

EMB

INSTALLATION INSTRUCTIONS

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CAUTION

We Recommend:

1. That Safety Glasses be worn during any cutting and drilling operations and grinding.
2. That safety gear such as Hard Hats, Safety Shoes, etc. be worn when required.

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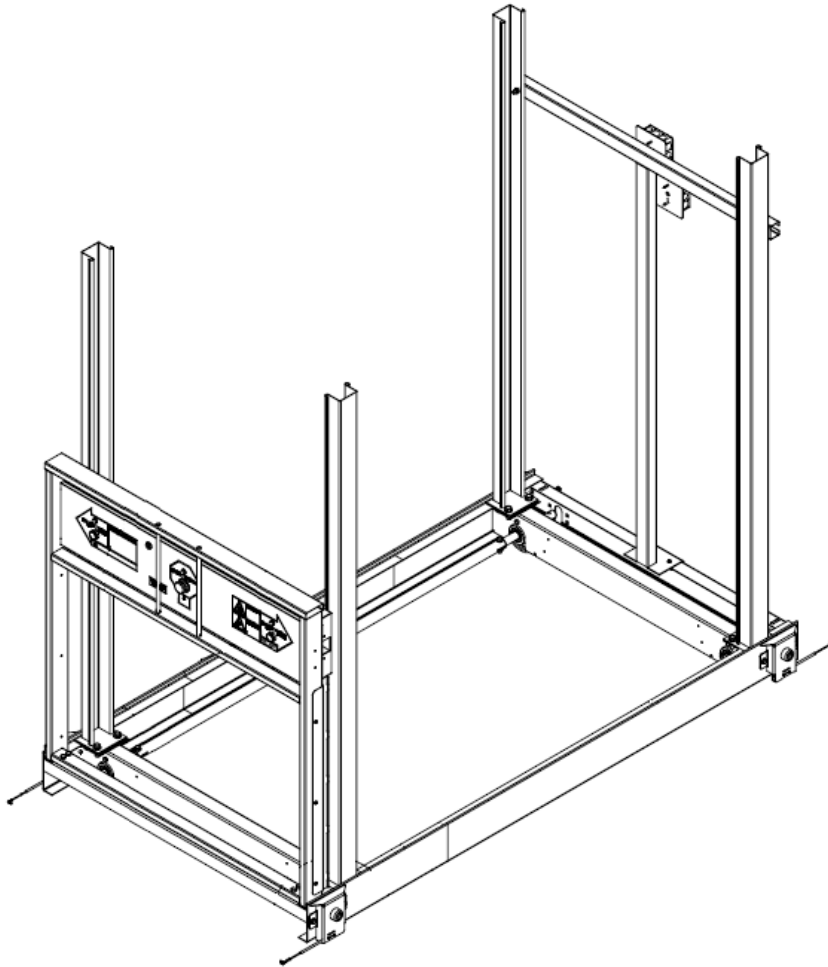
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SECTION I

INTRODUCTION

The purpose of this manual is to provide instruction for the steps required to install the rail, bases, and electrical portion of your moveable storage system. Except where noted, for purpose of clarity all references to right, left, front, and rear assume the reader is facing the true front of the system, which is the end the control/logic box is fastened to. The number one base is on the extreme left and each base to the right is consecutively numbered 2, 3, 4, 5, and so on. The order in which the steps are carried out is left to the discretion of the installer. The sequence that follows can be altered; indeed the steps may even parallel each other if more than one installer is involved.



TOOLS AND EQUIPMENT

1. (1) Rotor hammer, (5) 5/32" x 4" masonry drill bits, (1) 1/2" x 4" masonry drill bit
2. (2) 3/8" variable speed drill motors to use as screw guns.
3. (3) #2 Phillips head screwdriver tips
4. (4) 100 ft. electric extension cord (min 20 amps)
5. (1) Magic marker
6. (2) Tape measures (1 to be at least 25 ft. long)
7. (1) Metal band cutters
8. (1) Chalk box with chalk
9. (2) Straight blade screwdrivers
10. (2) Three way electric splitters for extension cords
11. (2) Phillips head screwdrivers (1) #2 tip
12. (1) Box or utility knife
13. (1) Pair oil resistant gloves
14. (3) 3/8" ratchets
15. 3/8" drive sockets set including, sizes 9/16", 1/2", 7/16"
16. (2) 6" extensions for 3/8" drive
17. (1) 3" extension for 3/8" drive
18. (1) Pair of standard pliers
19. (1) Pair needle nose pliers
20. (1) Pair of cutter (dike) pliers
21. (1) Small set steel drilling bits 1/16" to 1/2"
22. Small assortment #2 & #3 Phillips screwdriver and 3/16" & 1/4" flat head screwdriver tips to fit.
23. (1) Electrical continuity tester
24. Knee pads

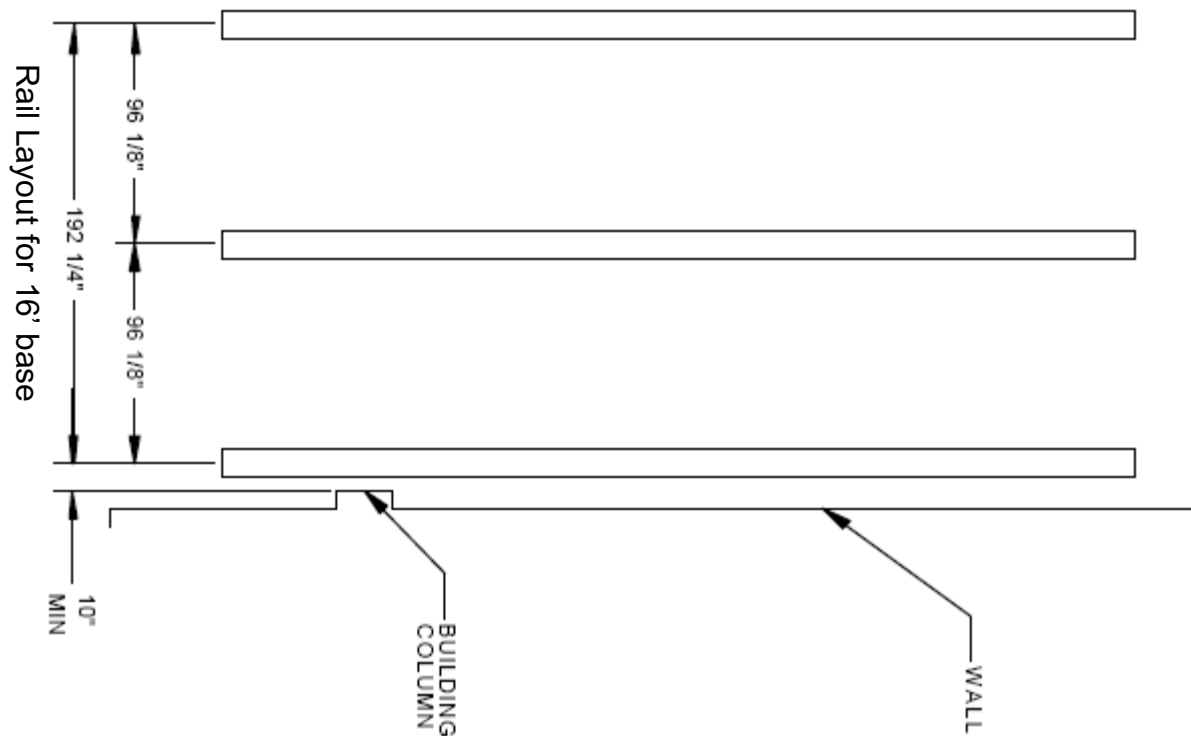
SECTION II

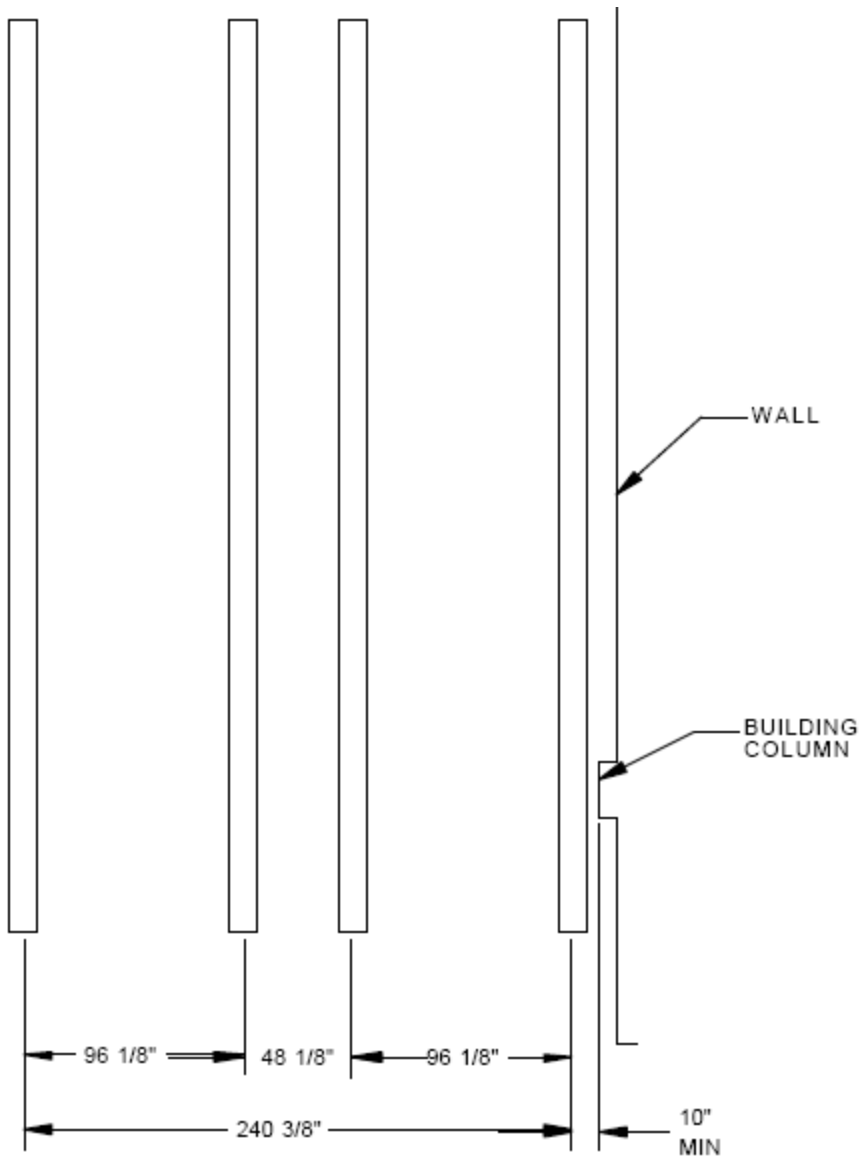
RAIL

A successful installation depends on properly placed rails. Rail systems must be square, properly spaced, and have smooth joints. If field cutting is required, any anchoring holes removed must be replaced. Place the new holes at the same dimension from the end as the original.

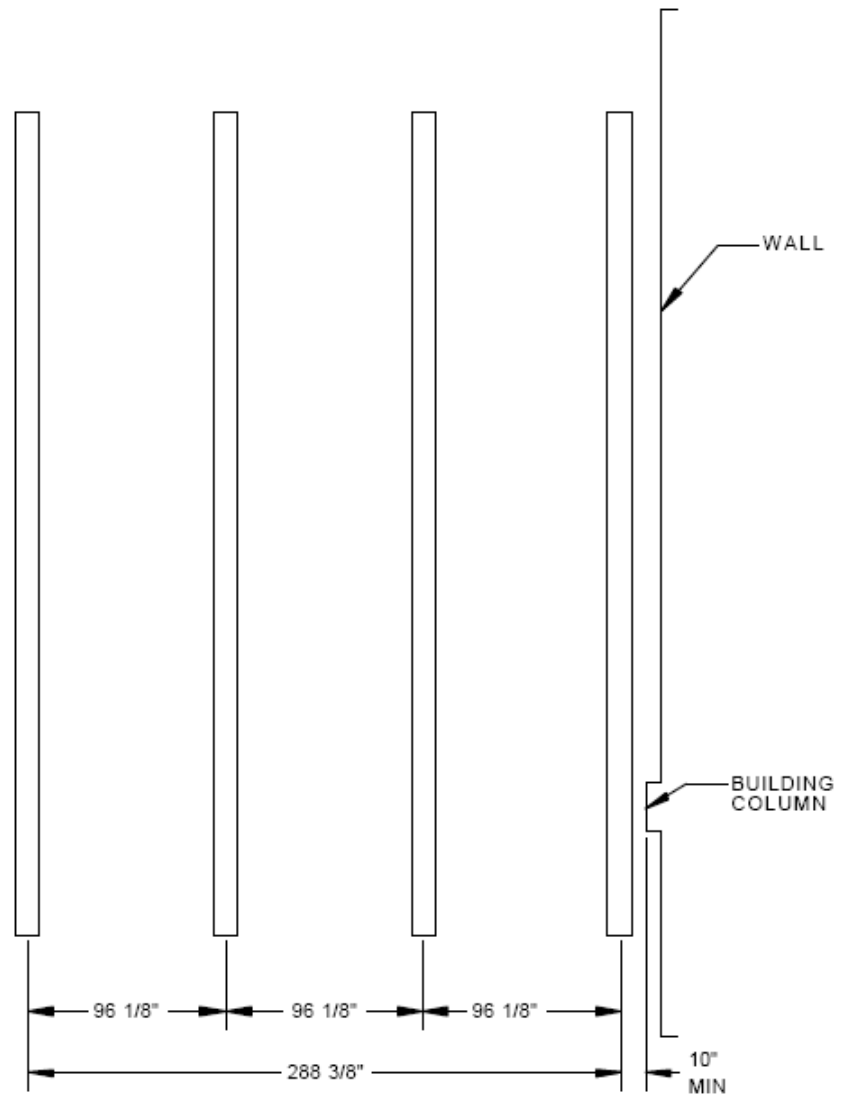
The distance from the back wall to the CENTER of the back rail should be taken from the point where the wall bulges (extends from flush and plumb) the most or where any obstruction sticks out. Rear base clearance depends on this. Rails should be distributed according to the layout received from production planning. See the illustrations on the following pages for basic rail layouts for various length systems. All dimensions are to the centerline of aluminum extrusion.

The rail assembly consists of aluminum extrusion, 5/8" bar stock, spring tension pins for joining the bar-stock, and 1 3/4" Tapcon concrete anchor. Assembly of the rail will be discussed throughout this section.

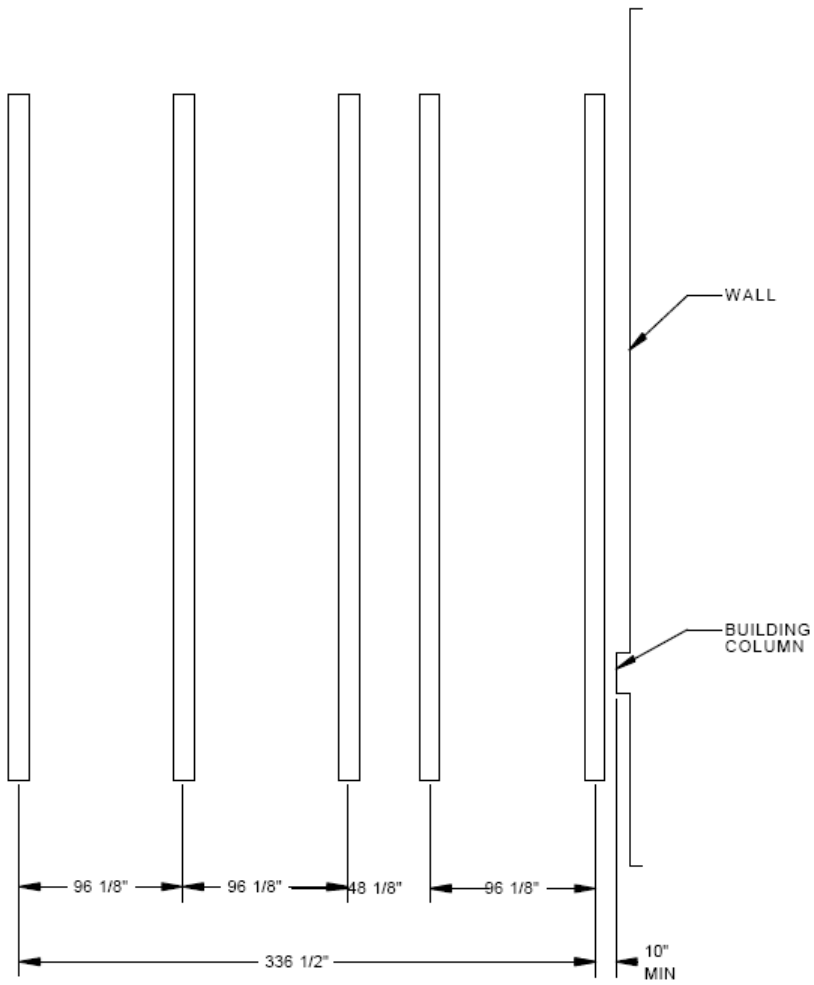




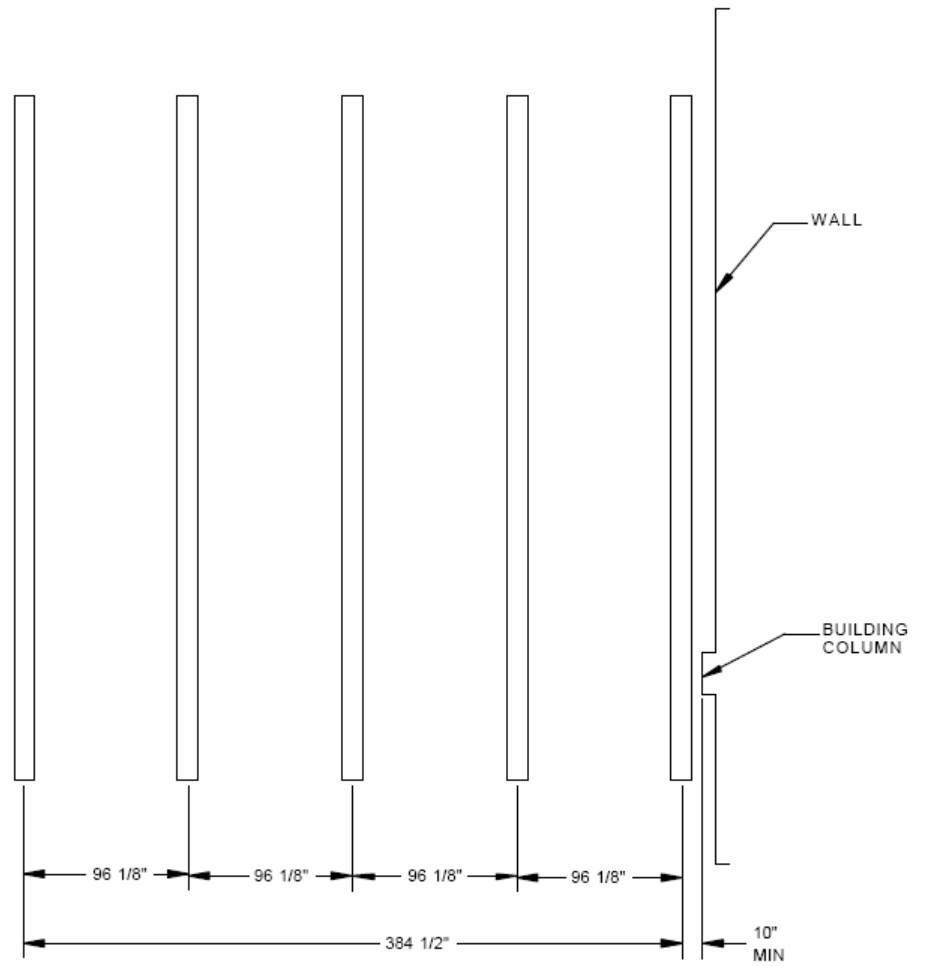
Rail Layout for 20' base



Rail Layout for 24' base



Rail Layout for 28' base

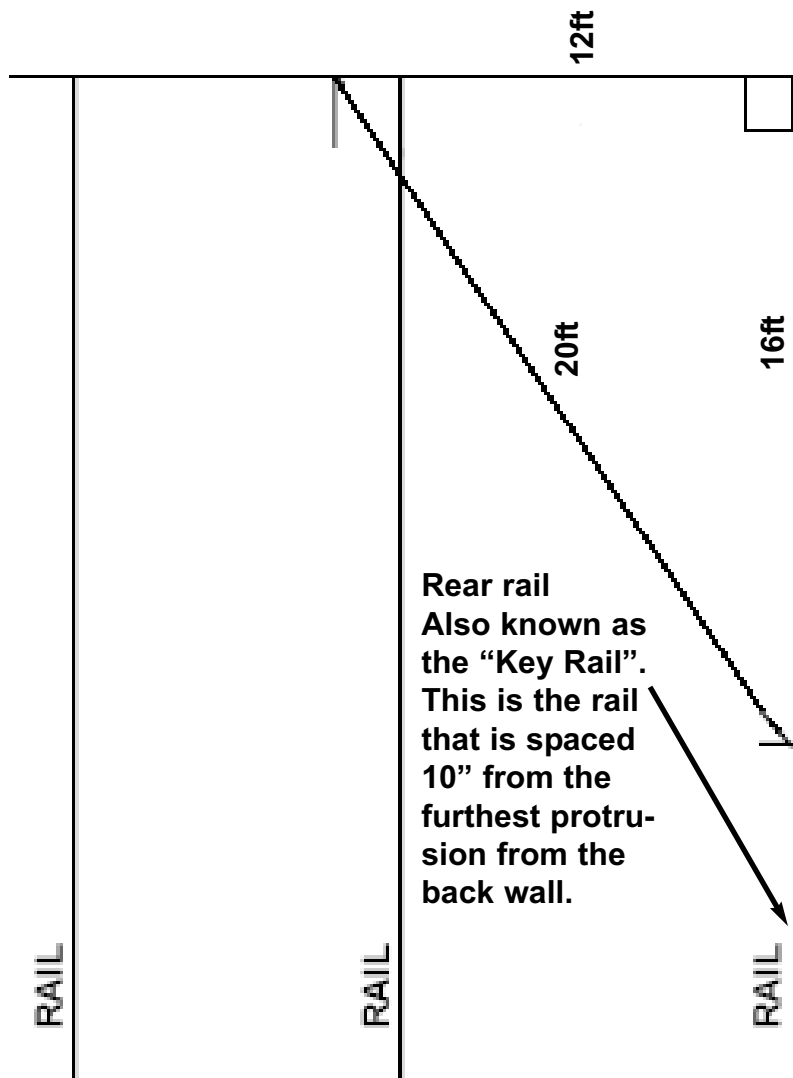


Rail Layout for 32' base

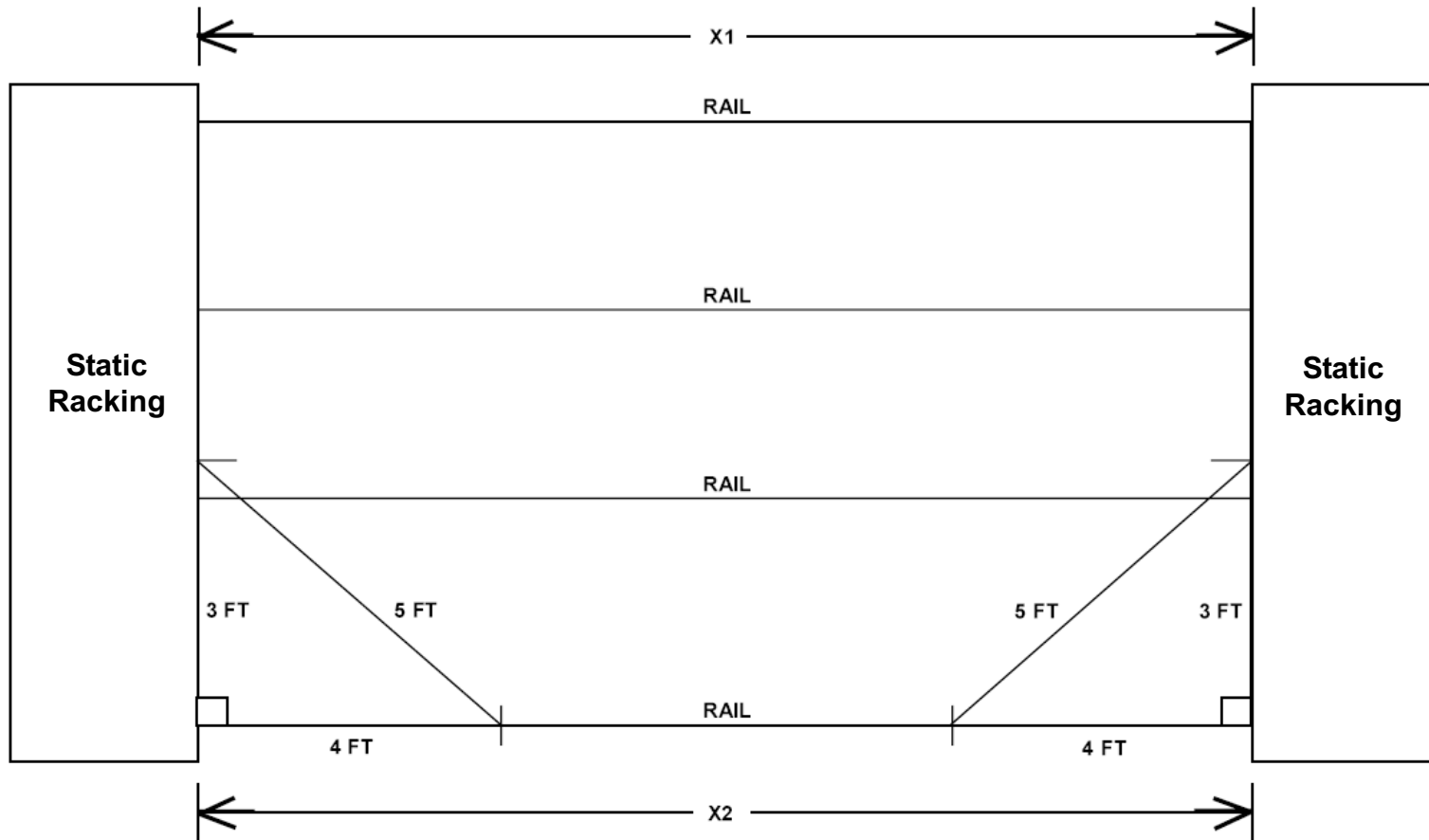
Squaring Rail to Static Racking

The simplest way to square a rail system is by using the "3-4-5" method. Basic Geometry states that if one side of a right triangle is 3 feet and another side is 4 feet, the diagonal measurement between the two will be 5 feet. The dimensions can be multiplied out to infinity and the relationship remains constant.

Expand the 3 and 4 foot dimensions as far as is possible; in this case to, 12 and 16 feet. Measure 16 feet along the chalk line for the rear rail. From the point of origin of the 16 foot line, swing an arc 12 feet away from and at approximately 90 degrees to the 16 foot line. From the other end of the 16 foot line, swing an arc 20 feet away until it intersects with the 12 foot arc. Drop a line from the origin point of the 16 foot line thru the junction of 12 foot & 20 foot arcs. The 16 foot line and 12 foot line are now square to one another. If you set the remaining rails to butt against the 12 foot line the rail system will be square. This will also be a reference line for placement of the static racking.

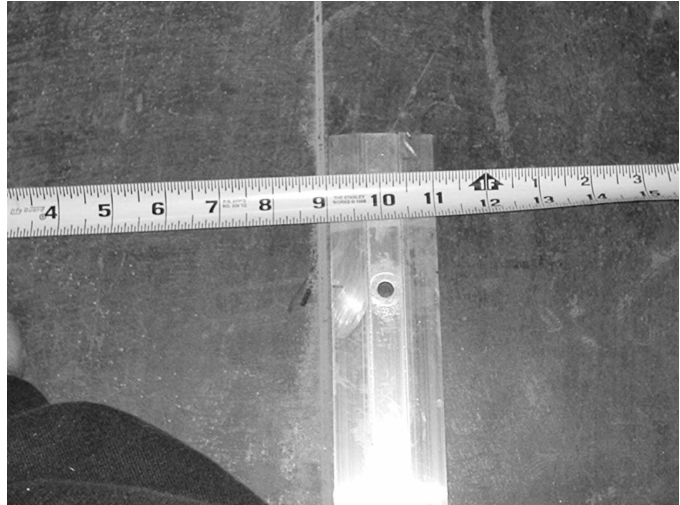


STATIC RACK SQUARING (3-4-5 METHOD)

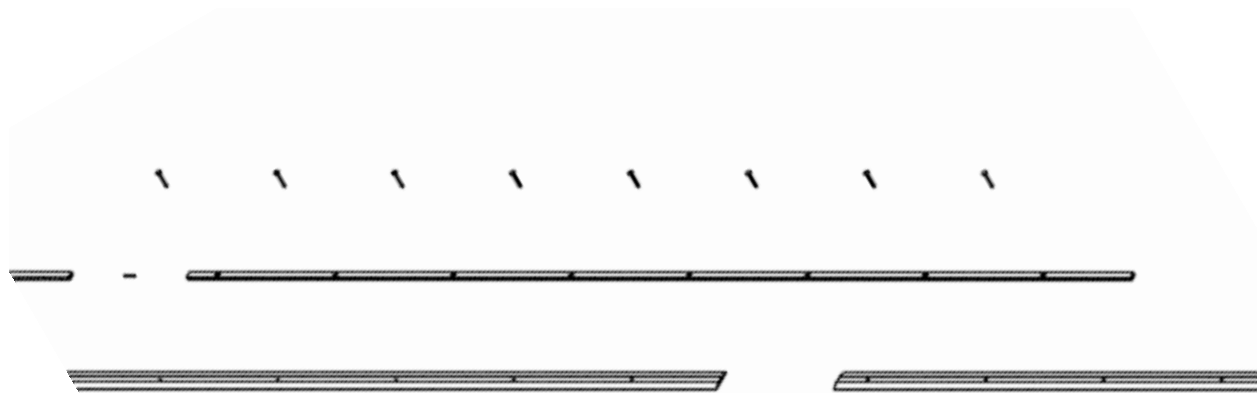
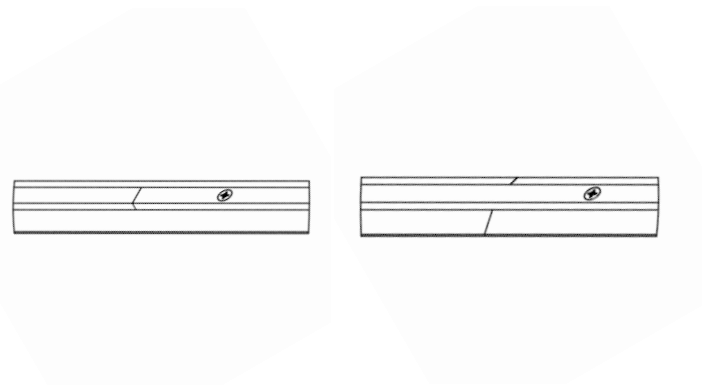


NOTE: X1 and X2 must match.
Square ALL platforms to the rails.
Expand the 3-4-5 right triangle to the largest extent possible within the system.
(See previous page)

Lay the rail extrusions out on the floor according to the floor plan provided by the production planning department. The rear "key rail" center line is 10" from the back wall. It is recommended that the chalkline be marked 9" from the back wall and the edge of the aluminum extrusion aligned with the chalkline. Since the base width of the extrusion measures 2", when the edge is aligned at 9", the center of the extrusion will fall at 10". Be certain of the rail locations to avoid costly errors. Overall squareness is also important in a properly laid rail system. As you space the rails, keep in mind that all dimensions are given from rail center to rail center. Check all your dimensions off the first key rail to avoid cumulative error.



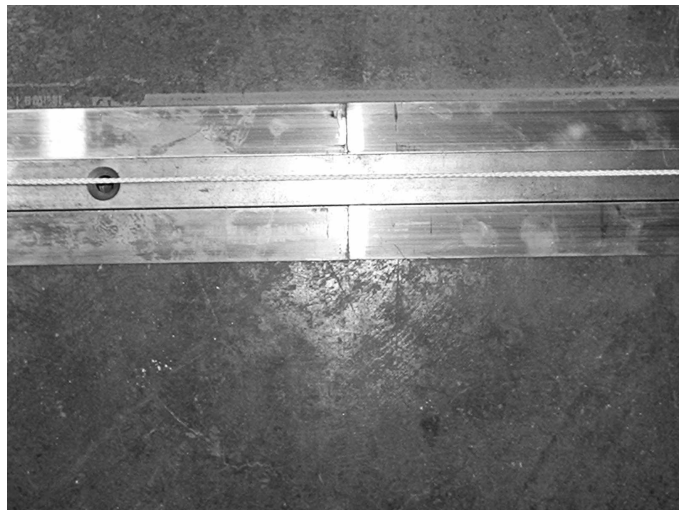
Lie the bar stock into the extrusions such that the splices do not overlap with the extrusions splices. Each piece of bar stock is spliced using a roll pin. No gaps should remain between the splices.



Using the provided blue Tapcon cement anchors, anchor each end of the key rail run. A hammer drill with a 5/32" masonry bit (keep spares) will be required to drill into the floor. Drill anchoring holes no less than 1 1/2" deep. Anchor the ends only at this time!



Before drilling the intermediate anchoring points for the key rail, stretch a dry line along the length of the rail to confirm perfect alignment of joints. Rails must be perfectly straight. Drive an anchor into the cement at the ends of the rail run and connect a string to each one. When the string is drawn tight, it should give an indication as to the straightness of the rail joints. After the straightness of the rail is confirmed, anchor the rail to the cement at all anchoring locations starting with the joints of the aluminum extrusion(s).



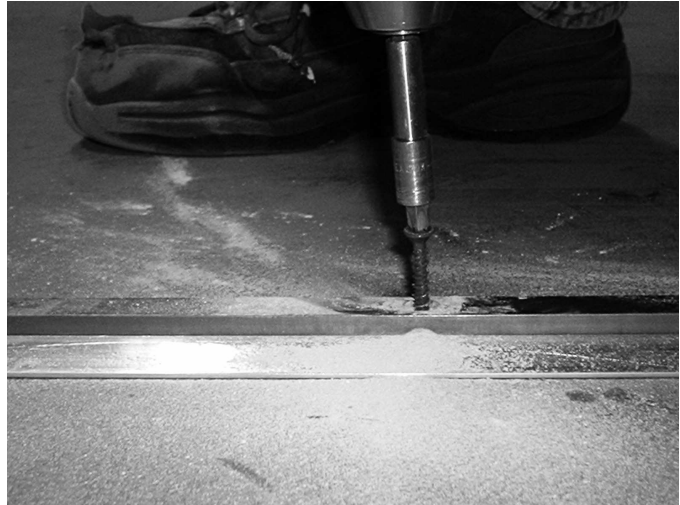
The anchors must be driven perpendicular into the floor so that the heads are seated properly into the countersunk hole of the bar stock.

The picture at the right is an incorrect method.



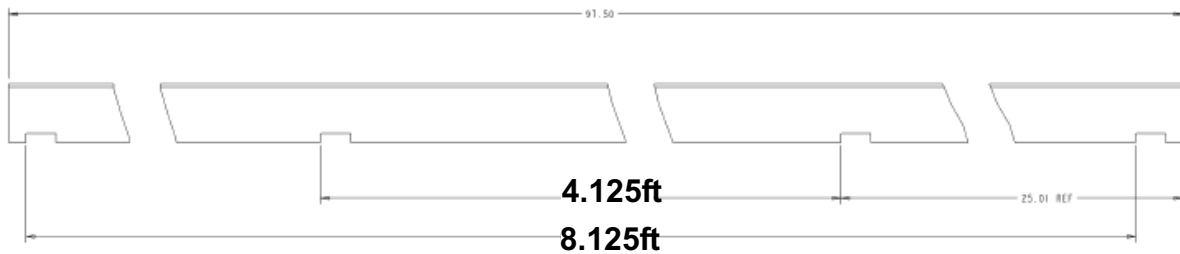
This is correct.

Note: Anchors must be used at every available anchoring location! Eight foot sections require 8 anchors, four foot sections require 4 anchors.



Use the Track Gauge to set the centers for remaining rails. The track gauge is an 8' 1 1/2" C-channel with four notches punched out of it. The gauge will allow for 4 foot (nominal) centers or 8 foot (nominal) centers. See production paperwork for centers.

Track Gauge



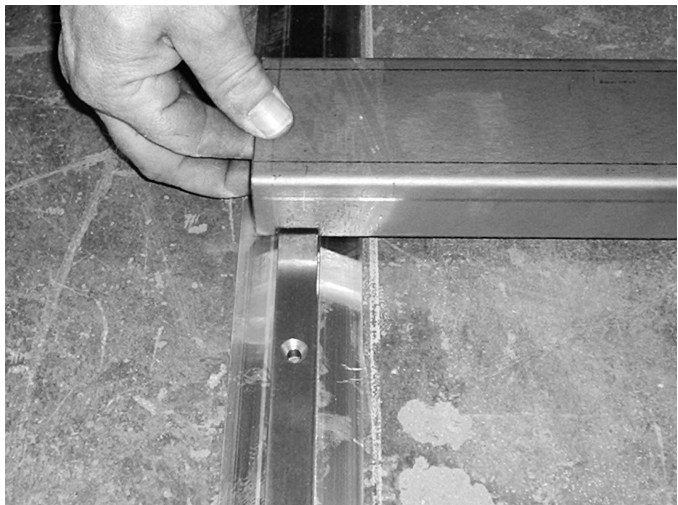
The track gauge is a tool to aid the installer to align the rail centers properly



Drop the appropriate knotch over the secured rail.



Line up the next rail using the appropriate knotch. Six track gauges will be sent per job. Place the track gauges approximately 5 feet from one another.





As previously stated, the track gauge is to be used as a tool for setting required rail centers. It is always a good idea to confirm the proper placement of the rail as per the production paperwork with a tape measure.

SECTION III

BASES

The bases will arrive as fully assembled as possible. All of the structural pieces will be welded in place, the wheel sections are assembled on the drive and load sides and many of the drive shafts will be installed. You will have to assemble all splice joints and install any drive shafts that span across splices. Remove the base sections from the skid and distribute them on the rails in close proximity to their final location. The bases are factory marked so that they can be assembled in proper order. It's important to follow the factory markings! Mixing base sections or assembling them in improper sequence will have a negative impact on their long term performance. The first leader (located on the left as viewed from the front of the system) base is marked #1 and sections of the leader base are numbered from front to rear.



Example: Base #1/Section #1
Base #1/Section #2
Base #1/Section #3
And so on.
Base #2/Section #1
Base #2/Section #2
And so on.

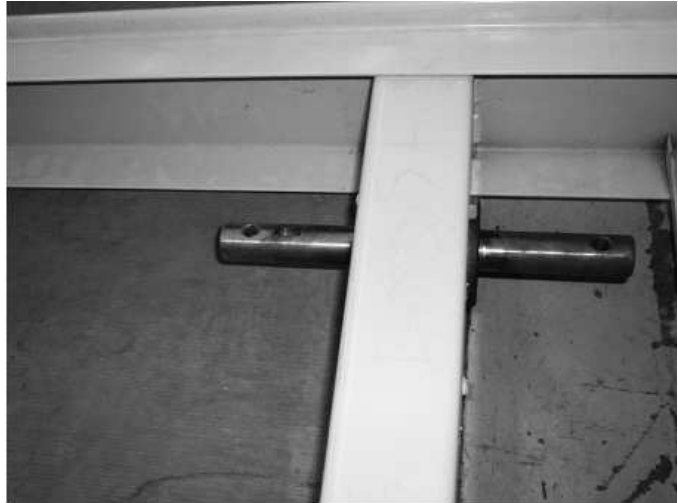
NOTE: This label is affixed to the interior of the base profile near the front of each section. Date of manufacture, color, Manufacturer job number and section location can be found on the label. The appropriate base number and section number will be checked off.



999999 CARRIAGE ST 10/29/97
1 2 3 4 5 6 7 8 9 0
1 2 3 4 5 6 7 8 9 0
SECTION
1 2 3 4 5 6 7 8 9 0
1 2 3 4 5 6 7 8 9 0

FORT ATKINSON, WISCONSIN 53538

Place the rear most section of the base on the rail. Note that the axle projects from the rear of the wheel section just as it does from the front of the wheel section. The rear portion is unused at this time but may be used at some future date to add extra length to the base.



It is possible that different length drive shafts might be used within the same base. Lay out the drive shafts and locate them as directed by the production planners paperwork. The small parts required for drive shaft installation are packaged separately.



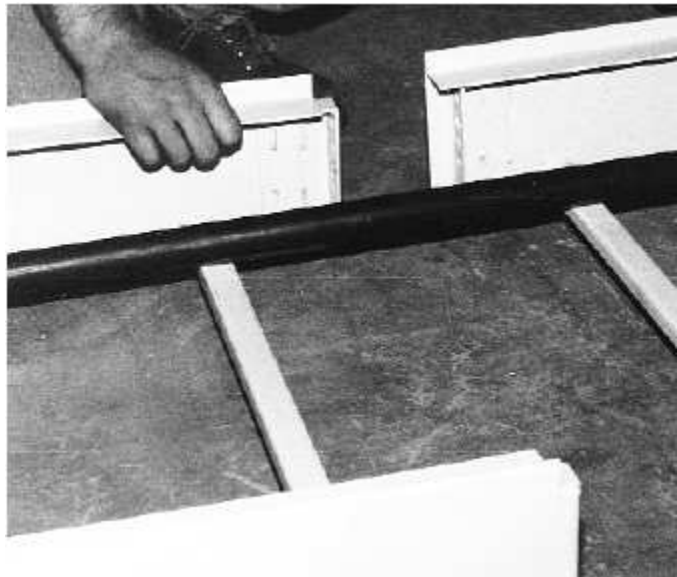
Slip the drive shaft over the axle.
NOTE: Each wheel axle to which the drive shaft is to be affixed will be coated with a black colored dry graphite film lubricant. This helps prevent shaft noise. If the substance is not present obtain some locally. Do not fasten shafts to untreated axles!



Slide it as far onto the axle as possible.



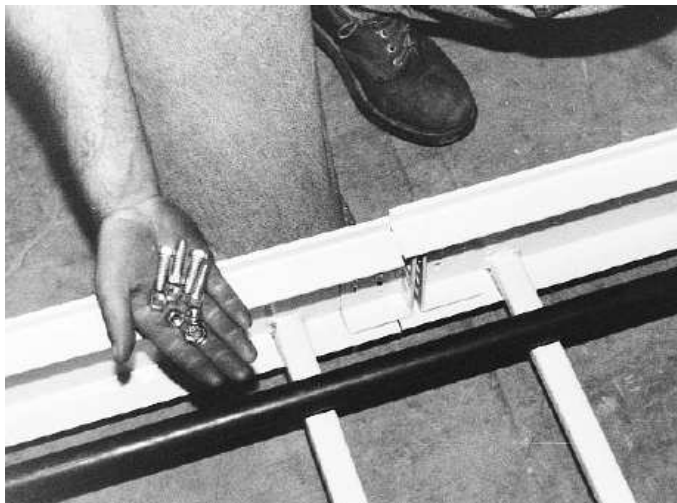
Bring the two sections of the base together. Note that the male portion of the splice assembly points toward the rear of the base. As the splice comes together slip the leading end of the drive shaft over its axle.



Select the nuts, bolts and lock washers required for the splice from the hardware package. Two of each are required for each side of the base;

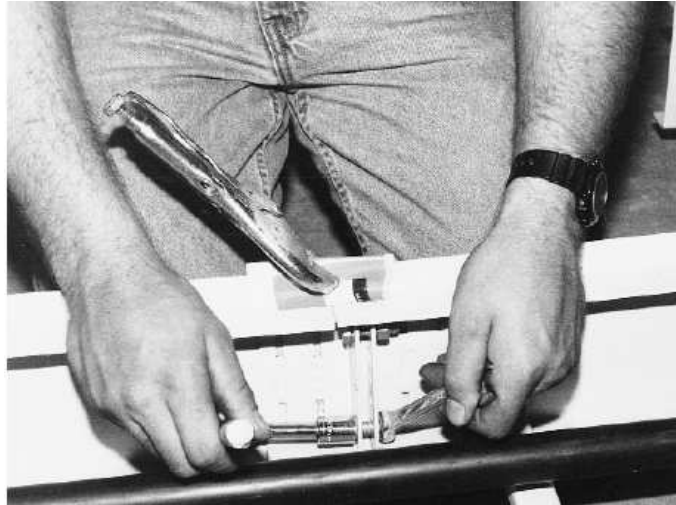
Item	Part No.
Bolt: 3/8 - 16 x 1 1/4	95021.04
Nut: 3/8 - 16	93002.10
Washer: 3/8 Internal Tooth	98003.07

Notice that the manufacturing process leaves five holes in each splice section but only the top and bottom holes are used.



Insert the hardware with the bolts going the same direction and the toothed washer on the nut side. If necessary, stabilize the splice with a vise grip pliers as shown. Use some material to protect the finish! Tighten the bolts until the 2 sections draw together and a *slight* distortion of the splice assembly pieces is observed.

Do not overtighten! Doing so may cause excessive crowning of the base which may lead to traction issues!



Each end of the drive shaft must be locked to its axle. Align the holes in the drive shaft and the axle.

Item	Part No.
(1) Bolt: 3/8 - 16	950087.001
(1) Nylock Nut	93013.06
(2) Washer	94017.07

These quantities are per end of the drive shaft.



After both ends of the shaft have been placed over the wheel axles and holes aligned, insert bolt/washer through shaft/axle at each end. To keep things consistent, it is important that both bolts are placed with the heads in the same orientation. Hand tighten nut/washer to each end.



Now tighten the nut to compress/collapse the tube shaft tightly around the drive axle. Repeat tightening procedure on the other end of the tube shaft.

NOTE: Continue the base splice and drive shaft assembly procedure as you work toward the front of the base.



SECTION IV

ELECTRICAL WIRING

The purpose of this section is to provide instruction for the steps required to install the electrical portion of your powered system. Except where noted, for purpose of clarity all references to right, left, front, and rear assume the reader is facing the true front of the system, which is the end the control/logic box is fastened to. The number one base is on the extreme left and each base to the right is consecutively numbered 2, 3, 4, 5, and so on. The order in which the steps are carried out is left to the discretion of the installer. The sequence that follows can be altered; indeed the steps may even parallel each other if more than one installer is involved.

TERMS:

1. Base:
The mobile structure supporting the pallet racking, which is driven along the rails by the gear motor.
2. Control/Logic Boxes:
This box houses the controls, logic board and IR spacing sensors. They will be labeled on a 1 of X format with the number 1 box fastened to the far left base. For example, if ten bases are to be installed the logic boxes will be labeled 1 of 10, 2 of 10, 3 of 10, and so on. A coil of wire tied cables (called the wire harness) will protrude from the bottom.
3. Cross Aisle Power/Communication Drape:
A combination of power and communication cabling spanning across each aisle coupled to the Power/Communication Pole of each base. Its purpose is to distribute power to each base and provide a communication path for logic.
4. Disconnect Breaker Box:
Makes or breaks the 20 amp supply to the system. Consists of a breaker switch, toroid filter, and inline filter. It is located on the wall behind each system module. **This item is to be installed only by a qualified electrician.**
5. Dynamic Spacing Sensor:
Contained within the Control/Logic Box this sensor is used by the logic to aid in base spacing.
6. Dynamic Spacing Reflector Plate:
These plates with reflective tape are required for proper Dynamic Spacing Sensor function. One plate must be used for every sensor.
7. Stanchion:
The rigid frame bolted to the front of each base used to hold the Control/Logic box.
8. Gear Motor:
Consists of a 90 volt D.C. electric motor and integrated gearbox.
9. Sweep Assembly:
Projects and receives an infrared beam along the length of both sides of each base. Base movement stops when beam is interrupted. There are transmitters and receivers. While in the aisle facing the base, the transmitter will always be on the right.
10. Power Pole:
A rigid "T" shaped pole positioned on the base rear on which to mount the Power/Communication J-box. This is to be installed before Racking is mounted to base.
11. Power/Communication J-Box:
The 4x4 electrical junction boxes fastened to Power/Communication Pole. The top one is for 120 volt power distribution and the bottom is for communication termination.
12. System Module:
Consists of adjacent bases in a system often separated by a static platform.
13. Wire Harness Raceway:
For protection of wire harness exiting from Control/Logic Box, the Wire Harness Raceway comes in two parts (channel & cover).

SUPPORT MATERIAL REQUIRED

In addition to tools used for laying rail and bases, one (1) small jewelers flat head screw driver, one 5/16" nut driver, and one 11/32" nut driver (both hollow shafted) should be added to tool kit.

CAUTION! HIGH VOLTAGE!!!

Some portions of this installation require working with 120V AC power. Extreme caution should be observed. The electrical wiring of some portions of this install may have to be executed by a licensed electrician. Check local codes for the rules governing this procedure.

STANDARD UL SUPPLY REQUIREMENTS FOR MOVEABLE BACKROOM SHELVING SYSTEMS

Locate customer supplied 4"x4" junction box at the rear of the system at an elevation of approx. 6 to 8 feet and aligned to the left half of the left most base, placed at the rear of the stationary. Power supplied to this junction box shall be on a dedicated/isolated 120VAC, 60Hz, 20 AMP circuit including a dedicated/isolated ground wire to the distribution source. ½" rigid or flexible conduit is required to connect between customer-supplied junction box and Leggett & Platt-supplied disconnect/breaker box. The disconnect/breaker box cover must be screwed in place and star washers used to assure positive ground connection between box and cover.

Use one disconnect/breaker box per range oriented on the side of the range it is powering. Mount it close enough so that the flat black power cable will run to the 1st base and drape in the bases full range of travel.

NOTE: Dedicated/isolated is defined as separate hot, neutral and ground wires from the customer distribution source/breaker panel. To avoid electrical interference, systems must never share wires with any external equipment.

On standard UL Listed systems, ½" rigid or flexible conduit is **required** between customer supply junction box and moveable shelving breaker box. All other Class 1 power is through 3 con vinyl-based SJO type insulated cables designed for maximum protected power load.

On conduit based systems, all Class 1 power distribution is through ½" rigid or flexible metallic conduit. Class 1 power is defined as 120VAC @ 60Hz.

STATIC CAUTIONS

Static Electricity has been identified as a major contributor to the degradation of electronic components. Wrist straps, often referred to as Static straps, are a cost effective solution to protect against such damage. Please take the following precautions when handling electronic components.

1. **Be careful not to touch the logic boards or the connectors on the ends of the cables without the use of static protection.**
2. **Never handle logic boards without a properly grounded and functional static strap.**
3. **Always handle logic board and electronic components with exposed circuitry from the edges being careful not to touch component leads.**
4. **If no static strap is available, discharge static buildup frequently by touching a grounded metal object.**
5. **Taking time to be static safe will save time and money in fewer service calls.**

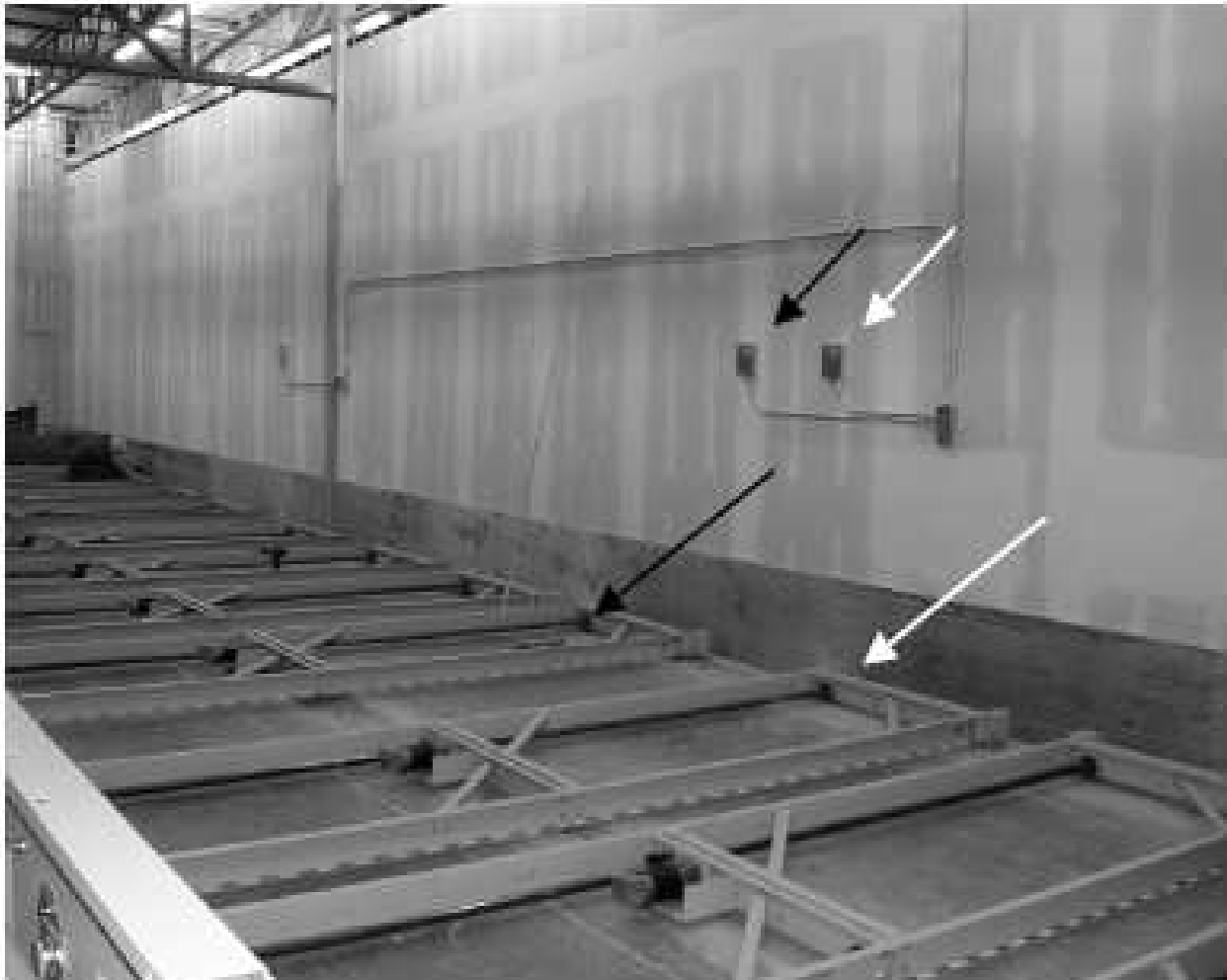
Power Supply Preparation

Run supply power to area near to the rear of the appropriate base so that the system breaker box can be mounted close enough to the base so that the 132" flat black drape cable can traverse the full range of the bases movement. The arrows indicate the appropriate base of the range and the disconnect box associated with it.

Note: Power can enter from left or right.



Do not make any high voltage power connections until all other wiring is completed!



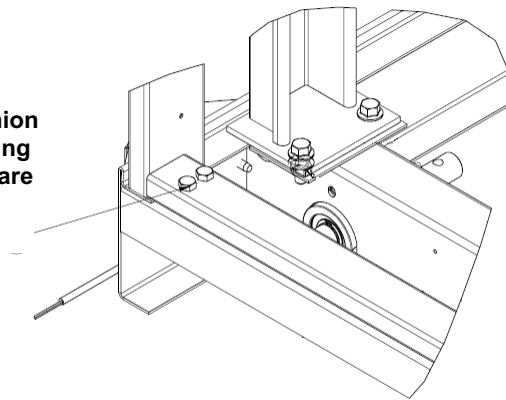
Stanchion Placement

Install End Stanchions on bases as shown using hardware supplied. Two bolts are used for each side.

Item
(4) Bolt: 3/8 - 16

Part No.
950078.001

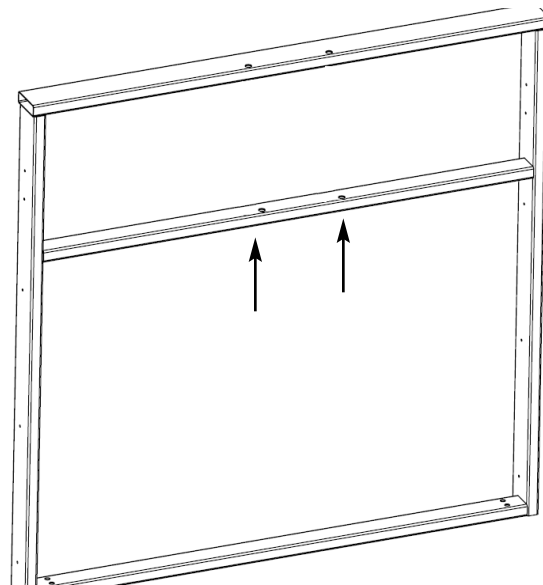
Stanchion
fastening
Hardware



DETAIL C
SCALE 0.500

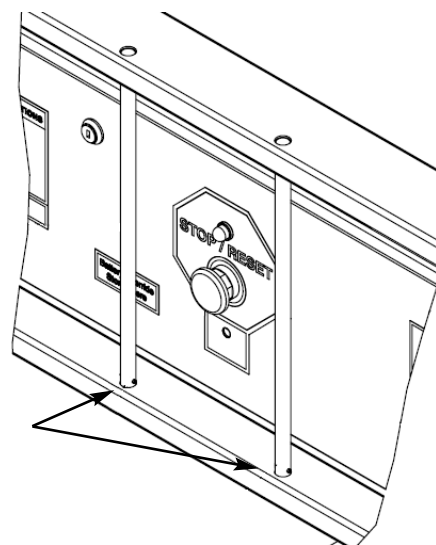
The forward facing side of the stanchion will have holes for the control panel protection rods. These holes will be offset closest to the front of the module.

The control protection rods should be installed upon completion of the installation. To install them, push them downward from the holes on the top of the stanchion with the hole to accept the spring pin down. After the rod is passed through the top holes on the stanchion, insert the provided spring pin so that the rod cannot be pulled back out.



With the pins in place, the protection rods can still be pushed upward so that the control panel can be opened for service.

Spring
Pins

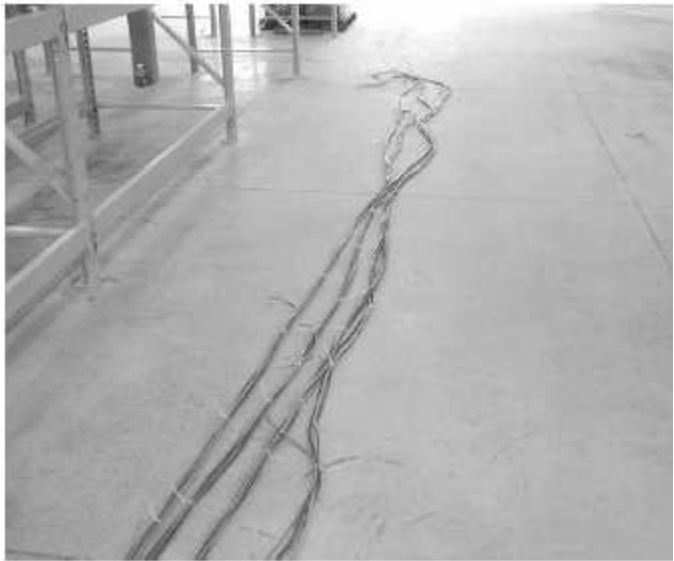


Wire Harness Preparation

Prepare the Wire Harness as shown by placing additional wire ties to bind up the cables for routing to the interior of the base. If this method is used Do Not cinch the wire ties too tightly as some may need to be removed later!



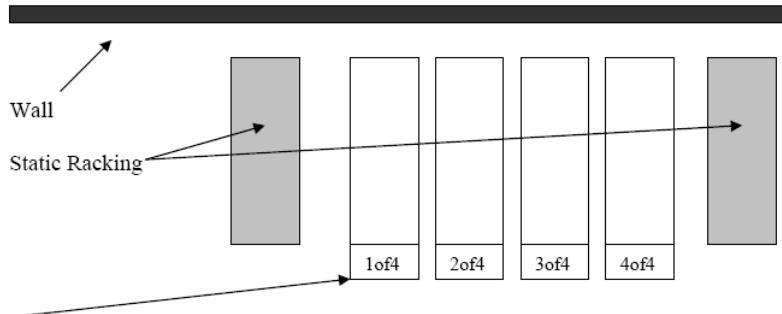
A clear area is required to prepare wire harness.



Control Box

Placement of the Control Boxes in the End Frame is in chronological order from LEFT TO RIGHT. Each control is labeled with its location. A sticker on the lower left of the box will indicate its location with 1 of x being the left most base in that range. For example, on 4 and 5 base ranges the boxes will read 1 of 4 or 1 of 5 and so on. Locate the Control box labeled 1 of x (the example below has 4 moveable bases so the box would be labeled 1 of 4) and place it near the front of the 1st base.

IMPORTANT! Control boxes must be positioned in as described or the system will not function!

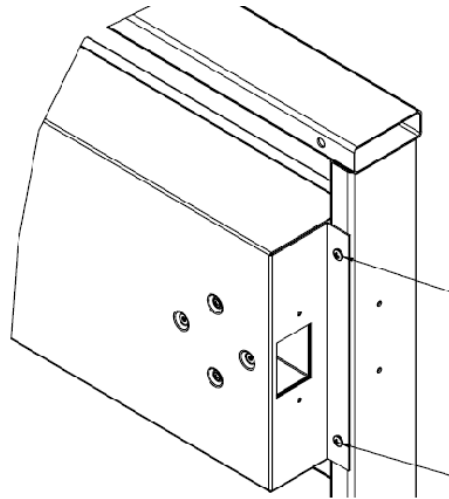


The stanchion is shown lying face down for clarity. Locate box labeled 1 of x depending on the number of bases in the range and insert it from behind into the stanchion of the left most base. Fasten at all 4 mounting holes with hardware provided. Repeat for the remaining bases to the right.



Fasten Control Panel as shown using supplied hardware.

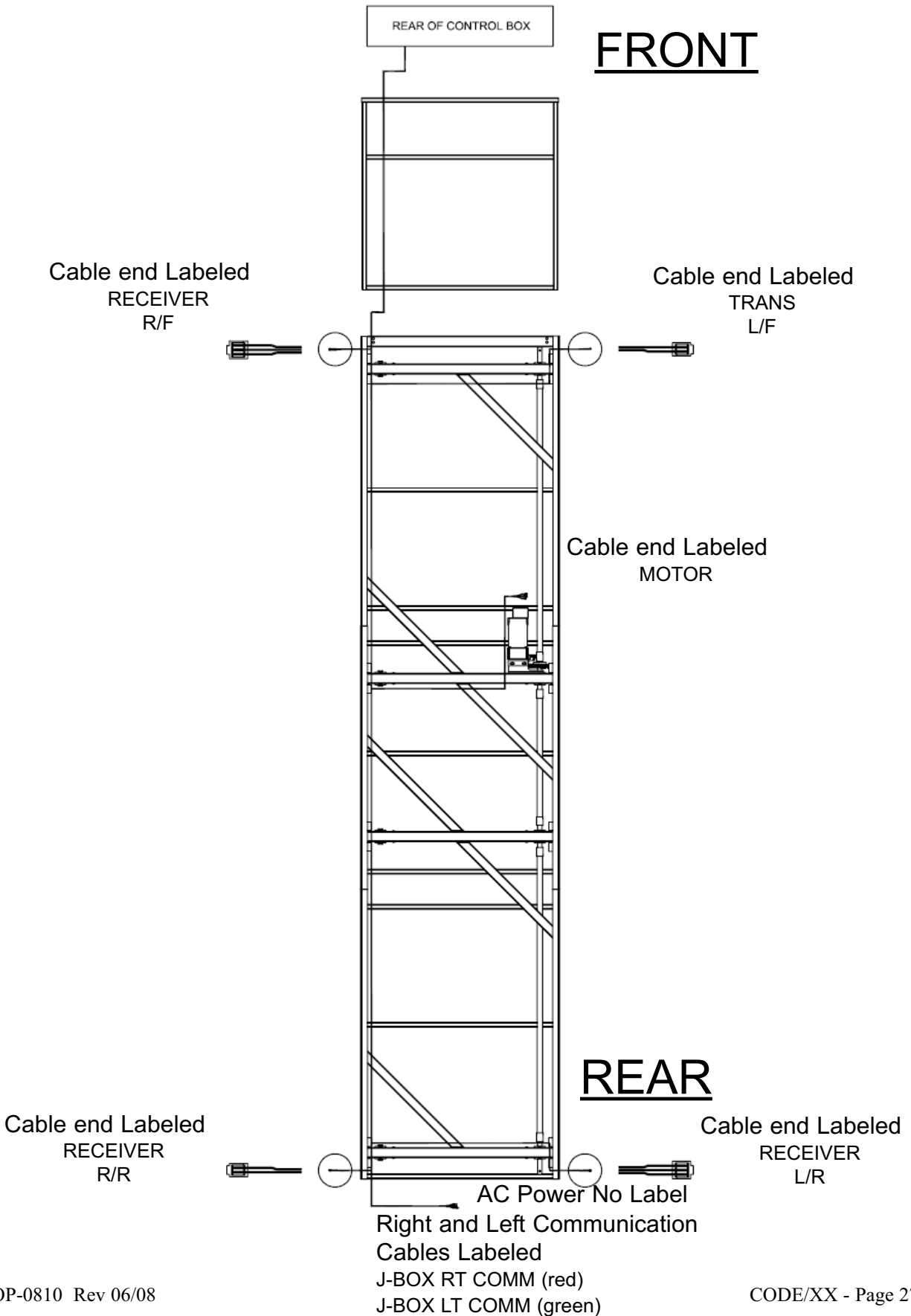
Item	Part No.
(4)Screw Pan Head Tek screw	96117.01



Feed wire Harness through wheel section at lower right of base to the interior of the base. Run the wire harness along right side of the interior of the base. Push; do not pull the harness through the access holes in each wheel section as you make your way toward the rear of the base. For a graphical representation of the cable routing, see the wire harness destination diagram on the next page.

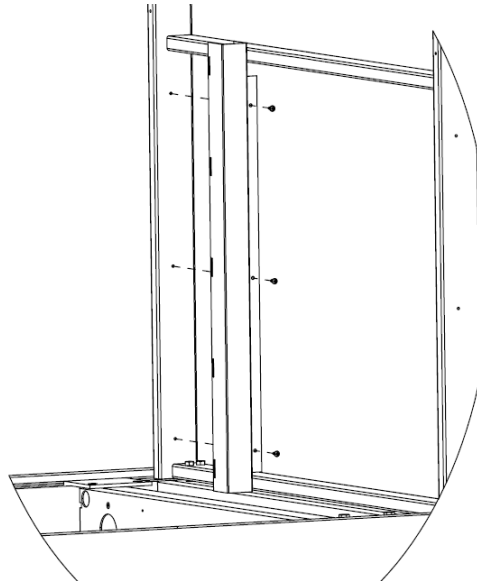


WIRE HARNESS DESTINATION DIAGRAM



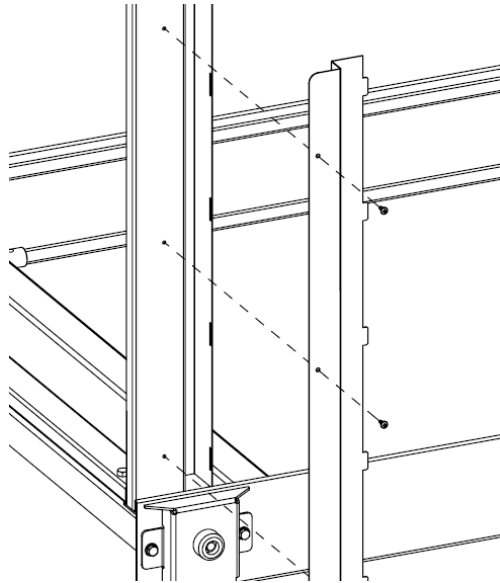
Install wire raceway and cover using hardware provided. Be careful not to pinch cables as they exit the raceway at the bottom.

Item	Part No.
(3)Screw Pan Head Tek screw	96117.01



Tuck all cables in harness neatly into the raceway. Put the cover on the raceway using hardware provided. Be careful not to pinch or strain cables!

Item	Part No.
(3)Screw Pan Head Tek screw	96117.01



Motor Power Wire Routing and Termination

The Control Box wire harness contains a d/c motor power cable that will be long enough to reach the motor for termination. Make connections color for color and stake the green ground wire to the ground lug.



Fasten motor power cable to frame with wire ties along its route to the motor. Coil extra wire and fasten it neatly as shown so it will stay off floor and away from moving parts.



Front and Rear Sweep (Electric Eye) Cable Routing

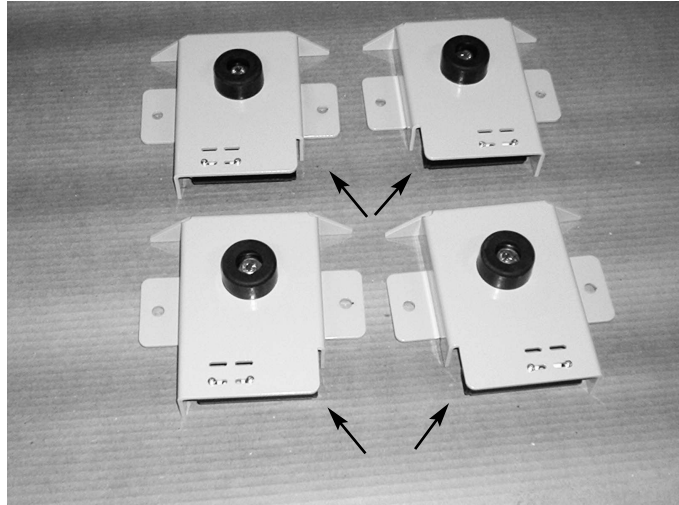
Route the front and rear sweep (electric eye) device cables as shown in the Wire Harness Destination Diagram on page 27.

Locate sweep device assemblies and bumpers. They are made up of sweep devices mounted into safety yellow mounting brackets. There are two types; left front/right rear and right front/left rear. The left front/right rear assemblies will have a 6" pigtail male ended pigtail with two conductors. The right front/left rear assemblies will have a three conductor male ended pigtail. Fasten the bumpers to each sweep bracket using the hardware provided.

Item	Part No.
(1)Bumper	300385.001
(1)Bolt Hex 1/4"	95002.09
(1)Hex Keps Nut	93015.02



The sweep pair shown on top is for the left side of the base. The sweep pair shown on the bottom is for the right side of the base. Note the arrows pointing to the openings in the brackets. These openings will always be on the bottom of the bracket and facing each other when the pairs are mounted correctly. Another way to tell is the pigtail connectors. Transmitter devices have a two conductor connection and receivers have a three conductor connection. Transmitters are always on the right as you face the sweep pair from inside the aisle.



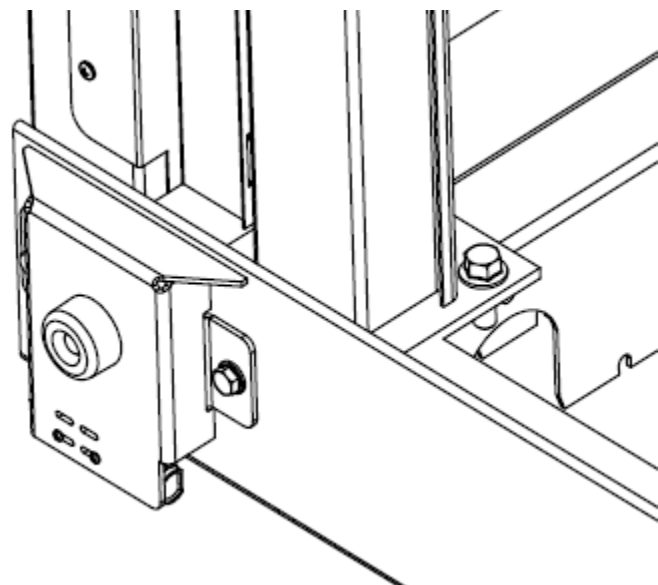
Make sweep connections. The two conductor transmitter sweeps will connect to the two conductor wire. The three conductor receiver sweeps will connect to the three conductor wire. The connections can only be made one way and will snap together. Do not force connections together. If they do not snap together easily, re-examine connections for proper fit. Keep the red connectors inside the yellow brackets when mounting making sure that cable does not block sweep lens.



Use the hardware provided to mount the sweep brackets to the base. The openings in the bracket will allow the sweep devices within to face one another as in the drawings. The hardware below is per sweep bracket.

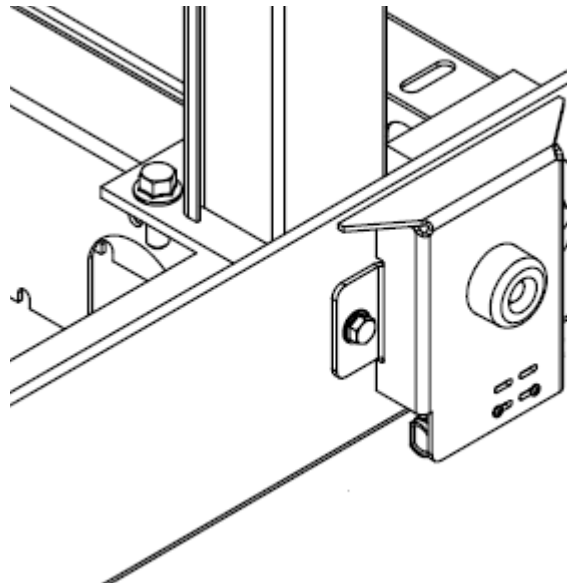
Item	Part No.
(2)Screw Type F Hex	960273.001
5/16"-18 x 3/4"	

The drawing to the right is a receiver.

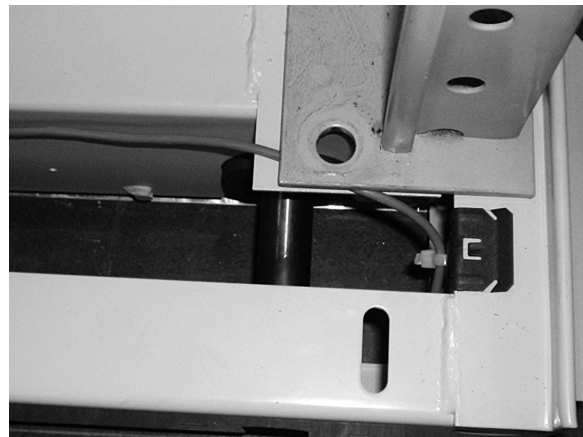


The drawing to the right is a transmitter.

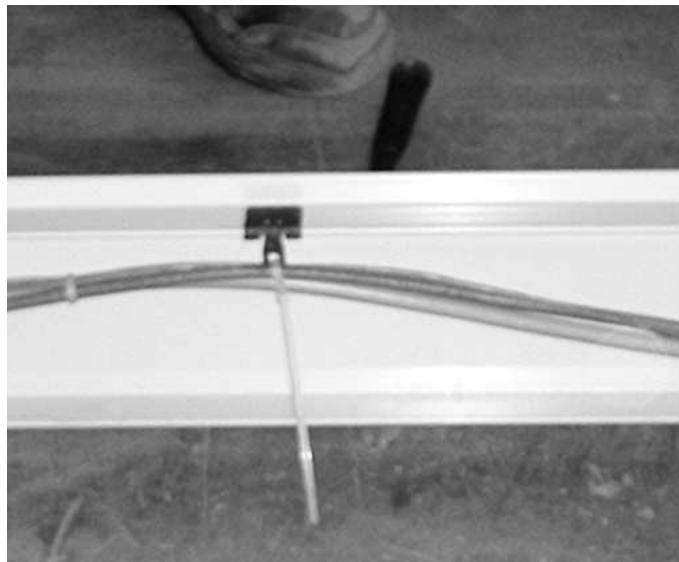
Note how both the receiver and transmitter devices point inward towards the center of the base.



Note: Avoid allowing sweep cables to become pinched during placement of racking uprights as shown below. Wire tie sweep cables well away from hazardous areas.

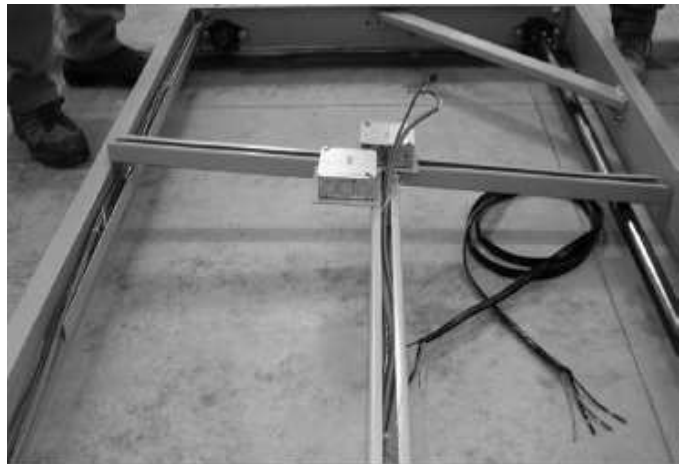


Wire harness will be secured using caddy clamps and wire ties. Place the caddy clamps equidistant from wheel sections. It is a good idea to route all cables to their proper destination prior to securing cables. All cables should be secured such that they do not drag on the floor and are safely away from moving parts.



Power Pole

Locate the power poles and lay them down channel side up at rear of bases as shown. Run AC power (thick gray three conductor cable) and low voltage communication cables (cables with red/green labels) in channel of pole to J-boxes.

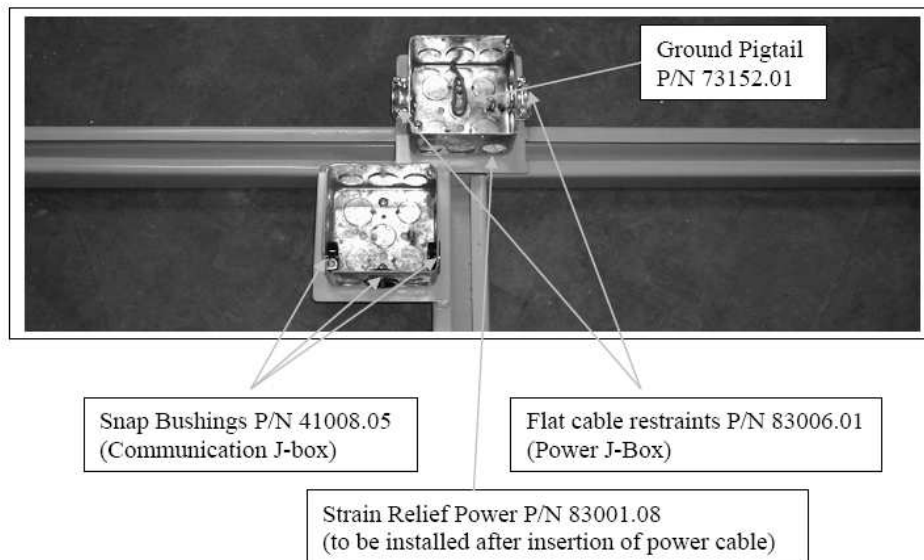


Knockout J-box holes on power poles. The upper box is for the AC power junction, the lower box houses the low voltage communication connections. The left most and intermediate power pole will have flat cable restraints (large knockouts) on both sides of the power J-box. The right most will have one only on the right. All power J-boxes will have bottom hole knockouts (small) for the 120vac cable. The left most pole communication J-box will have a snap bushing (large knockouts) on the bottom and left side.

Note: If power enters from right, the opposite knockouts will be used!

*Note placement of snap bushings and Flat cable restraints on the Power/Communication J-box.

** Flat cable restraints must be disassembled to install into J-Box.



Note: Remove green screw on ground pigtail. Remove one Tek screw from back of 4x4 "J" box and insert Tek screw through ground strap loop and re-insert Tek screw in back of 4x4 "J" box.

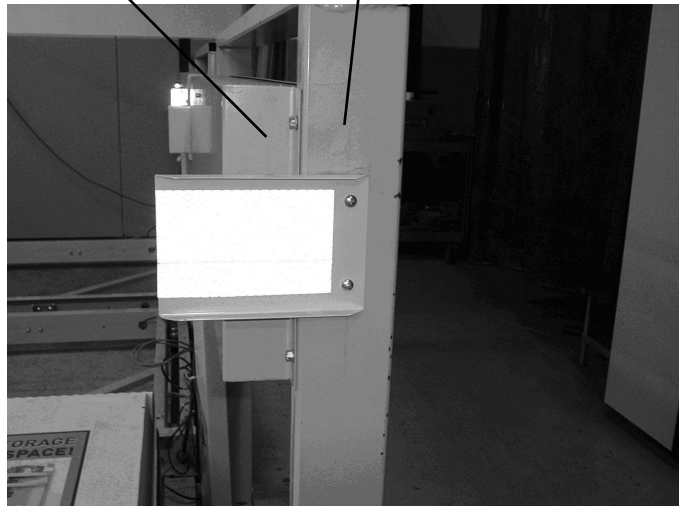
Dynamic Spacing Reflector Plates

Reflector plates are necessary to ensure proper functioning of dynamic spacing sensors. Locate 5 reflector plates for 4-base module or 6 reflector plates for 5-base module.



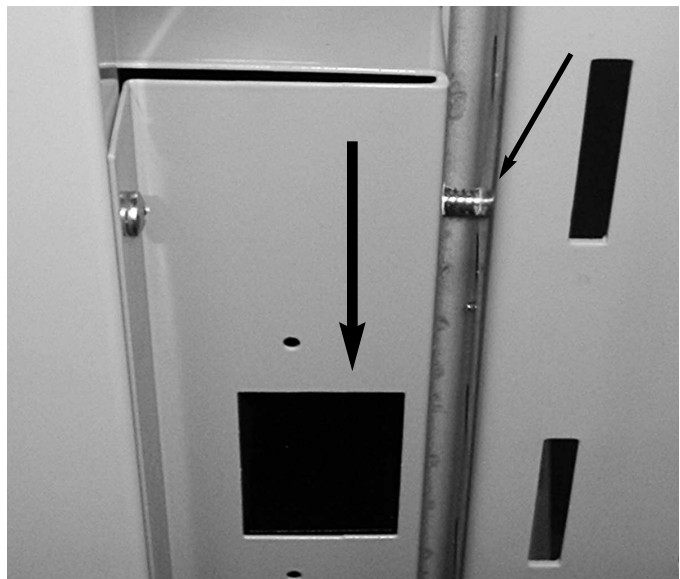
CONTROL BOX END FRAME

Mount reflector plates to movable bases 44" high to top of plate as shown in locations displayed in illustration on next page. Do not mount reflector plates over control boxes with openings on the side.



Do not mount reflector plates over control boxes with openings on the side! The photo to the right shows a control panel with an opening on the side for the distance sensor. The reflector plate for this distance sensor would be mounted on the neighboring carriage. This spot in the neighboring base would not contain an opening.

Note the tek screw exiting the back of the control box and into the upright. This should be done with all control boxes on both sides to provide greater stabilization of the stanchion. Run the tek screw from inside the box. **Be very careful not to damage circuit boards or cabling inside the control box!**

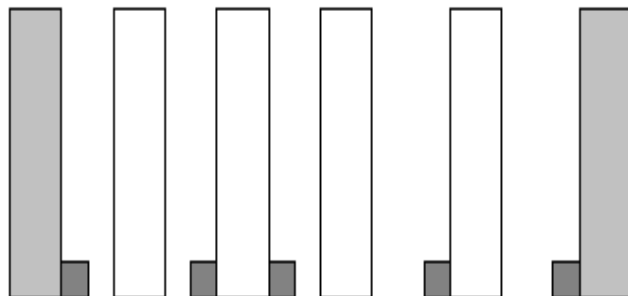


Mount reflector plates on upright of static shelving as shown.

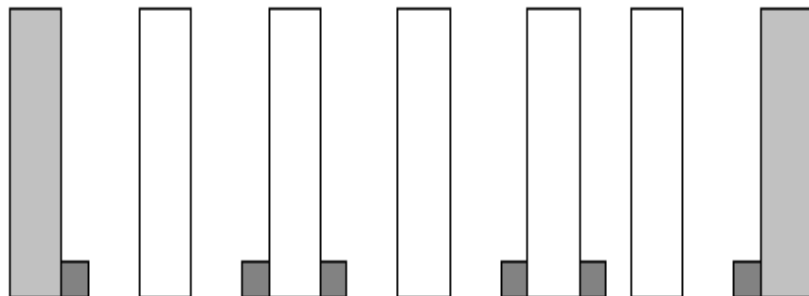
Note: This reflector must line up with opening on side of control panel. Field measure before mounting reflector plate



4-Base
Module



5-Base
Module



■ Reflector Plate
= Assembly
P/N 401419.001

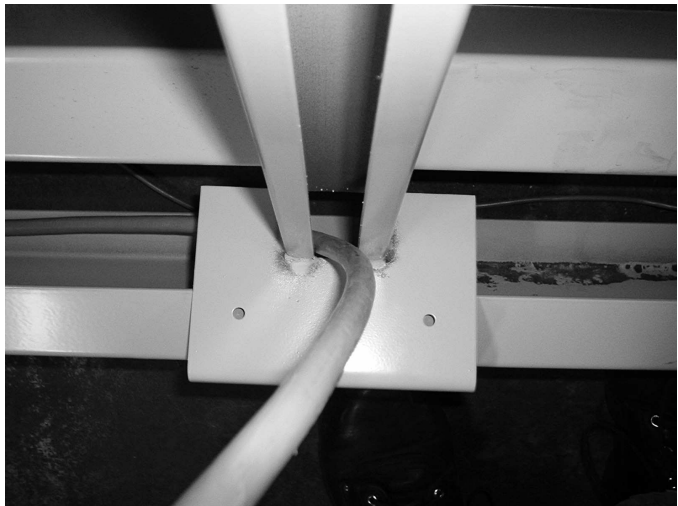
Power Pole Pre-Wiring Installation

Note: Wiring is shown standing up for clarity only. It is recommended to wire power poles and all drape wiring while pole is laying flat on interior of bases due to lack of space behind system.

Place the "T" shaped Power Pole as shown at the rear of the base with the mounting foot resting on the wheel housing and the channel facing out. Power and communication cabling will be tucked inside the channel

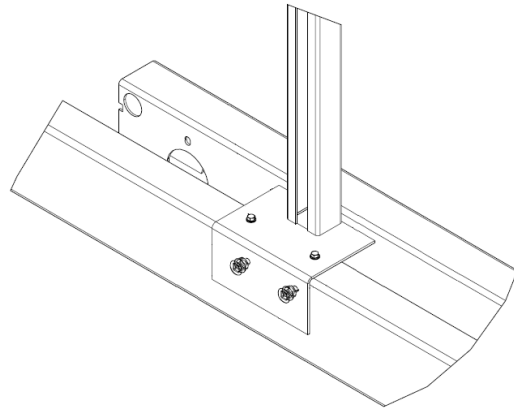


The power and communication cables will need to be fed through the opening at the bottom of the Power Pole.



Use Tek screws to secure foot to wheel housing from the top. Use base bolts and nuts to fasten from rear. Insert bolt from the inside of the wheel section and then install nut from outside the wheel section.

Item	Part No.
(2)Screw Tek Hex Head #12	96060.01
(2)Base Bolt	95004.02
(2)Nut Flange Lock	93005.06



DETAIL D

After racking is installed, secure cross member to racking.

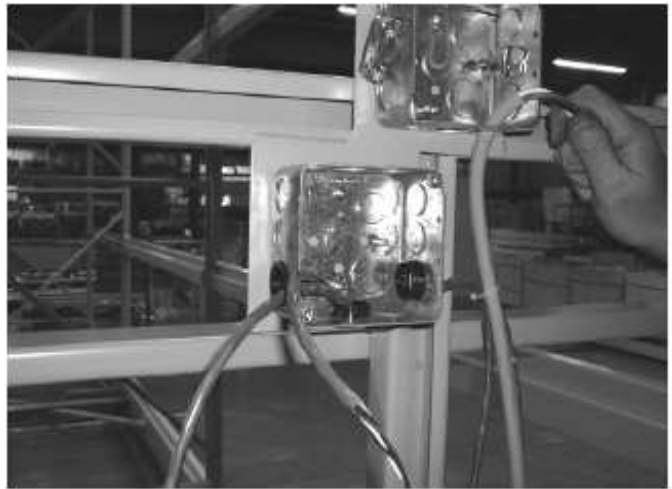
Item	Part No.
(2)Bolt: 5/16-18	95037.04
(2)Nut Flange Lock	93005.06



Guide main power and communication cables along wheel housing and up the channel of the power pole.



Run the communication cabling to lower J-box through bottom access. Communication cables are labeled left (green label) and/or right (red label) and have red terminal connectors on the ends. Route the power cable to the upper J-box through bottom access. Leave about 6 to 8 inches at J-boxes.

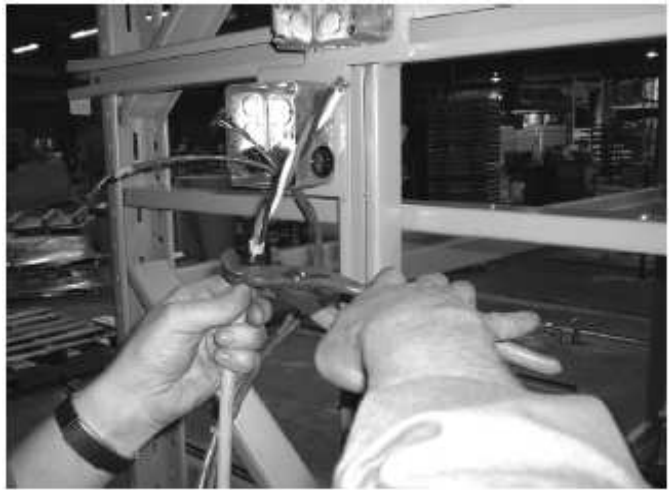


NOTE: The first control box (labeled 1 of x) will have only one communication cable in its wiring harness. It will have a Red label that says "RIGHT". The last control box (labeled x of x) will have only one communication cable in its wiring harness. It will have a green label that says left.

The photograph to the right is a Heyco strain relief grommet. A channel lock pliers is a useful tool for use installing them.

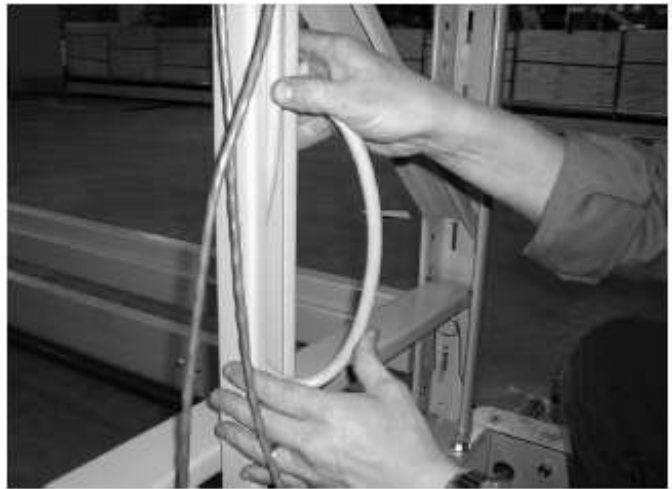


Install the Heyco strain relief grommet to the main power cable at the J-box.



Coil up excess cable and place into channel of power pole.

***Each base should be assembled/wired to this point before proceeding to the *Linking Power and Communication portion* of this manual!**



Linking Power & Communication (First Base)

Locate the pre-sized flat black cross aisle power coupling cable(s). They are all the same length and will come pre-stripped. Starting from the first base (on far right when viewing system from rear) moving left. Guide one end into the power J-box through the flat cable restraint on the left side of the box as you're facing it. Tighten the restraint on the cable. Insert the system to disconnect/breaker box flat black cable into the power J-box through the flat cable restraint on the right side of the box as your facing it.



Note: If power enters on right, use opposite sides.

Control Box	Flat Black Drape Cable
Black	Black
White	Red
Green	Orange

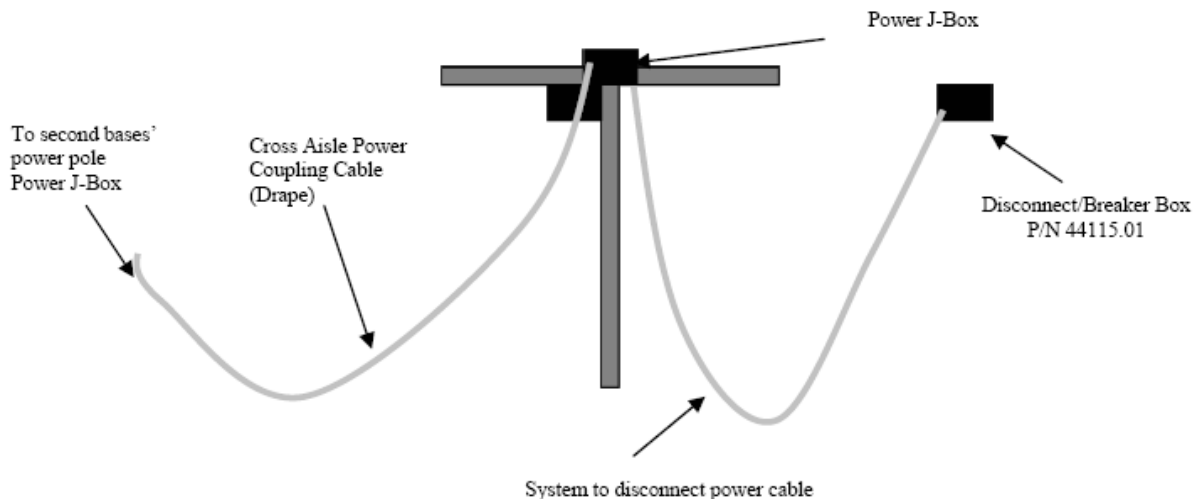
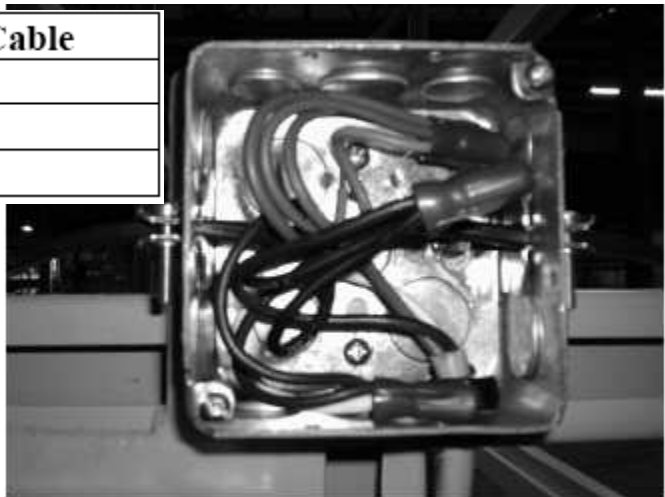
Wire nut the wires together as shown:

Green ground pigtail to green wire from control box & orange wire(s) from flat black cable(s).
White wire from control box to red wire(s) from flat black cable(s).

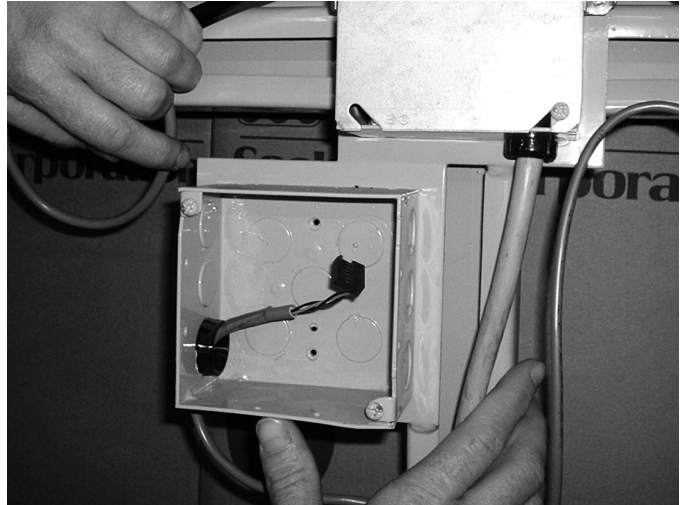
Black wire from control box to black wire(s) from flat black cable(s).

See wire color code chart above for quick reference.

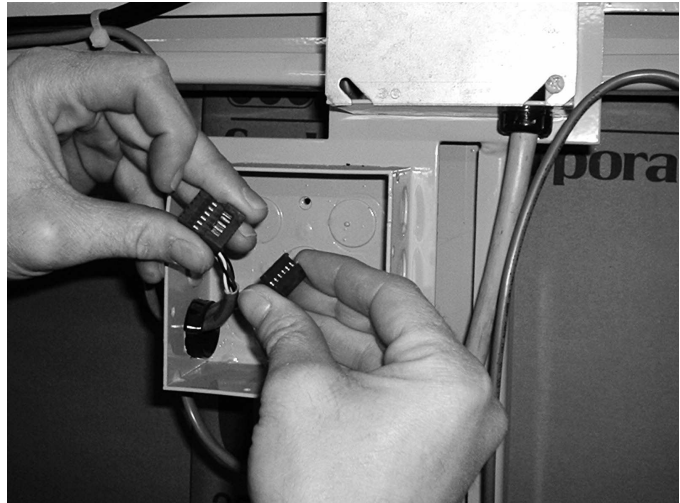
Place cover on box.



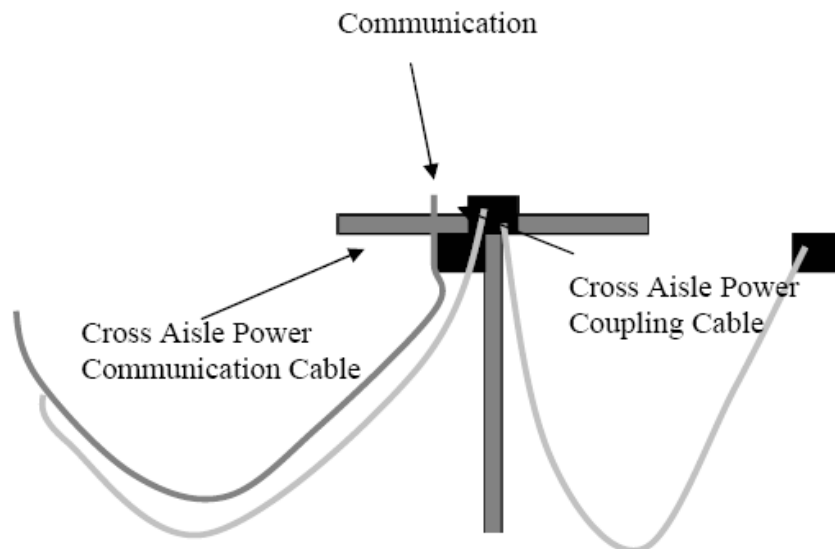
Locate cross aisle communication cables in shipment. Each cable will be the same length and have red color-coded label at one end and green color-coded label at the other end. The cables will be fastened red to red from communication J-Box and green to green from communication J-Box. The first base's communication J-Box will have a single communication cable with a red destination designator labeled "Right".



As viewed from rear, insert the red labeled end of cross aisle communication cable into the communication J-Box from the left. Connect to red labeled communication cable from wire harness. Place cover on box.

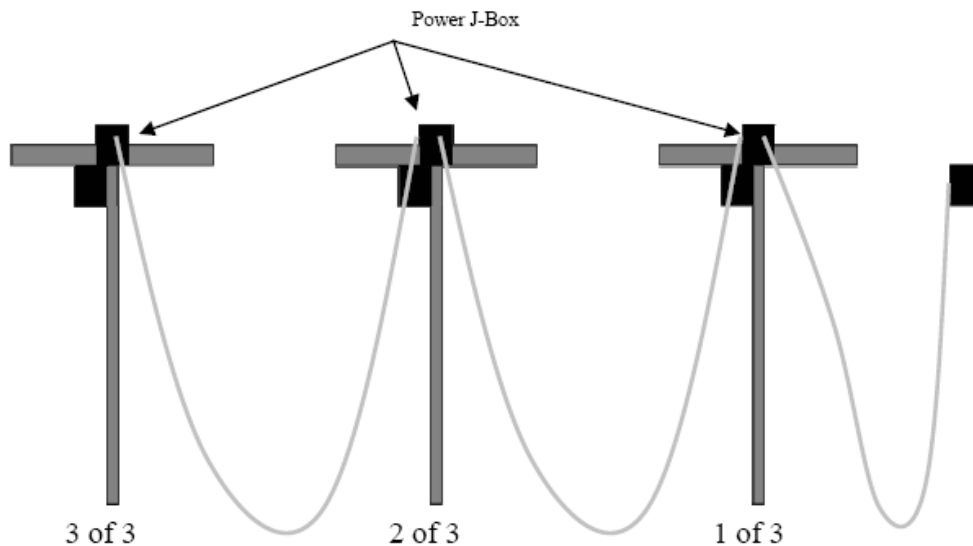
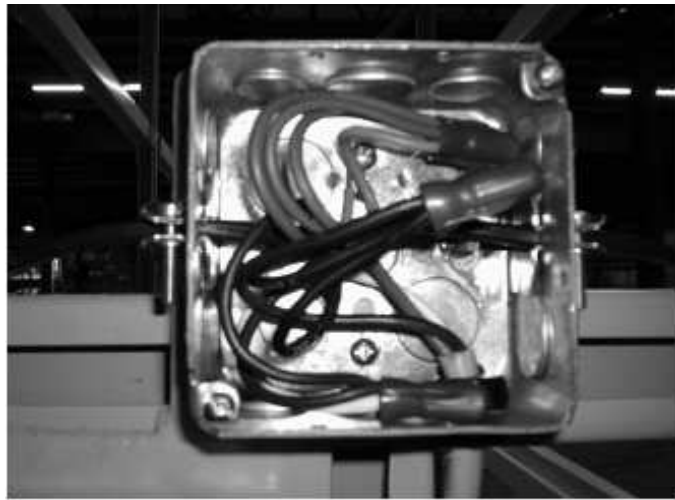


Place wire ties at approx. 12-18 inch intervals to hold flat power cable & communication cables together.



Linking Power & Communication (Intermediate Base)

As viewed from rear of system; locate flat black cross aisle power coupling cable from base to the right. Insert into right side of power J-Box through flat cable restraint (may require stripping). Tighten restraint. Insert another flat black cross aisle power coupling cable into left side of power J-Box through flat cable restraint and tighten. Wire nut the wires together as shown: Green ground pigtail to green wire from control box & orange wire(s) from flat black cable(s). White wire from control box to red wire(s) from flat black cable(s). Black wire from control box to black wire(s) from flat black cable(s). Place cover on box.

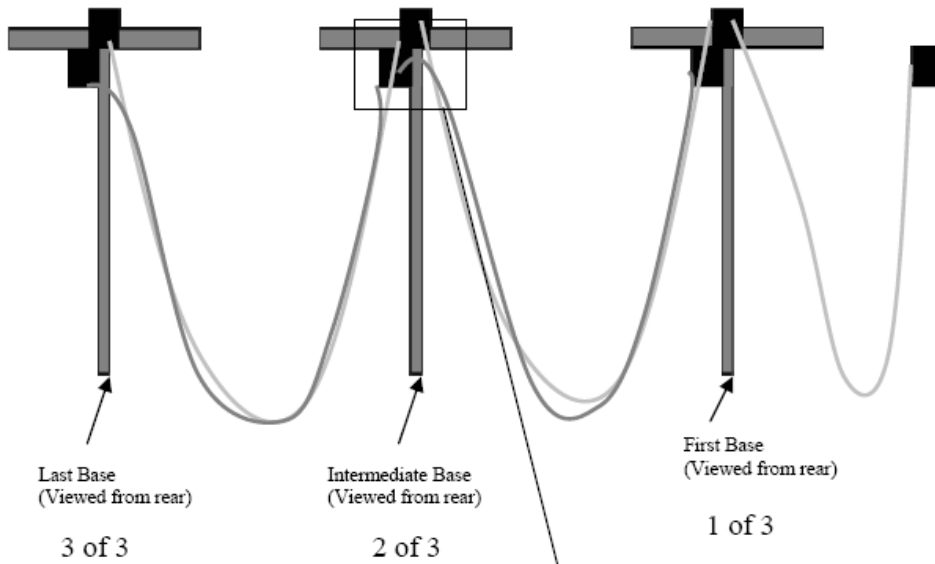


Proceed as described above for all other intermediate bases in the system.

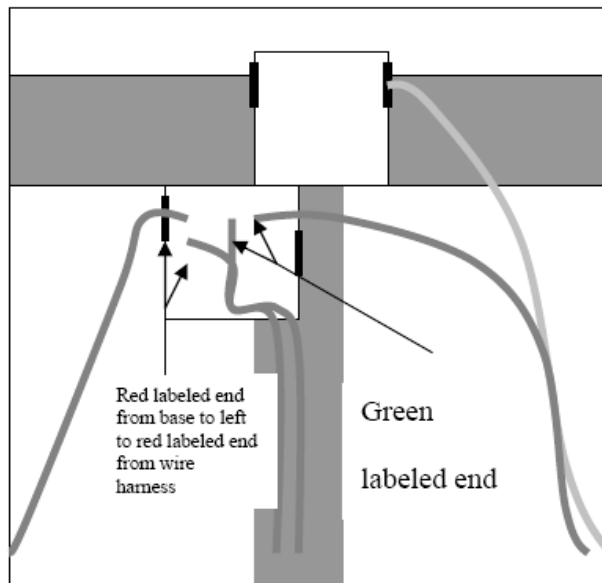
As viewed from **rear** of system module:

All Intermediate bases will have two communication cables in their wire harness and therefore two communication cables in the communication J-Box. Each cable will have a red or green color-coded label. Insert left end (green label) of cross aisle communication cable from 1st base into the communication J-Box of the second base through the snap bushing on the right of the box. Connect the green-labeled end of the cross aisle communication cable to the green labeled communication cable in the communication J-box. Insert red labeled end of the second cross aisle communication cable into the J-Box from the right and connect to remaining red labeled communication cable from wire harness. **(Green to green, red to red).**

(System Rear)



Shown above is a depiction of a hypothetical 3 base module with power and communication linked. Remember to wire tie power and com cables together about every 12 to 18 inches along the draped cables. The illustration to the right shows the method for linking communication on all intermediate bases.



Linking Power & Communication (Last Base)

Linking power and communication to the last base is much similar to linking the first base. The last intermediate base's communication J-Box will have a cross aisle communication cable with a green labeled end that should be connected to the green labeled communication cable from the wire harness of the last base.

Linking Main Power (Breaker Box)

⚠ DANGER

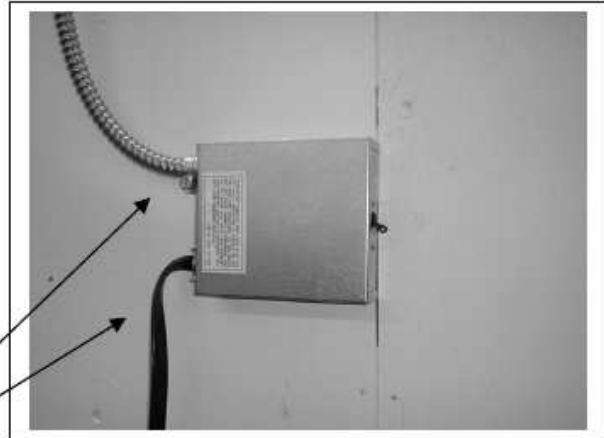
High Voltage!

Disconnect/Breaker Box:

This item is to be installed by a qualified/licensed electrician. It will normally be mounted on the wall behind the system at an elevation of approximately 6 feet. Make sure to have it mounted so that the power cabling can reach the first or last bases' power pole anywhere in its range of movement.

Customer 120V

Flex power cable leading to system

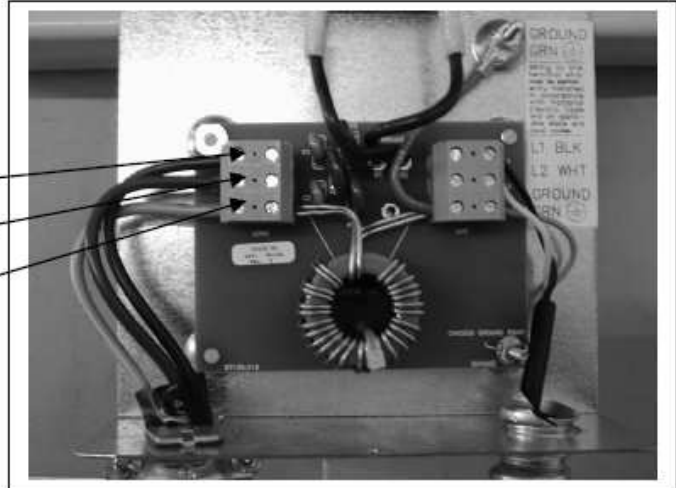


Breaker Box P/N 44115.01

Black

Red

Orange



Inside the Breaker Box

System must be connected to "Load" side of Breaker box!

System Startup

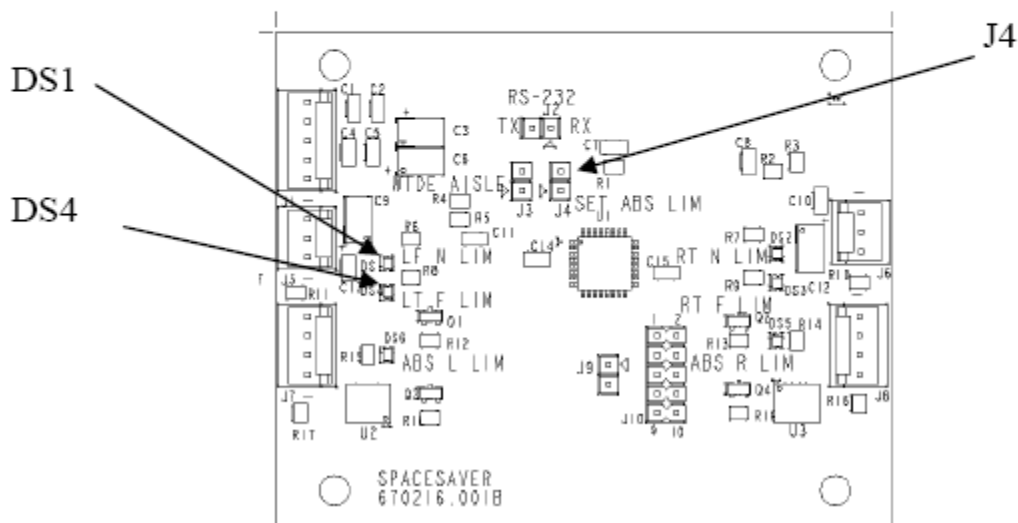
After all bases have been connected with power and communication drape kits, main power can be applied to system. All Select/Move buttons should display steady green LED's. If this is not the case, refer to the Troubleshooting sections on pages 50-52

SYSTEM CONFIGURATION

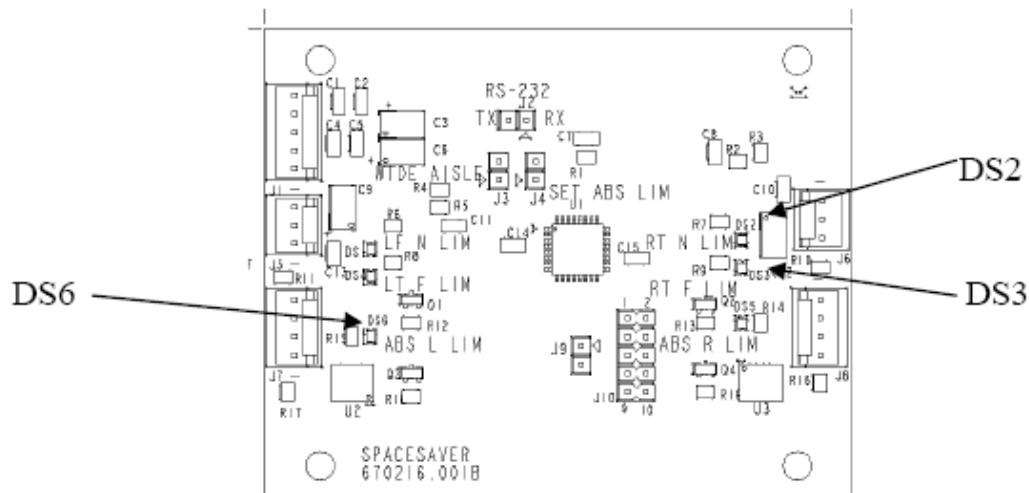
After a module has been completely wired with communication and power connected, the dynamic spacing must be configured. With power to the module turned on, use the Battery/Safety Override or move buttons to pack the bases to the right.

SETTING ABSOLUTE LIMITS

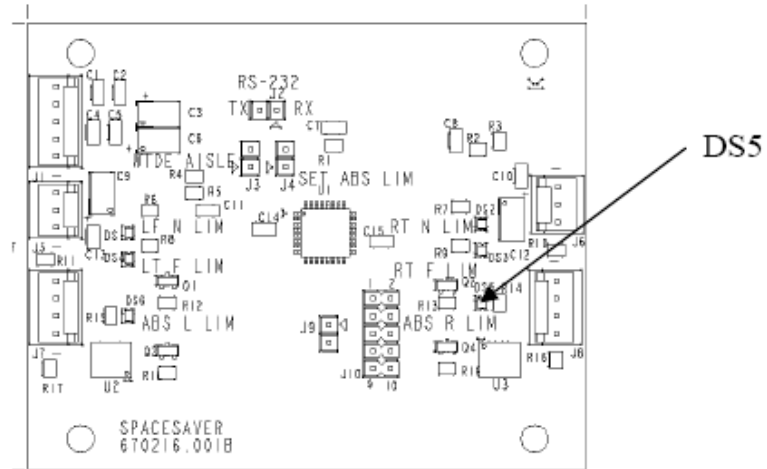
Step 1 Place adder board in programming mode. : After packing the shelving to the right, open the control box of the first base and place a 2-pin jumper on J4 of the Dynamic Spacing adder board in left most base (#1). Note that DS1 and DS4 are illuminated red and amber respectively.



Step 2 Setting Left absolute limit. : Press and hold the left move button of the first base so that it begins to move left towards the stationary shelving. Release the left move button just before the base bumpers make contact with the stationary. Note that DS1 and DS4 have turned off and DS6 is now illuminated red. After DS6 flashes 3 times the left absolute limit has been set. Note that DS2 and DS3 are now illuminated red and amber respectively



Step 3 Setting Right absolute limit. : Press and hold the right move button moving the base toward the base to its right. Release the right move button such that the bumpers of the first and second base are about 1" apart. Note that DS2 and DS3 have turned off and now DS5 is illuminated red. After DS5 flashes red 3 times the right absolute limit has been set.



Step 4 Save limits and test. : Remove the 2-pin jumper from J4 to save the established limits. Move the first base all the way to the left to test your settings. The base should stop about 1" from the stationary shelving. Since the second base is not equipped with distance sensors, move it to the left as well. It should stop about 1" from the first moveable. Repeat steps 1-4 for base 3 and 4 with a 4-base moveable or 3 and 5 with a 5-base moveable. Note that a 4-base moveable, only the right absolute limit must be set on the 4th base.

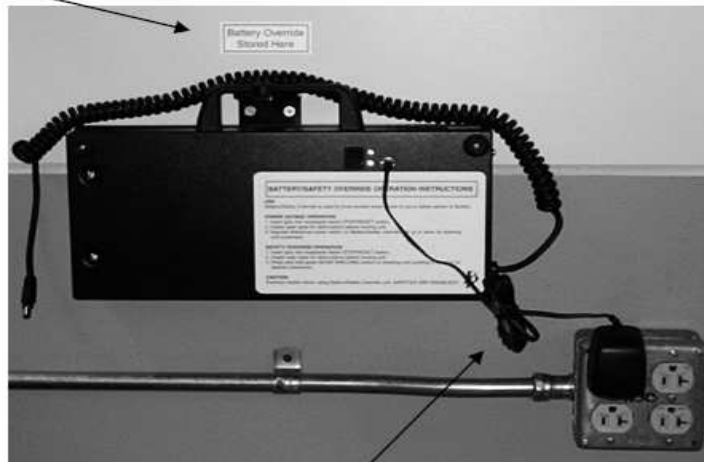
Battery Override

Place angle end stop battery override mount P/N 400973.001 on wall. The recommended location for the battery override is on a wall in the Layaway office near an outlet. Check with the store manager before mounting.



Sticker

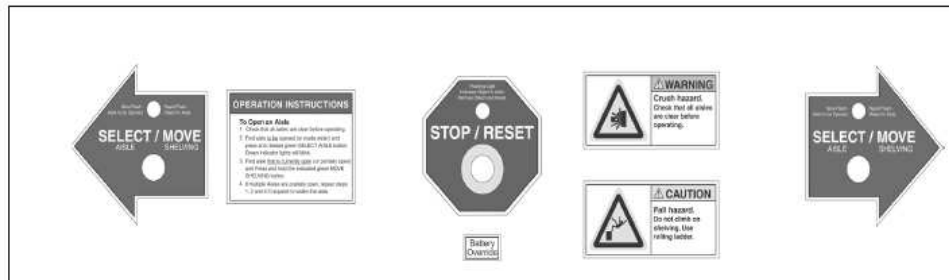
Hang Battery Override on angle and plug in with ac adapter cord. Place "BATTERY OVERRIDE STORED HERE" sticker on wall above unit so it is visible. It is recommended to contact the store manager to explain use and location of Battery Override.



Ac adapter cord

Guide to System Operation

The Control Panel

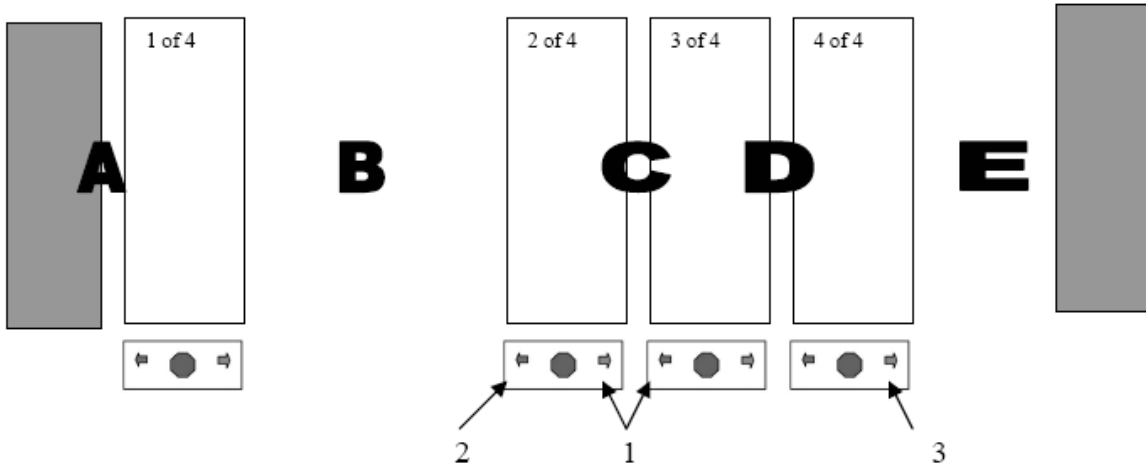


Solid green lights throughout the system indicate that the system is ready for use and any aisle can be opened. (See To Open an Aisle)

To Open an Aisle

1. Check that all aisles are clear before operating.
2. Select aisle to be opened (or made wider) and press and release green SELECT AISLE button. A slow blink of the green indicator light designates the aisle to be opened.
3. After an aisle is selected, solid green indicator lights will appear at the MOVE SHELIVING button on all control panels available to move. Press and hold the green MOVE SHELIVING button indicated by the solid green light to “drag” shelving in direction of arrow.

*NOTE: The operator may, at any time, release the MOVE SHELIVING button to stop movement or continue to press and hold until base movement stops automatically. If the MOVE SHELIVING button is released, the operator has approximately 4 seconds to resume movement. In addition, if the operator releases the MOVE SHELIVING button before movement stops automatically and is within 20” to 24” of adjacent shelving, a new “dynamic” spacing will be established. This means the shelving will now attempt to maintain this new spacing. For more on dynamic spacing see SYSTEM CONFIGURATION. If a dynamic spacing has been set it is possible for the operator to change it. See “Tightening an Aisle” below.



Aisle Selection Example

1. The operator wishes to select aisle C. To do so, the SELECT AISLE button of the control panel on either side of the aisle (and pointing to the desired aisle) should be pressed and released. A slow blink of the green indicator light will be displayed on either side of the selected aisle. (#1 above)
2. In addition to the slow blink of the green indicator lights at the selected aisle, solid green indicator lights will appear on all control panels available to move and in the green arrow pointing to the direction of movement. In this case the solid greens will be present at the buttons designated by #2 & #3 above.
3. If the operator presses and holds the Move Shelving button designated by # 2, the base labeled 2 of 4 will move left (Note the operator will have to walk along with the shelving as it moves holding the button thus the term “dragging” the shelving). If the operator chooses to press and hold the button designated by # 3, both 3 of 4 and 4 of 4 will move right. The operator may let go of the button at any time bringing shelving movement to a stop or continue to press and hold until movement stops automatically.

To Reset

1. Press the red STOP/RESET button and twist clockwise to release.

To Stop Movement

1. Release MOVE SHELVING button or press the red STOP/RESET button. Twist clockwise to release.

To Stop Movement While In Aisle

1. Block safety sensor beam located at red and white striped tape.

Object In Aisle

1. Remove object.
2. Press the red STOP/RESET button and twist clockwise to release.

Green Indicator Lights and Their Meaning

- Solid green lights throughout the system indicate that the system is ready for use and any aisle can be opened following the instructions above. (See To Open an Aisle)
- No green lights on the system indicate that the power is out.
- Slow green blinking light(s) indicates that an aisle has been selected to be opened. (See To Open an Aisle, Step 2) A selected aisle will remain selected (and blinking for 20 seconds). After 20 seconds it will return to solid green.
- Solid green light after selecting an aisle indicates that the unit(s) can be moved (See to Open an Aisle Step 3). A unit's green light will remain on for 20 seconds after "to be opened" aisle is selected. After 20 seconds it will reset and the aisle to be opened must be re-selected.
- A rapid flashing green light indicates that a safety sensor beam is blocked in a closed aisle. The obstruction must be removed. To remove the obstruction, open the aisle by moving the shelving unit away from the obstruction. To do so, press the green button, indicated by the rapid flashing green light, and then follow Step 3 under To Open an Aisle.
- A rapid flashing green light plus a rapid flashing red light at the Stop/Reset button indicates that a safety sensor beam is blocked in an opened aisle. The shelving can be moved away from the obstruction by selecting the faulted aisle. The operator may then press and hold the green MOVE SHELVING button indicated by the solid green light to "drag" shelving away from the obstruction.

Reset Button Use

- The reset button can be used when a user wants to cancel a selection and make a different selection.
- The reset button will flash when a person or an object has blocked a safety beam in a moving or open aisle. After removing the obstruction from the aisle the system must be reset. (See "To Reset")

Tightening an Aisle

- Shelving units that do not have the solid green after selecting an aisle indicate that they cannot be moved either because the distance between aisles is already at its minimum (Absolute Limit) or system "thinks" the aisle is closed (Dynamic Limit). In the later case, the shelving is not spaced at its minimum distance from adjacent shelving. After selecting an aisle, the operator must choose an aisle to be tightened. This is done by a press and hold of a MOVE SHELVING button that is not illuminated. The operator must push and hold for 2 seconds before movement is initiated. The operator may release the MOVE SHELVING at any time to establish a new Dynamic spacing or continue to press and hold until movement stops.

Multiple Aisle Configuration

- Moveable Backroom Shelving offers multiple aisle configuration. The diagram on page 48 depicts use of the multiple aisle configuration feature. Note that both the "B" aisle and the "E" aisle are open. If the "D" aisle is selected, the user has the ability to close either the "B" or "E" aisle to gain access to the "D" aisle.

Battery/Safety Override Use

Each system will be shipped with a Battery/Safety Override pack. This dual purpose device can be used as either a Battery Override or a Safety Override. The Battery Override mode is to be used in situations where power to the system has been lost. The store manager determines the exact location of the override pack at the time of install. The ideal location for the battery override is the layaway office.

Use as a Battery Override

- The Battery Override mode should only be used while power to system is disconnected.
- Insert jack into receptacle located under STOP/RESET button on control panel.
- Depress directional rocker switch up or down for base movement.

CAUTION!

Exercise caution when using Power Override unit, SAFETIES WILL BE DISABLED!!!

USE as a Safety Override

- The Safety Override mode must be used with power applied to system.
- Insert jack into receptacle below Stop/Reset button.
- Check open aisle for obstructions before moving unit.
- Press and hold button at green arrow pointing in direction of desired movement.
- Remove jack when safety override is not in use.
- Contact Service Personnel.

CAUTION!

Exercise caution when using Power Override unit, SAFETIES WILL BE DISABLED!!!

Operations Check

1. Ensure each aisle can be selected and accessed.
2. Note the speed of movement. Are all bases moving at approximately the same speed?
3. Pay close attention to absolute and dynamic spacing especially on the first and last base of each module. The absolute spacing of each base should be set so there is about 1" of space between bumpers.
4. Randomly test multiple aisle configurations. (See page 49)
5. Finally, test the operation of each IR safety beam by placing an object in the aisle and attempting to move the base towards it. If the safeties are working properly, the base will come to a stop slightly before contact with the object.

General Troubleshooting

1. No movement possible. No lights @ control.
 - a. Presence of AC power
 - b. Blown fuse @ logic
2. No movement possible.
 - a. Defective dynamic spacing sensor cable
 - b. Defective dynamic spacing sensor
 - c. Motor voltage @ TB2 (compare with working motor)
 - d. Drive train mechanical failure
 1. Defective motor
 2. Broken drive chain
 3. Drive shaft coupling failure
3. No movement possible. Flashing red @ RESET & rapid flashing green @ SELECT/MOVE button. (This indicates safety sweep activation)
 - a. Obstruction in aisle
 - b. Misaligned safety beam device
 1. Backroom Moveable Shelving systems employ IR safety beam device pairs that transmit from right to left. When a valid IR signal is received, the receiver displays a flashing green LED along on

the outward facing side. When no valid signal is detected either because of an obstruction or device misalignment, the receiver LED turns off.

- c. Safety beam device connections
 - d. Defective safety beam device cable
 - e. Defective safety beam device
4. No movement possible. All or most controls flashing red @ STOP/RESET. (This indicates loss of communication)
- a. Blown fuse @ logic
 - b. Communication cable connections
 - c. Defective communication cable
 - d. Defective logic board

TROUBLESHOOTING PRINCIPLES

STATIC CAUTION

Oftentimes troubleshooting of electronic systems requires bodily contact with static susceptible electronic components. Handle components with care! Refer to Static cautions in the manual.

COMMUNICATION

The logic board within the control box uses communication to transfer information from base to base about movement, distance, system safety status, etc. A "closed communication loop" is required for proper system function. An open communication loop results in a disabled system. The indicator LED's throughout the system will flash rapidly. (For more information on indicator LED's and their meanings see page 49 and 50)

LEFT AND RIGHT COMMUNICATION

Each logic board has a LEFT communication jack and a RIGHT communication jack. Think of LEFT communication as Communication IN to that logic board. RIGHT communication can be thought of as communication OUT from the logic board.

END of SYSTEM JUMPERS

To close the communication loop, END of SYSTEM JUMPERS are used. The left most base houses a logic that must communicate to the right only. The left most logic receives no information in from the left so we must tell it that it need not expect communication from the left, so we place a LEFT END of SYSTEM JUMPER. The right most base's logic makes use of a RIGHT END of SYSTEM JUMPER to tell it that it need not communicate to the right.

ISOLATION USING END of SYSTEM JUMPERS (EOS Jumpers)

Systems that are disabled due to an open communication loop may be addressed using the ISOLATION principle. First all communication cabling should be double checked for proper termination and the presence of EOS jumpers on the leftmost and right most bases' logins. Verify that cross aisle cables are properly terminated red to red or green to green. If all cabling has been checked but the system still exhibits an open communication loop, ISOLATION can be used to determine where the break in communication is. Remove the right EOS jumper from the right most base and place it on the right communication jack of the base to the left. i.e. Move the right EOS jumper from the 4th base in a 4 base range to the third base. This will remove the 4th base from the communication stream. If the break in communication was between the 3rd and 4th base, the 4th base will continue to issue a communication failure at its control panel but the 1st through 3rd base will resume normal operation. If the 1st through 3rd base still exhibit a communication Failure, move the right EOS jumper from the 3rd to the second bases' logic. In this manner we can ISOLATE our problem area. An EOS jumper place on the left and right communication jacks of the same logic will produce a single base closed loop. EXAMPLE. You have found that a communication failure in your 4 base range has disabled the system. You have thoroughly checked cross aisle cabling connections and checked t for the presence of an EOS jumper on the left communication jack of the leftmost or 1st base and a EOS jumper on the right communication jack of the right most or 4th base. You move the right EOS jumper from the 4th to the 3rd base and the problem still exists. You move the right EOS jumper from the 3rd base to the 2nd base and the 1st and 2nd base resume normal operation while the 3rd and 4th base still exhibit a communication failure. You have just

identified the break in the communication stream as being between the 2nd and 3rd bases. Upon closer investigation you find that the cross aisle communication cable between the 2nd and third base is damaged and must be replaced.

SWEEPS (Electric Eye)

Each side of a moveable base is equipped with a set of photo-optic sweeps. The sender will always be on the right as you face the set and the receiver on the left. The TRANSMITTER or sender will emit a visible red LED at it lens to indicate that it has power. The RECEIVER has a green indicator LED on its' face to indicate presence of a signal. A solid green indicates no signal is detected from the transmitter. A flashing green LED indicated the transmitters signal is detected. Evaluate and replace faulty component. If you are unsure try swapping out suspect component with a known good one. Remember that each aisle is protected by 2 sets of sweeps (electric eye)! One set on each base to the left and right of each aisle. A sweep (electric eye) fault in any aisle could be caused by either pair. The ISOLATION technique described above can help determine which pair is at fault or examination of the indicator LED's on the sweeps (electric eye) can lead you to the faulty component. An adjustment to the sweep(s) (electric eye) may be necessary. Adjustment potentiometers are found on the face of transmitters and receivers. The potentiometers should be adjusted fully clockwise to the 11 O'clock position. **Use care** not to strip the adjustment screw, they are made of plastic and strip easily. Note; Some older sweep (electric eye) sets only allow for adjustment on the receiver!

SWAPPING

One of the best troubleshooting method is simply to swap suspect components out with know working ones! Always turn system power off before making/breaking any connections.

CABLES

Always check for pinch points or other damage to cables related to the problem you're encountering. Also ensure that the cables are plugged into the logic/component correctly. All cables will be labeled at the logic end to enable you to verify its' correct placement.

Final Installation Checklist for Backroom Movables

Upon completion of the backroom moveable range, use the following checklist for system acceptance. (Check boxes in each subsection)

Rail

- Check the rail installation for joint uniformity. The rail must have a smooth transition from rail to rail.
- Check the rail installation for proper elevation and squareness. The rail should be square, that is the rails should run parallel to one another. The rail shall also conform to the following specifications regarding levelness.
 - o 1/8" maximum variation from true level within any range.
 - o 1/8" maximum variation between adjacent rails perpendicular to rail direction.
 - o 1/8" maximum variation along any 10 feet of rail.

Bases and Static Racking

- Ensure bases move smoothly along the rail with no binds or bumps.

Electrical

- Ensure power is installed following any applicable local codes. Ensure all wiring is installed following installation manual. Ensure all disconnect boxes and other components are installed following UL requirements.
- Ensure all cabling from wire harness is secured thoroughly with wire ties and no wires are pinched before, during or after completion of the installation process. Pay special attention to right front and rear sweep (electric eye) cabling at point of attachment of racking to bases.
- Ensure Battery Override is functional and has been mounted in the layaway office, or a location identified by managers, next to an outlet using Angle end Stop-Battery Override Mount P/N 400973.001. (See Battery Override subsection on page 46.)
- Safety Sweeps.
 - o Ensure all of fasteners are in place. Sweep (electric eye) Assemblies are fastened using:
(2)Screw Type F Hex 960273.001 5/16"-18 x 3/4"
 - o All fasteners must be installed straight so that they properly seat on the product.
 - o All fasteners must have their screw heads in place (i.e. no broken off screw heads)

Operations Check

- Ensure each aisle can be selected and accessed. (See "Guide to System Operation" section in manual for details)
- Note the speed of movement. Are all bases moving at approximately the same speed? If not, investigate further.
- Pay close attention to absolute and dynamic spacing, especially on the first and last base of each range. The absolute spacing of each base should be set such that movement stops leaving about 1" of space between bumpers. (See "Setting Absolute Limits" section in manual for details.)
- Randomly test multiple aisle configurations. (See "Multiple aisle configuration" subsection on page 49.)
- Ensure the proper operation of each IR safety beam by placing an object in the aisle and attempting to move the base toward it. If safeties are working properly the base will come to a stop slightly before contact with the object.

EMB III				
WM-PART #'S	MM PART #'S		DESCRIPTION	PAGE#
ELECTRICAL PARTS				
	APLP1		POWER PACK BATTERY OVERRIDE UNIT	46
EMB-GEARMOTOR	LCLPMTR	LCLPMTR	GEARMOTOR - 90VDC, BODINE, WITH TERMINAL BOX	28
EMB-MVSWITCHGRN	60MDZ2	640109.001	SWITCH - MOVE, GREEN	47
EMB-STOPSWITCHRD	60MDZ3	640110.001	SWITCH, STOP/RESET, RED	47
EMB-LEDGREEN	60MDZ4	650329.001	LED - INDICATOR, PANEL MOUNT, GREEN	47
EMB-LEDRED	60MDZ5	650329.002	LED - INDICATOR, PANEL MOUNT, RED	47
EMB-PHOTOSNSRTX	60MDZ6	610315.001	PHOTO SENSOR ASSY - TX	
EMB-PHOTOSNSRRX	60MDZ7	610315.002	PHOTO SENSOR ASSY - RX	
EMB-PCBLGCCNTRL	60MDZ8	680245.001	P.C.B. ASSY-LOGIC CONTROL, MIDLINE ELEC (EC3560)	
EMB-PCBLMTSWITCH	60MDZ9	680264.001	P.C.B. ASSY-NON CONTACT LIMIT SWITCH	44,45
EMB-FUSETUBE	60MDZ10	82010.02	FUSE-TUBE, TIME LAG (SLO-GLO) GLASS, MDX SERIES	
EMB-SWITCHHARNRH	60MDZ11	710398.001	CABLE ASSY - CONTROL/SWITCH HARNESS, RIGHT	
EMB-SWITCHHARNLH	60MDZ12	710404.001	CABLE ASSY - CONTROL/SWITCH HARNESS, LEFT	
EMB-SENSORASSY	60MDZ13	610308.001	SENSOR ASSY - DISTANCE	33,34
EMB-PCBTESTER	60MDZ14	680201.001	P.C.B. ASSEMBLY-TESTER, STATUS LED, POWER ASSIST	
EMB-CBLSTATUSLED	60MDZ15	710302.003	CABLE ASSEMBLY - STATUS LED, POWER ASSIST	
EMB-CNTRBOX	60MDZ16	440237.001P	BOX - CONTROL	
EMB-CNTRLBOXCVR	60MDZ17	340515.001P	COVER - CONTROL BOX	
EMB-CBLMTSWITCH	60MDZ18	710402.001	CABLE ASSY - LIMIT SWITCH INTERFACE	
EMB-INTERFCE	60MDZ19	710404.001	CABLE ASSY - I2C INTERFACE	
EMB-CNCTRASYJMPR	60MDZ20	700125.001	CONNECTOR ASSEMBLY - JUMPER, COMMUNICATIONS, POWER ASSIST	
EMB-JUMPER	60MDZ21	70048.01	JUMPER - .025 SQ POST.,100 CTR	
EMB-CVRDISTANCE	60MDZ22	340514.001P	COVER - DISTANCE SENSOR	
EMB-PWRDISCONNECT	60MDZ23	44115.01	POWER DISCONNECT BOX ASSEMBLY	23,43
EMB-CNTRBOXLBL	60MDZ24	900217.001	LABEL - CONTROL BOX	
		401512.001	BRACKET ASSY-PHOTOSWEEP, RR/LF, TX (EMB III)	30
		401512.002	BRACKET ASSY-PHOTOSWEEP, RF/LR, RX (EMB III)	30
		960273.001	SCREW TP F HX WSHR 5/16"-18 x .750" (TO MOUNT PHOTOSWEEP(EMB III)	
		300385.001	SPACER CARRIAGE BUMPER .750" (EMB III)	29
		93015.02	NUT 1/4-20 KEPS (FOR BUMPER) (EMB III)	
		95002.09	BOLT 1/4-20 x 1" (FOR BUMPER) (EMB III)	
		32005.01	CADDY CLAMP FOR SECURING WIRE HARNESS TO BASE INTERIOR	31
EMB-BRKTASSY	60MDZ29	401419.001	BRACKET ASSEMBLY - REFLECTOR	33
EMB-BTRYORCHRGR	60MDZ30	61131.01	BATTERY OVERRIDE - CHARGER CABLE	46
EMB-SCREW#6-32	70AAI12	920162.001	SCREW-TYPE AB, PAN HEAD, CR, # 6-32 UNC	
EMB-STRAINRFBOX	60MDZ32	83006.01	STRAIN RELIEF-BOX, CLAMP-TYPE, TWO PIECE 3/4", ZINC PLATED	
EMB-WIREPIGTAIL	60MDZ33	730152.001	WIRE GROUNDING PIGTAIL, INSUL, 12GA, #6-32 SELF TAPPING	
EMB-WIRENUTCNTR	70HBT2		CONNECTOR-WIRE NUT	
EMB-BUSHING	60MDZ34	41008.05	BUSHING-SNAP REGULAR	32
EMB-STRAINRF.875	60MDZ35	83001.07	STRAIN RELIEF-.875" (325-360)	32
EMB-STRAINRFST	60MDZ36	83001.08	STRAIN RELIEF-STRAIGHT THRU .875 DIA	32
EMB-CBLMOTOR	60MDZ37	710298.015	CABLE ASSY-MOTOR, POWER, 18/3, 306"	27
EMB-AISLESPAN12/3	60MDZ38		CABLE ASSY-FLAT, BLACK, POWER, AISLE SPAN, 12/3, 132"	39
EMB-AISLESPAN22/3	60MDZ39	710408.001	CABLE ASSY-COMM, AISLE SPAN, 22/3PR, 132"	40,41,42
EMB-INTERFACE12/3	60MDZ40	710337.017	CABLE ASSY-INTERFACE, POWER, 12/3, 534"	27
EMB-LFCOMM22/3	60MDZ41	710409.006	CABLE ASSY-LEFT COMM, 22/3PR, 528"	27
EMB-RTCOMM22/3	60MDZ42	710410.006	CABLE ASSY-RIGHT COMM, 22/3PR, 528"	27
EMB-PSLFFRONT108	60MDZ43	710411.001	CABLE ASSY-TRANSMITTER, PHOTOSWEEP, LEFT/FRONT, 22/2, 108"	27
EMB-PSRTREAR444	60MDZ44	710411	CABLE ASSY-TRANSMITTER, PHOTOSWEEP, RIGHT/REAR, 22/2, 444"	27

