

# TIGER LIFT TYPE X SERIES INSTALLATION

## GENERAL

**IMPORTANT**→ This manual is a general guide to the X series of elevators – X3 (direct hydraulic), X5 (roped hydraulic) and XD (winding drum). These elevators are designed for a lot of customization, so it is almost impossible to document every customized component in a manual such as this. Some parts for your job might not look like they appear here; they may be custom or updated. Check the installation documentation package for drawings specific to your job. If you cannot figure out how something goes together, give us a call.

1. Take some time to plan the installation. Read this manual first. It is laid out in sequential order. Make sure that you have the material and tools readily at hand for each sequence. X series elevators are simple to install with a minimum of tools. The following will suffice for most installations:

- ½ ton come a long
- short 4 x 4 timbers for blocking
- Hammer drill
- electric drill
- hacksaw or sawzall
- common handtools
- ½" or ¾" pipe die
- conduit benders
- rail file
- 4' level
- square
- tape measure
- volt/ohm meter
- wire cutters/strippers

2. Make sure you have the correct layout drawing. Carefully review all field dimensions against the layout drawing. (It takes 3 times as long to do everything twice.)

3. Make sure you have the correct wiring diagrams. Check the power supply with a meter for proper voltage before connecting any equipment.

4. Arrange the material on the jobsite in sequential order. (You don't want to be tripping over the cab while you are hauling rails into the hoistway.)

5. Plan your wiring and conduit runs carefully. Set up your main stack so you can take it to the controller with a minimum of fancy conduit or duct work.

6. Work safely! No job is worth getting hurt over. Keep your job neat. Always wear appropriate clothing and safety glasses whenever you cut, drill, weld or burn. Use a come-a-long to hoist heavy material. Check all rigging before hoisting. Never stand under hoisted materials. Do not use damaged hoisting equipment, or any other damaged tools. Report any unsafe conditions or injuries immediately.

7. Make certain your finished product is safe! If you think something might be unsafe, ask questions about it. Be sure every safety device is tested, and performs as intended, and that your wiring conforms to all code requirements. Make sure you do not leave any jumpers on control terminals or devices. Be absolutely 100% positive, before leaving the job, that it is right.

8. Try not to waste a lot of time on something that's not clear to you. We can usually answer your question in a matter of minutes. If you have any questions do not hesitate to call us here at the factory (734)-246-4700, we will be happy to help you.

# TIGER LIFT TYPE X3/X5 INSTALLATION

## I. RAILS & BRACKETS

1. Check hoistway against shop drawing for correct dimensions, plumbness, pit size, squareness, cylinder hole if required, travel and overhead. (An installer's checklist can be found in the packet along with this manual.)

2. Check shop drawing (also in same packet) for location of center of the face of the rails in relation to the hoistway entrance. Mark on pit floor. Figure 1 shows locations of typical dimensions, but **CHECK SHOP DRAWING!** At this point it is advisable to suspend a plumb line from the ceiling so that it hits the marks, and check that the distance from the line to the back wall is no less than indicated on the drawing, and no more than 1/4" greater than indicated.

3. Loosely install bottom rail brackets to bottom (female) end of rails. If you have a roped (X5) type installation, the bottom rail brackets are part of the bottom plate, which is installed now as shown in <Fig. 2>.

4. Stand rails on marks (or bottom plate for roped installation). Drill pit floor for bottom bracket anchors. Loosely install anchors.

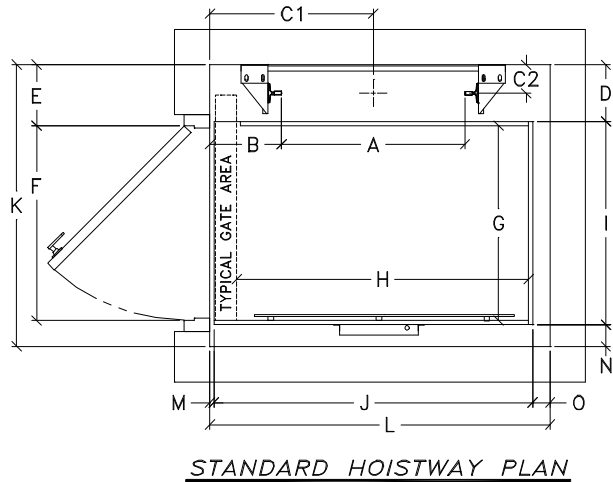


Figure 1

*A) Distance between guides, B) Rail king, C1) Rail center, C2) Rail to wall, D) Platform to wall, E) Entry location, F) Entry size, G) Inside clear depth, H) Inside clear width, I) Platform depth, J) Platform width, K) Hoistway depth, L) Hoistway width, M) Threshold Gap, N) Car depth clear, O) Car width clear*

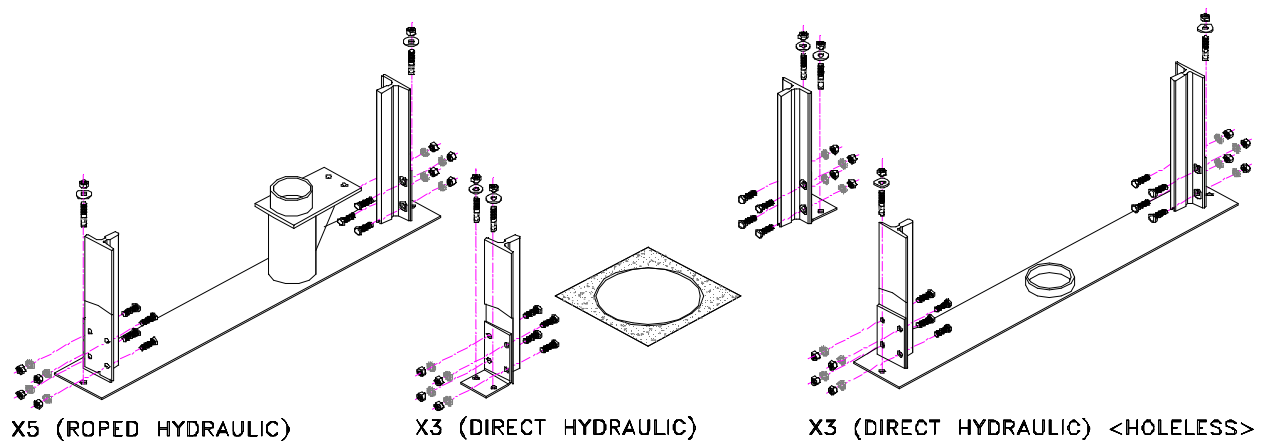


Figure 2

5. Refer to shop drawing HOISTWAY ELEVATION to find general location and intended orientation of rail bracket mounting angles (Typically 6' increments from pit floor). Mark the wall at first location to begin.

6. Loosely install rail bracket mounting angles (hangers) to the wall using dimensions at the top of the same view, then attach to the rail brackets loosely with appropriate fasteners <Fig. 3>.

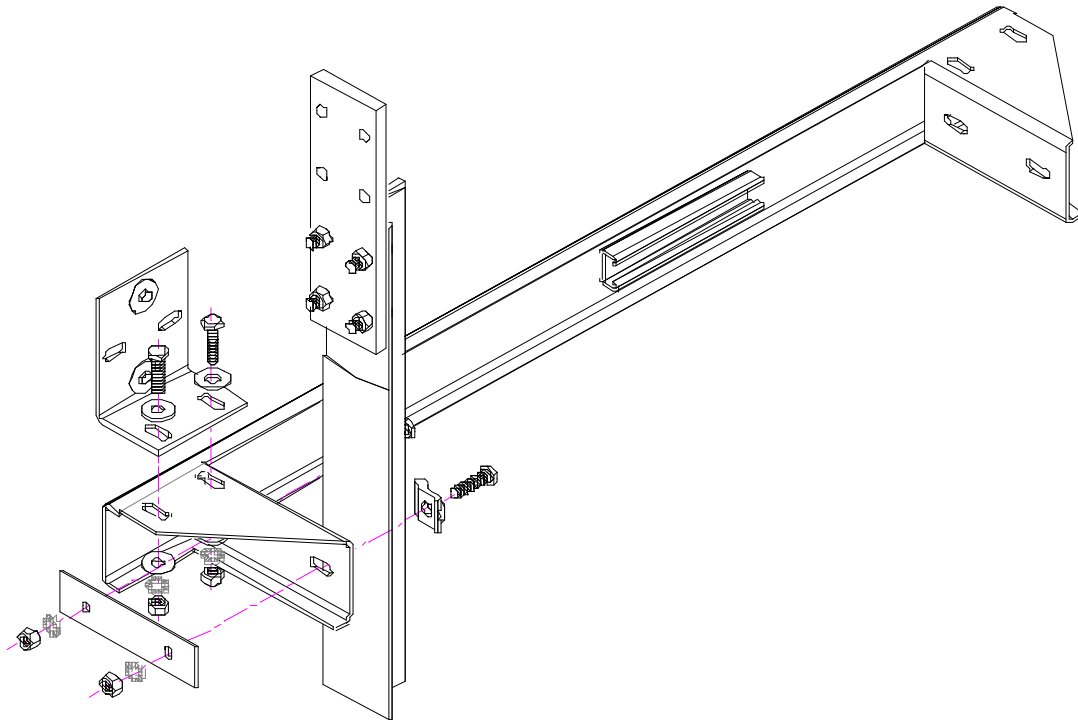


Figure 3

7. Secure rails to spreader with rail clips and backing plates. (Backing plates must be used to ensure the proper distance between rail fasteners). Be sure to wipe rails clean of debris with mineral spirits.

8. Check alignment with 4' level in 2 directions. Adjust to match shop drawing, then tighten bolts when rails are aligned & plumbed. Be sure to check DBG after tightening. (Shims may be necessary to achieve proper DBG)

8. Install shims if needed behind rails. (Failure to shim spreader if required may result in change in DBG and rails being out of square)

9. Install a fishplate and the next section of rails onto the set just completed, moderately tightening all bolts. Repeat steps 5 - 8.

10. Check all rail joints for smoothness. Shim and/or file as necessary. Securely tighten all fasteners.

11. Before continuing, be certain that you are satisfied with your rail installation. If you don't think the rails are in the right place, or aren't securely fastened, fix it now.

## IIA. HYDRAULICS - DIRECT (X3)

1. Measure jack for proper length - it should be approximately 2' longer than travel distance.

2a. (In-ground): Place pit channel over well hole. Center of pit channel should correspond with center of jack as indicated on layout drawing. On most jobs, the pit channel will have one leg made from flat stock, and the other made from angle.

The flat stock goes away from the car, towards the back wall.

<Fig. 4> Wrap the jack with protective tape as needed, and lower it into the hole through the pit channel.

2b. (Holeless jack): Your job may or may not have a stanchion tube. If it does, place it on the stanchion plate, then install the jack on top of it. If you do not have a stanchion tube, place the jack on the mounting ring on the jack plate.

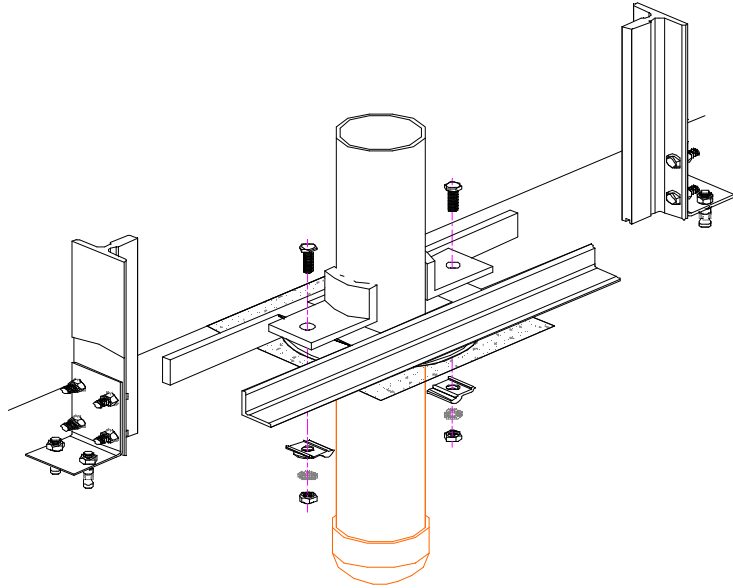


Figure 4

3. Loosely install the stabilizer(s) to the mounting channel located on the lower spreader(s) and the stabilizer strap(s) around jack, as shown in <Fig. 5>.

4. Check the inlet direction to minimize piping run and elbows in the hydraulic line. Fasten ears to channel with rail clips.

5. Use a 4' level to plumb the cylinder. Check in 3 places. Shim under cylinder ears and/or pit channel as needed. Check that center of cylinder is still in correct location relative to rails.

6. Tighten stabilizer bolts, and pit channel to the jack. Check cylinder again with the 4' level. Put a little dry sand in the hole, just enough to stabilize the bottom of the cylinder.

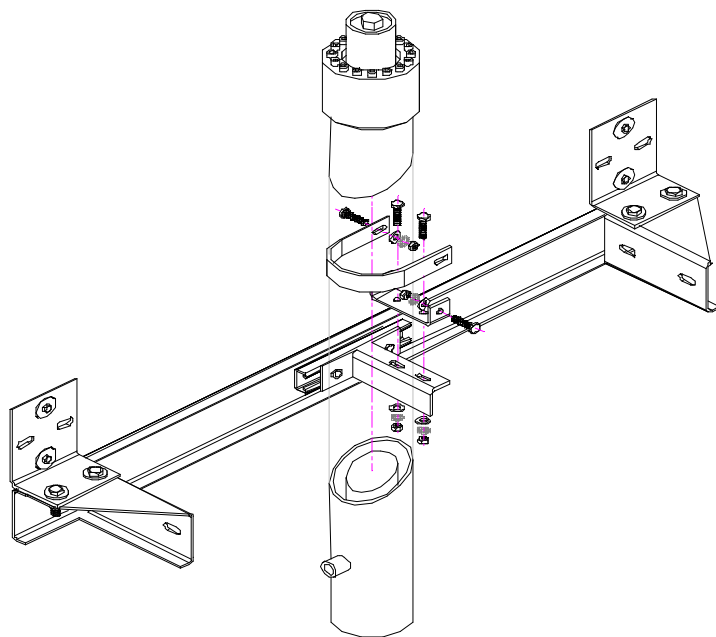
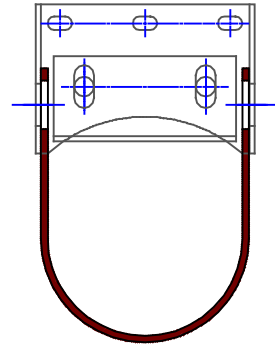
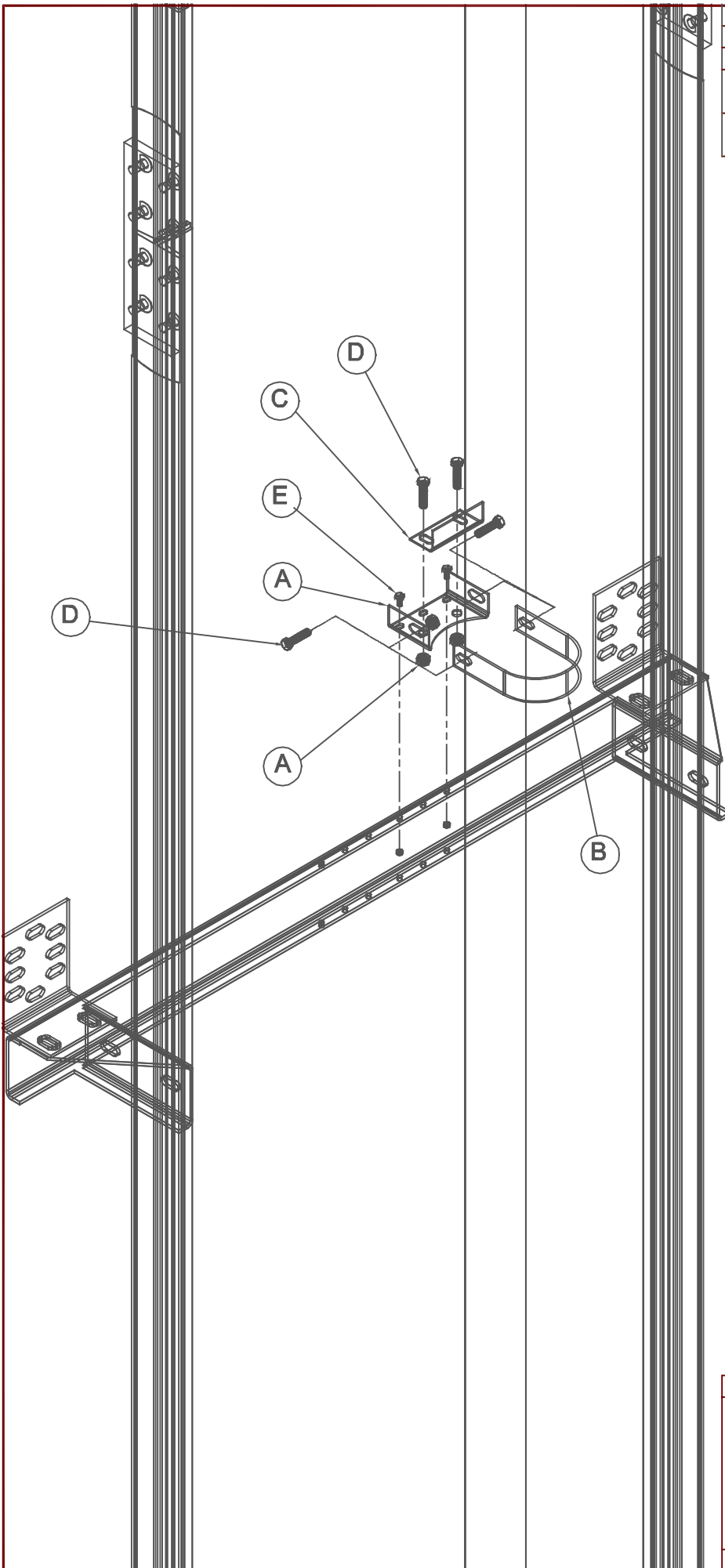
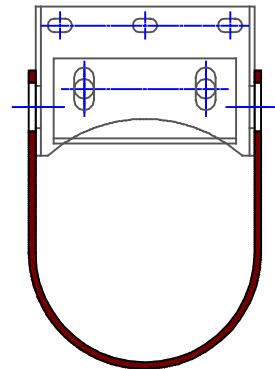


Figure 5 - OLD STYLE / also see next page

A	STABILIZER PART "A"
B	STABILIZER PART "B"
C	STABILIZER PART "C"
D	3/8-16 X 3/4" HEX HD. BOLT (PART# FST-3300) WITH 3/8-16 HEX HD. NUT (PART# FST-3310)
E	1/4-5/8 X 1/2" HEX HD. BOLT (PART# FST-3100) WITH 3/8-16 SPIN NUT (PART# FST-3127)



4" STRAP MOUNTS INSIDE



4 1/2" STRAP MOUNTS OUTSIDE

3D STABILIZER ASSEMBLY - ISO VIEW



ELEVATOR CONCEPTS

18720 Krause Riverview, MI 48193  
Phone (734) 246-4700 Fax (734) 246-2547

7. If the jack is long (14 ft+), it will have shipping rings installed onto the plunger. There will be a notice to this effect painted on the cylinder. Remove the shipping rings at this time. If you did not rig a chain fall at the top of the hatch to install the jack, you will need to do so to remove the plunger. Remove the head bolts, and the head. Be careful not to damage the seal or the o-ring. Install a 3/4" eye bolt on the plunger, and carefully raise it with the chain fall. Be very careful not to damage the plunger. Remove the shipping rings, then reinstall the plunger and head.

8. Plan your hydraulic piping run. Check the location of the piping outlet on the pumping unit. Set the pumping unit so your piping will have a minimum number of elbows. If you use a flex hose, make sure it is not twisted, kinked, or passing through a wall. Install shut off valves as required by local code. (Some installers put a union in the line somewhere near the jack to facilitate removal in the future if it is ever required.) Use a high quality thread sealant on all threads. DO NOT use thread sealant on swivel fittings for flex hoses. Clean the inside of all pipes and fitting to prevent metal chips, lint, dirt, etc. from getting in the hydraulic system. If you use pipe or fittings not supplied by Elevator Concepts, make sure they are rated for the system pressure.

9. Fill pump with oil - the motor must be still covered with oil when the plunger is fully extended. Most jobs take between 20 to 25 gallons. Remove the set-screw from the lower half of the head and replace with the bleeder valve. Remove the set-screw from the upper half of the head and replace with the hose barb, and run the plastic tubing back to the pumping unit, taping it to the hydraulic line.

10. Mount controller. Wire valve and motor - see the controller documentation for full details.

11. Use a temporary run button to engage contactor to run pump. Bleed piston. Check operation. Set bypass pressure for approx. 375# - see the valve documentation for full details.

12. Run piston to ring - check for sufficient travel. Check plunger & cylinder again with 4' level, adjust as required.

13. When you are certain the cylinder is plumb, and has sufficient travel, backfill the hole evenly, with clean dry fill sand, except for top 4". Cement top of hole around jack.



9. Plan your hydraulic piping run. Check the location of the piping outlet on the pumping unit. Set the pumping unit so your piping will have a minimum number of elbows. If you use a flex hose, make sure it is not twisted, kinked, or passing through a wall. Install shut off valves as required by local code. (Some installers put a union in the line somewhere near the jack to facilitate removal in the future if it is ever required.) Use a high quality thread sealant on all threads. **DO NOT** use thread sealant on swivel fittings for flex hoses. Clean the inside of all pipes and fittings to prevent metal chips, lint, dirt, etc. from getting in the hydraulic system. If you use pipe or fittings not supplied by Elevator Concepts, make sure they are rated for the system pressure. **THIS IS ESPECIALLY IMPORTANT ON ROPED HYDRAULICS (X5), the pressure is double that of an equivalent direct hydraulic (X3).**

10. Fill pump tank with hydraulic oil. The pump motor intake must remain submerged with oil when the plunger is fully extended. Most jobs take between 20 and 25 gallons. If a bleeder valve is supplied with the jack, install it in the hole in the side of the lower half of the cylinder head (remove screw if present; **NOTE** – leave screw in place if not installing bleeder valve) Install hose barb fitting in the upper hole on the side of the cylinder head (remove screw if present). Run the plastic tubing down along the jack and hydraulic line back to the pump tank. Be sure not to kink the tubing. Use wire ties or tape to keep the drain tube from hanging up on moving parts.

11. Mount controller. Wire valve and motor. (See the controller documentation for full details.)

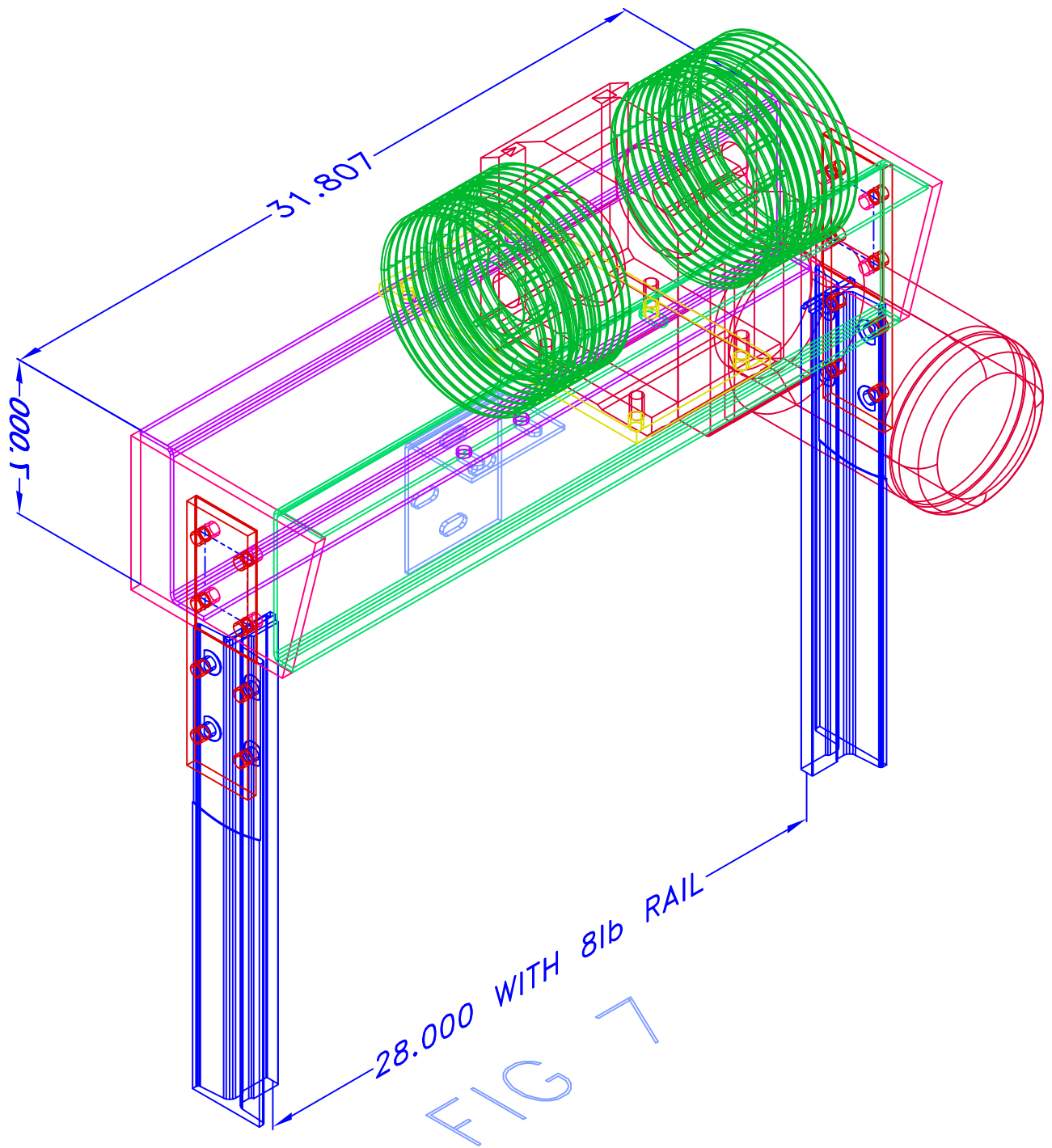
12. Use a temporary run button to engage contactor to run pump motor. Bleed piston. Set bypass pressure for approximately 750#. (See the valve documentation for full details.)

13. Check operation. Run piston to stop ring to check for sufficient travel. Make sure there is enough overhead for the sheave assembly. Make sure the gibbs do not bind in either the up or down direction. Check plunger & cylinder with 4' level, adjust as required.

### IIIC. OVERHEAD DRUM

1. Install the machine base to top of the rail stack with 2 fishplates. Secure to wall with bracket . See figure 7.
2. Install the machine onto the base. The machine weighs about 180#. Make sure you have adequate rigging for hoisting the machine. One method of getting the machine in place is to put the machine on a hand operated lift truck (such as McMaster Carr 9937T22), and use the car sling as a working platform. Hoist the car sling up to the top of the rails, and use the lift truck to raise the machine and position it to slide onto the base.
3. Put one end of the cable through the hole in the drum. Install a wire rope clamp on the end of the cable. Wrap the cable around the drum until the cable hanging off the drum is event with the lowest landing. You may need to secure the cable with tape or wire to keep it in the grooves of the drum until it is connected to the car and has weight on it. Repeat on the other side.
4. Some machines may be shipped without the breather valve installed. If so, remove plug and install breather.





### III. FRAME

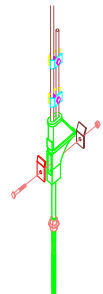
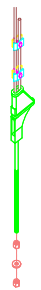
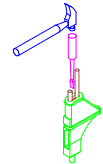
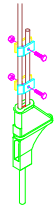
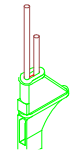
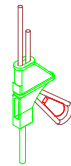
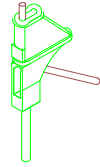
*Review figure 9 for a view of the frame; direct hydraulics will not have safety mechanism.*

1. On roped hydraulics and drums, install the safety blocks, knurled rollers, roller guide plates, roller arm to the sidestile/platform beam assembly. Install the guide rollers and thrust blocks. There will be 2 rollers at the top of the sidestile, and 1 at the bottom, toward the platform side.
2. Put the stile assemblies in the hoistway, and slip onto rail. Setting them on some short 4 x 4's of equal length (about 12") can make it easier to assemble the rest of the frame. Temporarily tie the stiles to the rails. Install the top crossbeam at top of stiles, and the bottom crossbeam at bottom of stiles.
3. Install the stringer beam to the ends of the platform beams.
4. Install the center beam to the stringer beam and bottom crossbeam. On roped hydraulics, the rope shackles, safety trigger, safety switch, and inertia spring should be installed now if they were not installed at the factory.
5. The roller guide studs are eccentric; adjust so the frame is plumb and level. Make sure the knurled roller and the safety block are clear of the rail. The top front rollers should just touch the rail.
- 6a. Direct hydro: Install the platen to the bottom and top crossbeams. You may have to raise the car to clear the top of the plunger. Run the plunger up to meet the platen, and install the plunger bolt.
- 6b. Roped hydro: Connect hoisting ropes. See "ATTACHING CABLES TO WEDGE SOCKETS" for detailed instructions on using wedge sockets. Raise the plunger until about 4-3/4" of plunger is out of the cylinder. Put the platform on the car frame, and block the car up so the platform is about 3" above the bottom landing. Install the hoist ropes, taking out as much slack as you can. The shackle nuts on the dead end should be about 1" past the cotter pin hole to allow for adjustment. The ropes will not be tight, but should not have excessive slack at this time. Now put sufficient weight on platform, to compress shackle rod hitch springs fully, then adjust rope length so that platform is floor level. Install the cable guard.
7. Install the safety linkage on roped hydraulics (X5).
8. Install platform extensions and beams, or platform trusses as applicable.
9. Install spring buffers. On jobs with a 12" pit, or less, they will mount inside the center beam, and will utilize the floor as a strike point. On all other jobs the buffers will be floor mounted, and will strike either under the platform beams, or at a buffer pad that mounts in the center beam.
10. Check operation of safeties if so equipped. Adjust according to adjustment procedure below.



## ATTACHING CABLES TO WEDGE SOCKETS

1. Insert end of cable through socket, taking up all slack in the cable.
2. Thread the end back through socket, leaving enough cable loop to install the wedge.
3. Insert wedge into the loop.
4. Pull down on the live end of the cable to keep it taut. Pull up on the dead end with a quick pull until the rope and wedge are seated in the socket.
5. After all cables are installed, let the weight of the car (and counterweights if so equipped) rest on the cables. The rope and wedge will firmly set in the socket. Install retainer clips - the lower clip at 2" above the socket, and the upper clip 4" above the lower clip.
6. If you must change the rope length, remove the weight from the cable, and use a hammer and a drift to tap the wedge out of the socket. You can also use a hammer and drift to roughly equalize the rope tension. With the weight still on the cable, tap the wedge down on the tightest cable until the rope slides through.
7. Finish equalizing cable tension with the rod nuts. Hold the socket to prevent rotation.
8. Some jurisdictions require an additional means to prevent the wedge from dislodging in the event of a slack cable condition. Install the wedge retainers as shown.



## TYPE "A" INSTANTANEOUS SAFETY WITH SLACK ROPE ACTUATION ADJUSTMENT PROCEDURE

1. Adjust the guide shoe or roller so there is about 1/16 clearance between the safety backup block and the backside of the rail.
2. Adjust the bearing plates so that both rollers engage the rails at the same time. The link rod goes through the bearing plates, which are bolted to the platform beams. They have slotted holes for adjustment.
3. If shackles are used on both ends of the cable, make sure that the distance from the bottom of the shackle rods in the pickup beam to the jamb nut is 3/4". This distance is set in the factory, so make all hoist cable adjustments at the dead end set of shackles located on the stanchion base (cables with swedged ends have no provision for adjustment in the pickup beam).
4. Now make sure that there is proper clearance between the safety roller and the rail when the safety is fully retracted. Put enough weight on the car to compress the shackle springs fully to the stop tube. With the actuator pan touching the bottom of the wedge socket shackle rods, adjust the link rod to get 3/32" clearance between roller and rail. Both swivel joints are right hand, so you will need to remove one end of the link rod to adjust it.
5. Manually pull down on the actuator pan. Check that there is sufficient travel in the linkage to fully engage the safety rollers into the rails. Check again that both rollers engage the rails at the same time.
6. Make sure the safety switch is installed and adjusted so that it opens before the safety rollers hit the rails. The switch is located inside the center beam.
7. There are several ways to test the safeties. The safest is to use a hydraulic jack with a remote cylinder, commonly known as a porta-power. You will need one that has sufficient weight capacity (2 tons minimum) and stroke (about 4" minimum). Fully extend the remote cylinder. Place it on top of a good 4 x 4 timber, about 48" long. Land the car sling on it. Make sure the cables are just slack; excessive slack can cause problems later by fouling the cables. Quickly release the porta-power. The safeties should set and hold the car. If not, recheck all steps above. Make sure the safety switch operates correctly. To release the safeties, first check that the cables are in their sheaves and not fouled on any brackets, etc. Then raise the car until all slack is out of the cables. Make sure the safety rollers and linkage fully retract and the safety switch resets. File any gouges, burrs, etc. from the rails.

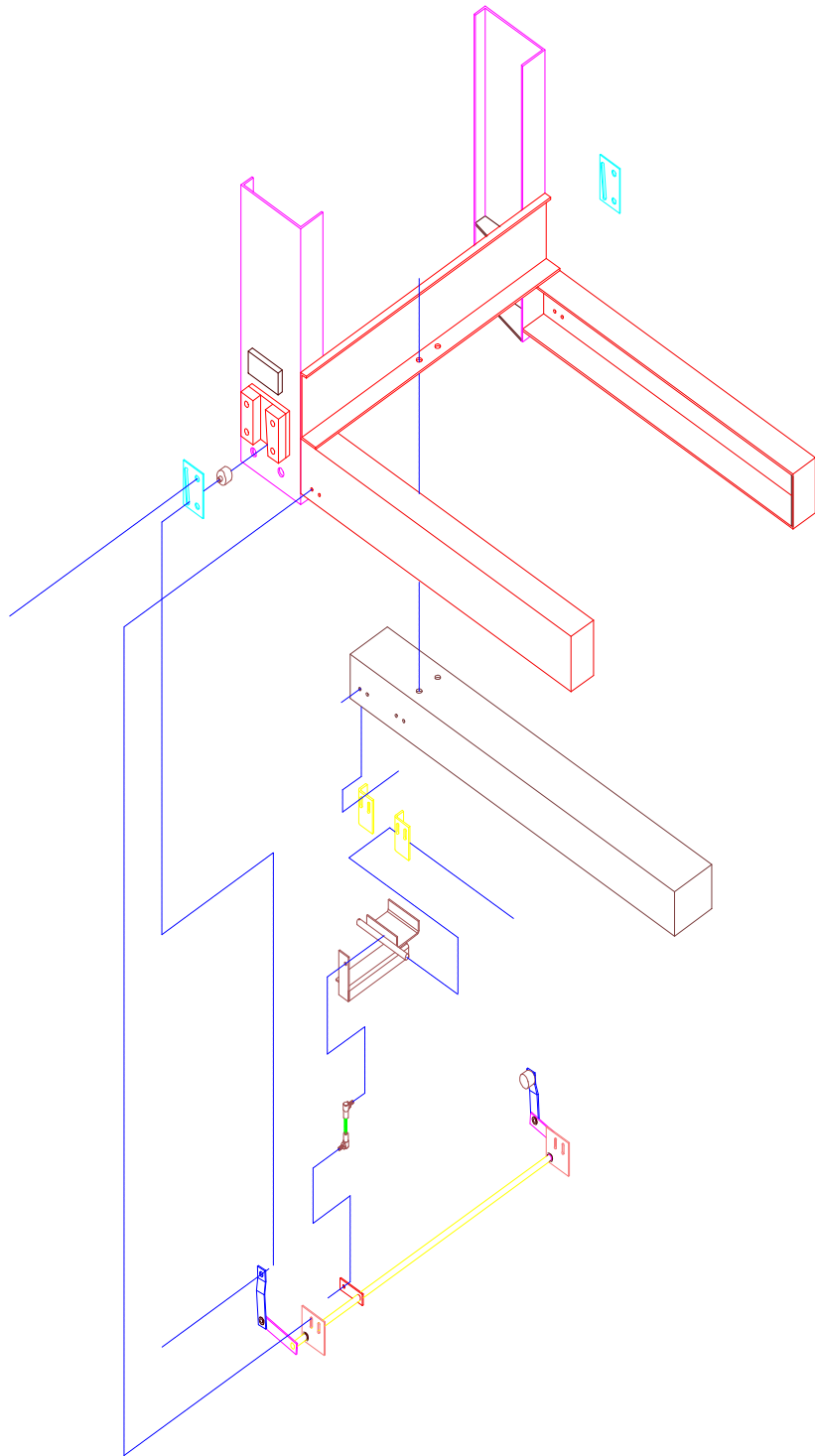


Figure 10

## SWITCHES & FIXTURES

1. Most installations will use a MAGLVL landing system. See the MAGLVL manual for complete details on installing this system.
2. If your installation has final or terminal limits in the hatch, install an actuating cam on the sidestile unistrut opposite the landing system. With the car at the bottom landing, set the terminal limit at floor level and the final limit for approximately 2" beneath floor level.
3. Run the car to the top level, and set the directional and final if applicable.
4. It is much easier to install floor-locating magnets, to the vertical tape with the cab off. Final floor stop adjustment can be done with the cab on; it is usually just a matter of moving the magnets a fraction of an inch. If you want to set the floor stops with the cab off, you will need to run the travel cord and temporarily connect it to the leveling unit. On most jobs the landing unit control board and the sensor unit are mounted to the ceiling, so you will have to hand the ceiling from the top beam temporarily.
5. Make sure the valve is adjusted properly before setting floor stops. Follow the procedure below to adjust the valve.
6. Run car to every floor. Check intermediate floors stops from both directions. You should be able to get within 1/2" regardless of direction or load.
7. Make sure all finals operate as intended.
8. Install the safety switch, if so equipped.
9. Install and wire pushbutton stations and doorlocks. Make sure door locks and wiring will not interfere with the platform. In some instances you may need to notch the platform. Run the car carefully through the hoistway to make sure there is no interference.
10. Install pit stop switch.

## HYDRAULIC & LEVELING SYSTEM SETUP BLAIN KV-1P VALVE

This system is designed to provide a leveling tolerance of 1/2" at 32 FPM. Optimum performance at about 25 FPM, and is designed around a coasting distance of 1/2" to 1". These are abbreviated set up instructions to get the car running. See the adjuster's manual for complete information.

### I. Pre-set Relief Valve:

1. With full load on the car, check pressure in up direction. If the cab is not installed yet, add 200#. After noting pressure, turn Adjustment screw S counter clockwise until loose.
2. Place an up call and close main oil line valve.
3. Turn in Adjustment screw S until pressure is between 110% and 125% of full load pressure. . Clockwise increases pressure; counterclockwise lowers the pressure.
4. Tighten the locking set-screw, recheck adjustment.

II. Set Up Bypass (Adjustment screw #1) so that car begins to move about 1 second after the pump starts with empty car. Clockwise shortens time; counterclockwise lengthens. After bypass is set, recheck relief setting. Adjust relief valve if necessary. Do not re-adjust bypass valve without checking relief setting afterward.

III. Set Down Acceleration (Adjustment screw #6 - inside down solenoid stem) so car accelerates smoothly. Initial adjustment: screw #6 in full clockwise, energizes down solenoid, screw out counterclockwise until car starts to move. Final adjustment: Clockwise for softer acceleration, counterclockwise for quicker acceleration.

IV. Set Down Speed (Adjustment screw #9) so that down speed full load is about the same as up speed. If you cannot attain correct speed with adjustment screw, check the following:

1. Check rails & guide shoes for binding
2. If pipe run is long and/or has many bends, 3/4" pipe may be required
3. Check down pilot stem for dirt or binding
4. Check down spool for dirt or binding
5. If none of these items solve problem, a different down insert may be required. Check no load pressure and contact us for further instructions.

### V. Preliminary set up for leveling unit:

1. Set any terminal hatch limit for floor level; set any final limit for 2" beyond floor level
2. Set landing system magnets per the instructions for the unit

### VI. Set terminal floor stops:

1. Disconnect wires from LU and LD, disabling leveling
2. Make a terminal UP call.
3. Adjust the terminal landing system magnet, or hatch switch, so the car stops at floor level.
4. Repeat for bottom landing.

VII. Set intermediate floor stops:

1. Reconnect LU and LD
2. With the car at a landing, set magnet per landing system instructions.
3. Lower the car at least 3 feet, then call it up to landing. If it's not level:
  - a. Car stops HIGH - raise LU sensor
  - b. Car stops LOW - lower LU sensor
4. Raise the car at least 3', then call down to landing. If not level:
  - a. Make sure the down solenoid is not hanging up, and that the down speed is correct.
  - b. Car stops HIGH - raise LD sensor
  - c. Car stops LOW - lower LD sensor
5. Repeat at other intermediate floors.

NOTE: Before adjusting sensors, be absolutely certain the valve is adjusted and functioning properly. The factory sensor spacing is designed for a valve that is functioning properly. If you need to change the spacing, it usually means the valve is not functioning properly.

VIII. If car overshoots and relevels in opposite direction, or oscillates:

1. Check the speed; reduce if too high.
2. Increase distance between LU & LD sensors
3. Check stopping distance; if car coasts more than about 1" after solenoid is de-energized, check solenoid needle valve and down spool for binding.

IX. If car stops and then coasts into leveling zone at intermediate floors:

1. In UP direction - increase distance between DZ & LU
2. In DN direction - increase distance between DZ & LD
3. Alternate method - shorten car magnet in 1/4" increments; terminal switches will need to be adjusted. **This is the only way to adjust systems with fixed sensors (typical after 1-1-2002).**

## CAB & GATE

Make sure the landing system and car safeties are installed and adjusted before attempting cab assembly. Review figure 11,12 and 14 for basic cab views. (Woodfold gate setup shown.)

1. Place the floor on the platform, maintaining the running clearance indicated on the layout drawing, temporarily screw some short wood screws into the underside, once it is in the desired location. See step 3 for floor fastening description.
2. If there are three walls, it is usually easier to put them together on top of the platform, then slide them into the recess around the perimeter of the platform. There will be a screw on each side of the short wall that goes into a keyhole slot in the clamp brackets (Fig 13) that are on the end of the long walls. Attach the wall nearest the sidestile with the mounting angles. There are holes tapped in the sidestiles. Install the ceiling
3. Always install the wall that covers the rails first. Attach with the mounting tabs on the floor once the wall is in place. The tabs should be mounted in opposing directions to eliminate shifting. There should be sufficient clips. Slide the other wall(s) into position, and then install the ceiling. Once the cab walls are in position, the temporary floor screws can be removed. Then drill holes through the floor to be able to replace the temporary fasteners with elevator bolts.
4. Fasten the top of the cab to the top channel, of the frame, with the cab mounting angles. There are two holes in the top channel, that correspond with one of the slots in the angles. The two round holes are to screw the angles to the ceiling, once the cab is level. Be sure not to screw through the ceiling!
5. Install the gate tracks and gates. If there is a gate bracket, for your job, you may want to connect it to the gate first. Adjust the angle of the track so the strike post of the gate is perpendicular to the strike wall. Adjust the level of the track so that the bottom guide pins are about 1/8" above the bottom of the sill groove.
6. Install the gate switches. On some jobs they are prewired; simply install them onto the mounting bracket. Check for full engagement with the gate closed. Adjust location until contact is made, every time the gate is closed.
7. Install the car fixtures and any other cab accessories.
8. Connect the travel cord to the car top box. The travel cord should begin to hang from the wall approximately one foot above the half-way point between the lowest & highest finish floors. With the elevator platform even with the lowest stop, the cord should hang loosely, with about 6" left from touching the pit floor. It should be fed through the secured car-top box and fastened when the correct placement is achieved. Be sure to leave enough extra cable to split the cord up, and run the leads to the contacts in the car-top box. Connect per controller documentation at the other end, in the machine room/area.
9. Install door locks and door lock cams. You should wire them in series. See controller manual for details.

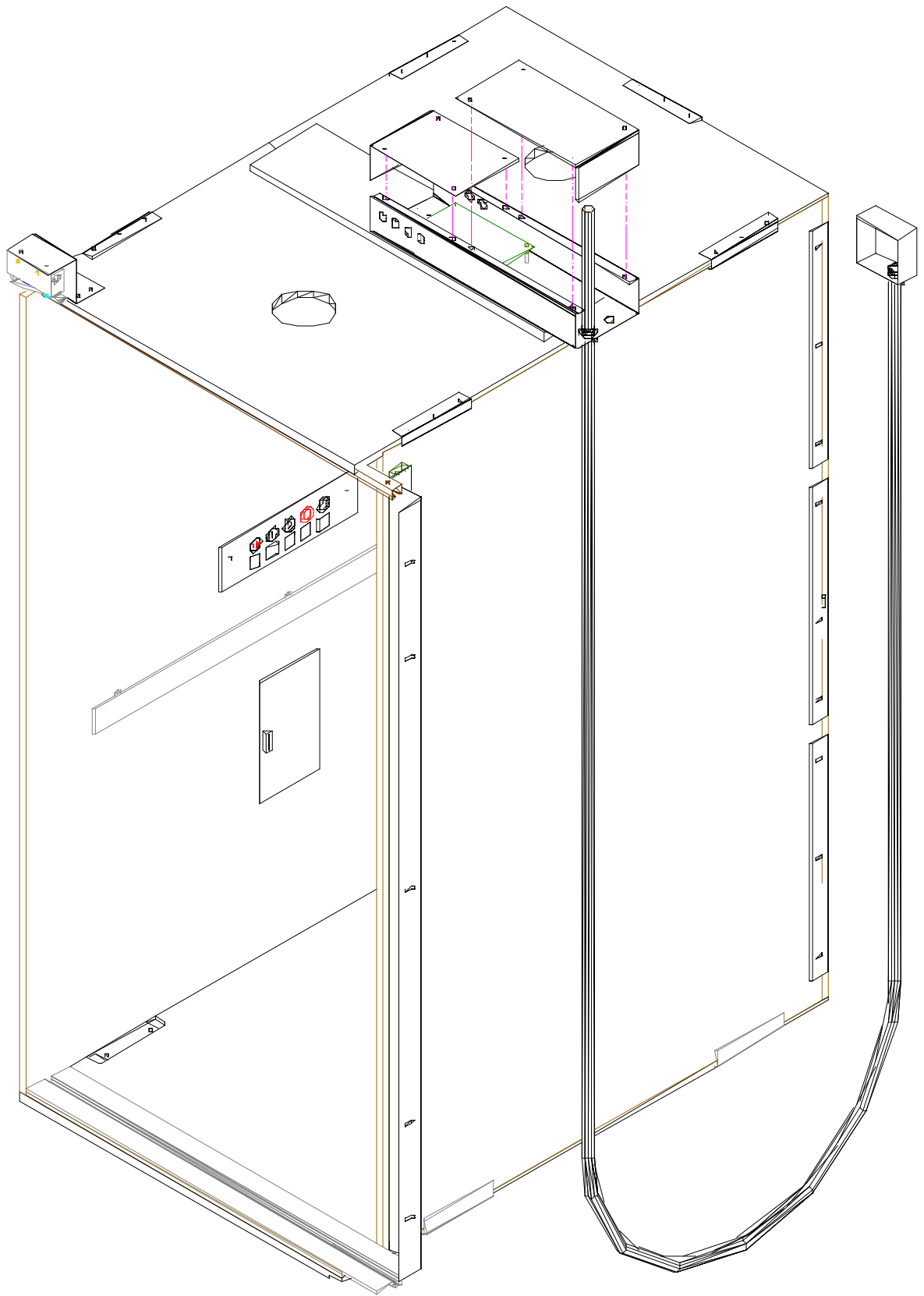


Figure 11

Fig 12

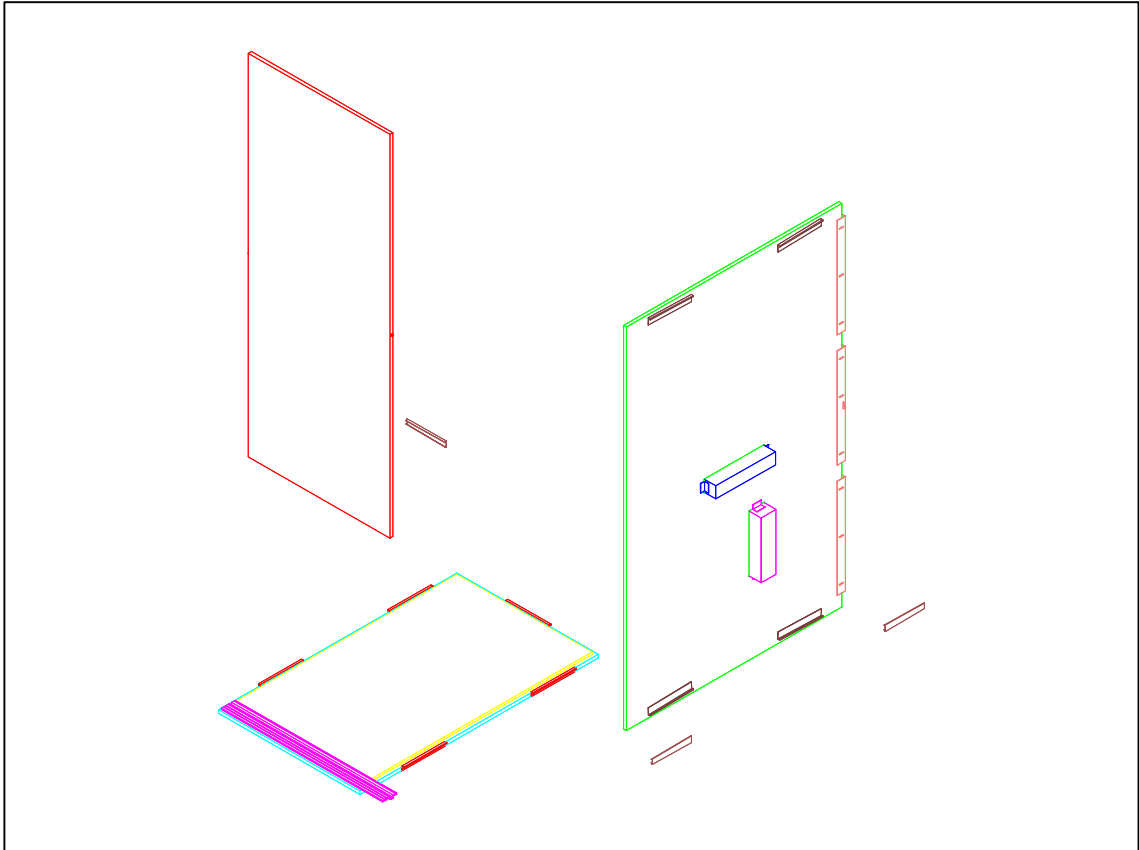
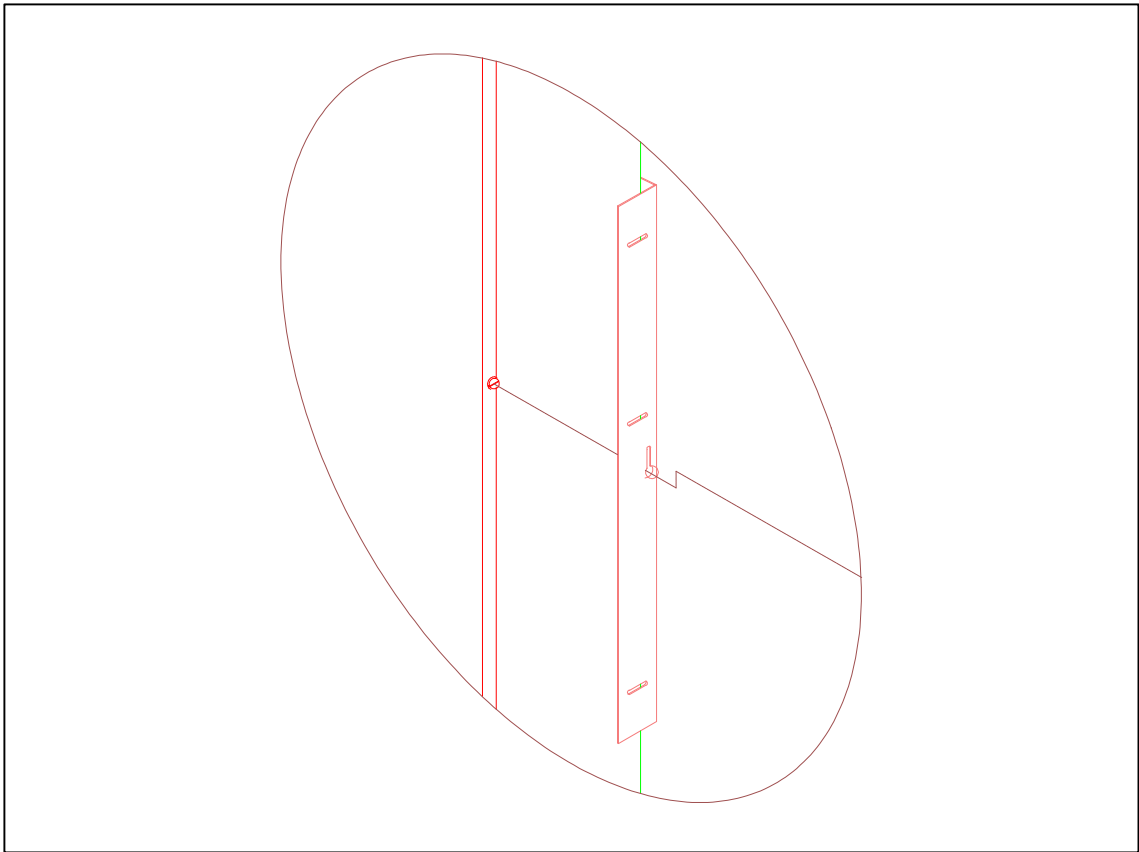


Fig 13



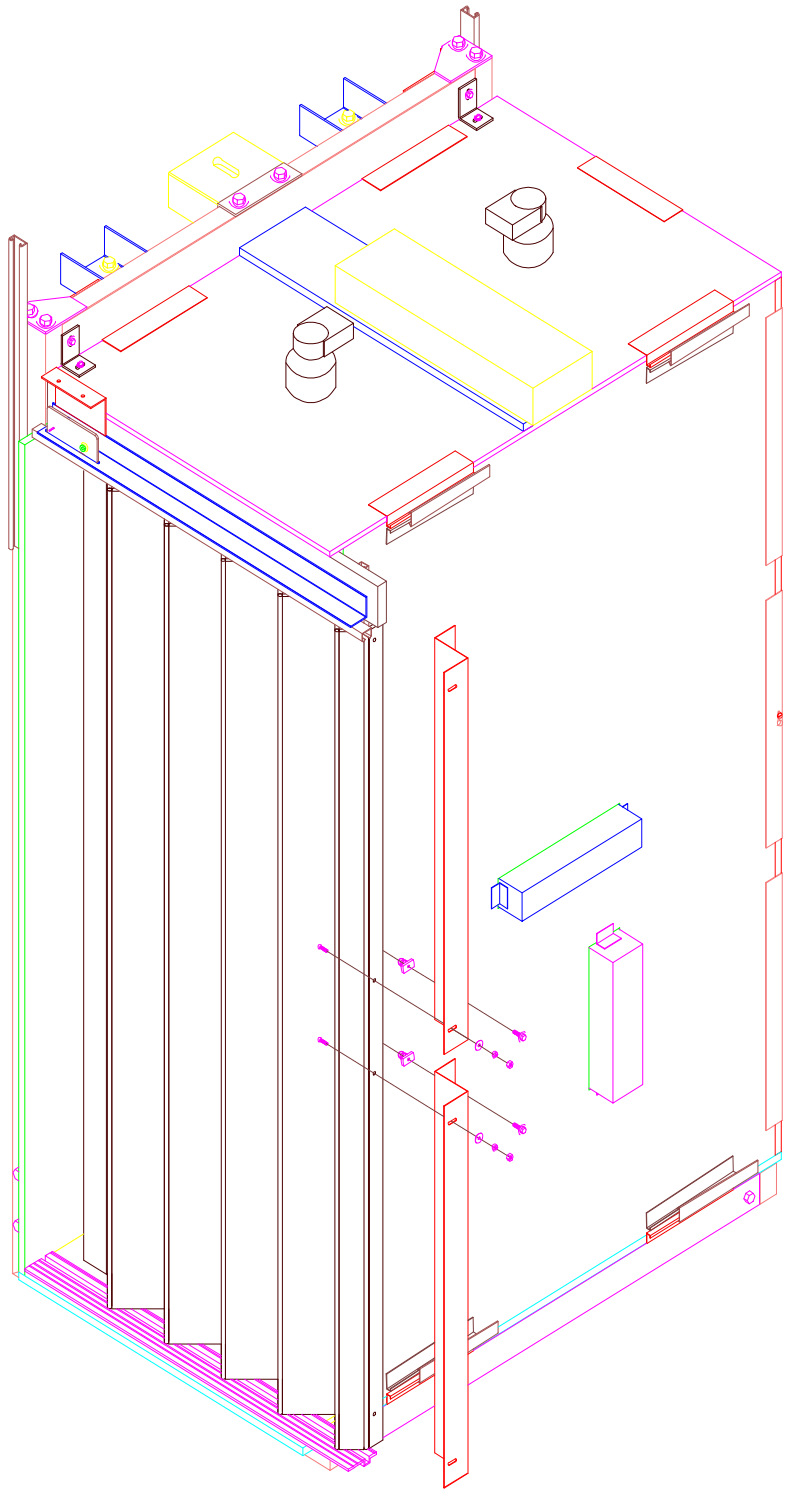


Fig 14

## FINAL CHECKOUT

1. Wire up the car and hatch devices to the controller. See the controller documentation for complete details.
2. Carefully run the car through the entire hatch to make sure there is sufficient clearance.
3. Run the car on the stop ring to make sure there is sufficient overhead clearance. Check that there is sufficient oil in the pump unit.
4. Run the car on the buffers to make sure the plunger does not bottom out in the cylinder.
5. Make sure all door locks function mechanically.
6. Check out automatic operation.
7. Place full load in the car. Check bypass pressure, floor stops, speed in both directions. Adjust control valve and switches as required.
8. Make sure every door lock, gate switch, safety switch, and safety device functions as intended. Perform a full load safety test if the car is so equipped.
9. Check that all fixtures function properly and that all light bulbs are working.
10. Make sure all jumpers are removed.
11. Make sure the rails are lubricated.
12. Clean up the installation.
13. Congratulations! Go have a cold one.