

INSTALLATION & ADJUSTMENT  
of  
**Exapta<sup>®</sup>s UniForce<sup>™</sup>**  
**hydraulic downforce system**  
for **JD 1890 CCS, 1990 CCS (dual-rank CCS) air drills**  
*(See different instructions for air drills with air carts, single-rank CCS, box drills.)*

**Installing the cylinders:**

1) Remove big coil spring on each opener: Lower the openers until they're touching the ground or shop floor, then put circuit in Float. Note: Only remove the first nut from OEM spring's rod (the second nut pre-loads the spring; no need to mess with it). Knock out roll-pin (roll-pin punch provided). Coil spring & rod/clevis apparatus lift out.

2) The lower end of cylinder's rod slides into cast bushing; **seat it with several whacks from a rubber mallet** on a solid surface (adding a drop of red Loctite is wise; provided) (Note: turning the bushing on the rod by hand often allows it to go easily; if bushing won't go into position, use fine emory cloth in bushing hole).

3) Install fittings into each cylinder's port (use 90-degree fittings where noted on the schematic). Tighten all fittings (90s should be pointed primarily forward/up).

4) Set cylinder + bushing into large flat washer, then into hole in cast opener (see photo A).

5) From bottom side of opener casting, the notched plate slides over cylinder rod and its ears go forward over the opener arm (see photo A). *Position the ear of plate behind/below nut on boot attachment bolt. Secure with 3/4" flange locknut, being sure prongs on the end of bushing mate into notches of plate as you tighten. Tighten nut sufficiently that notched plate draws tight against lower end of bushing (Note: bushing is longer than hole in the shank).*

6) Insert pin into top yoke of cylinder, and secure with roll-pin.



## Installing supports for header hoses:

1) Trays are positioned directly above the rank of openers that they serve. Position center trays at an offset fore/aft so they aren't directly in line with wing trays (see Photo B) (they need clearance when wings fold). Center front trays are spliced on 40 & 42/43-ft models; center rear (low-profile) trays are spliced on all CCS drills. Locate the halves, and prepare\* to fasten them together using splicer (sheet metal piece that fits on *underside* of tray to join the halves), and 1/2" x 3/4" button-head bolts and flange locknuts on bottom (button-heads on inside, where hose will lie), and with 5/16 x 3/4" hex-head bolts, flat washer & locknuts on the side (upright portion of tray). **Be sure to fasten the tray ends together that have only 4 holes, not the series of holes which belong on outer ends of tray (see Photo C).** (\*Some tray splices are most easily joined after sliding each half into position, rather than pre-assembling—especially center-rear.)



**Photo B.** Yellow lines show the offset of tray position on center vs wings. This is an 1895, hence the extra towers and extra rank. All trays go on top of frame tubes except center rear on CCSs.



2) For the *front* center trays, locate brackets #0002 and place them on the drill's center-section frame, over the fore/aft tubes (see Photo E—it's the same concept for all these brackets, except the *rear* center where the bracket comes up from underneath). Slide the 8" bar onto the brackets' studs from underneath, and then 1/2" flange locknuts—but don't tighten yet. Fasten front center tray to front brackets with 1/2" x 3/4" button-head bolts **using blue Loctite (provided)**. (Loctite isn't needed on anything secured with a flange locknut.) Center *rear* rank uses brkt #0007 which goes onto fore/aft frame tube from

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**Photo E.** RH wing: front, outer end. Brkt #0004. Tray is attached via 1/2 x 3/4" buttonhead bolts threaded into U-bracket. Assembly pulled up off the frame tube for viewing.

underneath, and bar on top. See photo D.) Assemble low-profile center-rear trays and attach to brkt using buttonhead bolts. Tighten all bolts & locknuts.

3) Trays for wings are single-piece. *Front* wing trays attach their *inner* end using brkts #0005. For *outboard* end, use #0004. Install front trays as far forward as possible (but square to drill frame, not angled). *Install all wing trays as far to the outboard direction as possible.* Tighten all bolts & locknuts.

4) *Rear* wing trays on *inner* end use a slotted bracket #0006 (Photo F) (#0013 for an 1895) that sets over rear gusset of frame tube, with 1/2" x 5.5" thru-bolt holding it. *Outer* end of tray uses brkt #0003 (Photo G).



**Photo G. RH wing: rear tray, outer end. Brkt #0003. Button-head bolts need to be tightened yet. Header hose is already assembled & lying across the U-bracket here.**

5) If rear rank is being equipped with UniForce, swap out OEM bracket that holds electrical box for Exapta's (see Photo H). **This must be done for clearance when folding.**

6) Carefully fold drill's wings, making sure trays don't hit each other. Now, tighten flange locknuts holding tray brackets in place.



**Photo F. LH wing: rear tray, inner end. Brkt #0006. Thru-bolt not yet installed here.**



**Photo H. When rear rank gets UniForce, the electrical bracket must be replaced w/ Exapta's #0023 (shown).**

## Installing header hoses:

1) For each rank of each drill section, organize header hoses & fittings per schematics provided. *These are  $\frac{3}{4}$ " hoses of different lengths (which are the numbers—in inches—on the hose in schematic).* Put all pieces together, but don't tighten them yet (these are **flared [JIC] fittings that don't need Teflon tape**; also note that flared fittings should thread on easily for a long way before you need a wrench—if not, you are cross-threaded). On T-fittings for drop hoses that are  $\frac{3}{4}$ ", install the reducer fitting to  $\frac{1}{2}$ " JIC.

2) Tighten all fittings on header hose such that *all T-fittings for drop hoses are aimed horizontal & rearward (fittings for feeder hoses from the manifold should be pointed straight up; and fittings for cross-flow hoses on each wing should be pointed straight up).*

3) Install the drop hoses ( $\frac{1}{2}$ " hoses from header to cylinder), *using specific lengths as noted in the schematic: S = 21", M = 31", L = 38", XL = 44".* Tighten all fittings.

4) Install  $\frac{3}{4}$ " x 46" 'bridge' hoses at hinge points for wings—these span the gap between header hoses (see Photo M). Tighten all fittings. Tether hoses so they stay away from pinch points.



**Photo M. 'Bridge' hose between drill sections in upper-left of pic.**

5) Install the  $\frac{3}{4}$  x 56" cross-flow hoses between front & rear ranks on each wing section. These have large elbows built-in on both ends. Tighten all fittings.

## Installing valve block, etc:

1) Locate bracket to secure UniForce manifold (valve block) onto frame, and attach it to underside of valve block with 4 screws w/ countersunk heads (use blue Loctite, provided). Set the bracket's legs (bolts) over frame at front-center of drill. Locate the bars that clamp bracket into position, slide them over bracket's stud bolts, and then flange locknuts—do not tighten yet.

2) There will be at least 2 cartridges installed (in the 2 – 3 front ports below/near gauge), and 2 – 3 corresponding rear ports used for short feeder hoses. Fittings are used to connect the 2 – 3 short feeder hoses (3/4") to each other approx 20" downstream (rearward) of valve block (if an accumulator is used, it plumbs into this location as well), then into 2 long feeder hoses. See Photo N.



**Photo N. 'Equalizer' fittings joining the feeder hoses on an 1890 w/ air cart. If 3 cartridges were used (to supply higher numbers of openers), there would be 3 short feeder hoses which would merge into the 2 long feeder hoses (one for each rank).**

3) Using UniForce manifold's

1" ports on RH side (RH when facing the direction of travel) (these are engraved 'P1' & 'T1') screw in the 90° elbows, and then to the 165" x 3/4" hoses that go to the tractor, then into the high-flow (5/8" body) male quick-coupler tips (provided) + adaptors (provided). Tighten all fittings. Zip-tie the long hoses as they run along drill's tongue (large zip-ties provided).

**4A) If the tractor has a spare remote**, the preferred setup is to run UniForce separately on that remote. The LH ports (3/4") ('P2' & 'T2') of the UniForce manifold should have plugs in them.

**4B) If no extra remote is available**, UniForce can run on the same circuit as the OEM rockshaft *unless the drill has been updated to a Power-Beyond valve block*. (There are some minor complications when running both systems on the same circuit, such as the pressure going to maximum [whatever the tractor's output, usually 2700 – 3000 psi] when rockshaft is raised, which isn't a concern except for creating more leaks and additional safety hazard; also our in-cab adjustment option cannot be used.) Remove the OEM rockshaft hoses from the OEM valve block, leaving behind all reducers and fittings in that valve block. Using the LH ports (3/4") ('P2' & 'T2') of the UniForce manifold, install the reducer fittings, and then connect to the OEM valve

block using a pair of 1/2" x 21" hoses. *The upper port of the UniForce manifold ('P2') goes to the port of the OEM valve block marked 'V2'; lower port ('T2') of the UniForce manifold goes to the port of the OEM block marked 'VI' (usually this results in the hoses crossing each other to make an 'x').* Tighten all fittings.

5) If an accumulator is being used: assemble it, mount it on the frame (see photo), and connect it to 'equalizer' fittings about 20" behind UniForce valve block (*don't use the port on valve block*). Accumulator should arrive pre-charged, unless the system was shipped by air. Pre-charge on accumulator should be 400 psi. Tighten all fittings.

6) Tighten the flange locknuts that hold the UniForce manifold bracket onto the frame.

7) if Exapta's in-cab pressure adjustment option is used, install it—see separate instructions.



#### Securing header hoses:

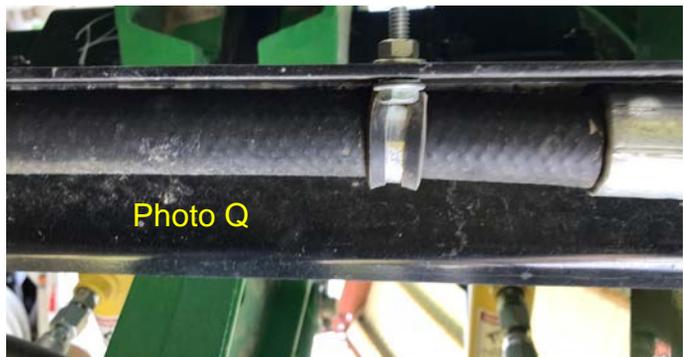
1) Slide header hoses from side to side until drop hoses and various fittings are in their best location. Using the hose clamps (see Photo Q), secure the header hose to the trays. Tighten locknuts. **The center rear rank is tethered entirely by zip ties**—no hose clamps are used.

2) Fold up the wings carefully, making sure none of bridge or drop hoses get caught or pinched. Adjust if necessary, or tether them away from pinch points.

3) Use zip-ties to further secure header hoses so they don't slide around on trays.

4) Attach warning tags to header hose.

**These are an important reminder to not crack any fittings open until the pressure gauge reads zero. The UniForce system remains pressurized when openers are in 'up' position. Don't assume you'll always remember this—install the tags.** Also, someone else might be operating the drill, and try to repair something.



## Prepare the system

Get all the air out of the lines! The easiest way is to *set the tractor's flow for the UniForce circuit to 5% (aka "0.5") so it's just a trickle. Put blocks under all the openers, so that when you rotate the rockshaft into the 'down' position, the UniForce cylinders are completely collapsed. Remove the plug (or hose) from the upper LH port ('P2') on the manifold—remove it completely. Note: the pressurized hose should be the one going into the top port ('P1') on RH side of UniForce manifold; if not, reverse the hoses at the tractor remote. After activating the circuit for 45 seconds or so, oil should start coming out this port (it won't geyser out, due to the low flow). Shut off the circuit, reinstall the plug & tighten it.*

Next, loosen some fittings (several turns) on ends of each header hose. Activate circuit again, and let it go until the oil is no longer foamy, and is a steady stream (not sputtering). Shut off circuit, and tighten all fittings. You will need to add hydraulic oil to the tractor during or after this process.

Remove blocks, and cycle rockshaft up and down a couple times with UniForce circuit activated. The openers should all rest at end of their stroke, whether or not the opener (UF) circuit has pressure on it. If openers are suspended in the air, this weird occurrence is due to air remaining (try to purge it). Keep working at getting air out until all this ceases.

If you followed this procedure, most of the air should be out of the system, but some always remains trapped, especially when oil is warm. Help this by operating the drill over a sharp change in elevation with all openers powered up—good examples would be the lip of a waterway, or the edge of a crowned dirt or gravel road (terraces aren't sufficient), or a modest gully. The more times you go over that jump in terrain with the system powered up, the sooner you'll get the last bit of air out of system for top performance. Also, letting the oil cool down completely (overnight) allows remaining air bubbles to migrate upward where they can be more easily purged when oil resumes flowing.

It's probably a good idea to change hydraulic filters on your tractor after running UniForce for an hour or so—there's always some bits of Teflon tape, hose shavings, etc., and the number of fittings and hoses is large.

## Operation & adjustment

- 1) Adjust the knob for *the rockshaft pressure to 2200+*: it cannot lift the drill frame by itself anymore. You want the rockshaft rolled over completely so that it's sloped downward at the rear by 15 – 20 degrees – it should remain in this position at all times during operation. Running the rockshaft at 2200 – 3000 helps it to quickly overcome the resistance from the opener circuit (which remains pressurized when rockshaft is raised) when lowering the openers to begin the pass.
- 2) Adjust knob for opener pressure (the UniForce system) until you are maintaining a reasonably uniform depth of cut. Running more than necessary, however, will cause sidewall compaction. Common range is 800 – 1600.
- 3) If you're drilling in steep terraces and the pressure on opener circuit drops unacceptably after the opener rank has passed over the terrace peak, this means that hydraulic flow is too low which can be remedied by: 1) *increasing the flow setting for that remote on the tractor (we prefer setting it at max flow)*; 2) using a tractor with greater hydraulic capacity, 3) installing Exapta's accumulator for the UniForce system, 4) teeing two remotes together (especially useful on older tractors).
- 4) Keep pressure on cylinder circuit during transport, to prevent openers from flopping around and causing damage to themselves, CCS tanks, or other structures.