

DRAFT

INSTALLATION & ADJUSTMENT of

Exapta[®] UniForce[™] hydraulic downforce system

for JD 1690, 1890 CCS, 1990 CCS (single-rank CCS) air drills
(See different instructions for air drills with air carts, dual-rank CCS [even if only 1 rank is being equipped with UniForce], 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.

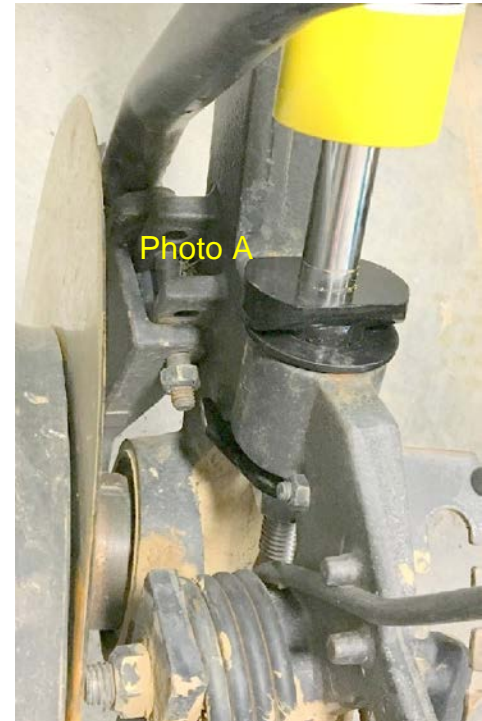
2) The lower end of cylinder's rod slides into cast bushing; **seat it with several whacks from a rubber mallet** on a solid surface (adding a drop of red Loctite is wise; provided) (Note: turning the bushing on the rod by hand often allows it to go easily; if bushing won't go into position, use fine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



Photo E. RH wing 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.

1) *Trays are only used on the wings.* Wing trays attach their *inner* end using slotted brkt #0013 that sets over front gusset of frame tube, *protruding forward*, with 1/2" x 5.5" thru-bolt holding it (need photo).

2) For *outboard* end, use brkts #0004. Place them over the fore/aft drill frame tube (Photo E). Slide the 8" bar onto bracket's studs from underneath, and then 1/2" flange nuts.

3) *Install all wing trays as far to the outboard direction as possible.* Fasten tray to 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.) Tighten all bolts & locknuts.

Installing header hoses:

1) For each drill section, organize header hoses & fittings per schematics provided. *These are 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 3/4", install the reducer fitting to 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 drop hoses (1/2" hoses from header to cylinder), *using specific lengths as noted in schematic: S = 21", M = 31", L = 38", XL = 44", XL+ = 50"*. Tighten all fittings.

4) Install 3/4" x 72" 'bridge' hoses at hinge points for wings—these span the gap between header hoses from center to wings. Tether hoses so they stay away from pinch points.



Photo K. UniForce valve block on box drill. Yours should have a 90-degree fitting on outboard side to reduce loop of hose needed.

Installing valve block, etc:

1) Attach line-body valve block to its pedestal (with port # engraving up), and secure that to 4x6 frame tube with square U-bolt provided (see Photo K). Mount this near center of drill or slightly left of centerline (left when facing direction of travel). Tighten locknuts.

2) Install gauge behind the port with '1' engraved near it (gauge's threads need Teflon tape) by using T fitting and reducers.

3) Route the ½" x 180" hoses along tongue, and secure with large zip-ties. On tractor end of hose, install high-flow (5/8" body) quick-couplers (provided) and adaptors. Tighten fittings.

4A) **If tractor has a spare remote**, the preferred setup is to run UniForce separately on that remote. The '2' & '3' ports of the UniForce valve block go to tractor (*Port '2' is pressure*). Tighten fittings.

4B) **If no extra remote is available**, UniForce can run on the same circuit as OEM rockshaft (there are some minor complications,

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 Exapta's in-cab adjustment option cannot be used). Remove OEM rockshaft hoses from OEM valve block, leaving behind all reducers and fittings in that valve block. Using extra T-fittings and pair of 44" hoses, connect UniForce valve block to OEM valve block: *Port '2' of UniForce valve block goes to the port of OEM valve block marked 'V2'; Port '3' of UniForce valve block goes to the port of OEM block marked 'V1'* Tighten fittings.

5) **If an accumulator is being used:** assemble it, mount it on the frame (see photo), and **connect it to an extra T-fitting where feeder hose goes into header hose**. Accumulator should arrive pre-charged, unless the system was shipped by air. Pre-charge on accumulator should be 400 psi. Tighten all fittings.

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

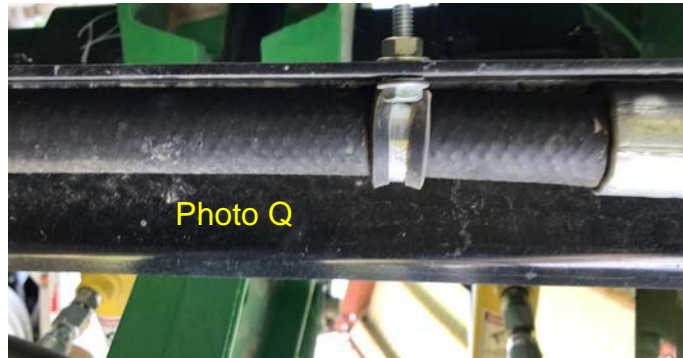


Securing header hoses:

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.

2) Fold up the wings carefully, making sure none of bridge 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 system: The easiest way is to *set tractor's flow for UniForce circuit to 5% (a.k.a. "0.5") so it's just a trickle. Put blocks under all openers, so that when you rotate rockshaft into 'down' position, the UniForce cylinders are completely collapsed. Completely remove hose from port '2' of UniForce valve block. Note: the pressurized hose should be the one going into port '3' of UniForce valve block; if not, reverse hoses at tractor SCV remote. After activating circuit for 45 seconds or so, oil should start coming out port '2' (it won't geyser out, due to the low flow). Shut off circuit, reinstall hose & 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.**