

INSTALLATION & ADJUSTMENT
of
Exapta[®]s UniForce[™]
hydraulic downforce system
for JD 1890 (5-section) air drills (50' & 60')
(See different instructions for box drills & 3-section air drills.)

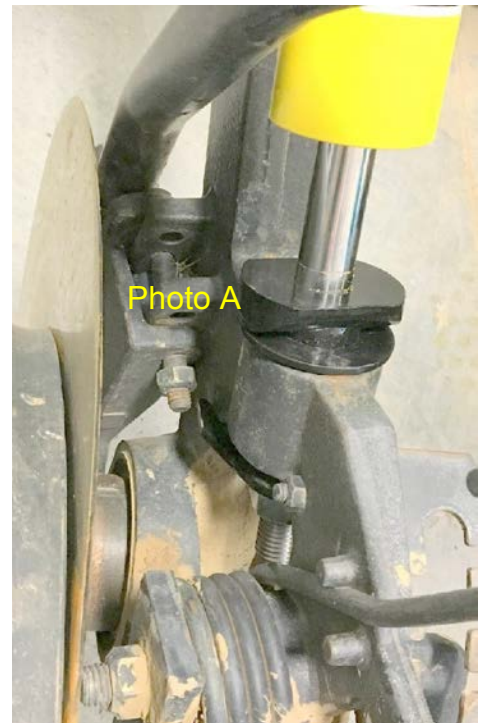
****With drill folded up, take photos of pinch points, and use chalk to mark them.**

Installing the cylinders:

1) Remove the 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 the cast bushing, and **seat it with several whacks with a rubber mallet** on a solid surface (adding a drop of red Loctite may be prudent; provided) (Note: turning the bushing on the rod by hand often allows it to go easily; if the bushing won't go into position, use fine emory cloth to clean any paint that may have gotten into the bushing's hole).

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



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

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

Installing support brackets for header hoses:

1) The center section trays are spliced. Locate them, and prepare* to fasten them together with the 1/2 x 1/2" button-head bolts and flange locknuts on the bottom (button-heads on the inside, where the hose will lie),



and with 5/16 x 3/4" hex-head bolts & locknuts on the side (upright portion of tray). Be sure to fasten the tray ends together that have only 4 holes (see photo C), not the series of holes which belong on the outer ends of the tray.

Next, locate the pedestal brackets and mount them on the drill frame using bar & rods to secure to the frame tube (see Photo D); pedestals for the rear rank should be mounted immediately ahead of the OEM hydraulic lines and touching them (*farther forward creates clearance issues when folding*) (again, see Photo D).

Fasten the tray to the pedestals with 1/2" x 1/2" button-head bolts using blue Loctite (provided). (Loctite isn't needed on anything secured with a flange locknut.)

2) The trays for wings' front rank are single-piece. (No trays are used for the wings' rear rank.) The U-brackets go over the frame tube as shown (see Photos E & F1, but note that Photo F1 doesn't have the hose protectors installed—see Photo F2 for that).



Photo D



Photo F1



Photo E



Photo F2

Installing the header hoses:

1) For each rank of each drill section, organize the header hoses & fittings per the schematics provided. These are $\frac{3}{4}$ " hoses. Put all the pieces together, but don't tighten them yet (these are all flared [JIC] fittings that don't need Teflon tape; also note that flared fittings should thread on easily for a good long way before you need a wrench—if not, you are cross-threaded). On the front, where the hinges are, there are pieces of woven nylon hose protector included that must be slid over the header & bridge hoses as they're being assembled (Photo F2). From the center to the inner wing, there are 28" & 12" protectors; from the inner wing to outer wing, there are 6" and 60" protectors.

2) Tighten all fittings on header hoses such that *all fittings for drop hoses (to cylinders) are aimed horizontal & rearward (fittings for feeder hoses from the manifold should be pointed straight up; fittings for cross-flow hoses should also be pointed straight up)*. Fittings should be 'dead-man tight' to avoid leaks (use a pair of 18" crescent wrenches; if you need to take the fittings apart, use ~3-ft cheater pipes on those wrenches). **Ends of header hoses on center section must not extend past OEM hydraulic fittings for clearance when folding (see Photo D), and preferably are closer to the frame than the OEM fittings.**

3) Install fittings into each cylinder's port (*use 90° fittings where indicated on the schematic*); **this is tapered pipe-thread and must have Teflon tape (provided). Use 2 full wraps of tape.** Tighten all fittings (90s should generally be pointed fwd/up).

4) Install the drop hoses (the $\frac{1}{2}$ " hoses from the header to each cylinder). *The length needed for each cylinder is on the schematic: S = 21", M = 31", L = 38", XL = 44"*. Tighten all fittings. **Route hoses for clearance when folded; zip-tie where needed (see photos & consult your chalk marks for pinch points).**

5) Install the 'bridge' hoses at the hinge points for the wings—these are $\frac{3}{4}$ " hoses (of lengths indicated in schematic) that join the header hoses. Bridge hoses go *above* the frame when joining the *front* inner & outer wings; they're *below* the frame when joining the *rear* inner & outer wings. Tighten all fittings. Tether the hoses so they stay away from pinch points at the hinges (see Photo G).

6) Install the 56" cross-flow hose between the front & back ranks in the center section, and the 68" cross-flow hoses on the outer wings. These are $\frac{3}{4}$ " hoses with large elbows built-in. Tighten all fittings.





7) Route the 222" feeder hoses from ~2 ft behind where the manifold will set to where they go into the header hoses at the middle of each inner wing (see schematics). Keep the feeder hoses towards the middle of the drill's frame to avoid pinch points.

8) Zip-tie drop hoses and feeder hoses away from pinch points. See Photos H & J (note that Photo H doesn't have the hose protector installed).

9) Zip-tie the header hose for the wings' rear rank to the OEM hydraulic hoses. For the 3 – 4 ft closest to the center section, the header hose must be *below* the OEM hoses (for clearance when folded). See photos below.



Installing the manifold (valve block), etc:

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

2) For drills with 53 – 76 openers, 3 cartridges & 3 rear ports are used on the manifold. For drills with 77 or more openers, all four of the 3/4" ports are used (all four should have cartridges inserted in the front). Connect the short (17") feeder hoses to the rear ports that correspond to where the cartridges are located. The feeder hoses will have additional equalizer fittings that connect the 3 feeder hoses just rearward of the manifold. The long feeder hoses join these equalizer fittings and go out to the appropriate fitting in each header hose for the inner wings. See Photo M.

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

4A) Unless the drill uses a JD Power Beyond setup for the rockshaft, remove the OEM hoses (leaving behind all reducers and fittings in the OEM valve block) that originally operated the rockshaft. Using the LH ports (3/4") of the UniForce manifold, install the reducer fittings, and then connect to the OEM valve block using a pair of 5/8" x 40" hoses (one end female JIC, the other end female face o-ring). The upper port of the UniForce manifold goes to the port of the OEM valve block marked 'V2'; lower port of the UniForce manifold goes to the port of the OEM block marked 'V1'. Tighten all fittings.

4B) If the drill uses a Power Beyond setup for the rockshaft, then keep everything that runs it the same (UniForce will instead operate on a separate remote). Plug the LH ports (3/4") of the UniForce manifold.



Photo M. On a 5-section drill with TBT cart. 3 cartridges used, going into 4 long 222" feeder hoses, with places for 2 accumulators to plumb in on both ends of equalizer fittings.

5) If an accumulator is being used: assemble it, mount it on the frame (see photo), and connect it to the fittings that equalize the feeder hoses just behind the valve block (*don't* use the port on the valve block). The 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 Exapta valve block's bracket onto the frame.

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



Accumulator on 60-ft w/ TBT cart. Note: 50-ft may have clearance issues with dolly wheels when folded with an accumulator in this location.

Securing the header hoses:

1) Slide the header hoses from side to side until the drop hoses and various fittings are in their best location. Using the clamping brackets (see photos D, F, H), secure the header hose for the center section & wings' front rank to the trays with 5/16" hex-head bolts and flange locknuts (bolt head towards inside of tray). Use one clamp on the far ends of each tray, and one clamp in the middle of each inner wing tray, and one in the middle of each center tray. Tighten locknuts.

2) Fold up the wings carefully, making sure none of the bridge hoses get caught or pinched. Adjust if necessary, or tether them away from the pinch points. (On 50-foot, if an accumulator is used, make sure the dolly wheels aren't going to strike it.)

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

4) On the hose protectors on the front rank's hinge points, slide them so they fully cover any areas of hose exposed to corn or sunflower stalks, and secure them with multiple zip-ties.

5) 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 the 'up' position. Remove pressure by moving the remote's switch or lever into 'Float.'* 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! Cycle the system multiple times with at least one fitting per header cracked open (preferably the ends of the header highest in elevation, or the farthest from the manifold). You may also need to considerably loosen a fitting close behind the block itself. Note: the pressurized hose should be the one going into the top port on RH side of UniForce manifold; if not, reverse the hoses at the tractor remote. Even if the loose fitting behind the manifold isn't spurting a geyser of oil, the rest of the system should still slowly filling with oil—there's a lot of gallons involved, so be patient. You will need to add oil to the tractor during this process.

This is only the beginning, however, since these are single-action cylinders. What really needs to happen is to collapse them (push the rod all the way in), and preferably on all of them at once.

This must be done while oil is flowing thru the headers. This is best done while going over a sharp change in elevation with all the 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). Another option might be to have the openers set down on a log or utility pole lying on the ground. Even after doing this several times, there will still be air in the system, which may cause strange things such as openers hanging up in the air. Keep working at getting the air out until all this ceases. The more times you go over that jump in terrain (or a log) with the system powered up, the sooner you'll get all the air out and it will behave normally. Also, letting the oil cool down completely (overnight) allows the remaining air bubbles to migrate upward where they can be more easily purged when oil resumes flowing.

Operation & adjustment

1) Adjust the knob for *the rockshaft pressure to 2000+*: 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 2000 – 3000 helps it to quickly overcome the resistance from the opener circuit (which remains pressurized with openers up) when lowering the openers to begin the pass.

2) Adjust the knob for the 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 – 1400.

3) If you're drilling in steep terraces and the pressure on the 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 the cylinder circuit during transport, to prevent openers from flopping around and causing damage to themselves, CCS tanks, or other structures.