



## Technical Service Bulletin 04T02 TURNTABLE INSTALLATION

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### 1) General

- a) The turntable may normally be installed directly to a concrete floor as long as the floor is at least 4" thick and good quality. Whether installing on the floor or footings, expansion anchors are recommended and the installation is similar.
- b) If the installation includes a saw, the saw should be set up first and leveled and (temporarily) wired so that the saw blade can be moved forward and back and up and down through its full range of travel to confirm the table is set correctly relative to the saw.
- c) Related instructions
  - i) Saw foundation drawing
  - ii) TSB 04T03 Saw Installation instructions
  - iii) TSB 04T05 Turntable Cement Form instructions
  - iv) TSB 04T06 Cement Top Mixing instructions

### d) Tools

- i) 18" accurate carpenter's level (optional) and carpenter's torpedo level.
- ii) Tape measure and adjustable wrenches
- iii) Transit level or
- iv) Precision level calibrated to better than .005 inches per line per foot.
- v) Hammer drill, Hilti model 25 or better.

### e) Supplies

- i) Concrete anchor sets. Each set consists of one anchor with washer and nut plus two additional washers and two additional nuts. The anchors are 5/8" x 8-1/2" Hilti anchors, Hilti PN 282533. The tilting table requires six sets. The standard table requires four sets.
  - ii) Construction Grout (for machine bedding). It can be purchased from an industrial building supply distributor. ChemRex (Degussa Building Systems) is one manufacturer. For a local distributor, call 1 (800) 433-9517. Their grout comes in 50lb bags and mixes to .45 ft<sup>3</sup> (777 in<sup>3</sup>). The total footprint area of a tilting turntable is 700 in<sup>2</sup> and requires a minimum 700 in<sup>3</sup> of grout assuming the gap between the foot and the floor is 1". The total footprint of a standard table is 144 in<sup>2</sup> and requires 144 in<sup>3</sup>. The recommended gap for grouting is between 1" and 2". The above quantities are for illustration purposes only and are absolute minimum. Alternately, ChemRex MasterFlow 928 flows much easier, but requires a temporary retention dam around the foot.
  - iii) Hydraulic Oil. The tilting turntable is hydraulic powered. It cannot be shipped with hydraulic oil. The customer must purchase 10 gallons of ISO grade AW-46 oil from a local power equipment dealer.
- 2) **Set the Location.** Position the turntable on the floor relative to the saw per the saw foundation drawing. Move the saw through its full X and Y range of travel to ensure that the bottom point of the blade covers the full 6' x 10' dimension of the tabletop. Later a cement top must be poured on the table and the top must be planed flat using a planing wheel mounted on the saw. In order for the entire top to be planed flat, the saw travel must be able to cover the dimensions of the tabletop.
- 3) **Drill anchor holes.** Drill the holes for the concrete anchors through the holes in the table base plates into the concrete floor per the manufacturer's instructions. Remove the table and

- install the anchors per the manufacturer's instructions. Install a length of threaded rod then a nut and then a flat washer on each anchor and set the table base plates back on top of the anchor and washer. Put a 2<sup>nd</sup> washer and then a nut on the threaded rod above the base plate.
- 4) **Set the height.** Turn the nuts to raise or lower the height to be correct within 1/8" relative to the saw. The nominal height of the top of the steel frame of the tabletop above the floor is 28" including grout. The nominal height of the top of the 2" cement cap (after planing) is 30" above the floor. For saws with non-tilting arbors such as the 515 or 541, the important height is relative to the smallest saw blade installed (typically 14") and the spindle in its lowest cutting position. The distance from the bottom of the blade to the top of the steel frame of the tabletop should be 1-1/2". Assuming the tabletop is capped with 2-1/4" of cement, and assuming the top 1/4" is planed off to make the surface flat, then the blade will be capable of penetrating 1/2" into the planed surface when the blade is new. It is normal to cut into the table 1/8" deep and the extra 3/8" penetration is an allowance for blade wear. When the blade is worn and the segments are reduced by 3/8" in height, the worn blade will still be able to penetrate 1/8" into the cement top.) See TSB 04T03 Saw Installation instructions. If your blade segments are taller than 3/8" you'll want to reduce the 1-1/2" table-to-blade gap accordingly.
  - 5) **Leveling Theory.** It is critical that a turntable be adjusted and leveled properly to function properly. It is critical that the plane of rotation be precisely parallel to the X-Y plane of travel of the saw before the cement top is milled. The plane of rotation is the underside surface of the support ring on the bottom of the tabletop. This surface is precision machined and bears on the 8 support rollers. Ideally both the plane of saw travel and plane of table rotation will be absolute level. However, if the saw is already set and the travel is not level, then either the saw must be corrected to absolute level or the plane of rotation of the table must be set parallel to the plane of travel of the saw. It is definitely not enough to just put a level on the base or the tabletop. These are not precision surfaces. Even if the steel top is perfectly parallel, if the plane of rotation is off, the top will not be parallel if it is rotated from its original position. If the saw and plane of rotation are precisely parallel, it does not matter that the steel top may not be true. The finished cement surface will be made true and level by the process of planing- if the plane of rotation is level.
  - 6) **Rough Leveling.** Before making the plane of rotation precise, make the base approximately level. A carpenter level will suffice. Start with the feet of the base elevated on the jack screws at least 1" to allow for leveling grout. You are leveling the FEET of the table- NOT the 4 pairs of support rollers. Never attempt to level the table by changing the height of the 4 pairs of support rollers. (See Support Rollers.) Place the level at four points on top of the perimeter channel inside the support ring and adjacent to the support rollers. Raise the appropriate low legs to make the base approximately level. As a general rule, move the two jackscrews on one side up the same amount and move the two jackscrews on the opposite side down this same amount. This will pivot the table roughly about the midpoint without changing the height or disturbing the level in the opposite direction.
  - 7) **Precision Leveling.** The precision positioning can be done by one of three methods: *Parallel Method, Transit Method* or *Level Method*. The Transit or Level methods are recommended for absolute level. The Transit Method is the easiest. The Parallel Method requires only common tools.
    - a) **Parallel Method.** (This method matches the table rotation to saw travel.)
      - i) With the table at the 0° position (normal cutting position), make a mark on the top of the steel tabletop at the center of the 6 ft long channel on the right end of the table. Call this the 3 o'clock position when standing at the loading side of the table looking down on the table. Move the saw gantry and carriage so the bottom of the saw blade

(or the end of the spindle) hovers over mark. Note the distance from the blade to the mark. Rotate the table 180° degrees to put the same mark at 9 o'clock and move the saw blade over the mark and repeat the measurement. Adjust the jackscrews until the measurements at 3 and 9 o'clock are equal. Alternately, instead of measuring it is simpler, quicker and more accurate to place a block on the mark and lower the blade down until it just kisses the block. Rotate the table as before and adjust the jackscrews until the blade just kisses the block at 3 and 9 o'clock.

- ii) Rotate the table to the 90° and 270° positions and repeat the measurements to the mark or block at 6 and 12 o'clock and make appropriate adjustments to the jackscrews to make the measurements equal.
  - iii) Repeat (a) and then (b) again until the measurements do not change and are equal all around.
- b) Transit Method. This method establishes absolute level. The plane of travel of the saw must also be the absolute level for this method to be accurate.
- i) Mark the table as in 2a above. Set up a transit level and take height measurements from the mark at 3, 6, 9, and 12 o'clock. Adjust the jackscrews until the measurement is the same at all 4 positions. Go around again with measurements to ensure they haven't been affected by subsequent adjustments.
- c) Level Method. This method establishes absolute level. The saw must also be the absolute level for this method to be accurate. This method is similar to a technique sometimes called "splitting the bubble", which is similar to the same technique that is used to calibrate a precision level.
- i) With the table at the 0° position (normal cutting position), place the precision level on the center plate of the tabletop parallel to the 10ft long I-beams of the top.
  - ii) Note the bubble error and direction. Arbitrarily assign any bubble error to the right as a negative value. (eg. "At 0° = -3 lines right") and do not move or disturb the level. Rotate the table to the 180 position. Note the bubble position (eg. "At 180° = 1 line left"). Compute the average of the errors by adding the errors and divide by 2. For example,  $-3 + +1 = -2 \div 2 = -1$ . Again, do not move the level. Now adjust the legs to move the bubble this amount in the opposite direction. For example adjust the legs so the bubble moves -1 line from the +1 position or to 0°. Move the front and back (left) leg the same amount so as to not change the height or disturb the level in the opposite direction. When the average reading = 0°, the plane of rotation is level in that direction. Here are some more examples:
    - (1) Readings:  $0=3L$ ;  $180=-1R$ . Avg error,  $E = (3L+(-)1R)/2=2L/2=1L$ . Solution: Raise the right side 1 line so  $180=-1R+(-)1R=-2R$ . Rotate the table back to the 0 position. Does  $0^\circ = 3L+(-)1R=2L$ ? If so,  $E=(-2R+2L)/2=0/2=0$ .
    - (2) Readings:  $0=3L$ ;  $180=3L$ . Avg error:  $E=(3L+3L)/2=6L/2=3L$ . Action: Raise the right side 3 lines so  $180=3L+(-)3R=0L$ . Rotate the table back to the 0 position. Does  $0^\circ = 3L+(-)3R=0L$ ? If so,  $E=(0L+(-)0R)/2=0/2=0$ .
    - (3) Readings:  $0=-4R$ ;  $180=-1R$ . Avg error  $=(-4R+(-)1R)/2=-5R/2=-2.5R$ . Action: Raise the left side 2.5 lines so  $180=-4R+2.5L=-1.5R$ . Rotate the table back to 0 position. Does  $0^\circ=-1R+2.5L=1.5L$ ? If so,  $E=(-1.5R+1.5L)/2=0/2=0$ .
  - iii) After the table is level in the left-right direction, level it in the cross direction or front-back direction. With the table at the 0 position, place the precision level in a front-to-back direction (across or normal to the I beams) in the center of the table. Repeat the above step ii to level the plane of rotation in the front-to-back direction. Arbitrarily assign error in one direction (e.g. front) as a negative value.

- iv) Repeat Step ii in the left-right direction to confirm the front-back adjustments of iii did not disturb the former.
- 8) **Cement Top.** Install the cement top except for planing. See TSB 04T06 Cement Top Installation instructions.
- 9) **Grout Legs.** First recheck the precision level of the table. Without disturbing the base, grout the legs. Follow the directions on the bag or request a product spec sheet for mixing and placing. Wet down the grout area then use compressed air to blow off the free water. This will ensure the correct curing of the grout by establishing the correct moisture content in the grout area. Use a blunt object to pack the grout under each leg. Trowel the grout around the leg to form a slope out and down to the floor. For larger gaps up to 6", build a dam around the foot.