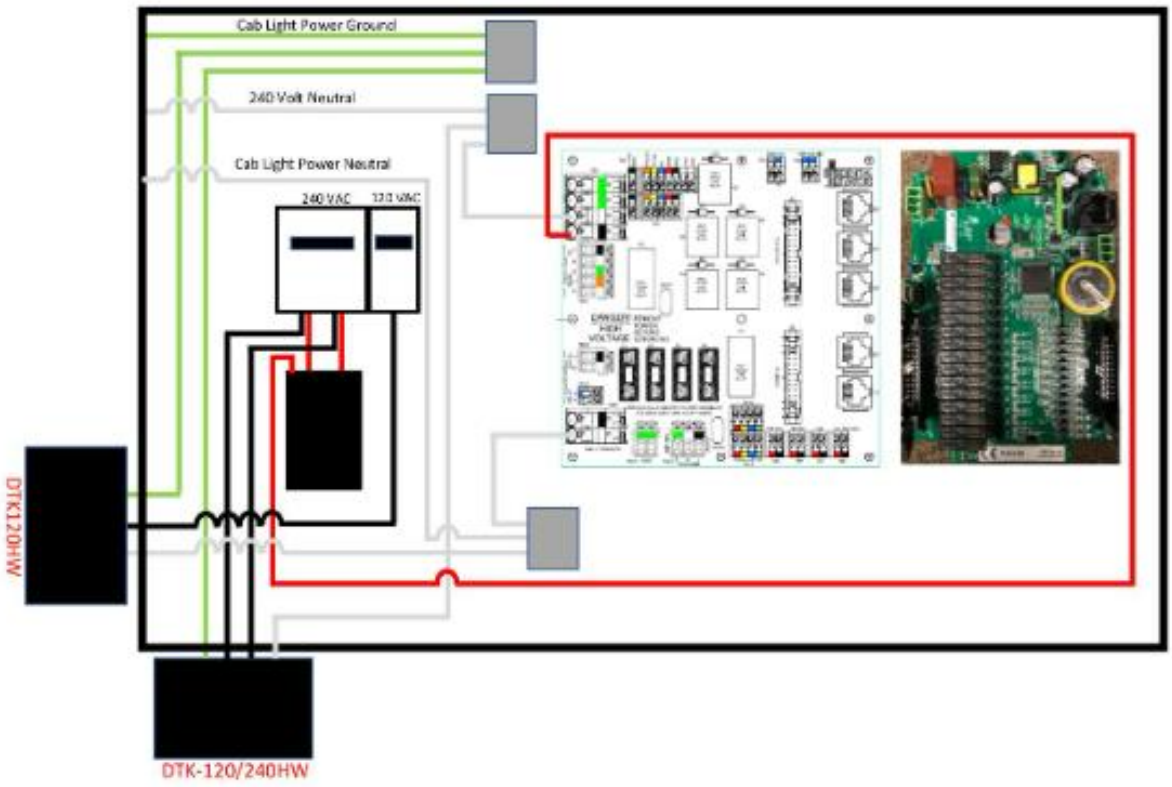


FIG. 25A

An alternate method of wiring may be used when having issues with tripping a Cab Light Arch Fault Breaker.

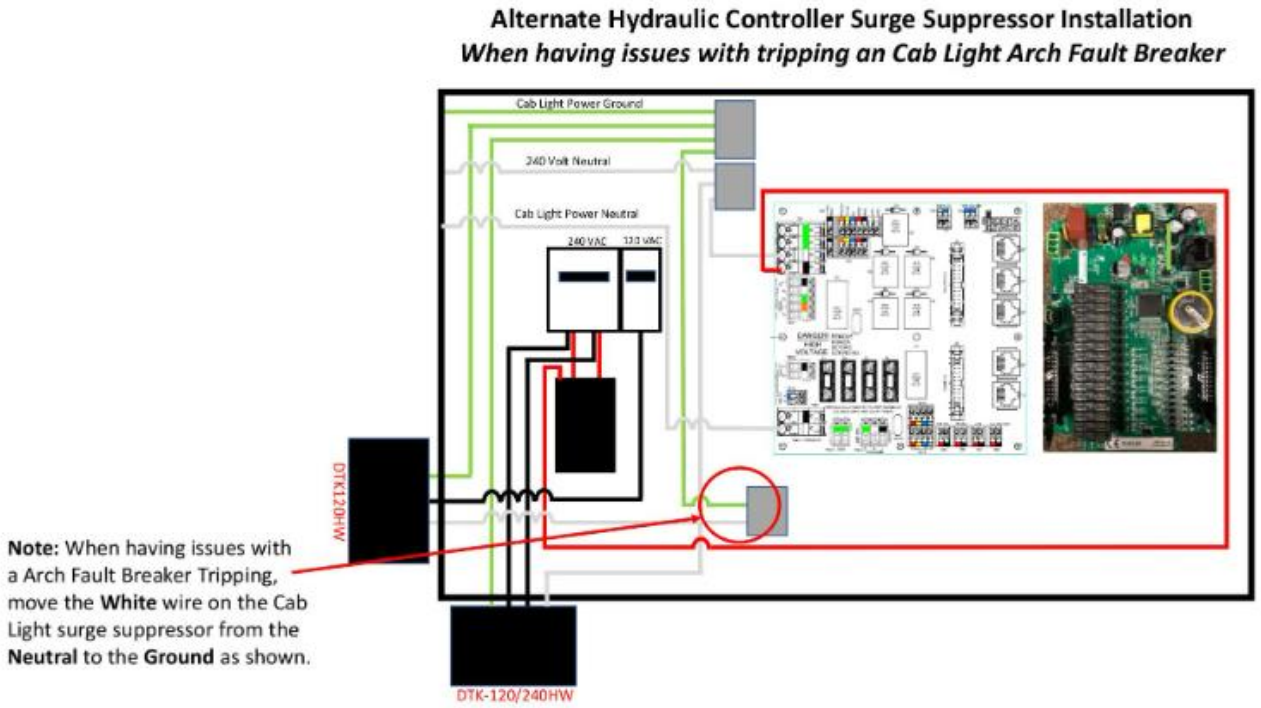


FIG. 26A

Car Top Surge Surpressor Installation

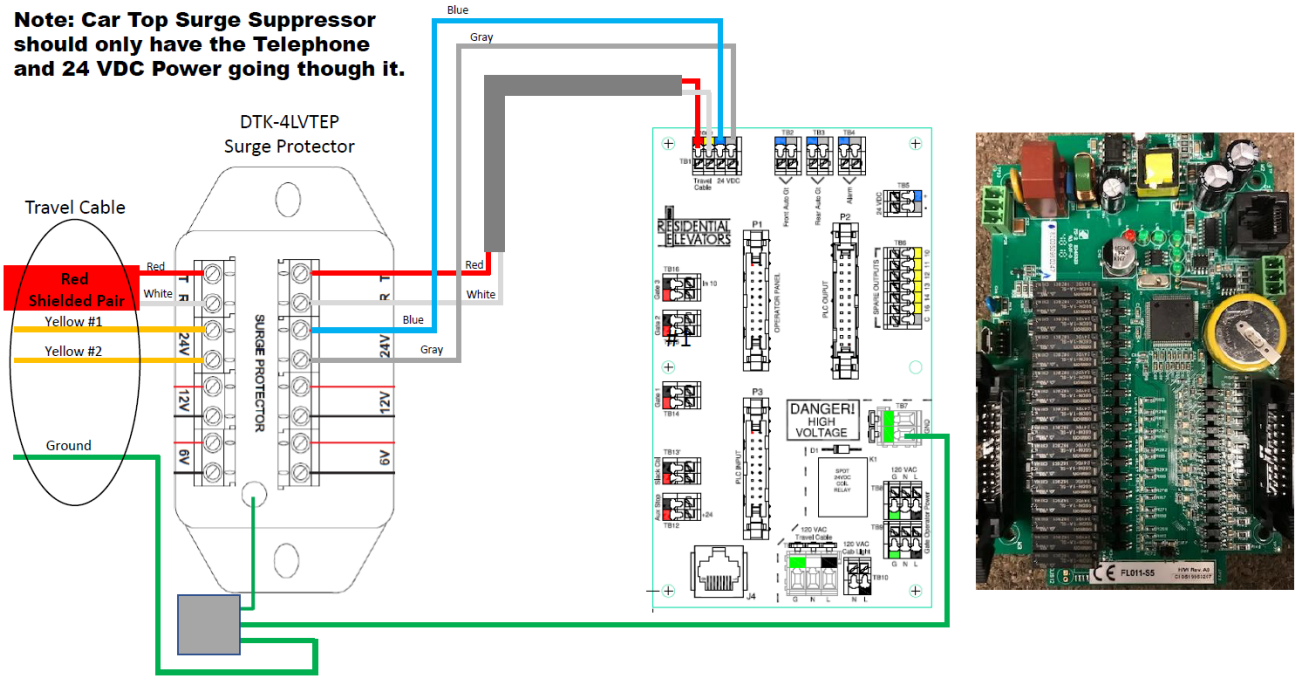


FIG. 26B

Platform Installation

Bleeding The Piston

Prior to setting platform, be sure to bleed the piston of all air using the brass bleeder valve on the top of the jack.

After all air is out, check back after running the elevator and make sure there is no air in the jack again.

Setting The Platform

Prior to setting the platform, make sure that the bottom eccentric rollers are properly set. If the rollers are set after the platform is set, the running clearances may be altered. Before bolting the platform to the car frame base run the elevator to all floors to determine the best possible alignment of the platform to the landings. The minimum threshold running clearance should be set to a 1/2" at the tightest floor. The maximum threshold running clearance should never exceed 1-1/4" by code. Be sure to check the door jambs for minimum running clearance from the platform as well.

Note: If the running clearance is the tightest at the top landing, a level needs to be used to ensure the door frame is plumb and will maintain minimum running clearance with the car top when the cab is built.

Bolt the platform to the car frame base by drilling a hole through the platform using a 5/16" drill bit, then use the 5/16" platform bolts provided in the hardware box. Use a minimum of (4) bolts per platform and position the bolts to where they are not under a cab wall. Once the platform is securely fastened to the car frame be sure to level the platform in both directions prior to building the cab.

Note: Use an engineered ruler when setting running clearance and documenting 3/4x4 measurements.

Note: When setting the platform, the 3/4x4 rule needs to be considered. The GC needs to be informed immediately of any changes that need to be made to the door jamb placement to ensure that baffles will not be necessary.

Note; Verify that the ropes are at the proper length and the car sill over-travels the top floor landing 3"-5" while the piston is on the stop ring.

Don't forget to ensure that the leading edge of the sill plate is in line vertically with the door jambs in relation to the strike point of the gate. Set the sill plate to match the average of the difference as long as it doesn't reduce the running clearance on the side of the cab to the shaft wall. The cab gate strike point must line up with a minimum of one landing door.

NOTE: If there is no trim provided on the inside of the shaft confirm with the GC the thickness intended on being used prior to setting the platform. Remember it is REI policy that the maximum thickness of the inside trim is not to exceed 1/4" to help avoid "3/4x4Rule" issues.

For Single-Opening Cabs: verify the platform size of the car. Then verify the rail side designation. Make sure based on the hoistway size that you have a minimum of 3" clearance past the platform on the COP wall side and confirm you have the proper running clearance on the car opening side and a minimum of 3" opposite the car opening side.

For Adjacent or Pass-Thru Cabs: The same rules apply, a minimum of 3" is required for the travel cable and COP.

Note: At the completion of the installation, if a running clearance or "3/4 x 4 Rule" violation exists, you must disable the elevator by leaving the job in disabled mode until the violation has been addressed. Only an REI employee can take a job out of disabled mode once the violation has been corrected!

Leveling The Platform

Start leveling the platform from the rail wall. Shim the platform up as needed, while working in a counterclockwise direction. The side of the platform that is opposite to the rail wall can be leveled by using the sling extension. Fill any voids between the platform and the sling after leveling with taper shims.

Note: An unlevel platform can lead to several issues with the gate, cab, and ride quality.

Note: Be sure to check the level of the platform again after conducting the drop test.

Home Elevator
'3/4 x 4 rule'

Residential Elevators. Inc. (REI) manufactures and installs a fully code compliant elevator per the ASME ANSI A17.1 2016 Safety Code for Elevators and Escalators Part V Private Residence Elevators Rule 500.4b of the above referenced code states:

Elevator Safety Code Section 5.3.1.7.2 and 5.3.2.8.3

The distance between the hoistway face of the hoistway door and the hoistway edge of the landing sill (threshold) shall not exceed 19mm (3/4") for swinging doors.

With swinging doors and car gate in the fully closed position, the spaced between the hoisway door and the car gate must reject a 100mm (4") diameter sphere at all points.

Running clearance between finished floor threshold and elevator gate sill must be between ½"-1 ¼" while not violating the ¾"x4" rule. Ensure that all frame rough openings are square, level, plumb and in-line with each other, at all landings.

NOTE: Concrete block/ masonry shafts and some commercial metal door frames can often create "3/4 x 4 rule" violations. Review the 3/4 x 4 Rule At the completion of the installation if a 3/4 X 4 violation exist no elevator is to be turned over regardless, no exceptions.

GA ONLY

5.3.1.7.2 Clearance Between Doors or Gates and Landing Sills and Car Doors or Gates.

The clearance between the hoistway doors or gates and the hoistway edge of the landing sill shall not exceed 19 mm (3/4 in.). The distance between the hoistway face of the landing door orgate shall not exceed 75 mm (3 in).

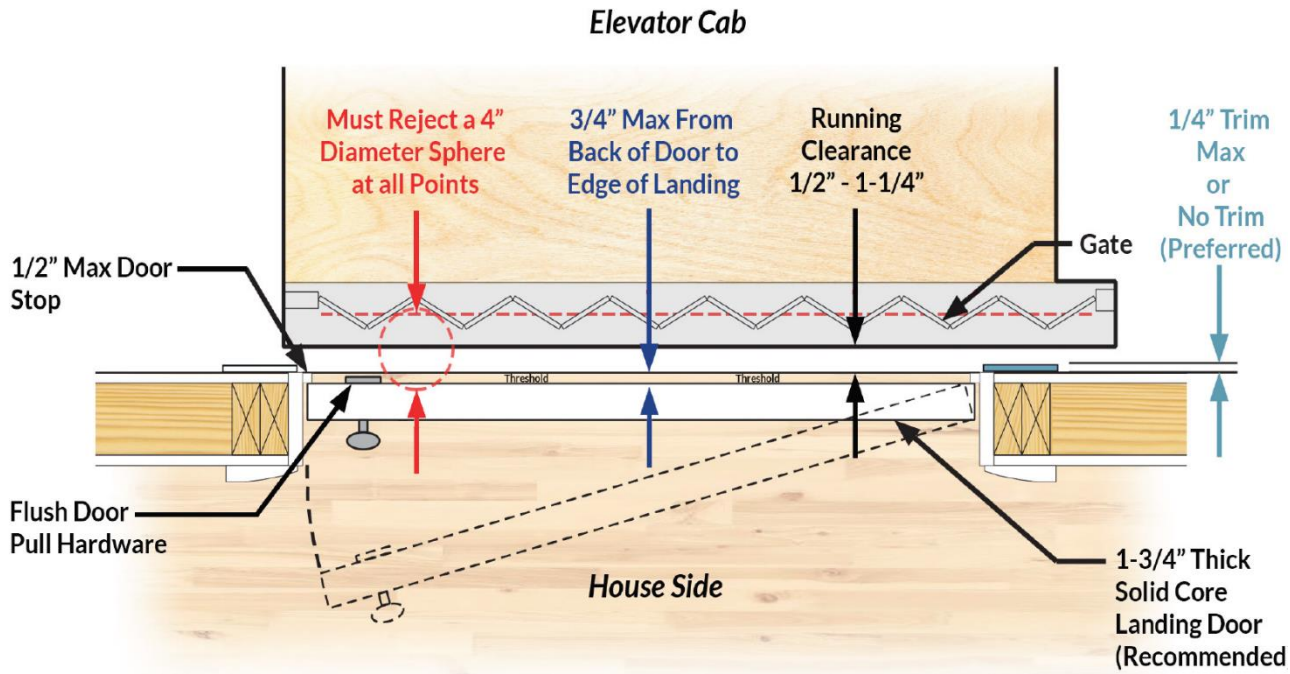


FIG. 28A

Drip Line/Can

Install the pit drip can directly on the PIT FLOOR between the backside of the pedestal base and the rail wall. The pit can should never be mounted anywhere other than on the pit floor. Never install the pit can in a wall cavity or on the pedestal bracket. If the can was to fill up with oil it could overflow onto a finished floor. Drill a 3/8" hole in lid of can and insert hose or remove the lid and insert the hose. (Fig. 29c)

Install the drip line on the rear side of the jack. The jack brackets have holes for the drip line to be ran through. Large zip ties shall be installed to secure the drip line to the jack every 3'.

Note: Do not tighten the zip ties so tightly that they pinch the tube and restrict and block the flow of oil if the packing fails.



FIG. 29A



FIG. 29B



FIG. 29C

HallStations/Landing Operator Panel

Standard Hallstations

Hall stations are to be mounted at a height of 42" to the centerline of the fixture unless the customer requests a different height. When possible, always consult the GC or homeowner prior to installing the hall stations. When determining the height, take into consideration an adjacent light switch, etc. When determining the hall station placement horizontally, consider the width of the mounting space. If the Space is under 12" wide center the hill station. If the mounting space is over 12", use a center point of 4" off the door trim. If there are any obstructions or is no room to mount hall station on hardware side of door, consult with GC on other options, like the other side of the door or on the trim.

Keep aesthetics in mind before mounting. Remember in flood areas that all electrical components unless pertinent to the operation of the elevator are required to be mounted above the Base Flood Elevation (B.F.E.)

Make sure the fixture is plumb. Use a torpedo level or better yet measure off of the door trim/ casing to plumb the fixture. Always use the proper RJ45 & RJ12 connectors when installing the hall stations.

Always ensure the mounting bracket is installed properly and level using fasteners in all 4 mounting holes and use the proper sheet rock anchors when required. (See Fig. 30b)

If mounting on sheet rock, use a 1" Paddle bit at the CenterPoint before mounting frames. This will confirm what's behind the mounting surface before we mount our frames and drill our hole for the wires. Doing this we can avoid the risk of hitting any other house wires running through the wall and ensure that we are using the correct hardware when mounting the frame.

Next drill a minimum 1/2" hole through wall and run the flat cable through the wall and leave a minimum of 6" to install the connectors on the ends and insert them into the switch and mount the hall stations on the bracket attached to the wall and ensure they are plumb.



FIG. 30A



FIG. 30B



FIG. 30C

Flush Mount Hall Stations

Use provided security bolts to mount the face of the LOP to the GC mounted housing inside the wall. Plumb the LOP with a torpedo level or by measuring off the trim nearby.

Use the knockouts provided and a gromet when running wires into the housing. Use a ½" bit to drill into the hoist way.



FIG. 31A

Touchscreen Hall Stations

Use provided security bolts to mount the face of the LOP to the GC mounted 2 gang box inside the wall. Plumb the LOP with a torpedo level or by measuring off the trim nearby.

When running the wires for the touchscreen hall stations, run a round four wire in addition to the wires you would normally run for regular hall stations. This wire will be running from the machine room and be "Daisy Chained" from each hall station to the next. For example, on a 3-stop traction your wire will start at the Machine room, then go to the 3rd floor hall station, then from the 3rd floor hall station the wire will be ran to the 2nd floor hall station, then from the 2nd to the 1st.

Note: Touchscreen Hall stations are only used on jobs that have a Touchscreen COP as well.

When setting up the Touchscreen COP you must enable Touchscreen Hall stations on the setup screen. When you press enable, it will take you to a screen to enable the hall stations individually. Here you will select all floors that have a Touchscreen Hall station.

Finally, the software will need to be downloaded to the touchscreen hallstations. Connect the usb cable to the hall station and download the correct software. Use Flexidownload to download the application from the sharefile to the hallstaton. There is a different Touchscreen application file for each landing/hall station. Only check firmware and application, there ladder for this file.



FIG. 31B



FIG. 31C

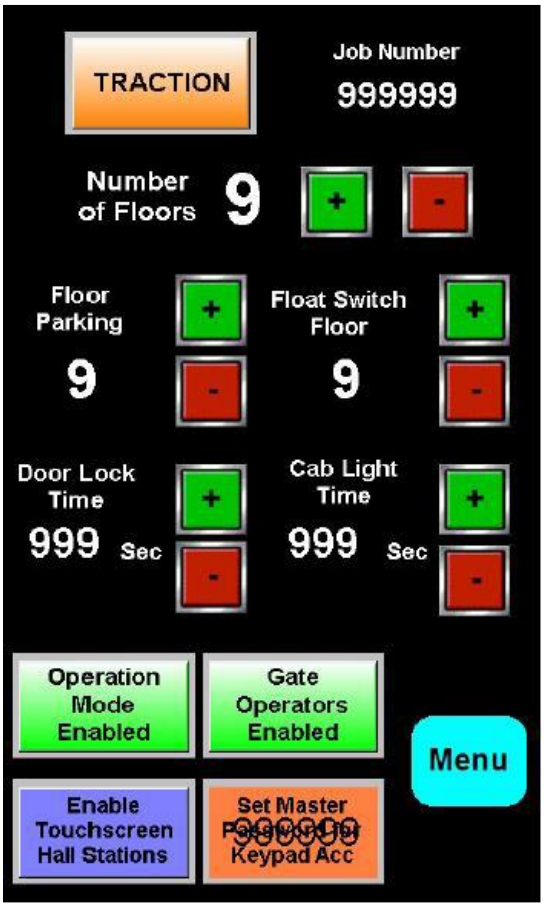


FIG. 32A



FIG. 32B

Enable the touch screen hallstations by tapping the purple button on the setup screen of the COP, then proceeding to enable each hall station according to every landing that has one.

Keyed Hall Station

When a keyed hall station is being used, a #3 interface must be used as well. The Flat 4 wire from the interlock will run to this interface, and so will the Flat 8 from the controller. From here there will just be a round four wire that runs from the interface to the keyed hall station. (See Figures 33a and 33b)

Tip: Keep In mind how much space you have around the platform when mounting the interface box. Avoid mounting the box close to the travel cable loop.

Keyed Hallstation to #3 Interface (Car Here and Car Call LTs)

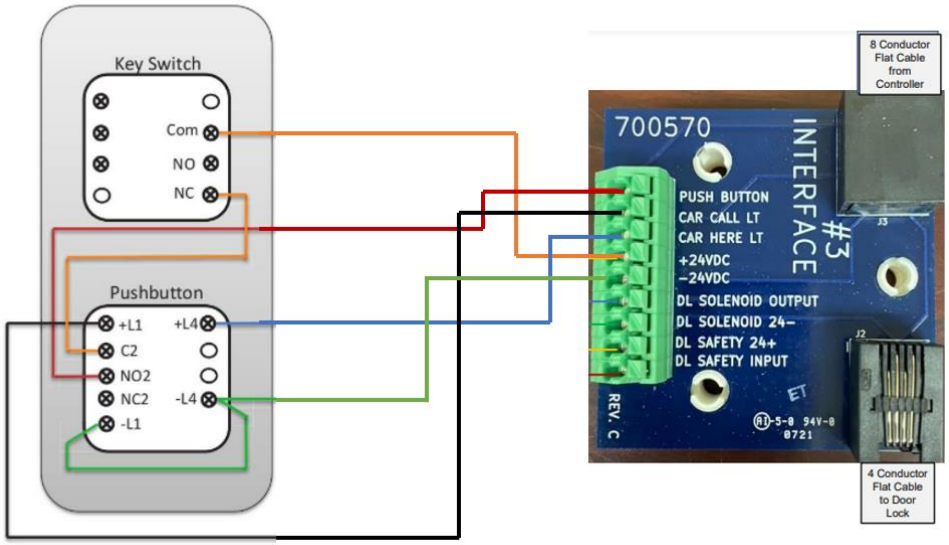


FIG. 33A

Weatherproof keyed Hallstation to #3 Interface (Car Here Light Only)

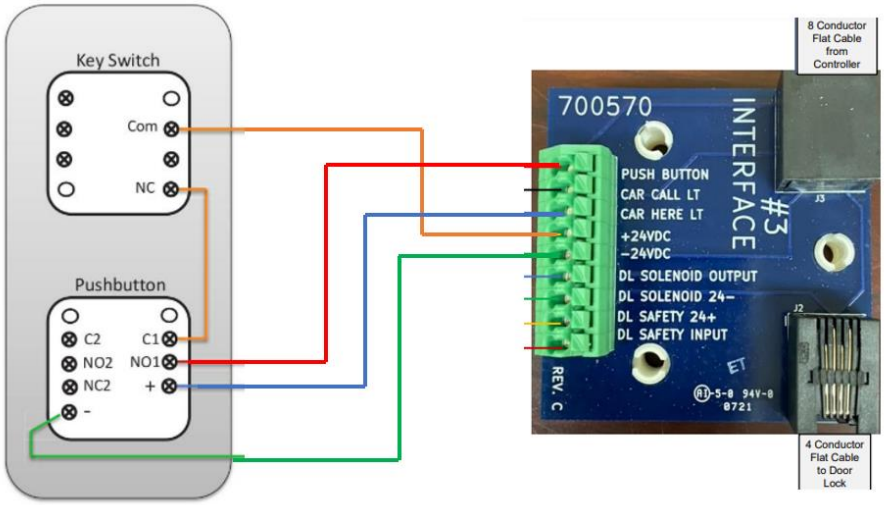


FIG. 33B

Interlocks with Notched Doors

This is work done by others, not to be done by REI Personnel.

Note: Door Template is designed to be used for right- or left-hand door, just flip template over 180 degrees.

Measure up from the bottom of the door 67” to the bottom of the template, then mark the Cutout on the face of the door, then repeat on the opposite side of the door.

Cut out the door, then close the door, and mark and cut out the 3/4”or less doorstop at the same place as the door cut out.

The door Cutout for the Door Lock should look like fig. 34a



FIG. 34A



FIG. 34B

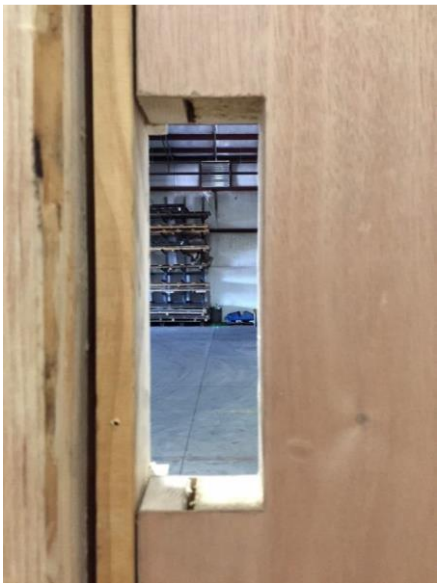


FIG. 34A

Standard Door Interlock with Keeper Plates

Note: Doors and Doorstops should be cut before arriving to jobsite to spec given by salesman. If these items are not completed when you arrive to the jobsite, contact your sales rep immediately and/or consult the Project Manager.

Make sure that the top hinge on the door jamb has at least one 3" screw in it. If it does not, install a matching screw from your truck stock. Make sure you do this prior to interlock installation.

1. Make sure all the doors close tightly against the door stop with using only the door hardware provided by the homeowner or the GC. If this is not the case, it will affect the operation of the REI door lock. (Contact your sales rep and inform them of this)

Note: If there is no door hardware at installation you will need your MIT to hold the door tight to the doorstop when you are the marking door jamb.

2. Use the yellow template with the four holes and two pegs to mark your door. Rest the pegs on the door cut out on the outside of the door and flush the template up with the side of the door. Now use a pencil to mark the holes in the template. (See Fig. 35a)

3. Remove the template and drill all four holes with a 1/8" drill bit.

4. Mount the orange template to the door. Close the door and mark the front pilot holes for the interlock on the door jamb. (See Fig. 35b)

5. Remove the orange template from the door and mount the keeper plate using all four security screws. (See Fig. 35c)

Note: If the doors are 1 3/8" thick, a spacer will be needed when mounting the keeper plate. These are part of your truck stock.

6. Drill the holes marked on the door jamb with a 1/8" drill bit. Then mount the interlock to the jamb just using the front holes.

7. From inside the hoistway, standing on the platform, close the door and ensure the alignment is correct. If the alignment needs adjustment now is the time to do so.

Note: The door lock may need to be shimmed with the interlock shims in your truck stock to correct alignment.



FIG. 35A



FIG. 35B



FIG. 35C

8. After the alignment is complete, install the back screws.

Note: Depending on the doorstop width, you may not be able to install the back mounting screws. Also, you will not need to use the jack screw in this application, you can dispose of this.

9. After the interlock is mounted you can determine the location of the hole for your RJ12 hole. This hole should be just under the interlock and close to the back of the jamb. Use the long 3/8" drill bit and aim as far back toward the corner of the hoistway. Remove the interlock to drill this hole if you need to.

10. Feed the wire through the hole, crimp the RJ12 onto the end and plug it into the interlock.

11. Use a screwdriver to mount the cover onto the interlock.

12. Ensure there are no problems with the access key opening the interlock.



FIG. 36B

REEL Strike Locks

Note: When you arrive at the jobsite, the landing doors should be completed and ready for you to install the REEL. If any of the following items below are not done, call your manager and the sales rep and document on Job site arrival.

- Permanent doors must be installed.
- All door jambs mortised.
- Doors need to have the deadlatch hole predrilled. This backset will be either 2 3/8" or 2 ¾". The 2 ¾' backset is shipped with every REEL kit. If the backset is 2 3/8", make sure the correct backset is in the job box.
- Doors will need either a ball catch, magnet, and/or pre-loaded hinges.

1. Verify that the correct locks have been shipped, the locks are handed and cannot be reversed for the wrong handed doors.

2. Drill a ½" hole through the cavity in the jamb for the REEL lock, and fish this wire through. Aim for the corner of the shaft when drilling this hole. At no point should this wire be cut and/or re-crimped.

Note: If there is any problem installing the REEL Strike due to the mortise, consult the GC on what needs to be done to make the strike fit correctly.

3. With the REEL strike sitting in its correct position, pre-drill the jamb through the two mounting holes with a 1/8" drill bit. Then proceed to mount the lock to the jamb with the provided hardware. (See Fig. 37a)

4. Install the deadlatch kit into the precut hole in the door. The thumb turn on the hoist way side of the door is a store room style latch, this means that it will spring back its latching position after every use. Verify that when all hardware is installed on the deadlatch kit that this is springing back after use of the handle, key, and when entering and exiting the REEL Lock.

Note: If the door is 1 3/8" thick, you will need to use a spacer ring to install the Dead Latch kit. This spacer should be a part of your truck stock.



FIG. 37A

5. At 80” up on the door jamb, we will drill the hole the REED switch, center this hole to where the door will be sitting while fully closed. For example, if the closed door sits perfectly on the doorstop, and the door is 1 ¾” thick, the center of the hole drilled should be 7/8” off the doorstop. At this mark we will drill a 3/8” straight into the jamb, then through that hole we will drill a ¼” hole towards the corner of the shaft. We are using this smaller drill bit so that we do not damage the jamb while drilling at an angle into the shaft.

6. Use 4 conductor round cable and connect the red and black wire to the reed switch, the other two wires will be spares. Be sure to tighten down the screw terminals.

7. Fish the wire through the ¼” hole drilled into the shaft and insert the REED switch into the 3/8” hole.

8. Now transfer the height you used for the REED switch on the jamb over to the door using a pencil and match the dimension you used horizontally to mark where we will install the magnet.

9. Drill out a 3/8” hole for the magnet, this hole should only be as deep as the thickness of the magnet.

Note: Using a 3/8” forstner bit will leave a cleaner hole and overall, a better-looking installation of the magnet.

(See Reed Switch Pics in Fig.38a)

10. Now install the #5 interface, there should be a #5 interface for each landing sent in the job box. When mounting the #5 interface remember that it needs to be in range of the REEL strike wire. Also keep in mind clearances around your cab and your travel cable loop to ensure there is no problem when all is built.

11. Now connect all components to the #5 interface. (See Fig. 39b)

- Connect the Flat 4 wire from the LOP to J1.
- Connect the REEL Strike to J2.
- Connect the Red and Black from the REED switch to the two green terminals.

Note: Ensure all crimps are facing the correct direction and match how the REEL Strike Wire is crimped. If one wire is crimped incorrectly the REEL strike WILL be damaged.



FIG. 38A

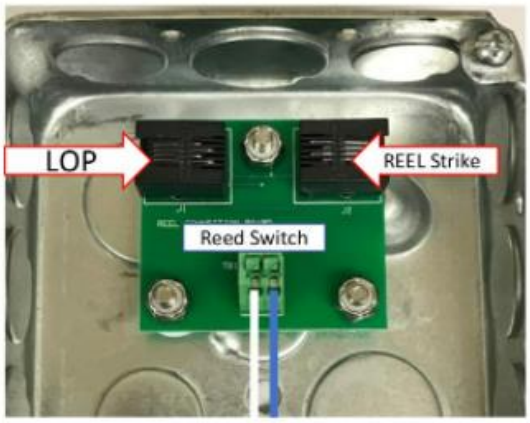


FIG. 38B

Photo Eye Brackets and Encoder Belt/Brackets

Photo Eye Brackets

On a standard push button elevator, mount the Photo Eye Brackets once you have a running platform. These photo eye brackets will be taped uniquely to the floor they belong to.

When mounting the brackets, you will stop the car at the finished floor level/estimated finished floor level and mount the photo eye on the rail. Align the reflective tape floor level to the photo eyes to the stopping position of the tape.

Note: The arm of the photo eye bracket may need to be repositioned if it needs to be mounted to where a fishplate/bracket are.

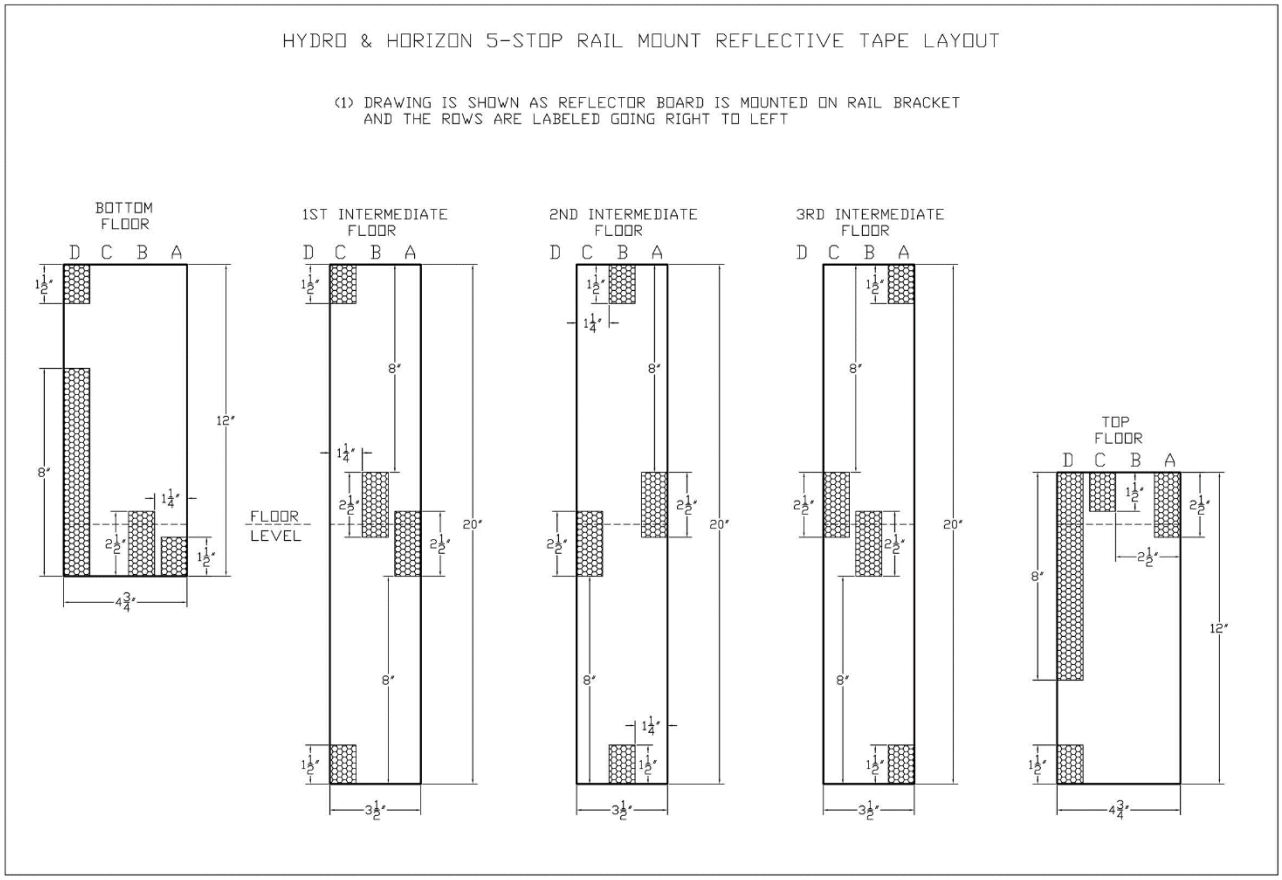


FIG. 39A

Encoder Brackets

On a Touchscreen COP job, mount the Encoder brackets once you have a running platform.

Install the lower Overtravel CAM, the top of the CAM should be 1” below the overtravel switch roller when the platform is at the bottom floor level.

Install the Lower Encoder Belt Bracket 36” from the pit floor to the bottom of the bracket. If there is a fishplate or rail bracket interfering at 36”, move the lower encoder belt bracket up just above the plate or bracket. (See Fig. 40a)

Install the Top Overtravel CAM, the bottom of the CAM should be 1” above the overtravel switch roller when the platform is at top floor level. (See Fig. 40b)

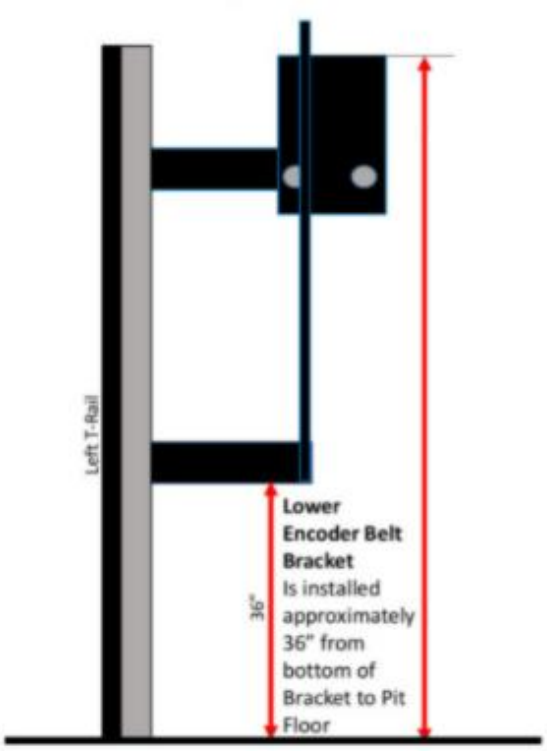


FIG. 40A

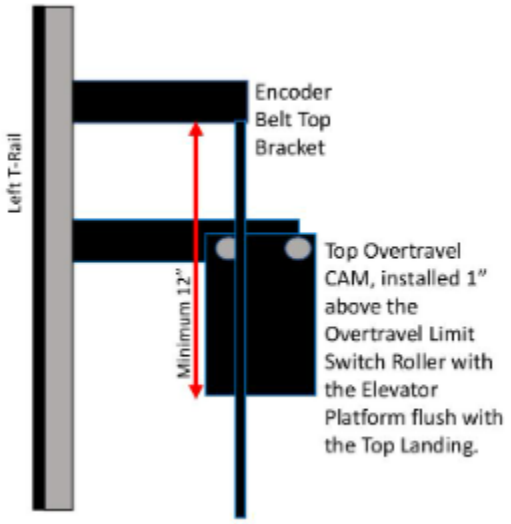


FIG. 40B

Encoder Belt

Loop the Encoder Belt through the Upper Belt Brackets bottom hole. Make sure the belt teeth are facing to the right.

Note: Make sure the Encoder Belts Teeth are face to face, so they fit in each other, then install the two zip ties. The length of the tail should be 2 ½" – 3" long.

Ensure that while traveling down on the platform with the encoder belt, the belt does not get twisted and teeth stay to the right.

Attach the encoder belt spring to the lower encoder belt bracket.

Attach the encoder belt to the spring until the spring is extended 5", then fasten the belt loop with zip ties. Cut the tail so that the length is 2 ½"-3" long.

Route the encoder belt through the encoder toothed when and idler pully. (See Fig. 41C)

Make sure the encoder belts teeth engage the toothed wheel on the encoder and make sure the encoder belt is not twisted or knotted.



FIG. 41A

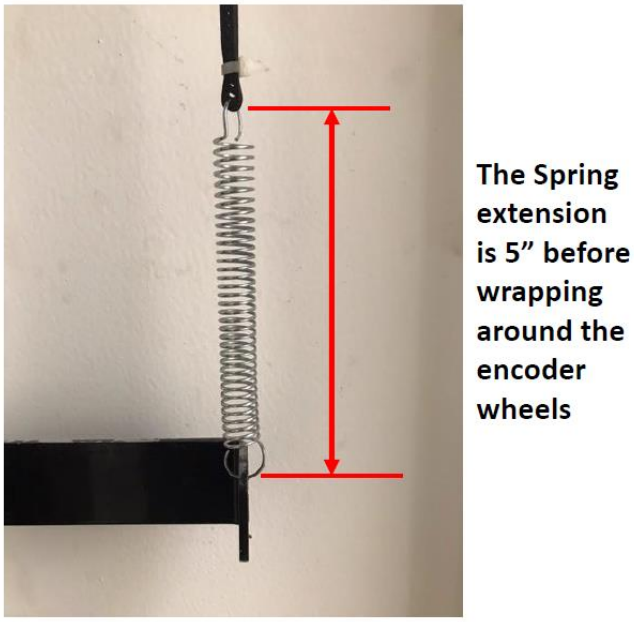


FIG. 41B



FIG. 41C

Travel Cable Installation

Two Kellum grips are required on every job, one on the cartop and one at the top of the hoistway.

If the travel cable is being ran up from a remote machine room, the height of the kellum grip must be mounted 2’ higher than half the height of hoistway.

Note: The Kellum Grip used in the shaft is to be mounted with the proper anchor. Do not use a one-hole strap.

The reason for the proper anchor is to securely attach the Kellum Grip and support the weight of the traveling cable and to control the loop if needed. One-hole straps are to be used to strap the traveling cable to the wall going back to the controller/machine room.

Note: Ensure the kellum grip is bearing the load of the travel cable, not a strap!

The travel cable should be mounted with a minimum 30” space between the Kellum Grip hanging points of the car Kellum Grip on the car top in relation to the Kellum Grip in the shaft. On jobs where the machine room is in the attic you need to mount the Kellum Grip in the overhead of the shaft, preferably upon entry, not the mid-point of the shaft and not in the attic. Confirm when installing the car top Kellum Grip that the travel cable loop will not bottom out on the pit floor when the car lands on the pit floor. When the car is sitting on the pit floor you want the loop to be 1”-2” off of the pit floor.

Note: Travel Cable calculation: Pit floor to the bottom of the sling divided by 2 plus 2”.

Be sure to always drill a 1-1/8” hole with a hole saw or paddle bit through the ceiling or machine room wall when the machine room is outside of the hoistway.

The traveling cable, floor wires or any other piping/wiring shall never be run through the access panel.



FIG. 42A



FIG. 42B

Wiring

All wires are to be run straight neat and secured to the walls. Never cross cables. Never run wires across the top of a door jamb or across a wall that a landing door is installed. If needed, run the wire(s) up and above the top floor door and back down or down and below the bottom floor threshold and then back up, or along the backside of the shaft to hall stations and door lock assemblies.

Note: When working out of your home market make sure you know the electrical code for home elevators. For example, all hoistway wires in NJ need to be ran in PVC/EMT pipe.

Flex runs are to be adequately secured to the shaft walls, car top, etc. All runs that exceed 12" are required to be properly strapped. Use the proper size strap for the size flex being installed.

Use proper fittings for the application being used. Do not use Romex fitting for flex runs. Romex fittings are to be used for jacketed cables only. Do not use flex or Romex fittings for EMT. Adequately staple or wire tie the flat wire to the shaft walls. When in doubt add additional fastening points. Final limit wires typically are not adequately secured to the wall. Be sure to install the cover to all 4x4 boxes, junction boxes, etc. Always install a fitting on the end of all flex runs where the flex doesn't connect to an enclosure.

Do not splice wires inside the shaft or anywhere without using a 4x4 box. The junction box is required to make the proper connection and it also indicates a connection point. Make sure that all fittings are securely tight to the junction box, switch, etc.



FIG. 43A



FIG. 43B

Car Installation

Installing The Cab Walls

Prior to installing the walls be sure to inspect the cab corner bracket hooks to make sure that they are straight and level.

First, set the back wall in place, run the car up and insert the 1-3/4”x 1/4”cab bolt through the bottom of the platform and into the bottom of the panel and hand tighten. After installing the wall ensure that the panel will not fall forward. (See Fig. 44a)

Note: Use Caution when installing panels, prior to installing them have a plan on how you will fit the panel into the space. This will be more difficult if your door is shorter than your cab.

Next, bring one of the side walls (preferably the rail wall first if a side mount rail system) and then align the hooks to the receiver and push the side wall into the receiver. (See Fig. 44b)

Note: If the Job has a straight pass-through cab, the two walls will be installed independently, only being fastened to the platform and cartop. If the job has a adjacent pass-through cab, the two walls will mate like an inline cab, then there will be a post that will be installed independently, only fastened to the cartop and platform. Be sure to make sure the post is facing the right direction during installation.

When all the hooks are in then you can simply pull down on the top of the panel to ensure the top edges of the panel are lined up properly. Confirm that the top of the side wall is either flush with the top of the back wall or below. Sometimes a light “tapping” of the side wall panels is required to “set the hooks.” Be sure to use a block of wood on the top of the panel as a striking point and be sure to hit the outer edge of the panel versus the inside edge of the panel. (See Fig. 44c)

When the setting of the panel is complete, then repeat the above process for the remaining sidewall.

After the two side panels are installed, you may run the car up and insert the rest of the bolts. When tightening the bolt make sure the cab panels are flush with the platform and line up with the pencil marks. Use a wrench or the low torque setting on the impact to fasten the bolts, they can easily pull the rivets out of the panels if torqued too much.



FIG. 44A



FIG. 44B



FIG. 44C

When the side wall(s) are installed, they can be tightened by taking an 8’ piece of schedule 80 hard pipe and driving the hooks downward. This can be done on a 4’ ladder before the cartop is on, or on the cartop after it has been installed.

Installing The COP

Prep the COP by verifying that all wires are plugged in correctly and secured. Install the end caps and confirm that they are tight and fit seamless with the main housing.

Mount the flat washer and bushing with one of the provided shorter screws. Then tape up the end of the ribbon cable and feed it up the EMT pipe. This can also be fed down if disconnected from COP. After the wire is fed, double check all connections, hang the COP on the bushing and level the COP. Do NOT do this with a level. Plumb the COP by measuring off the trim, corner, or gate strike in the cab.

Install the bottom end cab cover with a screwdriver, use a cloth to make sure you do not rub and damage the cab wall.

Note: If the job has a touchscreen COP, the COP will be done after the Touchscreen has been wired.



FIG. 45A



FIG. 45B

Installation of the Gate and Cartop

Place the bottom of the gate in the track on the platform. Remove the top gate track from the cartop and slide it onto the gate's top roller.

Note: If this is a scissor gate, you will need to remove the two screws from rear post and set them aside prior to bringing the gate into the cab. If this is an accordion gate you will need to verify that all hardware, the receiver, and the magnet are all present after taking the gate out of the box.

Note: Be sure to make sure the gate(s) are leaning into a secure position to make sure they do not fall over at any point.

With caution place the cartop on top of the cab and secure it to the rest of the cab with the provided hardware. Slide the gate track into the gate switch puck if the gate switch has been installed already. (See Fig. 46a)

Note: When securing the cab panels to the platform, make sure that all the walls are flush with the end of the cartop, and the gate switch puck is all the way against the strike.

Mount the cab steady brackets on the sling, make sure they are sitting flat on the cartop. (See Fig. 46b) After tightening the cab steady brackets, level the cab, place the level on every cab wall while leveling. It is very important for the gate's operation that the strike is leveled perfectly. Secure the cab steady brackets to the cartop with a minimum of 4 hex head cartop screws on each bracket. Make sure when tightening these you use low torque to avoid stripping out the wood.

Note: Excessive force is not needed to level your cab. This can cause binding in the cab and/or sling and bring upon several issues in the ride quality. If it is difficult to level the cab, double check if the platform is level.

Once cartop is secured and the cab has been leveled, secure the gate track to the top of the cab. Start by using the holes on each end that have already been used when the track was previously mounted to the cartop. Then fill the rest of the mounting holes with the gate track screws provided. (See Fig. 46c)

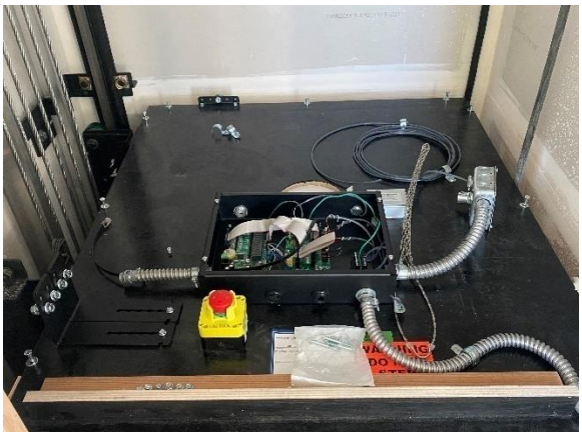


FIG. 46A



FIG. 46B

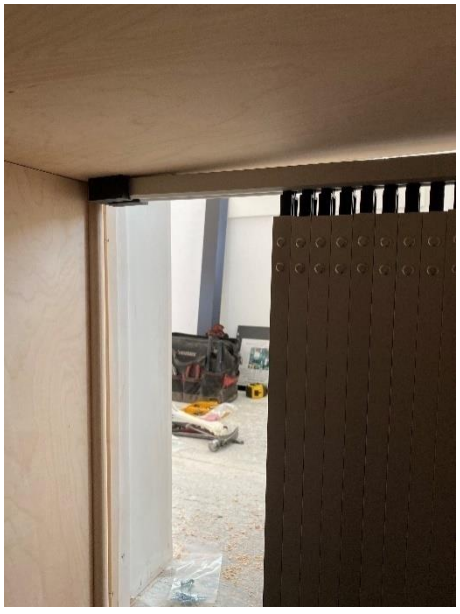


FIG. 46C

Warning: All gates are intended to operate with a gate closure contact/switch that is connected to the elevator control system. Failure to install a code compliant gate closure switch could result in injury or death.

Scissor Gate Installation

Note: After the top gate track is fastened to the cartop, verify that the bottom of the gate is not dragging in the threshold.

Cut the plastic wrap off the gate and use the provided screws that were removed earlier to mount the back post of the gate to the pre-drilled holes in the top gate track and the bottom threshold (See Fig. 47a and 47b). Verify the gate moves smoothly and easily through the track and that it enters the gate switch with ease.

Accordion Gate Installation

Note: After the top gate track is fastened to the cartop, verify that the bottom of the gate is not dragging in the threshold.

Drill 4-5 holes with a 1/8" drill bit evenly spaced out on the last panel on the accordion gate, these holes will be used to mount the gate to the gate stack pocket. (See Fig.47c) Push the gate to where it has fully stacked in the pocket and hold the back mounting panel in place. Fasten one screw down and verify that the gate stacks properly, if it does not stack properly, take out the screw and try again. Once the gate is stacking, properly insert the rest of the screws.

Note: When you fully open the gate it should fully stack, the gate should be level, and it should not spring back. If the gate springs back the gate is binding, and the mounting panel may need to be adjusted.

Take the receiver and line it up with the gate switch and gate channel in the threshold. Ensure the receiver is elevated and not resting on the threshold. Pre-drill these holes to mount the receiver and used the provided hardware to mount it on the gate strike. Make sure the lead gate post fully enters the receiver evenly and smoothly. (See Fig. 47d)

Mount the provided magnet onto the receiver. Align these properly by placing the magnet on the gate and fully closing gate, the adhesive should stick the magnet to the receiver. Double check the alignment and fasten the magnet to the receiver, this will need to be pre-drilled as well.

Note: If the job has a power gate operator, the receiver magnet is not needed.

Note: With both style of gates, you must verify that the gate handle is accessible from the doorway when the gate is fully opened and closed. If one of these are behind either return, verify your cab and hoistway measurements, and contact your manager or production.



FIG. 47A



FIG. 47B



FIG. 47C



FIG. 47D



FIG. 47E



FIG. 47F

Millennium Gate Installation

Installation of Top Track

The upper track is secured to the top of the carriage with 3 x Cartop screws with pre-drilled holes along the heel of the lowest track section. (See Fig. 48a)

The front edge of the lowest track element should be proud of the front edge of the ceiling by roughly 1/8in to ensure that panel #1 does not rub. (See Fig. 48b)

The side of the upper track can be aligned with the daylight line for side-to-side positioning.

Once alignment along the front edge and side are achieved and the screws are in place the support brackets to fix the top edge of the upper track can be added. An image of the support brackets is shown below.

The support bracket (Z-Bracket) is secured to the top of the upper track with #6 self-tapping screws that are supplied by Good Gate. There are three brackets and there will be several sets of pre-drilled pilot holes in the top of the upper track. Hardware for securing into the cab ceiling is not supplied. (See Fig. 48c)



FIG. 48A



FIG. 48B



FIG. 48C

Which end the 3rd bracket is mounted to will depend on the position you need for your gate switch.

Installation of the Lower Track/Sill

Once the upper track is secure.

Insert panel #1 in appropriate channel of the upper track this should be done using the groove machined roughly at the midpoint of the channel.

Put the sill underneath of panel #1 with the panel inserted in the appropriate groove. (Please note that it is intended that panel #1 and #2 share a groove and panel #3 and #4 share the other.) (See Fig. 49a)

Push panel #1 to the back of the channel such that the lower aluminum cross piece is touching the surface of the track that is furthest from the landing side.

Using a level check to see the that the panel is vertically plumb Shift the lower track until the panel is vertically plumb.

Mark where the lower track / sill should be located

Adjust the position of the track so the lower track/sill travel matches the travel of the upper track and the end sits in the pocket area..

Slide the panel out of the way of any screw holes for the lower track Secure lower track / sill with #10 taper head wood screws.

Ensure that the screws do not touch off on the bottom of the panel – if it does then you may need to torque the screws tighter or shim the upper track higher due to the overall dimensions of your car.

Test to make sure that the panel is plumb in several places along the full travel to ensure that the alignment is good for the lower track.

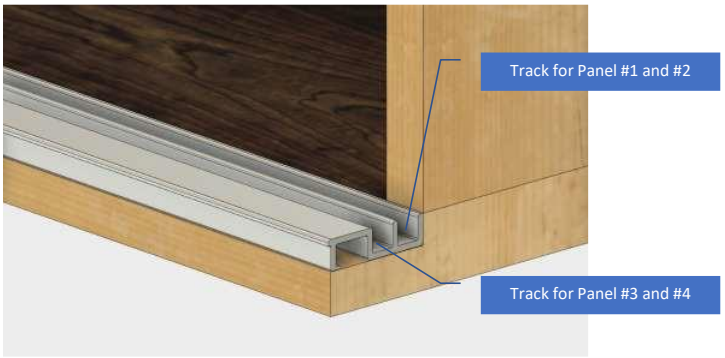


FIG. 49A

Installation of Panels

Panel Insertion

Each track has a machined slot for insertion of a single wheel of the appropriate panel into the track. The process for doing this is as follows:

-Place the lower edge of the panel into the appropriate groove of the lower track/ sill

-Move the panel in to position so that the wheel on the left side of the panel (looking at it from the landing side) is inserted first by simply pushing it in to the slot

-Move the panel to the left and then insert the other wheel

-Move the panel back to the right so that the full panel is now on the other side of the groove before proceeding with the next panel

Panels should be inserted in the order of #1, #2, #3, #4.



FIG. 50A

Installation of Mid-Panel Slot Catches

The panels are equipped with slots to secure each gate panel to the subsequent one. For the sliding action to perform properly and deflection requirements to be maintained slot screws must be installed.

Insert #10 pan head screws at mid-height of panels from the landing side through the slots. The screws are in the small parts bag sent with your gate.

There are 6 screws for each gate and they have tamper-proof heads. An appropriate screw bit is shipped with each gate for installation of the screws. The screws are compatible with most tamper proof #10 screw drivers. (See Fig. 50c)

The screws should have a light pink film on them. This is a thread locker compound intended to harden once they are installed. If you remove them after a short time then new thread lock compound should be applied.

Tighten the screws so the shoulder is snug against the upright of the next gate panel. This should position the screws such that the head does not touch the panel in which it slides and it also does not contact any other panel as it opens and closes such that binding is avoided.

Warning: Failure to insert these screws or installing screws that do not have a thread locking compound on them could cause serious injury or death.



FIG. 50B



FIG. 50C

Checking for Plumb and Smooth Operation

Once the panels are inserted and connected the operation should be checked for any binding, scraping or other problems.

Panels should also be checked for plumbness with a level at several positions.

The most common issue with smooth operation is that the upper track is tilted and the bearings are rubbing on the upper part of the each track instead of just rolling on the bottom surface of the upper track. This can be remedied by simply adjusting the position of the Support bracket. An image of this support bracket and the slot allowing adjustment without drilling new holes in the cab ceiling is shown to the side and videos for adjustment can also be found on our website.

Setting Travel Stops

Standard

The gate upper track assembly comes with three flange nut/ set screws installed in the top track to stop the panels from moving beyond points that would allow for openings that compromise the safety function is provides.



FIG. 51A

The position for the third flange nut/set screw will vary depending on the gate opening direction but they are easy to install and adjust with a standard hex key. On the bottom track one of the set screws prevents the gate from coming out of the end of the track. The second set screw on the bottom track must be adjusted to stop the trailing edge of panel 1 from traveling past the interior wall of the car on the pocket side. If this is not set properly panel 1 can travel to far in the closed direction creating a gap between the trailing edge of the gate and the wall on the pocket side of the elevator.

WARNING: Failure to properly set the mechanical travel stops could result in serious injury or death.

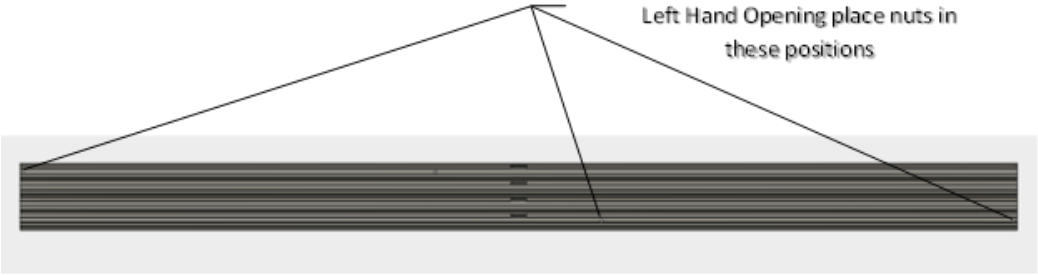


FIG. 51B

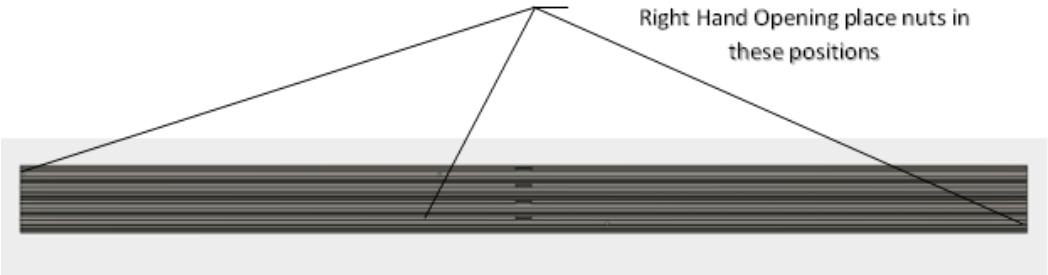


FIG. 51C

Closure Magnet, Contact/Switch, and Brackets

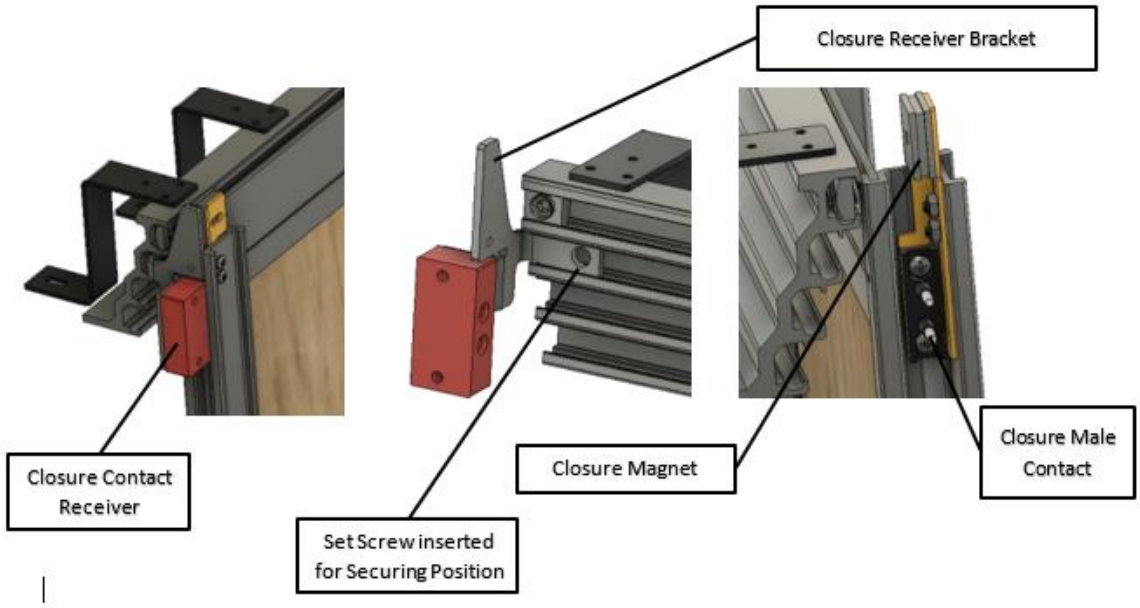


FIG. 52A

The above shows the standard contact switch that is supplied and should be installed as part of the gate set up.

The kit includes CSA/UL certified contact/ switch that is shown in red and there are screw terminals that should be connected to the elevator safety circuit.

The closure contact receiver is attached to a bracket that is inserted into the track for panel #3 on the upper track and secured with set screws in the bracket when the desired position is achieved. The exact position can be adjusted to ensure that the leading edge of the gate touches off on the “slam post” of the carriage while having positive engagement with the magnet and contact to indicate closure.

A magnet and male contact is included in a second bracket and this should be installed on the leading edge of the gate panel at the top. The magnet can be adjusted for desired makeup of the contact and magnetic retention.

The kit is “handed” and replacement parts should be ordered accordingly. The kit for gates intended for use with auto-operators removes the magnet retainer as it is not required on auto-operation assemblies.

Kit Assembly Part Numbers and Descriptions

CG0063-ASM-LH	Pin Plate, Contact Plate, Magnets, and mounting hardware for Left Hand Manual Operation Gates
CG0063-ASM-RH	Pin Plate, Contact Plate, Magnets, and mounting hardware for Right Hand Manual Operation Gates
CG0066-ASM-LH	Pin Plate, Contact Plate, and mounting hardware for Left Hand Auto Operation Gates
CG0066-ASM-RH	Pin Plate, Contact Plate, and mounting hardware for Right Hand Auto Operation Gates

Testing Checklist

Testing Check	Yes/ No
Check that height of carriage is appropriate for gate height and shim if the carriage is not square/ level	
Check that back of landing door is less than 3/4in from inside of shaft	
Check that there is clearance between gate and the back of each landing door is not more than 4in.	
Gate Panels move smoothly and do not bind	
Gate panels are plumb	
Top track support brackets are in place and secured	
Mid Slot Screws are in place and secure with thread lock compound	
Gate closure switch is in place and activates/ deactivates correctly to avoid carriage movement if the gate is in the open position	
Gate pocket is blocked off and travel stops are properly set to not allow for users to put hands or tooling into elevator shaft space	
All panels have clearance between the bottom edge and the lower track to avoid rubbing and unintended interference	

Wiring the Cartop

Cartop Rules

1. All wiring, except the traveling cable and low voltage cab light wires are required to be in flexible conduit. This includes gate switch(es), slack cable wire, photo eyes/encoder, gate operator(s).

2. Any flex run that doesn't terminate into a box requires a proper flex fitting on the end of the flex to protect the flex and wires.

3. The alarms are to be mounted inside the car top controller box via a 3/4" knockout.

4. All four gate switch cover screws are to be used when installing the cover on the switch enclosure.

5. When installing the 4 x 4 box on the car top from the COP it is required to have a 3/4" EMT box connector connecting the box to the conduit.

6. Make sure that all car top devices are mounted square to the ceiling.

7. Run the slack cable wire down the COP wall and through the access point in the outrigger.

8. Install the top valence/sight guard to cover the gate switch and the door opening.



FIG. 54A



FIG. 54B

Cartop Controller Connections

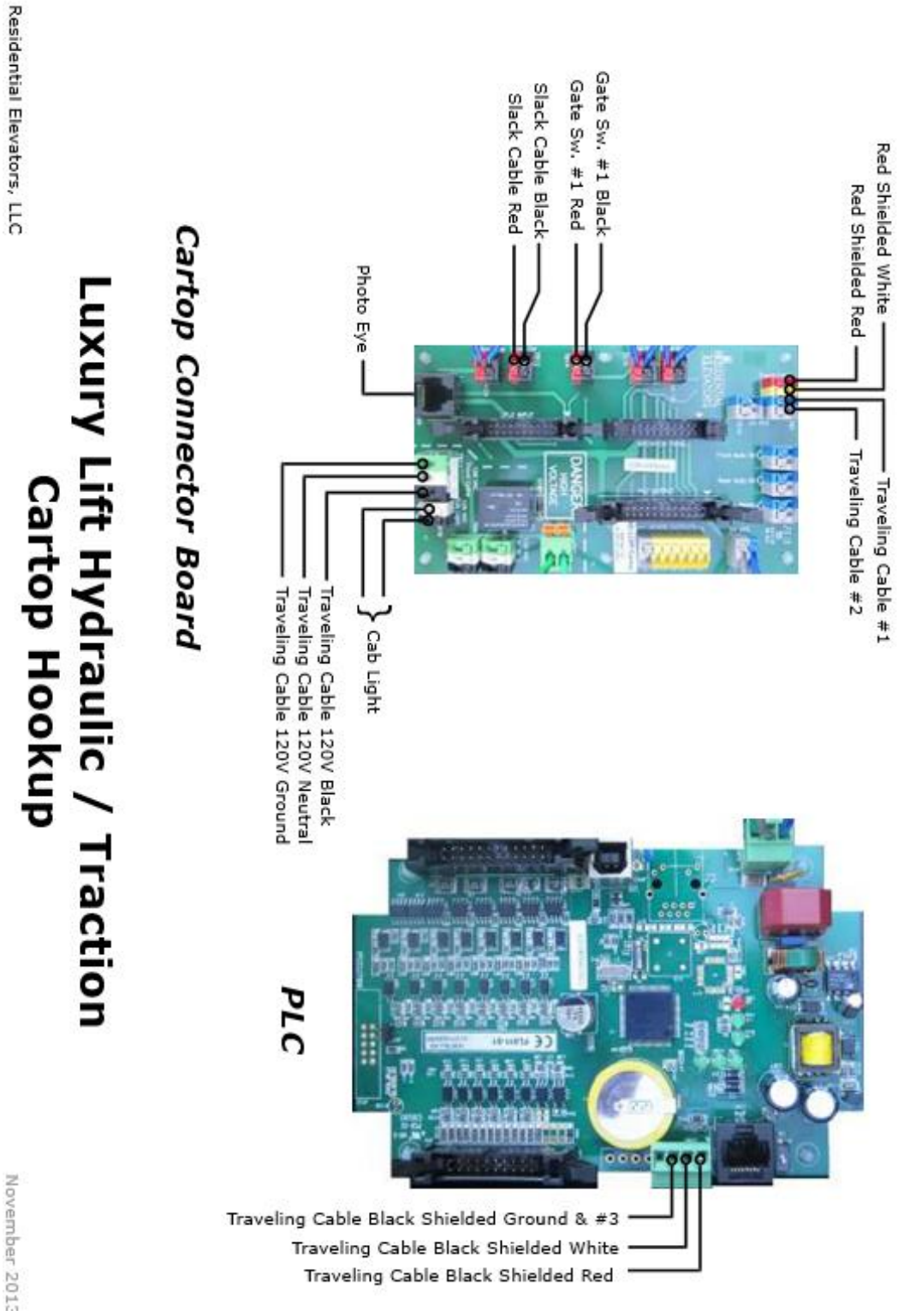


FIG. 55A

Touchscreen Cartop Controller Connections

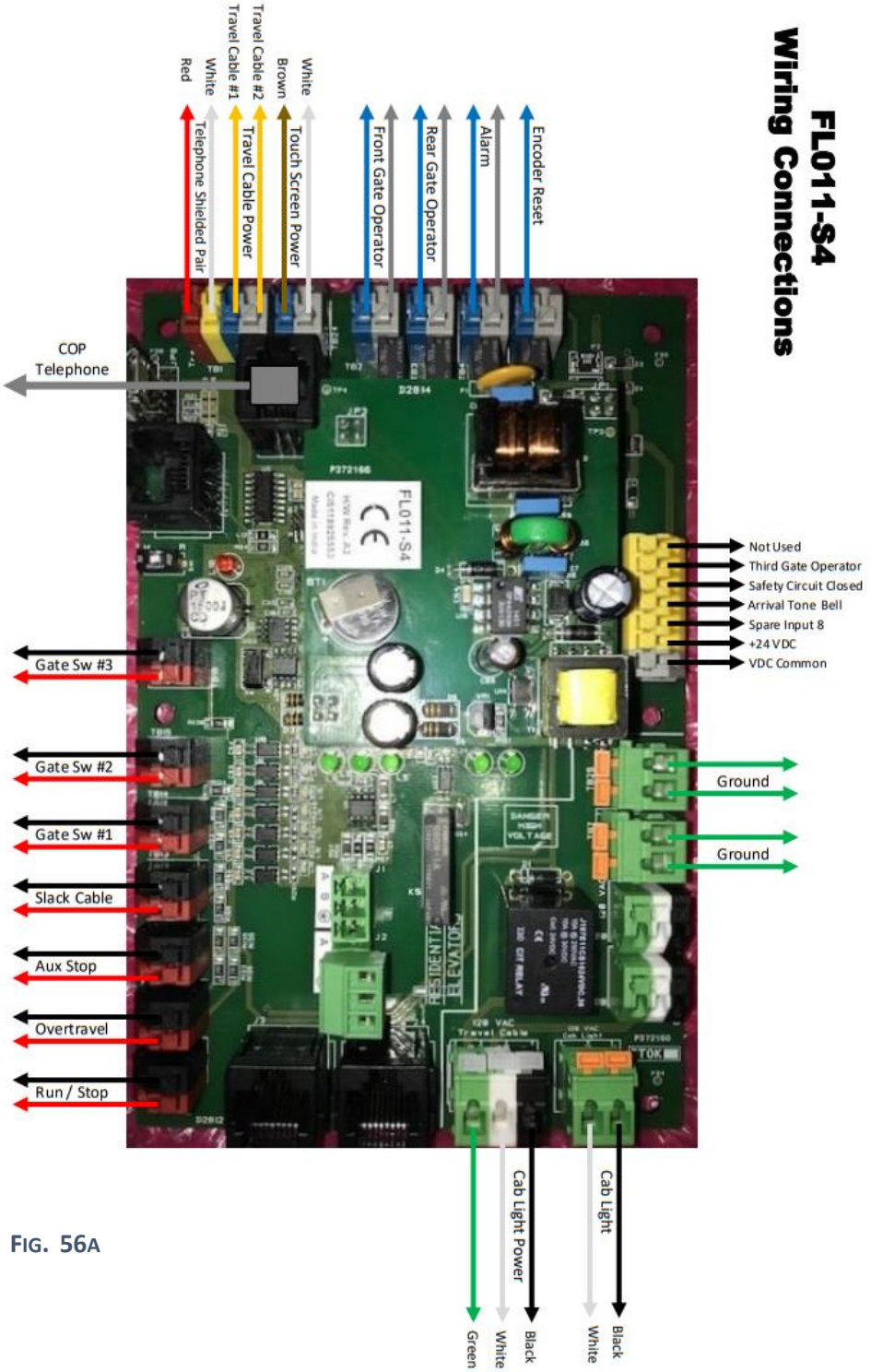


FIG. 56A

Power Gate Operator

ECI PGO

Place PGO on car top and make sure PGO is the correct size. The ECI PGO can be either handed if you're Operator is not set up for the side you need, you will need to move the gate switch to the other side and flip the magnet assembly around.

Note: The Magnet must be pulling the gate closed, not pushing. This way in the event of an emergency, someone can break the gate arm free from the magnet to open the gate.

Flush the PGO up with the end of the cartop and begin to run the wires and flex from the cartop controller to your PGO. This can be done with just an 8-conductor round wire.

After wiring, turn on the cab light power circuit, this powers the PGO.

Select the orientation and let the PGO learn itself. Now put the PGO into manual mode and begin to set the arm on the gate.

Note: Make sure the L brackets are installed properly to protect the gears in the PGO from being struck.

When setting the arm ensure that the arms cam high enough can activate the gate switch.

After the gate arm is attached, screw down the PGO to the cartop and restart the learning cycle. You may have to move the PGO left or right and repeat this step to ensure it fully opens and closes. Adjust the gate switch position to make sure when the gate strikes the receiver the gate switch is activated.

After this is set you need to set all parameters to the values provided by the REI ECI PGO installation document. (See Fig. 57a)

Set to automatic before closing the PGO.

Parameters

Parameter	Setting
Close Speed	100
Cl slow speed	20
Cl braking pos	250
Close torque	170
Cl holding force	0
Open speed	100
Op slow speed	20
Op braking pos	250
Open torque	170
Op holding force	0
Acceleration	100
Deceleration	250
Nudge speed	30
Timeout	15
Reopen triggers	0
Auto Close	1

FIG. 57A



FIG. 57B

Wiring the ECI PGO

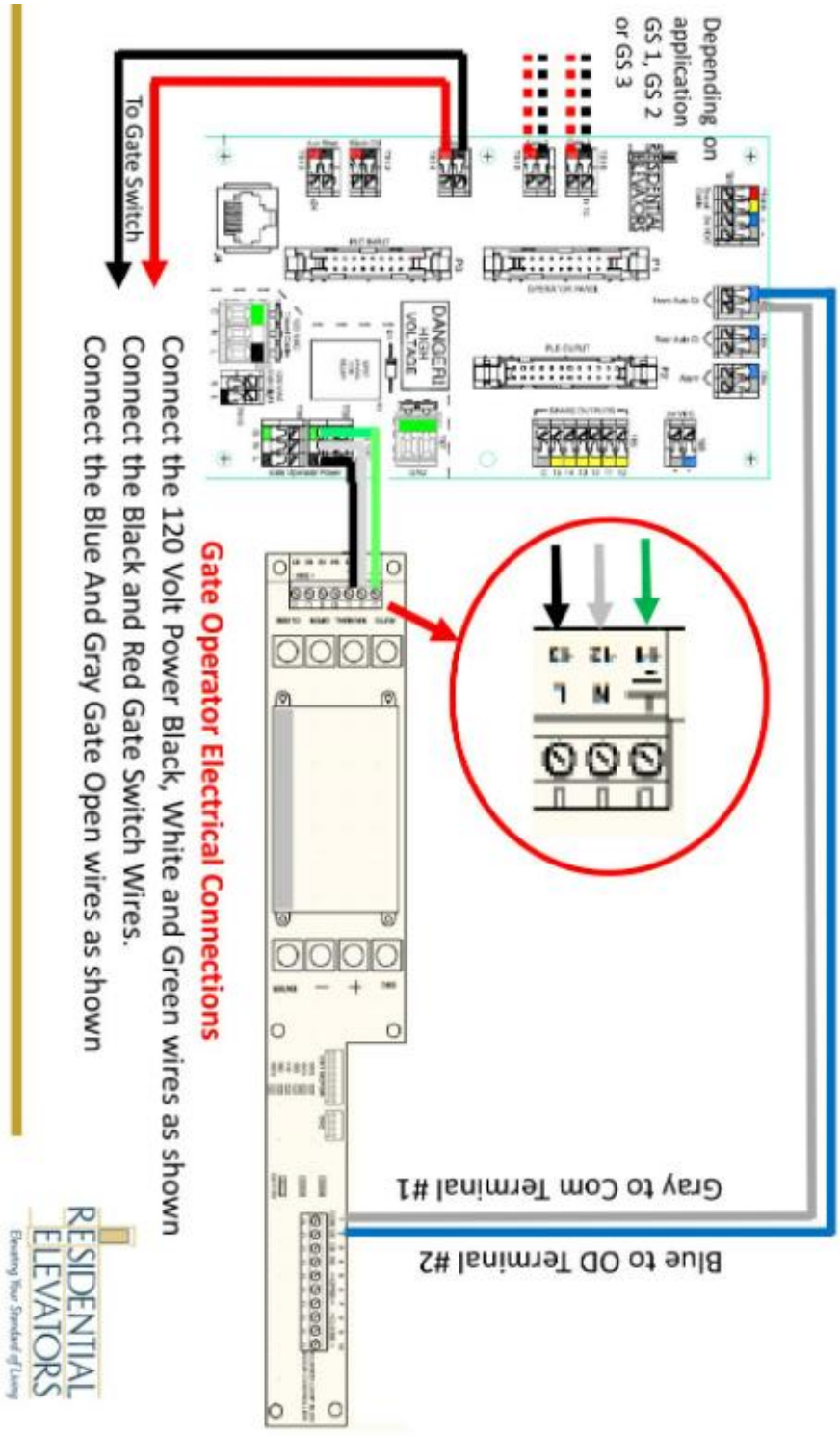


FIG. 58A

Car Bottom

Place car where the bottom of the car frame is accessible from the pit.

Install the safety activation arm using the hardware provided. Make sure the proper shoulder bolt and nut is used for the linkage to the safeties.

Note: Ensure that the shackle rods are no more than ¼" away from the activation arm. The shackle rods also should not be touching the activation arm.

Install a romex connector on to the slack cable switch and install the slack cable switch to the sling. Ensure that the proper mounting holes are being used and that the placement of the slack cable switch is where it will be activated by the activation arm.

Install the slack cable wire from the car top, feed the wire through the ¾" hole in the sling extension and staple to the car bottom. Make sure to leave a service loop. Use the red and black wire and install in N/C terminals in the switch.

If not already done, the pit-stop switch, and the float switch (if applicable) can be installed. Verify that these items will not come into contact with the car and will be at least ½" away from it. The Pit stop switch should be withing 18" from the landing and no more than 18" higher than the first landing flooring. These components shall not be near the travel cable loop.

Install the toe guard, place the toe guard on the threshold to where the top of it is ¼" away from the top of the threshold and is centered and covering the doorway. (See Fig. 59c)

Note: When installing toe guard, start from one end and then install the rest of the screws into the end of each of the next mounting hole. This will prevent bubbling by stretching the toe guard out.



FIG. 59A

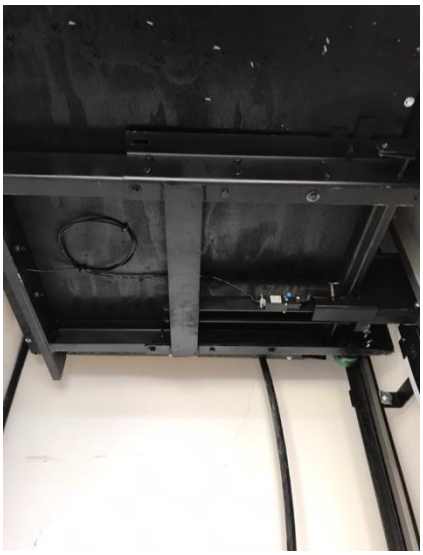


FIG. 59B



FIG. 59C

Touchscreen COP

When installing the Touchscreen Car Operator Panel, five wires will be needed:

1. USB Cable (Provided with job)
2. Encoder Cable (Provided with job)
3. Round 8 Conductor Cable
4. Round 4 Conductor Cable
5. Flat 4 Conductor Cable (Provided with job)

The wires need be fed down from the top of the car and cut to the necessary length, which should be just longer than the bottom of the COP enclosure.

Note: Ensure that the factory end of encoder cable can reach the encoder before cutting.

Note: The USB cable provided shall not be cut, as both factory sides are necessary for use.

When wiring any communication cables, it is imperative that the communication wires are following the most up to date protocol. See current wiring protocols below:

- The Round 4 Conductor Wire shall not have its shielding cut back more than 1 ½". The red and white wires must be twisted. This Applies to the cartop and COP side.
- The pink and grey wires coming from the encoder shall not be exposed outside of the shielding more than a 1 ½" and must be twisted.



FIG. 60A

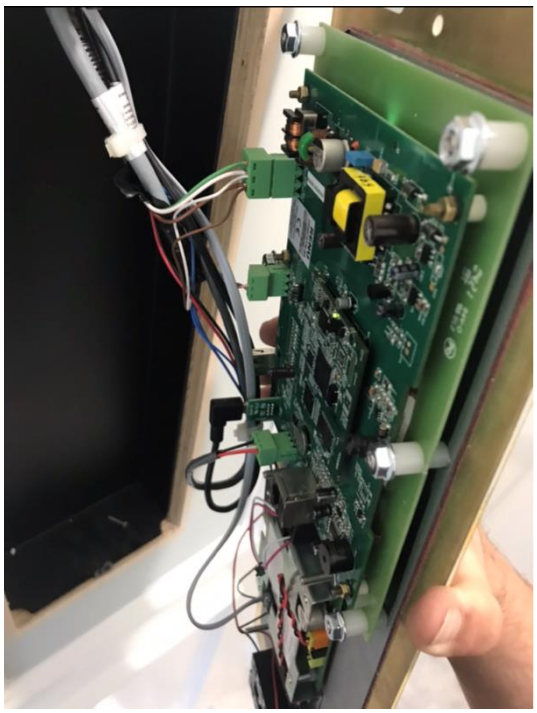


FIG. 60B

Touchscreen Wiring Connections

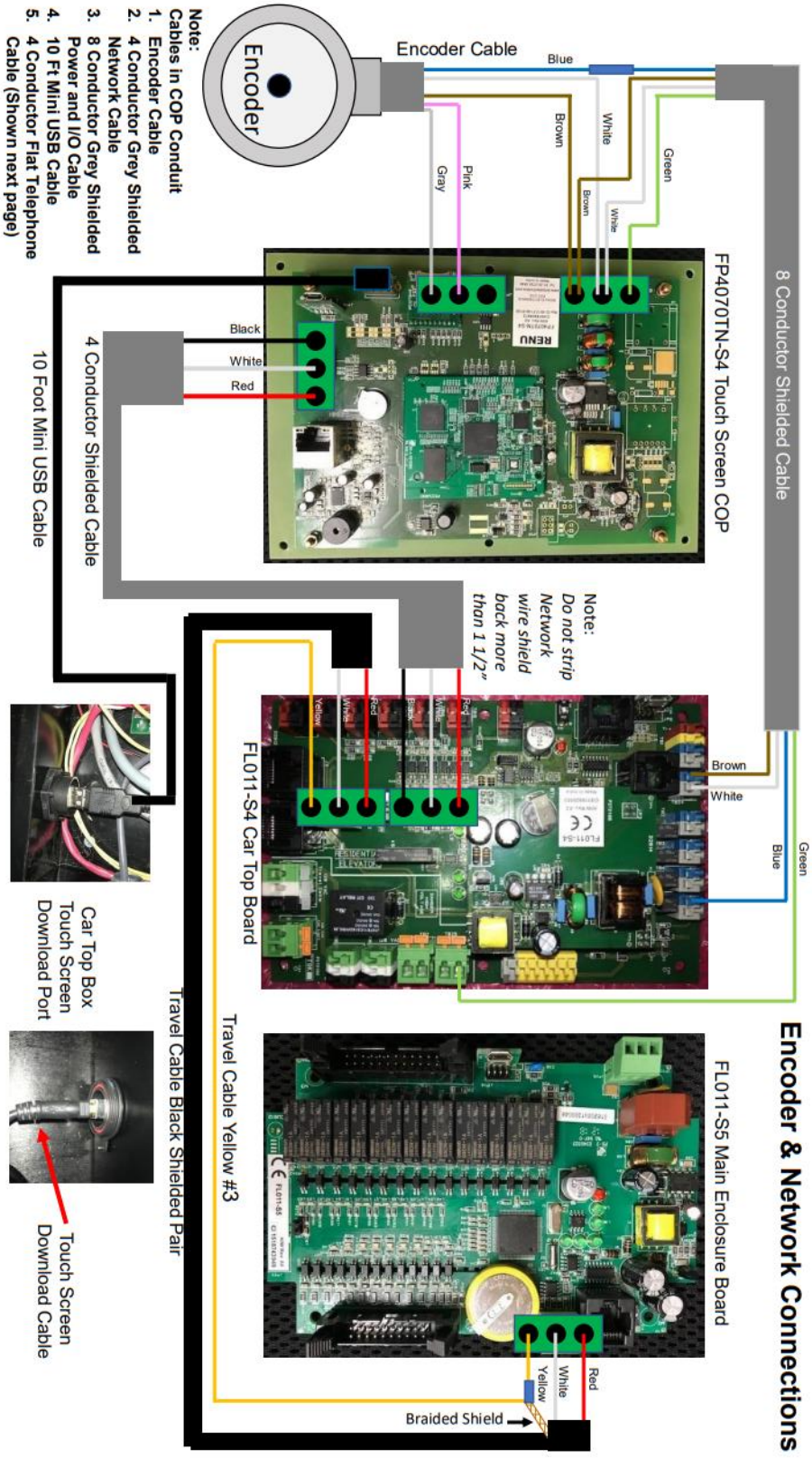


FIG. 61A

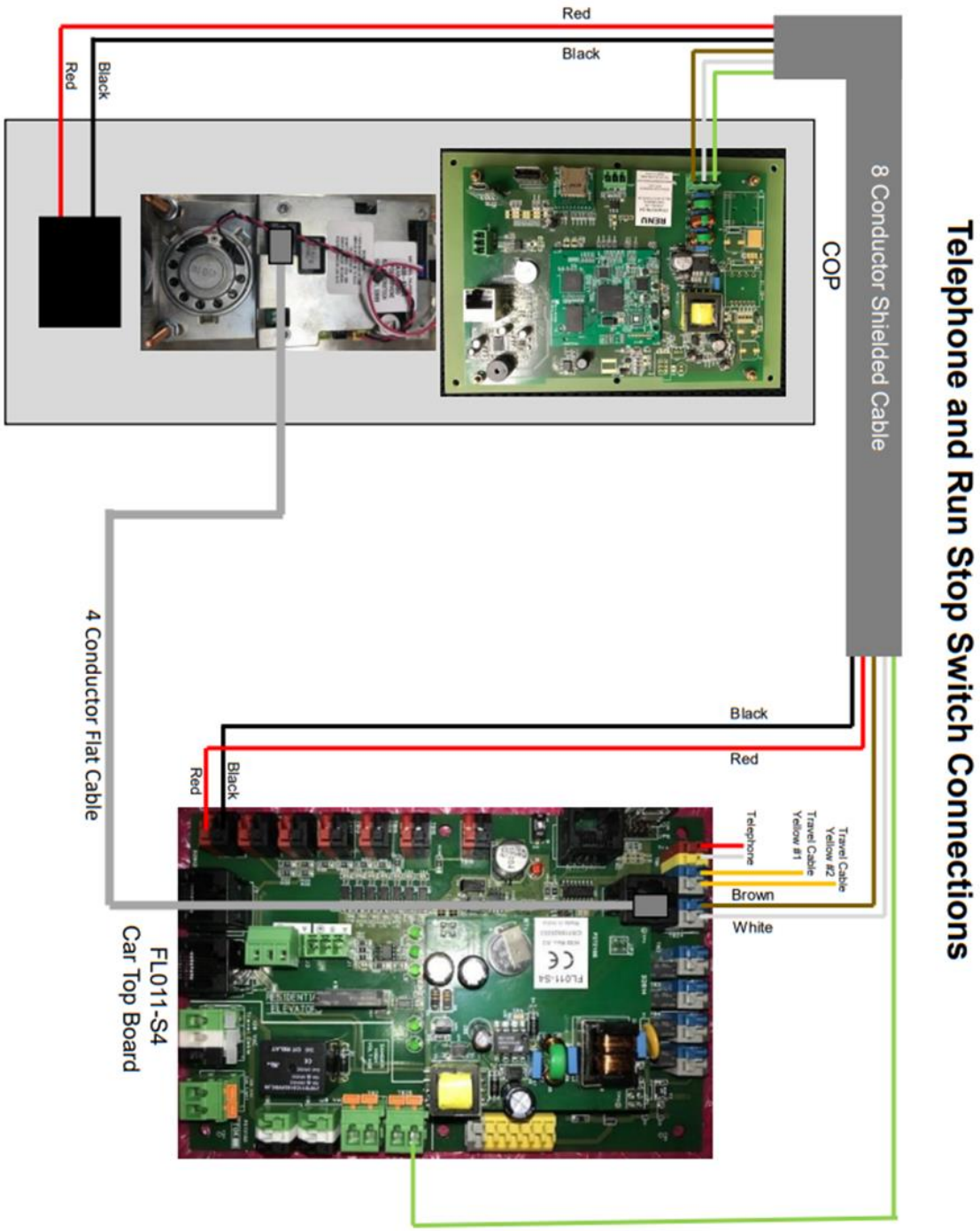

Red
Black
Red
Black
COP
8 Conductor Shielded Cable
Telephone and Run Stop Switch Connections
4 Conductor Flat Cable
Black
Red
Red
Black
Telephone
Travel Cable Yellow #2
Travel Cable Yellow #1
Brown
White
FL011-S4
Car Top Board

FIG. 62A

Programming and Startup

PnP Programming

The ETOOL will be used. Using FlexiDownload, Download the latest software in the main controller PLC first using the USB 2.0 port on the left side of the board. Ensure the ribbon cables are unplugged when downloading the software. Now, download the latest software to the Cartop PLC using the same port but on the cartop board. Once the software is downloaded, plug in the ribbon cables. Now use the troubleshooting/setup cable and plug it into the RJ45 Jack on the right side of the PLC. Use the Controller Manager application to now enable and setup the elevator. Refer to the JSDS to ensure all options are added accordingly. Once the elevator has been setup, enabled, and all safety circuits have been closed, it will begin to lower in slow speed to the closest floor. Once it reaches the landing, the elevator will need to be put into service mode.

Note: The run button must be unplugged prior to the programming process on a hydro and the two purple wires must be connected.

Note: Use extra caution and never enter the shaft without two safety circuits being open. For example, the door and gate being open.

Touchscreen Programming

Use the ETOOL to download software to the main controller PLC and the cartop PLC. Next download software into the touchscreen COP, then you will login and set up the elevator via the COP. Remember to refer to the JSDS to enable any options accordingly. Enable maintenance mode and check the I-monitor/Diagnostics screen to verify that everything is working properly. Now set the floor levels via COP then proceed to enable the elevator through the main controller using the ETOOL and controller manager. This will be done through the Enable Elevator tab and clicking the large red button.

Note: The touchscreen software is NOT the same as the PnP software. Always make sure the proper software is being used with the latest version.

Note: Remember to connect to the internet and sync your controller manager after every install.

Testing, Running, and Final Adjustments

Failure to properly test elevator safeties can result in injury of death.

Now begin the process of the running the car and start testing the operation of the system, during this process you will need to address the following items:

1. Final checking of the bottom eccentric rollers.

2. Final checking of the car frame guide shoes and tightening of jamb nuts.

3. Final filing and dressing of all rail joints and lubing of the T rail system. Address all ride quality issues and make sure all hardware is tight and secure.

4. Final adjustment of the reflector boards to the thresholds of each floor level. If touchscreen COP double check floor levels set.

5. Final testing of each hall station to ensure each operates properly.

6. Final testing of each door lock and keeper to ensure the lock operates properly when arriving at the floor level and the keeper is aligned properly to allow for proper opening and closing. Ensure that each door will only open when the car is at that floor.

Note: Double check all safety circuits for proper operation. Ensure that when a door or gate is open the elevator WILL NOT operate.

7. Final testing of COP to ensure it calls to each floor and that the emergency stop, light, and alarm switches work properly. Ensure the phone is hooked up properly.

8. Final testing of the gate switch to ensure when the gate is open more than 1/2” to 1” that the car stops during travel and will not move when sitting at a floor in the open position. Ensure that the gate alarm is working.

9. Testing of the Pit Stop switch and the Float Switch.

10. Testing of the CarTop Stop switch.

11. Testing of the FL Reset Key Switch and Access Door Switch (If Applicable)

12. Final testing and acceptance of any other options added at the time of programming.

13. Final testing of the emergency lowering system.

14. Final Adjustments to the Valve. Add below items after or during the full load test.

- Anticreep/Static Test: With a full load, ensure that the elevator does not lose pressure for 30 min.
- Empty Load: Pressure during travel with empty load.
- Working Pressure/Full Load: The pressure during travel with a full load.
- Pressure Relief: Run the elevator onto the stop ring and document the bypass pressure which should be 125% of the full load pressure. Adjust bypass S-adjustment if necessary. Plug back in PLC and reset system and check all safety circuits.
- Pipe rupture valve test: This is the overspeed test showed on pg. 65. Record the measurement that the car stops below the top landing.

15. Full load weight test and testing of the car safeties and slack switch. Including the drop test.

16. Check cable tensioning and verify with REI cable tensioning tool that both cables are equally tensioned. After this add the rope clips, zip-ties, electrical tape, and anti-spin. Make sure the nuts are pinched on the shackles and cotter pins are properly installed.

17. Review the minimum items to be painted; pit pan, bottom of cab and car frame assembly after the cab is built and the piston. Use a paint shield when doing any painting. Flat Black Paint is supplied with each job and should only be used, nothing else or any other color is acceptable. Do not get over spray on the walls and pit floor.

Weight, Drop, and Overspeed Test

Conduct the weight test in increments, start with 300 lbs., then do 600 lbs., then the full rated load of 950 lbs. Be sure to display your weights in a manner where they can all clearly be counted in the required weight test photo. Take a picture of the weights in the cab with the elevator 3'-5' off the first-floor level. Run the elevator with the full rated load to every floor several times.

With the full load rated capacity, place a hydraulic jack halfway extended in the pit and run the elevator down onto a 4x4 wooden post 5' long. Make sure the 4x4 post is positioned in the center of the cross member on the sling. Run the piston down until there is an appropriate amount of slack in the cables to simulate a slack cable condition. Release the pressure on the jack at this point. Once the cables have slack and the elevator is sitting on the safeties, ensure the safety activation arm has activated the slack cable switch. Be sure that the safeties properly set to the guide rails. Take a photo of the successful drop test.

Use your run button to raise the car off the safeties. Remove jack, 4x4 post, and any other tools used for the drop test from the hoistway used for drop test. Reset slack cable switch and disconnect the run button. Car is ready for operation at this point.

Note: At this time, make sure the platform has remained level

Overspeed Test.

While the elevator is at the top floor, with a full load, turn the down flow on the valve controller up to 11 GPM. Then call the elevator from the top floor to the first. The elevator should stop within a foot from the top landing and the velocity fuse should be engaged.

After this has been done, use the run button to disengage the velocity fuse. Disconnect the run button. Car is ready for operation at this point.

Now you may disconnect the run button and close the machine room.



FIG. 65A



FIG. 65B

Job Wrap Up

Final Clean Up

At the completion of the installation, you will need to clean and wipe down the cab, hoist way, pit, and preparation areas. Also wipe down doors, jambs, walls, and any other surface you have touched and left stains and/or marks on any surface.

Treat the home and job site as your own, always leave it cleaner than you found it. Clean the job site daily disposing of all trash and place it in a dumpster or receptacle provided on job site.

All trash should be placed in proper receptacle as needed during the install, if there is no receptacle on site, get with GC/HO on how trash is to be discarded.

Pictures

At the completion of each installation, several pictures of the installation will need to be taken, include photos of the items below, but it is encouraged to take as many as needed to document the install.

The following pictures are required at completion of each installation and must be added to the final checklist.

1. Finished Machine Room
2. Finished Cab (each panel)
3. Fully Closed Gate
4. Finished Car Top
5. Wiring inside cartop, controller, and behind the COP (if Touchscreen).
6. Finished Hoistway
7. Full Load Weight Test
8. Safety Activation Test
9. Equipment upon arrival
10. Each Landing Door open and closed including the LOP, flooring, door hardware and interlock.
11. Emergency Access Key location
12. Painted Piston, Pit Pan, and Car bottom.

Taking Measurements

Note door compliance measurements at each floor and take pictures of the measurements taken with a ruler. Submit these measurements along with the final checklist on each install.

Note: Door Compliance measurements should never be taken with a tape measure, they need to be taken with a ruler.

Disable elevator

Disable the Elevator unless all doors are in compliance and the elevator meets code.

Final Checklist

After completion of the install, the final checklist needs to be completed. The Final Checklist is to be completed before the installation mechanic leaves the jobsite. It is important to fill out the checklist completely and accurately. The install photos will be added to the final checklist.

Record Measurements Including:

- Voltage for House power, UPS, and Power supply
- Door Measurements
- Valve Pressures
- Velocity Fuse Measurement

Note on the final checklist the state the elevator was left in, whether the elevator was left on permanent power, and if it has permanent power.

Note in the final checklist any GC items, REI Items, and/or general notes on the job.

GC items are things the GC needs to address to get the elevator finished and enabled by the sales rep. Some items may be market specific, so know what is required in the market you are installing in. GC Items may Include:

- No Permanent Power
- No Active Phone Line
- No Access Door
- No Door Hardware
- No Finished Flooring

REI Items are things that REI needs to return to the job to complete. We should always be striving to not return to an install, however, in the occasion of an early install we may need to return to finish the job. REI items may include:

- Return to install interlocks
- Return to install gate

Billing

After Install is complete, submit the job for billing.

Glossary

This section defines various terms used in this code. In addition, some nomenclature and terminology used in the elevator industry and other ASME publications are defined.

access switch: *see hoistway access switch.*

alteration: any change to equipment, including its parts, components, and/or subsystems, other than maintenance, repair or replacement.

alteration, as part of an: a repair or replacement that is included with other work that is classified as an alteration.

approved: acceptable to the authority having jurisdiction.

authority having jurisdiction: the organization, office, or individual responsible for enforcement of this Code. Where compliance with this Code has been mandated by legislation or regulation, the "authority having jurisdiction" is the regulatory authority (*see regulatory authority*).

authorized personnel: persons who have been instructed in the operation of the equipment and designated by the owner to use the equipment.

auxiliary power lowering device: an alternatively powered auxiliary control system that will, upon failure of the main power supply, allow a hydraulic elevator to descend to a lower landing.

brake, driving machine, elevator, dumbwaiter, or material lift: an electromechanically or electro hydraulically released spring, or gravity applied device, that is part of the electric driving machine of the elevator, dumbwaiter, or material lift used to apply a controlled force at a braking surface to hold or retard the elevator, dumbwaiter, or material lift.

electro hydraulically released: a means of release in which an electric current applied to a solenoid valve or the motor of a hydraulic pump directs pressurized hydraulic fluid to an actuator (such as a hydraulic jack) that overcomes a resisting force (such as a spring) as long as the electric current flows.

electromechanically released: a means of release in which an electric current applied to an actuator (such as a solenoid) causes an electromagnetic force that overcomes a resisting force (such as a spring) as long as the electric current flows.

braking, electrically assisted: retardation of the elevator, assisted by energy generated by the driving-machine motor.

brake, emergency: a mechanical device independent of the braking system used to retard or stop an elevator should the car overspeed or move in an unintended manner. Such devices include, but are not limited to, those that apply braking force on one or more of the following:

a) car rails

b) counterweight rails

c) suspension or compensation ropes

d) drive sheaves

e) brake drums

braking system: driving-machine brake alone, or in combination with electrically assisted braking, that operates to slow down and stop the elevator.

buffer: a device designed to stop a descending car or counterweight beyond its normal limit of travel by storing or by absorbing and dissipating the kinetic energy of the car or counterweight.

oil buffer: a buffer using oil as a medium, that absorbs and dissipates the kinetic energy of the descending car or counterweight.

gas spring-return oil buffer: an oil buffer utilizing the pressure of a compressed gas to return the buffer plunger or piston to its fully extended position.

mechanical spring-return oil buffer: an oil buffer utilizing the force of the compressed mechanical spring or springs to return the buffer plunger or piston to its fully extended position.

oil buffer stroke: the oil-displacing movement of the buffer plunger or piston, excluding the travel of the buffer plunger accelerating device.

spring buffer: a buffer utilizing one or more springs to cushion the impact force of the descending car or counterweight.

spring buffer load rating: the load required to compress the spring buffer an amount equal to its stroke.

spring buffer stroke: the distance the contact end of the spring can move under a compressive load until all coils are essentially in contact or until a fixed stop is reached.

building code: an ordinance that sets forth requirements for building design and construction, or where such an ordinance has not been enacted, one of the following model codes:

a) International Building Code (IBC) b) Building Construction and Safety Code (NFPA 5000) c) National Building Code of Canada (NBCC)

bumper: a device, other than an oil or spring buffer, designed to stop a descending car or counterweight beyond its normal limit of travel by absorbing the impact.

cable, traveling: *see traveling cable.*

capacity: *see rated load.*

car door interlock: a device having two related and interdependent functions, which are

a) to prevent the operation of the driving machine by the normal operating device unless the car door is locked in the closed position.

b) to prevent the opening of the car door from inside the car unless the car is within the landing zone and is either stopped or being stopped.

car door or gate, power-closed: a door or gate that is closed by a door or gate power operator.

car door or gate electric contact: an electrical device, the function of which is to prevent operation of the driving machine by the normal operating device unless the car door gate is in the closed position.

car door or gate power closer: a device or assembly of devices that closes a manually opened car door or gate by power other than hand, gravity, springs, or the movement of the car.

car, dumbwaiter, material lift: the load-carrying unit that includes a platform or transfer device and may include an enclosure and / or car frame.

car, elevator: the load-carrying unit including its platform, carframe, enclosure, and car door or gate.

car enclosure: the top and the walls of the car resting on and attached to the car platform

car frame: the supporting frame to which the car platform, upper and lower sets of guide shoes, car safety, and the hoisting ropes or hoisting-rope sheaves, or the plunger or cylinder of a direct-acting elevator, are attached.

car frame, overslung: a car frame to which the hoisting rope fastenings or hoisting-rope sheaves are attached to the crosshead or top member of the car frame.

car frame, sub-post: a car frame all of whose members are located below the car platform.

car frame, underslung: a car frame to which the hoisting- rope fastenings or hoisting-rope sheaves are attached at or below the car platform.

car platform: the structure that forms the floor of the car and that directly supports the load.

car platform frame: a structural frame, composed of interconnecting members, that supports the car platform floor.

certified: see listed/certified.

certifying organization: an approved or accredited, independent organization concerned with product evaluation that maintains periodic inspection of production of listed/certified equipment or material and whose listing/certification states whether that equipment meets appropriate standards or has been tested and found suitable for use in a specified manner.
NOTE: For the purpose of this definition, accredited means that an organization has been evaluated and approved by an Authorized Agency to operate a Certification/Listing program and is designated as such in a publication of the Authorized Agency.

chain, suspension (hoisting): chain used to raise and lower a dumbwaiter or material lift car or its counterweight.

clearance, bottom car: the clear vertical distance from the pit floor to the lowest structural

or mechanical part, equipment, or device installed beneath the car platform, except guide shoes or rollers, safety jaw assemblies, and platform or guards, when the car rests on its fully compressed buffers.

clearance, top car, electric elevators: the shortest vertical distance between the top of the car crosshead, or between the top of the car where no crosshead is provided, and the nearest part of the overhead structure or any other obstruction when the car floor is level with the top terminal landing.

clearance, top car, hydraulic elevators: the shortest vertical distance within the hoistway between the horizontal plane described by the top of the car enclosure and the horizontal plane described by the lowest part of the overhead structure or other obstruction when the car floor is level with the top terminal landing.

clearance, top counterweight: the shortest vertical distance between any part of the counterweight structure and the nearest part of the overhead structure or any other obstruction when the car floor is level with the bottom terminal landing.

component rated pressure: the pressure to which a hydraulic component can be subjected.

control, motion: that portion of a control system that governs the acceleration, speed, retardation, and stopping of the moving member.

control, AC motor: a motion control that uses an alternating current motor to drive the machine.

control, AC motor, DC injection: a motion control for an AC motor that produces retardation torque by injecting a DC current into either a stator winding of the motor or a separate eddy-current brake.

control, single speed AC: a motion control for an AC motor that has a single synchronous speed.

control, two speed AC: a motion control for an AC motor that has two different synchronous speeds by connecting the motor windings so as to obtain a different number of poles.

control, variable voltage, variable frequency (VVVF): a motion control that changes the magnitude and frequency of the voltage applied to the motor.

control, variable voltage AC (VVAC): a motion control for an AC motor that varies the amount and direction of output torque by controlling the magnitude and phase sequence of the voltage to the motor.

control, DC motor: a motion control that uses a DC motor to drive the machine.

control, dual bridge thyristor converter: a motion control for a DC motor that supplies the armature with variable voltage of either polarity, and is capable of current flow in both directions.

control, generator field: a motion control that is accomplished by the use of an individual generator for each driving-machine motor wherein the voltage applied to the motor armature is adjusted by varying the strength arid direction of the generator field current.

control, multivoltage: a motion control that is accomplished by impressing successively on the armature of the driving-machine motor a number of substantially fixed voltages such as may be obtained from multi- commutator generators common to a group of elevators.

control, rheostatic: a motion control that is accomplished by varying resistance and/or reactance in the armature and/or field circuit of the driving-machine motor.

control, single bridge thyristor converter: a motion control for a DC motor that supplies the armature with variable voltage of fixed polarity. The field is reversed to control direction and to cause regeneration.

control, electrohydraulic: a motion control in which the acceleration, speed, retardation, and stopping are governed by varying fluid flow to the hydraulic jack.

control, static: a motion control in which control functions are performed by solid-state devices.

control, operation: that portion of a control system that initiates the starting, stopping, and direction of motion, in response to a signal from an operating device.

operation, automatic: operation control wherein the starting of the elevator, dumbwaiter, or material lift car is effected in response to the momentary actuation of operating devices at the landing, and/or of operating devices in the car identified with the landings, and/or in response to an automatic starting mechanism, and wherein the car is stopped automatically at the landings.

operation, group automatic: automatic operation of two or more nonattendant elevators equipped with power- operated car and hoistway

doors. The operation of the cars is coordinated by a supervisory control system including automatic dispatching means whereby selected cars at designated dispatching points automatically close their doors and proceed on their trips in a regulated manner. It includes one button in each car for each floor served and “UP” and “DOWN” buttons at each landing (single buttons at terminal landings). The stops set up by the momentary actuation of the car buttons are made automatically in succession as a car reaches the corresponding landing, irrespective of its direction of travel or the sequence in which the buttons are actuated. The stops set up by the momentary actuation of the landing buttons may be accomplished by any elevator in the group, and are made automatically by the first available car that approaches the landing in the corresponding direction.

operation, non selective collective automatic: automatic operation by means of one button in the car for each landing served and one button at each landing, wherein all stops registered by the momentary actuation of landing or car buttons are made irrespective of the number of buttons actuated or of the sequence in which the buttons are actuated. With this type of operation, the car stops at all landings for which buttons have been actuated, making the stops in the order in which the landings are reached after the buttons have been actuated, but irrespective of Its direction of travel.

operation, selective collective automatic: automatic operation by means of one button in the car for each landing served and by “UP” and “DOWN” buttons at the landings, wherein all stops registered by the momentary actuation of the car buttons are made as defined under nonselective collective automatic operation, but wherein the stops registered by the momentary actuation of the landing buttons are made in the order in which the landings are reached in each direction of travel after the buttons have been actuated. With this type of operation, all “UP” landing calls are answered when the car is traveling in the up direction and all “DOWN” landing calls are answered when the car is traveling in the down direction, except in the case of the uppermost or lowermost calls, that are answered as soon as they are reached, irrespective of the direction of travel of the car.

operation, single automatic: automatic operation by means of one button in the car for each landing served and one button at each landing, so arranged that if any car or landing button has been actuated the actuation of any other car or landing operating button will have no effect on the operation of the car until the response to the first button has been completed.

operation, car switch: operation control wherein the movement and direction of travel of the car are directly and solely under the control of the attendant by means of a manually operated car switch or of continuous- pressure buttons in the car.

operation, car switch automatic floor-stop: operation in which the stop is initiated by the attendant from within the car with a definite reference to the landing at which it is desired to stop, after which the slowing down and stopping of the elevator is effected automatically.

operation, continuous-pressure: operation control by means of buttons or switches in the car and at the landings, any one of which may be used to control the movement of the car as long as the button or switch is manually maintained in the actuating position.

operation, preregister: operation control in which signals to stop are registered in advance by buttons in the car and at the landings. At the proper point in the car travel, the attendant in the car is notified by a signal, visual, audible, or otherwise, to initiate the stop, after which the landing stop is automatic.

operation, signal: operation control by means of single buttons or switches (or both) in the car, and “UP” or “DOWN” direction buttons (or both) at the landings, by which predetermined landing stops may be set up or registered for an elevator or for a group of elevators. The stops set up by the momentary actuation of the car buttons are made automatically in succession as the car reaches those landings, irrespective of its direction of travel or the sequence in which the buttons are actuated. The stops set up by the momentary actuation of the “UP” and “DOWN” buttons at the landing are made automatically by the first available car in the group approaching the landings in the corresponding direction, irrespective of the sequence in which the buttons are actuated. With this type of operation, the car can be started only by means of a starting switch or button in the car.

control room, elevator, dumbwaiter, material lift: an enclosed control space outside the hoistway, intended for full bodily entry that contains the motor controller. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift but not the

electric driving machine or the hydraulic machine.

control space, elevator, dumbwaiter, material lift: a space inside or outside the hoistway, intended to be accessed with or without full bodily entry. that contains the motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift but not the electric driving machine or the hydraulic machine.

control system: the overall system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the moving member.

controller: a device or group of devices that serves to control in a predetermined manner the apparatus to which it is connected.

controller, motion: an operative unit comprising a device or group of devices for actuating the moving member.

controller, motor: the operative units of a motion control system comprising the starter devices and power conversion equipment required to drive an electric motor.

controller, operation: an operative unit comprising a device or group of devices for actuating the motion control.

door: the movable portion(s) of an entrance that closes the openings. It consists of one or more solid face panels that are permitted to be equipped with a vision panel.

door, horizontally sliding: a door that moves horizontally.

center-opening: a horizontally sliding door consisting of two panels, so arranged to open away from each other.

center-opening, multiple-speed: a horizontally sliding door consisting of more than two panels, so arranged that the panels or groups of panels open away from each other.
door, folding: a hinged door consisting of two or more panels that fold and move horizontally.

multiple speed: a horizontally sliding door with two or more panels, so arranged to open away from one side.
single-speed: a one-panel horizontally sliding door.

door or gate, manually operated: a door or gate that is opened and closed by hand.
door or gate, power-operated: a door or gate that is opened and closed by a door or gate power-operator.

door or gate, self-closing: a manually opened door or gate that closes when released.
door, swinging: a door that pivots around a vertical axis. door, vertically sliding: a counterweighted or counterbalanced door consisting of one or more panels that move vertically to open or close.

door, vertically sliding sequence operation: where the opening and closing relationship of the car and hoistway doors do not occur simultaneously.

door, biparting: a vertically sliding door consisting of two or more sections, so arranged that the sections or groups of sections open away from each other, door,
wraparound: a horizontally sliding door that bends around a car enclosure.

door locked out of service: a hoistway entrance in which the door is mechanically locked by means other than the interlock to prevent the door being opened from the car side without keys or special equipment.

door or gate closer: a device that closes a door or gate by means of a spring or gravity

door or gate electric contact: an electrical device, the function of which is to prevent operation of the driving machine by the normal operating device unless the door or gate is in the closed position.

door or gate power operator: a device or assembly of devices that opens a hoistway door(s) and/or a car door or car gate by power other than hand, gravity, springs, or the movement of the car; and that closes them by power other than hand, gravity or the movement of the car.

dumbwaiter: a hoisting and lowering mechanism equipped with a car of limited size that moves in guide rails and serves two or more landings that is used exclusively for carrying materials and is classified by the following types.

dumbwaiter, hand: a dumbwaiter utilizing manual energy to move the car.

dumbwaiter, power: a dumbwaiter utilizing energy other than gravitational or

manual to move the car.

dumbwaiter, electric: a power dumbwaiter where the energy is applied by means of an electric driving machine.

dumbwaiter, hydraulic: a power dumbwaiter where the energy is applied, by means of a liquid under pressure, in a cylinder equipped with a plunger or piston.

dumbwaiter, direct-plunger hydraulic: a hydraulic dumbwaiter having a plunger or cylinder directly attached to the car frame or platform.

dumbwaiter, electrohydraulic: a direct-plunger dumbwaiter where liquid is pumped under pressure directly into the cylinder by a pump driven by an electric motor.

dumbwaiter, maintained-pressure hydraulic: a direct- plunger dumbwaiter where liquid under pressure is available at all times for transfer into the cylinder.

dumbwaiter, roped-hydraulic: a hydraulic dumbwaiter having its piston connected to the car with wire rope.

dumbwaiter, undercounter: a dumbwaiter that has its top terminal landing located underneath a counter.

elevator: a hoisting and lowering mechanism, equipped with a car, that moves within guides and serves two or more landings and is classified by the following types NOTE: See 1.1.2, Equipment Not Covered by this Code.

elevator, freight: an elevator used primarily for carrying freight and on which only the operator and the persons necessary for unloading and loading the freight are permitted to ride.

NOTE (elevator, freight): Its use is subject to the modifications specified in 2.16. *elevator, hand:* an elevator utilizing manual energy to move the car.

elevator, inclined: an elevator that travels at an angle of inclination of 70 deg or less from the horizontal.

elevator, mine: an elevator installed in the mine hoistway, used to provide access to the mine for personnel, materials, equipment, and supplies. To meet the requirements of a mine elevator, the components must be designed and installed in conformance to Part 2 of this Code, except as modified in 5.9. Mine elevators are similar to electric passenger elevators but are modified to operate in the mine environment.

elevator, multicompartment: an elevator having two or more compartments located one above the other.

elevator, observation: an elevator that permits exterior viewing by passengers while the car is traveling.

elevator, passenger: an elevator used primarily to carry persons other than the operator and persons necessary for loading and unloading.

elevator, power: an elevator utilizing energy other than gravitational or manual to move the car,

elevator, electric: a power elevator where the energy is applied by means of an electric driving machine.

elevator, hydraulic: a power elevator in which the energy is applied, by means of a liquid under pressure, in a hydraulic jack.

elevator, direct-acting hydraulic: a hydraulic elevator in which the energy is applied by a direct hydraulic driving machine.

elevator, electrohydraulic: a hydraulic elevator in which liquid under pressure is supplied by a hydraulic machine.

elevator, maintained-pressure hydraulic: a direct- acting hydraulic elevator in which liquid under pressure is available at all times for transfer into the hydraulic jack.

elevator, roped-hydraulic: a hydraulic elevator in which the energy is applied by a roped-hydraulic driving machine.

elevator, limited-use/limited-application: a power passenger elevator in which the use and application is limited by size, capacity, speed, and rise.

elevator, private residence: a power passenger elevator that is limited in size, capacity, rise, and speed, and is installed in a private residence or in a multiple dwelling as a means of access to a private residence.

elevator, rack-and-pinion: a power elevator with or without a counterweight that is supported, raised, and lowered by a motor or motors that drive a pinion or pinions on a stationary rack mounted in the hoistway.

elevator, rooftop: a power passenger or freight elevator operating between a landing at roof level and landings below. It opens onto the exterior roof level of a building through a horizontal opening.

elevator, screw column: a power elevator having an uncounterweighted car that is supported, raised, and lowered by means of a screw thread.

elevator, shipboard: lifting equipment installed in ships, in offshore drilling rigs, or offshore oil production platforms for the purpose

of transporting personnel, maintenance equipment, and ship stores that serves defined landing levels; comprised of an enclosed car running between rigid guides, the dimensions and means of construction of which permit the access of persons.

elevator, sidewalk: an elevator of the freight type operating between a landing in a sidewalk or other exterior area and floors below the sidewalk or grade level. It opens onto the exterior area through a horizontal opening.

elevator, special purpose personnel: an elevator that is limited in size, capacity, and speed, and permanently installed in structures such as grain elevators, radio antenna, bridge towers, underground facilities, dams, power plants, and similar structures to provide vertical transportation of authorized personnel and their tools and equipment only.

elevator, used for construction: an elevator being used temporarily, only for construction purposes.

elevator personnel: persons who have been trained in the construction, maintenance, repair, inspection, or testing of equipment.

emergency signal device: a device that can be operated from within the elevator car to inform persons outside the hoistway that help is required.

emergency stop switch: a device located as required and readily accessible for operation, that, when manually operated, causes the electric power to be removed from the driving-machine motor and brake of an electric elevator; or from the electrically operated valves and pump motor of a hydraulic elevator; or of a dumbwaiter; or of a material lift.

enforcing authority: see authority having jurisdiction and regulatory authority.

engineering test*:* a test carried out by or witnessed by a registered or licensed professional engineer, testing laboratory, or certifying organization to ensure conformance to Code requirements.

entrance assembly, elevator, dumbwaiter, or material lift: the protective assembly that closes the hoistway openings normally used for loading and unloading, including the door panel(s), gate(s), transom panel, fixed side panel, gibs/guides, sill/sill structure, header, frame, and entrance hardware assembly, if provided.

entrance assembly, horizontally sliding type: an entrance assembly in which the door(s) slides horizontally.

entrance assembly, swinging type: an entrance assembly in which the door(s) swings around vertical hinges.

entrance assembly, vertically sliding type: an entrance assembly in which the door(s) slides vertically.

entrance frame, applied: see applied frame entrance.

entrance hardware assembly: the track(s), hangers, drive arms, pendant bolts, chains, belts, cables, sheaves, pulleys, hinges, vertically sliding guide shoes, and related hardware that are necessary to suspend and maintain the position of the doors within the entrance assembly.

factor of safety: the ratio of the ultimate strength to the working stress of a member under maximum static loading, unless otherwise specified in a particular requirement.

fail safe: a characteristic of a system or its elements whereby any failure or malfunction affecting safety will cause the system to revert to a state that is known to be safe.

fire barrier: a fire-resistance-rated vertical or horizontal assembly of material designed to restrict the spread of fire in which the openings are protected.

fire-protection rating: a designation indicating the duration of the fire test exposure to which a fire door assembly (entrance) was exposed and for which it met all the acceptance criteria as determined in accordance with a recognized fire test standard. Ratings are stated in hours or minutes.

fire-resistance rating: a designation indicating the duration of the fire test exposure to which components of building construction (walls, floors, roofs, beams, and columns) are exposed and for which it met all the acceptance criteria as determined in accordance with a recognized fire test standard. Ratings are stated in hours or minutes.

fire-resistive construction: a method of construction that prevents or retards the passage of hot gases or flames, specified by the building code.

gate: the moveable portion(s) of an entrance that closes the opening. A gate has through openings.
horizontally sliding collapsible gate: a series of horizontally sliding vertical members, joined by a scissors- like linkage that allows the assembly to collapse.
horizontally sliding non-collapsible gate: a non-collapsible assembly consisting of one or more sections that slide horizontally.
vertically sliding gate: a counterweighted or counterbalanced assembly, consisting of one or more sections that move vertically to open or close.

gate, semiautomatic: a gate that is opened manually and that is closed automatically as the car leaves the landing.

governor: see speed governor.

governor pull-through tension (force): the magnitude of the tensile load developed in the moving governor rope after the governor rope retarding means is actuated.

governor rope retarding: a mechanical means of developing a sufficient force in the governor rope to activate the car or counterweight safeties or to trip the governor rope releasing carrier, where used. Such mechanical means include, but are not limited to, rope-gripping jaws, clutch mechanisms, and traction arrangements.

hoistway (shaft), elevator, dumbwaiter, or material lift: an opening through a building or structure for the travel of elevators, dumbwaiters, or material lifts, extending from the pit floor to the roof or floor above.
hoistway, blind: the portion of a hoistway where hoistway entrances are not provided.
hoist way, multiple: a hoistway with more than one elevator, dumbwaiter, or material lift.
hoistway, single: a hoistway with a single elevator, dumbwaiter, or material lift.

hoistway door: see door.

hoistway door electric contact: see door or gate electric contact.

hoistway door or gate locking device: a device that secures a hoistway door or gate in the closed position and prevents it from being opened from the landing side except under certain specified conditions.
hoistway door combination mechanical lock and electric contact: a combination mechanical and electrical device with two related, but entirely independent functions, that are
(a) to prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position
(b) to lock the hoistway door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone
NOTE: As there is no positive mechanical connection between the electric contact and the door locking mechanism, this device ensures only that the door will be closed, but not necessarily locked, when the car leaves the landing. Should the lock mechanism fail to operate as intended when released by a stationary or retiring car-cam device, the door can be opened from the landing side even though the car is not at the landing. If operated by a stationary car-cam device, it does not prevent opening the door from the landing side as the car passes the floor.
hoistway door interlock: a device having two related and interdependent functions, that are:
(a) to prevent the operation of the driving machine by the normal operating device unless the hoistway door is locked in the closed position
(b) to prevent the opening of the hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped
hoistway door interlock retiring cam device: a device that consists of a retractable cam and its actuating mechanism and that is entirely independent of the car door or hoistway door power operator.
hoistway gate separate mechanical lock: a mechanical device the function of which is to lock a hoistway gate in the closed position after the car leaves a landing and prevent the gate from being opened from the landing side unless the car is within the landing zone.

hoistway enclosure: the fixed structure, consisting of vertical walls or partitions, that

isolates the hoistway from all other areas or from an adjacent hoistway and in which entrances are installed. All other areas or from an adjacent hoistway and in which entrances are installed.

hydraulic jack: a unit consisting of a cylinder equipped with a plunger (ram) or piston, that applies the energy provided by a liquid under pressure.

hydraulic machine: a unit consisting of pump, motor, valves, and associated internal piping, that converts electrical energy and supplies it as a liquid under pressure.

in-car stop switch: a device located in the car and accessible for operation by elevator personnel only, that, when manually operated, causes the electric power to be removed from the driving-machine motor and brake of an electric elevator or from the electrically operated valves and pump motor of a hydraulic elevator.

installation: a complete elevator, dumbwaiter, escalator, material lift, or moving walk, including its hoistway, hoistway enclosures and related construction, and all machinery and equipment necessary for its operation.

installation, existing: an installation that has been completed or is under construction prior to the effective date of this Code.

installation, new: any installation not classified as an existing installation by definition, or an existing elevator, dumbwaiter, escalator, material lift, inclined lift, or moving walk moved to a new location subsequent to the effective date of this Code.

interlock: see car door interlock and hoist way door interlock.

labeled/marked: equipment or material to which has been attached a label, symbol, or other identifying mark of an approved or accredited in dependent certifying organization, concerned with product evaluation, that maintains periodic inspection of production of labeled/ marked equipment or material, and by whose labeling/ marking the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

landing, dumbwaiter: that portion of a floor, balcony, platform, or landing door used to discharge and receive materials.

landing, elevator or material lift: that portion of a floor, balcony, or platform used to receive and discharge passengers or freight.

landing, bottom terminal: the lowest landing served by the elevator or material lift that is equipped with a hoistway entrance.

landing, top terminal: the highest landing served by the elevator or material lift that is equipped with a hoistway entrance.

landing, next available: the first landing in the direction of travel that the elevator is electrically and mechanically capable of serving with a normal slowdown and stop.

landing zone: a zone extending from a point 450 mm (18 in.) below a landing to a point 450 mm (18 in.) above the landing.

leveling: controlled car movement toward the landing, within the leveling zone, by means of a leveling device, that vertically aligns the car platform sill relative to the hoistway landing sill to attain a predetermined accuracy.

leveling device, elevator, dumbwaiter, or material lift car: the portion of a motion control system comprised of a device or group of devices that, either automatically or under control of the operator, initiates leveling, and automatically stops the car at the landing.

leveling device, anticreep: a leveling device used on hydraulic elevators to correct automatically a change in car level caused by leakage or contraction of fluid in the hydraulic system.

leveling device, inching: a leveling device that is controlled by the operator by means of continuous- pressure switches.

leveling device, one-way automatic: a device that corrects the car level only in case of under-run of the car, but will not maintain the level during loading and unloading.

leveling device, two-way automatic maintaining: a device that corrects the car level on both under-run and overrun, and maintains the level during loading and unloading.

leveling device, two-way automatic nonmaintaining: a device that corrects the car level on both under-run and over-run but will not maintain the level during loading and unloading.

leveling zone: the limited distance above or below an elevator, dumbwaiter, or material lift landing within which the leveling device is

permitted to cause movement of the car toward the landing.

listed/certified: equipment or materials accepted for inclusion in a publication by a certifying organization.

load, dynamic: the load applied as a result of acceleration or deceleration.

load, impact: a suddenly applied load.

load, static: the load applied as a result of the weight.

machine driving: the power unit that applies the energy necessary to drive an elevator or other equipment covered by the scope of this Code.

driving machine, electric: a driving machine in which the energy is applied by an electric motor. It includes the motor, driving-machine brake, and the driving sheave or drum, together with its connecting gearing, belt, or chain, if any.

driving machine, direct: an electric driving machine, the motor of which is directly connected mechanically to the driving sheave, drum, or shaft without the use of belts or chains, either with or without intermediate gears.

geared driving machine: a direct driving machine in which the energy is transmitted from the motor to the driving sheave, drum, or shaft through gearing.

winding drum machine: a geared driving machine in which the suspension ropes are fastened to and wind on a drum.

traction machine: a direct driving machine in which the motion of a car is obtained through friction between the suspension ropes and a traction sheave.

geared traction machine: a geared-drive traction machine.

gearless traction machine: a traction machine, without intermediate gearing, that has the traction sheave and the brake drum mounted directly on the motor shaft.

worm-geared machine: a direct driving machine in which the energy from the motor is transmitted to the driving sheave or drum through worm gearing.

driving machine, indirect: an electric driving machine, the motor of which is connected indirectly to the driving sheave, drum, gear reducer, or shaft by means of a belt drive or chain drive.

belt driving machine: an indirect driving machine equipped with a belt system as the connecting means.

chain driving machine: an indirect driving machine with a chain system as the connecting means.

driving machine, rack-and-pinion: an electric driving machine in which the motion of the car is obtained by a power-driven rotation pinion(s) mounted on the car, traveling on a stationary rack mounted in the hoistway.

driving machine, screw: an electric driving machine, the motor of which drives a nut on a vertical screw or rotates a vertical screw to raise or lower an elevator car.

driving machine, chain, dumbwaiter or material lift: a driving machine in which the motion of a car is obtained through a connection between a driven sprocket and the suspension chains.

driving machine, hydraulic: a driving machine in which the energy is provided by a hydraulic machine and applied by a hydraulic jack.

chain-hydraulic drive machine: a hydraulic driving machine in which the drive member of the hydraulic jack is connected to the car by chains or indirectly coupled to the car by means of chains and sprockets.

direct hydraulic driving machine: a hydraulic driving machine in which the driving member of the hydraulic jack is directly attached to the car frame or platform.

roped-hydraulic driving machine: a hydraulic driving machine in which the driving member of the hydraulic jack is connected to the car by wire ropes or indirectly coupled to the car by means of wire ropes and sheaves. It includes multiplying sheaves, if any, and their guides.

machine room and control room, remote, elevator, dumbwaiter, material lift: a machine room or control room that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

machine room, elevator, dumbwaiter, material lift: an enclosed machinery space outside the hoistway, intended for full bodily entry, that contains the electric driving machine or the hydraulic machine. The room could also contain electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift.

machine space, elevator, dumbwaiter, material lift: a space inside or outside the hoistway, intended to be accessed with or without full bodily entry that contains elevator, dumbwaiter, or material lift mechanical equipment, and could also contain electrical equipment used directly in connection with the elevator, dumbwaiter, or material lift. This space could also contain the electric driving machine or the hydraulic machine.

machinery space and control space, remote, elevator, dumbwaiter, material lift: a machinery space or control space that is not within the hoistway, machine room, or control room, and that is not attached to the outside perimeter or surface of the walls, ceiling, or floor of the hoistway.

main floor: the floor providing normal egress from a building.

maintained pressure: the hydraulic pressure between the pressure source and the control valves of a maintained pressure hydraulic elevator.

maintenance: a process of routine examination, lubrication, cleaning, and adjustment of parts, components, and/or subsystems for the purpose of ensuring performance in accordance with the applicable Code requirements. (See also repair and replacement.)

manually (manual) reset, elevator:
(a) a type or feature of an elevator part or component that, when actuated, requires intervention of a person in order to reinstate it to its non-actuated state.
(b) a type of action required to be taken by a person to reinstate an elevator part or component from an actuated state to its non-actuated state.

may: indicates permission, not a mandatory requirement.

mechanical lock: see hoistway door combination mechanical lock and electric contact and hoistway gate separate mechanical lock.

modernization: see *alteration*

normal stopping means: that portion of the operation control that initiates stopping of the car in normal operation at landings.

operating device: the car switch, push buttons, key or toggle switches, or other devices used to actuate the operation control.

operating speed in the down direction: the speed at which a hydraulic elevator, dumbwaiter, or material lift is set to lower with rated load.

operation, inspection: a special case of continuous-pressure operation used for troubleshooting, maintenance, repair, adjustments, rescue, and inspection.

overhead structure: all the structural members, walls, platforms, etc., supporting the elevator machinery, sheaves, and equipment at the top of the hoistway.

periodic tests, category: a grouping of tests performed at common time intervals required by the authority having jurisdiction.

Phase I Emergency Recall Operation: the operation of an elevator where it is automatically or manually recalled to the recall level and removed from normal service because of activation of firefighters' emergency operation.

Phase II Emergency In-Car Operation: the operation of an elevator by firefighters where the elevator is under their control.

piston: a short cylindrical member that is provided with a sealing means that travels with the member within a hydraulic cylinder. Pistons may be coupled to the elevator, dumbwaiter, or material lift by a coupling means that passes through a sealing means provided in the cylinder head.

piston, rod: the coupling means between the piston and its driven member.

pit, elevator: the portion of a hoistway extending from the sill level of the bottom terminal landing to the floor at the bottom of the hoistway.

plunger (ram): a long cylindrical compression member that is directly or indirectly coupled to

the car frame. This member is not provided with a sealing means. Where used in assembly with a cylinder, the sealing means is provided on the cylinder head. In the case of telescopic plungers and cylinders, a sealing means may be used in the moving plunger, that is also a cylinder.

position indicator: a device that indicates the position of the elevator, dumbwaiter, or material lift car in the hoistway. It is called a hail position indicator when placed at a landing or a car position indicator when placed in the car.

power unit, hydraulic: see hydraulic machine.

pressure piping: the piping for a hydraulic elevator between the pump and the hydraulic jack.

private residence: a separate dwelling or a separate apartment in a multiple dwelling that is occupied only by the members of a single family unit.

private residence elevator: see elevator.

rated load, elevator, dumbwaiter, material lift, or escalator: the load that the equipment is designed and installed to lift at the rated speed.

rated load performance: the operation of the elevator with its rated load at rated speed.

rated speed: the speed at which the elevator, dumbwaiter, escalator, moving walk, or material lift is designed to operate under the following conditions:

elevator, dumbwaiter, or material lift: the speed in the up direction with rated load in the car. (See also operating speed in the down direction.)

escalator: the rate of travel of the steps, measured along the centerline of the steps in the direction of travel, with rated load on the steps. In the case of a reversible escalator, the rated speed shall be the rate of travel of the steps in the up direction, measured along the centerline of the steps on the incline, with rated load on the steps.

moving walk: the rate of travel of the treadway, horizontally or at an incline, with rated load on the treadway. In the case of reversible inclined moving walks, the rated speed is the rate of travel of the treadway in the up direction, measured along the centerline of the treadway surface in the direction of travel, with rated load on the treadway.

readily accessible: capable of being reached quickly for operation, renewal, or inspection, without requiring those to whom ready access is a requisite to climb over or remove obstacles or resort to portable ladders, chairs, etc.

recall level: the designated or alternate level that cars are returned to when Phase I Emergency Recall Operation is activated.

regulatory authority: the person or organization responsible for the administration and enforcement of the applicable legislation or regulation governing the design, construction, installation, operation, inspection, testing, maintenance, or alteration of equipment covered by this Code. (See also authority having jurisdiction.)

rehabilitation: see *alteration; maintenance; repair*; and *replacement.*

remote machine and control rooms: rooms that do not share a common wall, floor, or ceiling with the hoistway.

repair: reconditioning or renewal of parts, components, and/or subsystems necessary to keep equipment in compliance with applicable Code requirements. (See also *replacemen*t and *maintenance*.)

replacement: the substitution of a device or component and/or subsystems, in its entirety with a unit that is basically the same as the original for the purpose of ensuring performance in accordance with applicable Code requirements. (See also *repair* and *maintenance*.)

restricted area: (applicable to Part 7) an area accessible only to authorized personnel who have been instructed in the use and operation of the equipment.

rise: the vertical distance between the bottom terminal landing and the top terminal landing of an elevator, dumbwaiter, or material lift.

rope, aircraft cable: a wire rope built for a special purpose having special flexibility properties, zinc-coating, high breaking strength, and antirust qualities. Designed originally for use with aircraft controls.

rope, governor: wire rope with at least one end fastened to the safety activating means or governor rope releasing carrier, passing over and driving the governor sheave, and providing continuous information on the speed and direction of the car or counterweight.

rope, suspension (hoisting): wire rope used to raise and lower an elevator, dumbwaiter, or material lift car or its counterweight, or both.

rope-fastening device, auxiliary: a device attached to the car or counterweight or to the overhead dead-end rope-hitch support that will function automatically to support the car or counterweight in case the regular wire rope fastening fails at the point of connection to the car or counterweight or at the overhead dead-end hitch.

runby, bottom, elevator car: the distance between the car buffer striker plate and the striking surface of the car buffer when the car floor is level with the bottom terminal landing.

runby, bottom, elevator counterweight: the distance between the counterweight buffer striker plate and the striking surface of the counterweight buffer when the car floor is level with the top terminal landing.

runby, top, direct-plunger hydraulic elevator: the distance the elevator car can run above its top terminal landing before the plunger strikes its mechanical stop.

safety, car or counterweight: a mechanical device attached to the car, car frame, or to an auxiliary frame; or to the counterweight or counterweight frame; to stop and hold the car or counterweight under one or more of the following conditions: predetermined overspeed, free fall, or if the suspension ropes slacken.

safety, self-resetting: a car or counterweight safety released and reset by movement in the up direction.

safety bulkhead: a closure at the bottom of the cylinder located above the cylinder head and provided with an orifice for controlling the loss of fluid in the event of cylinder head failure.

screw column: a vertical structural member provided with screw threads that support the car of a screw column elevator, dumbwaiter, or material lift. The screw column may be either in tension or compression.

shaft: see *hoistway.*

shall: indicates a mandatory requirement.

should: indicates a recommendation, not a mandatory requirement.

sight guard: a vertical member mounted on the hoistway side of the leading edge of the car.

slack-rope switch: a device that automatically causes the electric power to be removed from the elevator driving- machine motor and brake when the suspension ropes of a winding drum machine become slack.

sleeving (liner): the insertion of a smaller diameter cylinder inside the existing cylinder of a hydraulic jack.

sling: see *car frame.*

software system failure: a behavior of the software, including its support (host) hardware, that is not in accordance with the intended function

solid-state device: an element that can control current flow without moving parts.

speed governor: a continuously operating speed monitoring and detection device that, at predetermined speeds, provides signals to the controller and imparts a retarding force to activate the car or counterweight safety.

starters control panel, elevator: an assembly of devices by means of which the starter may control the manner in which an elevator or group of elevators function.

static switching: switching of circuits by means of solid-state devices.

terminal landing: see landing, elevator or material lift.

terminal stopping device, final: a device that automatically causes the power to be removed from a driving-machine, motor and brake, or from a hydraulic machine, independent of the functioning of the normal stopping means, normal terminal stopping device, and any

emergency terminal speed-limiting device, after the car has passed a terminal landing.

terminal stopping device, machine final (stop-motion switch): final terminal stopping device operated directly by the driving machine.

traveling cable: a cable made up of electric conductors, that provides electrical connection between an elevator, dumbwaiter, material lift car, or counterweight, and a fixed outlet in the hoistway or machine room.

type test: a test carried out by or witnessed by a certifying organization concerned with product evaluation and the issuing of certificates to ensure conformance to Code requirements.