

INSTALLATION & ADJUSTMENT
of
Exapta®s UniForce™
hydraulic downforce system
for JD 750, 1560, 1590 & Pro-series openers on box drills
(See different instructions for air drills.)

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. On 60/90/Pro-series, only remove the first nut from OEM spring's rod (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. On 50-series, break loose jam-nut inside spring using skinny wrenches and cheater pipe, then unscrew bolt from bottom.

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 emery cloth in bushing hole).

3) On 60/90/Pro-series: Install o-ring fittings into each cylinder's port (use 90-degree fittings where noted on the schematic). *Don't tighten fittings until orientation is determined in next part (next page).* On 50-series: Install pipe-thread fittings into each cylinder's port (use 90-degree fittings where noted on the schematic); **this is tapered pipe-thread and must have Teflon tape (provided). Use 2 full wraps of tape.** *Don't tighten fittings until orientation is determined in next part (next page).*

4) Set cylinder + bushing into large flat washer, then into hole in cast opener (see photos A1, A2).

5) From bottom side of opener casting, the notched plate slides over cylinder rod and its ears go forward/down over the opener arm on 60/90 openers (see Photo A2) (50-series: the ears go up/rearward [Photo A1]). *On 60/90s, position the ear of plate behind/below nut on boot attachment bolt.* On Pro-series, see Photo A3 for orientation. 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 clevis of cylinder, and secure with roll-pin. (50-series: new pin provided)



Installing header hoses:

1) Tighten fittings in the following orientations: On rear rank, all are pointed forward/up (Photo B). On front rank, the 90°s point forward/up, except for the ends which face inward (see Photo C). Reversing (loosening) a fitting with Teflon tape often causes it to leak (remove & re-tape). These fittings need to be quite tight to avoid leaks.

2) On rear rank only, install drop hoses (the ½" x 10.5" hoses from cylinder to the header hose that runs along rockshaft). Drop hoses go above the steel tube that supports the plastic seed tubes. *On front rank, there are no drop hoses*; instead, use T-fittings (M-F-M) directly onto the 90°s coming out of cylinder (see Photo C). 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.

3) Find the header hoses of the appropriate lengths to go between each drop hose on the rear rank (see hose schematic). There are longer hoses to span where the rockshaft's supports & torque cylinders are, and some 90s to help with this (see schematic & Photo D). Also install one T-fitting (M-M-F) in the middle for 'feeder' hose (1/2") coming from the UniForce manifold/valve block.



Photo B



Photo C



Photo E

4) On the front rank, header hoses will typically be slightly longer (~2") than distance between cylinders (see Photo C), and where openers are somewhat close together, use the length specified and make a loop, orienting the loop upward to prevent stalks from catching on it – see Photo E). On the front rank of 7.5" drills, where a pair of openers are very close together, one of that pair

will need an 8" drop hose to move the T-fitting away from the other, and the header hoses on each side of that drop hose will be longer (see hose schematic).

5) Tighten all fittings. When tightening, pay attention to if it causes a hose to rub against something by twisting the hose.

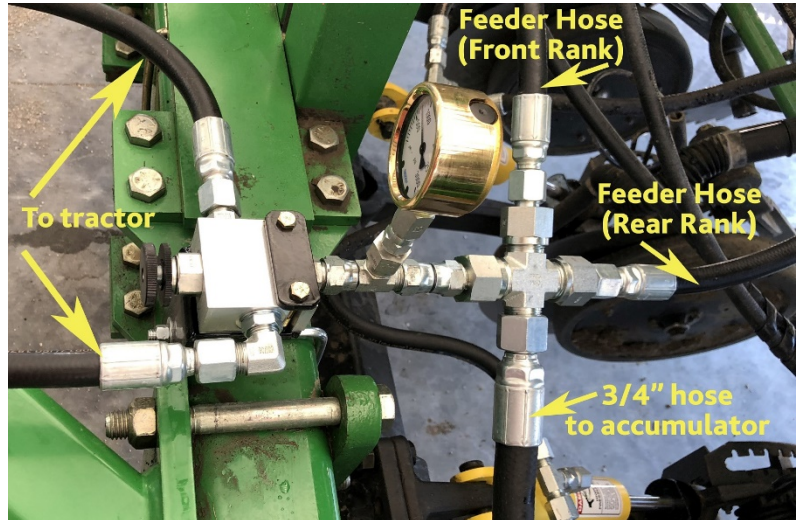


Installing the valve block, etc:

For single box drills (*not a pair pulled together on a hitch—see next page for those*), you'll have a line-body valve block (see photo to right):

1) Attach line-body valve block to its pedestal (with port # engraving up), and secure that to the 4x6 frame tube with the square U-bolt provided. Mount this near the center of the drill but slightly L of centerline. See photo.

2) Install gauge behind the port with '1' engraved near it (the gauge's threads need Teflon tape) by using tee-fitting and reducers. Behind the tee for the gauge is another tee* that goes into two 'feeder' hoses, one for each rank.
*If an accumulator is used, this will be a cross (4-way) instead of a tee.



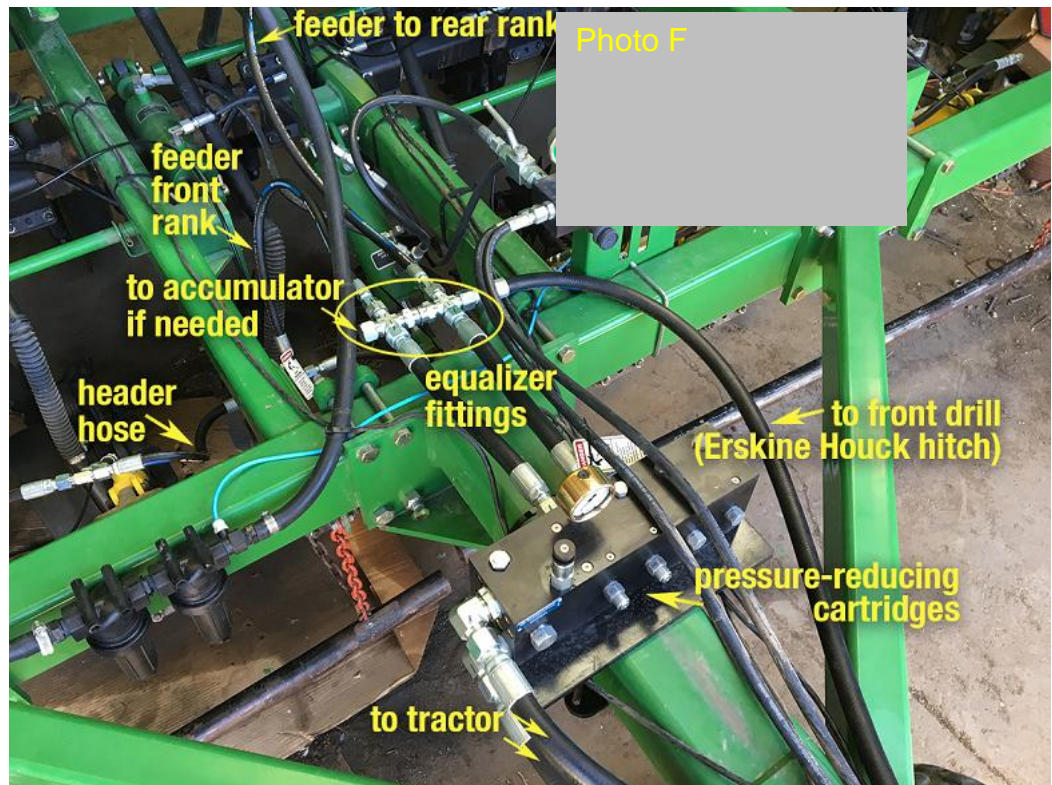
3) Route the 165" hoses along the tongue, and secure with large zip-ties. Install the high-flow (5/8" body) quick-couplers (provided) and adaptors on the tractor end of the hoses. Tighten fittings.

4A) **If the 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 the OEM rockshaft (there are some minor complications, such as the pressure going to maximum [whatever the tractor's output, usually 2700 – 3000 psi] when the rockshaft is raised, which isn't a concern except for creating more leaks and additional safety hazard, but also that the 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 extra tee-fittings and pair of 44" hoses, connect the UniForce valve block to the OEM valve block: *Port #2 of the UniForce valve block goes to the port of the OEM valve block marked 'V2'; Port #3 of the UniForce valve block goes to the port of the OEM block marked 'V1'* Tighten fittings.

For a pair of box drills pulled together on a hitch, you should have a large manifold (see Photo F):

1) Locate the bracket to hold the manifold onto the frame, and attach it to the underside of the manifold with 4 counter-sunk screws (use blue Loctite, provided). Set the bracket's legs (bolts) over the frame at the front-center of the drill (see photo) (For Erskine Houck Hitches,* put the manifold on the rear drill when in transport; for JD hitches, manifold goes on the front 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) There will be 2 cartridges installed (in the 2 front ports below/near gauge), and 2 corresponding rear ports used for short feeder hoses. There will be fittings to connect the 2 short feeder hoses (3/4") to each other approx 20" downstream (rearward) of the UniForce manifold (if an accumulator is used, it plumbs into this location as well). See Photo F.

3) Using the 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 3/4" hoses that go to the tractor—on Houck Hitches, these are spliced with quick couplers so that the rear drill can be unhooked from the front. (see separate instruction sheet for protecting hoses on Houck Hitches.) Route hoses along Houck Hitch. Two of the 3/4" hoses go from the tractor to the manifold, and one 3/4" hose goes from the equalizer fittings (behind the manifold) to the other drill, routed again along the hitch. At tractor, hoses use the high-flow (5/8" body) male quick-coupler tips (provided) + adaptors (provided). Tighten all fittings.

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. (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 blocks using pairs of 1/2" 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 'V1' (usually this results in the hoses crossing each other to make an 'x').* Tighten all fittings.

5) If accumulators are being used: assemble & mount them on frame (see photo); connect them to the fittings that equalize the feeder hoses just behind the valve block (*don't* use the port on the valve block) and to where the 3/4" hose to the other drill reduces to the 1/2" feeder hoses for each rank. The accumulators should arrive pre-charged, unless the system was shipped by air. Pre-charge on accumulator should be 400 psi. Tighten fittings.

6) Tighten the flange locknuts that hold the UniForce valve block's bracket onto the frame.

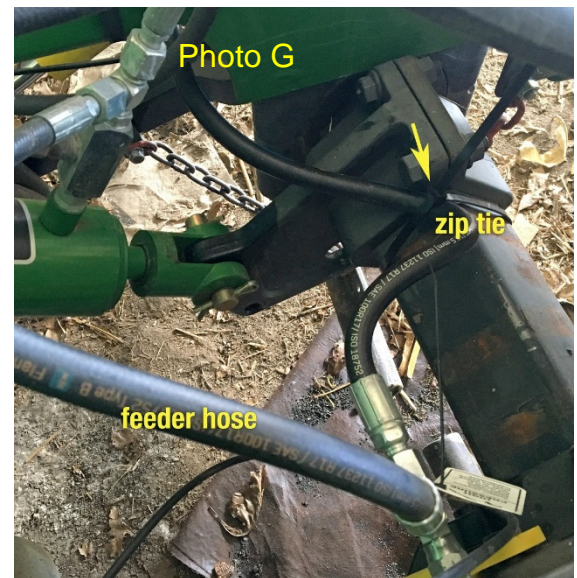
7) if Exapta's in-cab pressure adjustment option is used, install it—see separate instructions.



Securing the header hoses:

1) Using 0.5"-wide zip-tie, secure the front header hose where it goes past the cylinders that torque the rockshaft (see Photo G). Secure any other longer hoses to keep them from rubbing on frame, or dropping into the path of stalks, etc.

2) 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! 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.*

For single drills using a line-body valve block, 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.

For pairs of drills pulled together using a manifold-type valve block, remove the plug (or hose) from the upper LH port on the manifold ('P2')—remove it completely. Note: the pressurized hose should be the one going into the top port on RH side of UniForce manifold ('P1'); 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 the ends of each header hose. Activate the circuit again, and let it go until the oil is no longer foamy, and a steady stream (not sputtering). Shut off the circuit, and tighten all fittings. You will need to add hydraulic oil to the tractor during or after this process.

Remove the blocks, and cycle the rockshaft up and down a couple times with the UniForce circuit activated. The openers should all rest at the 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 the 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 the oil is warm. Help this by operating the drill 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), 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 the system for top performance. 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.

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+ 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 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 – 1600.

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 bouncing and damaging the cast bushing.