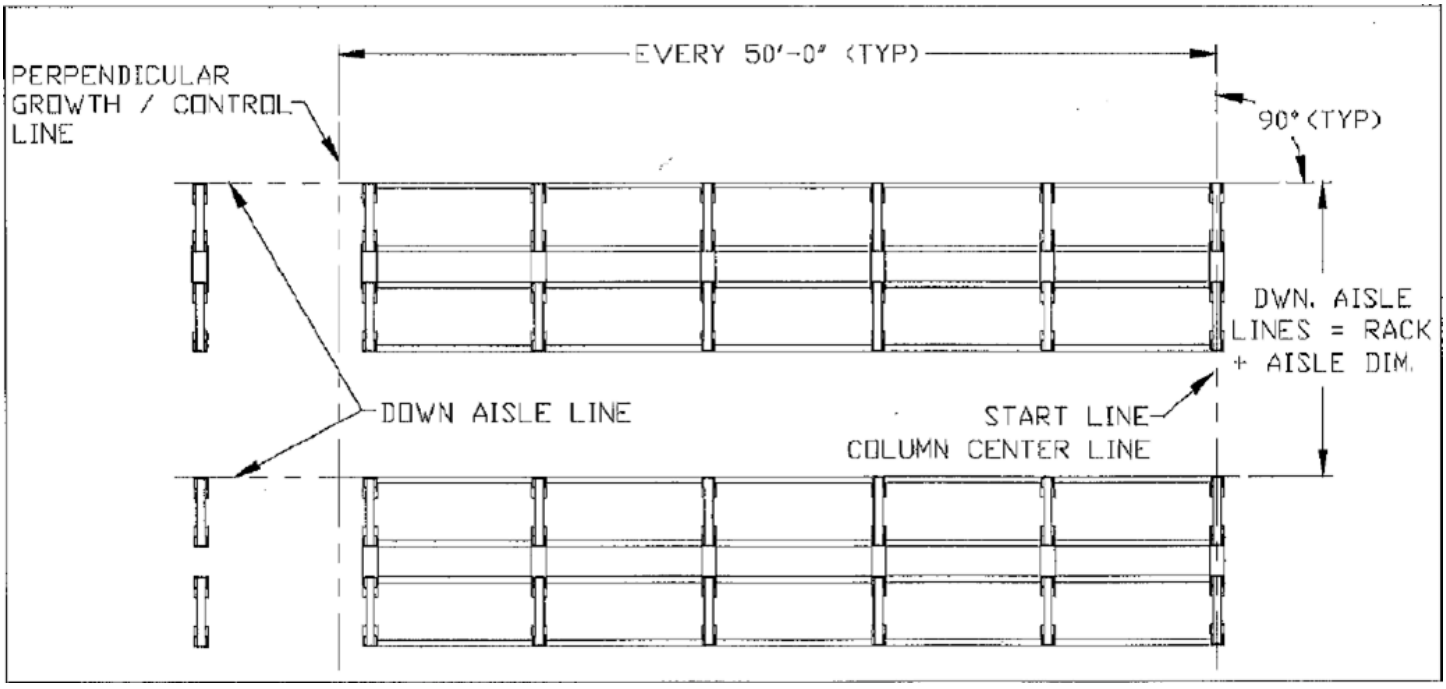
Important Guidelines for Installation

1. Verify shipment. Compare the components received with the bill of material and packing lists. If there is a variance, note that variance on the shipping documents and contact your Lyon Dealer or Lyon immediately.
2. Damaged racks must be addressed by the customer immediately. Failure to do so could result in rack component failures.
3. Do not store rack material outdoors. Extensive damage may occur. The standard painted finish is not intended for outdoor storage.
4. The rack must be installed using all components and hardware specified. Elimination of components or hardware should never be attempted.
5. All beams must be locked in place with beam locks.
6. Decking material must be securely anchored and supported to insure that it cannot accidentally shift during loading and unloading the rack.
7. Use of the rack for supporting loads beyond that for which it is specifically designed for, (i.e. sprinkler pipes, refrigeration equipment, etc.) should not be attempted. Use of the rack as scaffolding, or climbing on the rack is not recommended. Persons using the rack for these purposes shall do so at their own risk.
8. Installation should be performed under the guidance and supervision of a person that is a qualified and experienced rack installer. It is important that all personnel wear hard hats while installing bolted connections.
9. Proper floor design to accept the loading conditions imposed upon it by the rack structure shall not be the responsibility of Lyon.
10. Never install beams from both ends of the row at the same time. Always start at one end only, or from the center of a row and work both ways.
11. Always engage both ends of the beam at the same time, and be sure it has fully engaged the column before seating beams to install locking devices.
12. The use of proper tools for rack assembly is mandatory. Normally a rawhide faced hammer or urethane hammer may be used for installing beams.
13. Do not hammer on the ends of beams to install and seat! If seating is difficult, get a piece of 1” x 1” x 1/8” angle x 6” long. Stand it up on top of the hook and hit downward, seating the hook.

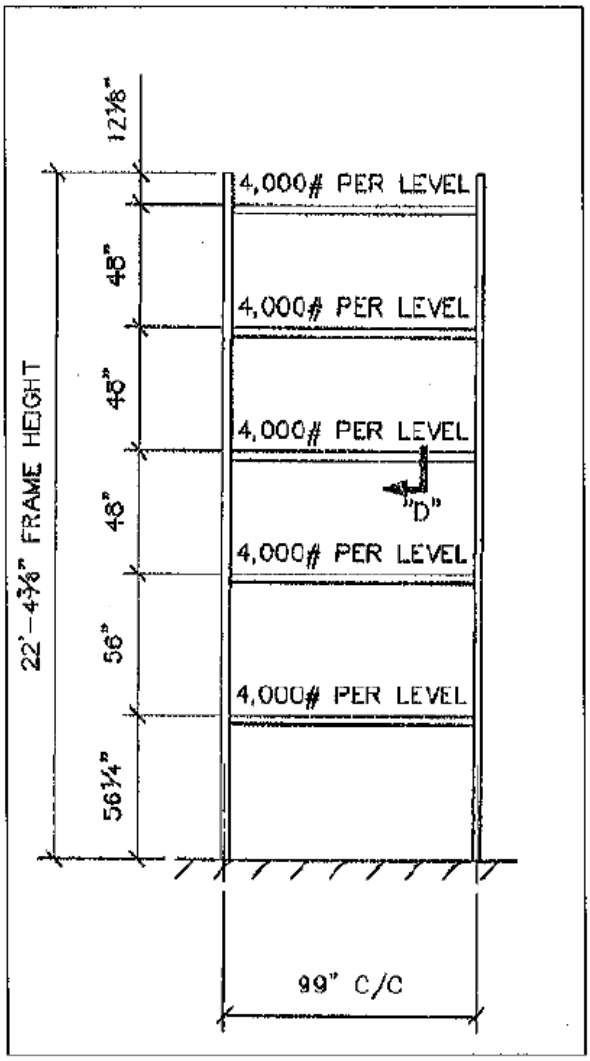
Installation Procedure

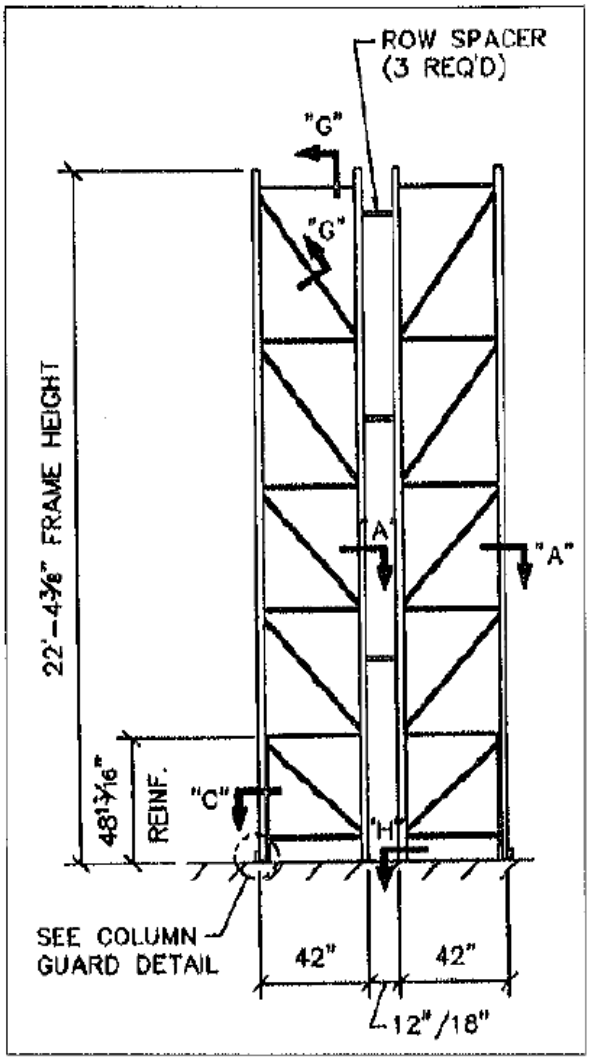
1. Clear the Area
   The installation area should be free and clear.
2. Chalk Lines
   Establish the rack layout. Determine the rack position and aisle dimensions. Layout the position of the rack on the floor by snapping chalk lines to locate the aisles and front of the uprights. Upright must be 90 degrees to the aisles. Check for obstructions such as building columns, light fixtures, cooling and heating ducts, compressor and furnace units, electrical units, etc, for rack and load clearance.
   a. Start at the beginning of a bank of rack and snap a “start line”. The “start line” should be the center of the first column in the rack system and should run perpendicular to the aisle. Then every 50 ft. snap “growth/control line(s)” parallel to the “start line”. Be sure that the “start line” and “growth/control line(s)” are perpendicular (90 degrees) to where you would like the aisle to be.
   b. Next snap a “down aisle line” at the front of the frames nearest the first aisle. For accuracy use the front of the frame's column. In order to snap the rest of the “down aisle lines” you will need to know the dimensions of a bank of rack and the aisle width. The rack width may be obtained by adding the frame widths and the spacer length.
   c. After the rack width is known add the aisle width. The total of the rack width and the aisle width is the distance at which the rest of the “down aisle line(s)” are to be snapped from the first “down aisle line”. Be sure they are perpendicular to the “start line” and parallel to the first “down aisle line.”



3. Charting Floor Deviations
   A laser or any surveying equipment may be used to establish any deviations in the floor. Find the high point of the floor in the area where the racking will be installed. Mark the floor or a chart with the information so each frame can be shimmed to establish a level system. The system must be plumb within 1/4” per 10' of height.

4. Beam and Hardware Identification
   Beams should be installed at the indicated heights using the correct hardware specified in this manual. All hardware is A-325 high strength bolts and nuts. Do not, under any circumstances, use any hardware other than that which is specified without approval from Lyon. Refer to the 'Bolting & Locking Device Details' of this guide to determine the correct hardware for all connections.
5. Rack Profile
   Identify and gather the correct components for five (5) bays at this time. (10 bays if your system is back-to-back) Refer to the proper rack profile from the “supplemental drawings” prepared for this particular system and/or any special instructions. EXAMPLE:

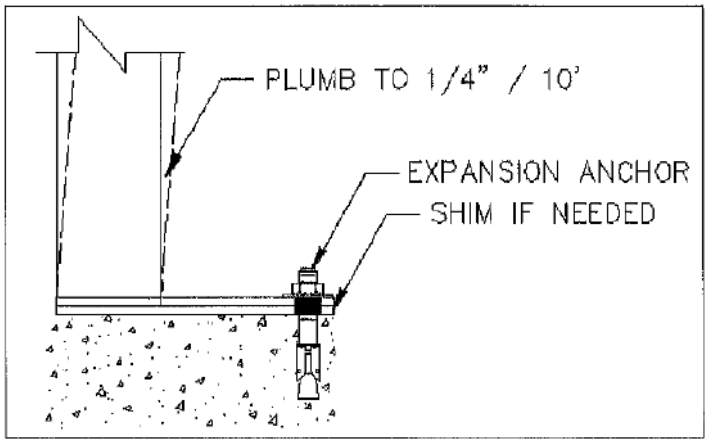




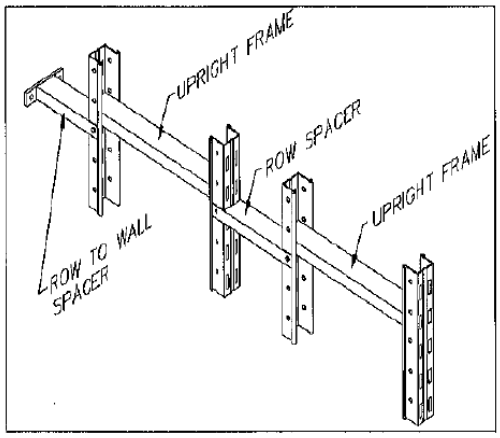
6. Raising the “Start Line” Frame
   Begin at the “start line” where it intersects the “down aisle line”. Be sure that the frame depth, height, style etc., and also the slope of the diagonal braces are correct. Frames are generally installed with the column at the high end of the diagonal brace as the front of the frame. Place the base of the frame on the “star line” with the front of the frame on the “down aisle line” and raise to a vertical position. Recheck to be sure that it's on the proper lines.

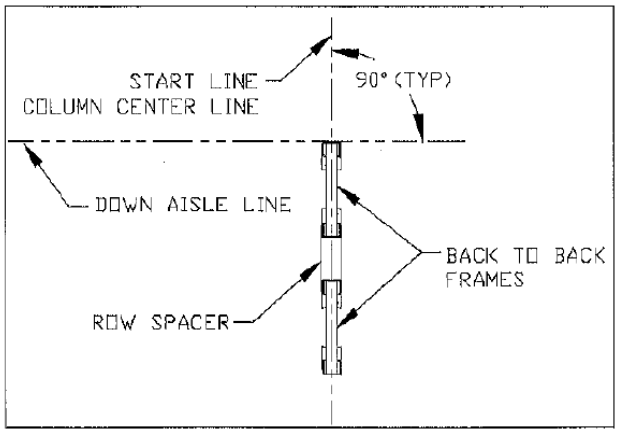
Raising the upright is accomplished manually with relative ease by having one or two people place their feet on the base pads and two or three people raise the frame to a vertical position. This procedure will work with up to 23' or 24' upright frames. If the upright is too heavy, use a forklift truck to raise it.

7. Shimming the “Start Line” Frame
   Shim the frame(s), if needed with positioning metal shims (or equivalent) at this time. The rack manufacturers institute (R.M.I.) requires that frames be plumb within 1” per 10' of height. Lyon recommends within 1/4” per 10' of height unless the lift truck manufacturer requires stricter tolerances. Refer to the floor chart or markings on the floor that were made in step 3 for shimming. Add metal shims as required by your chart or markings.
8. Lagging the “Start Line” Frame
   The frame should be plumb, 90 degrees to the “down aisle line” and correctly positioned with the center of the frame's upright on the “start line”. It should be anchored now to ensure that it stays in position. Lag only the frame(s) on the “start line” (refer to step 2). The remainder of the lagging will be done as the final step. Lag bolts must be of the type specified in the bill of material.

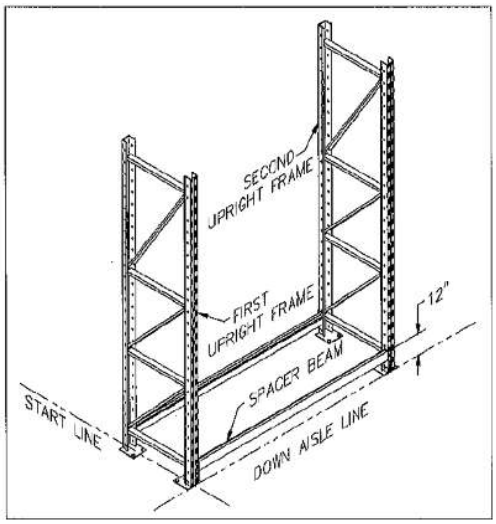


9. Back-to-Back “Start Line” Frames
   If your selective rack contains back-to-back frames it will be necessary to install a row spacer on the interior columns of the frames. This must be done BEFORE lagging the second frame of the back-to-back set. This will give the exact distance needed between the back-to-back frames. (See the “bolting and locking device details” section for the correct spacer installation procedure.) Generally spacers should be installed with the first one as close to the top as possible and additional spacers positioned down in 6 ft. increments. The number of spacers is determined by the frame height.

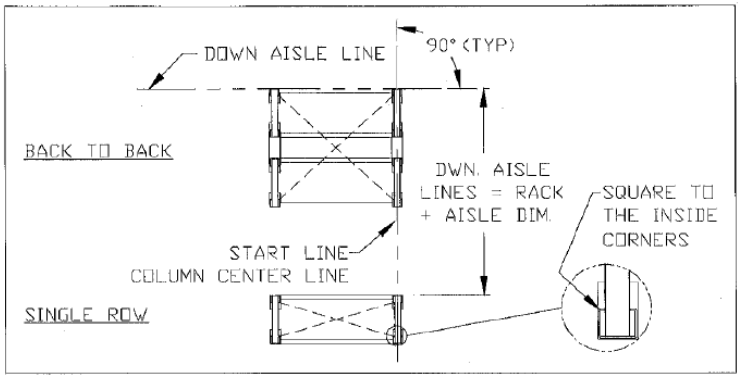




10. Completing All “Start Line” Frames
    All the “start line” frames for one bank of rack should be raised, spacers installed (if necessary), shimmed (if necessary), set 90 degrees to the “down aisle line” and lagged. (see steps 6-9)
11. Raising the First Bay
    With one or two people, repeat the procedure as outlined in step 6, raising the next upright frame to a vertical position approximately a beam’s length from the first frame. Place the frame with the brace pattern identical to the first frame on the “down aisle line”. With someone holding the frame in its' general location, place a lower beam in its' correct location on both sides of the frame. If the lower beams in your system are 48 inches from the floor or more it will be necessary to use temporary beams at the 12 inch level on both sides of the frame.

    If your system utilizes a bolted connection, hand-tighten all bolts. If it utilizes standard hooks, tip the hook back inserting the bottom edge of the hook plate into the return flange of the column, then roll the beam into place, inserting the hook lugs into the column slots. Tier II beams have connector pins that are inserted into the tear-drop shaped holes in the column face. Be sure to engage both ends of the beam at the same time and fully engage the columns. Seat the beam by tapping it into full engagement. Use a rawhide mallet if necessary
    ***NOTE: Position beams to assure a safe and steady starting structure.**
12. Installing Remaining Beams of the First Bay
    Install all frames and beams necessary to complete the bay (or bays if back-to-back)
    IMPORTANT: Hand tighten all bolted frame/structure connections at this time. Connections must have some play for adjustment. Do not torque until the racks are squared and ready to be lagged.
13. Shimming the First Bay
    Shim the second frame of the first bay, if needed with self positioning metal shims (or equivalent) (see step 7.)
14. Place Plumb Line
    Be sure the first bay is plumb. The accuracy of the following bays will depend somewhat on the accuracy of the first bay.
15. Squaring the First Bay
    In order to assure that the bay is not out of square it must be squared before going on. If this is not done the entire bank may be out of square. Square the upright frames from inside corner radius to inside corner radius as shown in the drawing. Use a laser measuring device or tape rule.

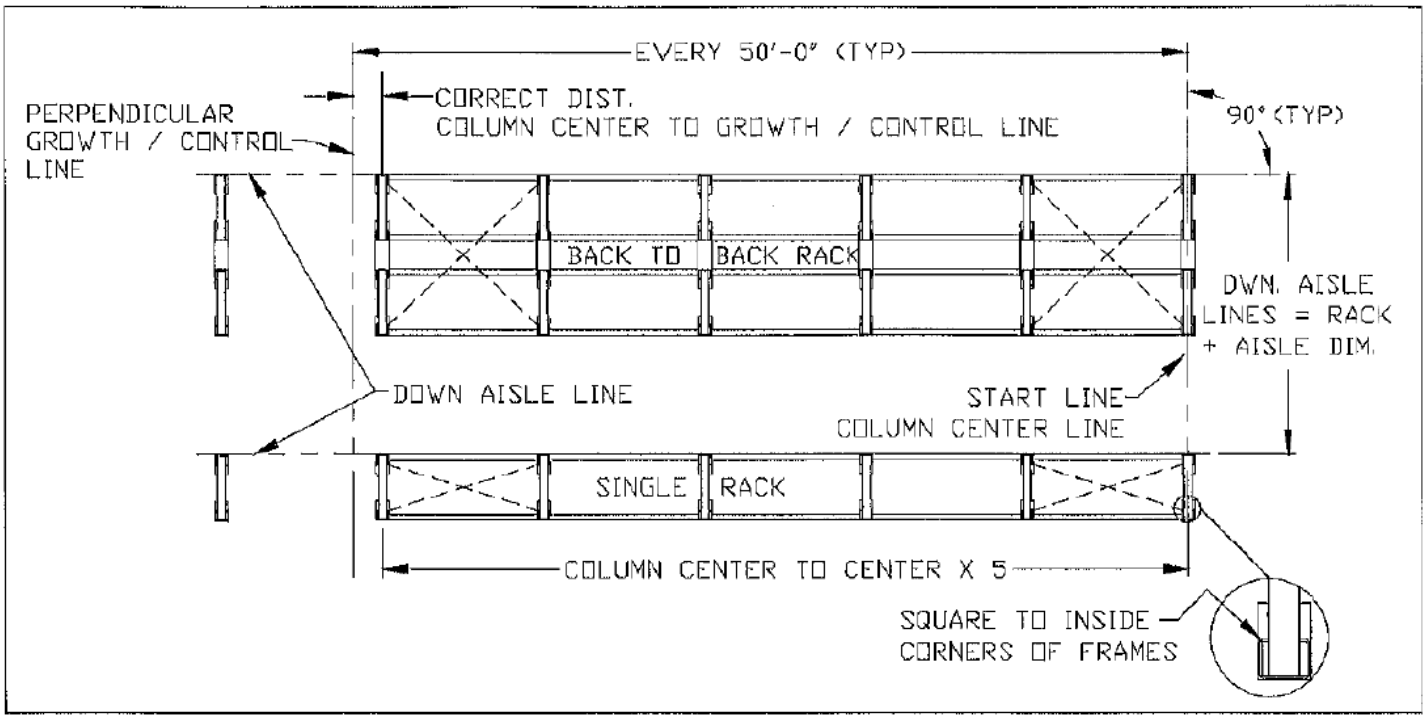
    

16. Tighten and Torque All Bolted Connections
    Bolted connections in the rack system should be tightened now and torqued to the proper specifications. Install all locking devices. (Refer to the “Bolting and Locking Device Details section)
17. Lagging the First Bay
    The first bay should be complete, plumb, square, correctly positioned on the chalk lines, and connections tightened. It should be anchored now to ensure that the rack system stays in position.
18. Completing Five Bays and Checking Growth
    Continue installing bays until there are five complete bays (ten bays if your system is back-to-back). Make sure you use a beam at 48 inches or less from the floor as a means of correctly spacing the frames. Once you have the bays complete, check for growth. Growth may accumulate from the tolerances of each bay as they are assembled. The last frame of the five bays may be closer or further from the “growth/control line” than it should be. In order to find the correct distance from the “growth/control line” you may figure the distance mathematically.

    The distance may be found by multiplying the center to center distance of the frame columns X the number of bays installed. The distance from your “start line” to the “growth/control line” is also used. Subtract the smaller number from the larger number and this is the correct distance the center of the frame should be from the “growth/control line”

    Example distance to “growth/control line” - (bank length x qty of banks)
    = distance from center of column to “growth/control line”
    50 ft – (8 ft x 5) = 10 ft

    Once the correct distance is found this must be compared to the actual distance. If adjustments are needed adjust each column as necessary to bring the rack to the correct distance from the



“growth/control line”

19. Shim and Plumb Five Bays
    Shim the frames if needed with self positioning metal shims (or equivalent) at this time. (refer to step 7 for details) Place the plumb line at the start and the end of each set of five bays (ten if back-to-back)
20. Squaring The Last Bay Of A Set Of Five
    In order to assure that the bays remain square, the last bay of the set of five bays must be squared before going on to the next set. If this is not done the entire bank may be out of square. At the last bay, square the upright frames from inside corner radius to inside corner radius as shown in the drawing for step 18. Use a laser measuring device or a tape rule.
21. Tighten And Torque All Bolted Connections
    Bolted connections in the rack system should be tightened now and torqued to the proper specifications. Install all locking devices. (Refer to the “Bolting and Locking Device Details section)
22. Lagging The Set Of Five Bays
    The bays should be near complete, correctly positioned on the chalk lines, shimmed, plumb, square, locking devices installed and connections tightened. They should be anchored now to ensure that the rack system stays in position. (see image from step 8)
23. Installing Crossbars And Decking
    Some rack systems utilize crossbars or crossbars and decking. If your rack system includes crossbars and/or decking, install them now.
24. Completing A Bank Of Selective Rack
    The remainder of the selective rack bank can now be completed by repeating steps 6-23. Repeat these steps for each bank, always using a complete, correctly positioned, shimmed, plumb and square starter bay, until the entire system is complete.