Exapta's UniForce™
hydraulic downforce system
for 60-ft JD 1890/1895 air drills, including Pro-series openers

Step 1: Remove coil spring & rod on each opener.

- Lower the openers until they're touching the ground, then put circuit in Float.
- Remove nut and knock out roll-pin (keep pin & roll-pin). Remove coil spring & rod

Step 2: Install fittings into each cylinder's port

- Tighten all fittings (90/45 degree fittings should point primarily up)
- Use schematics as a reference when to use 90/45 degree fittings. (Hint: if cylinder is directly/slightly under the frame, use a 90 or 45)

Step 3: Slide cylinder into cast opener hole. (See photo A & AA)

- Slide large flat washer onto cast bushing
- Set cylinder + bushing + large flat washer into hole in cast opener.
- Slide notched plate over the cylinder rod (ears pointed forward/down). *Position the ear of plate behind nut on boot attachment bolt.*

Note: For 90-series openers: (see photo A). On Pro-series openers: (see Photo B) for orientation of notched plate.


Photo A

Step 4: Secure notched plate with 3/4" flange locknut.
IMPORTANT: prongs on the end of bushing must mate into notches of plate as you tighten. Tighten nut sufficiently.

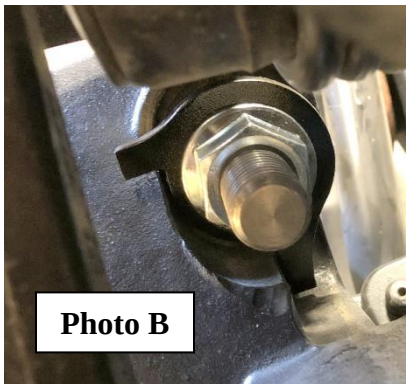


Photo B

Step 5: Insert pin into top clevis of cylinder. Secure with roll-pin.

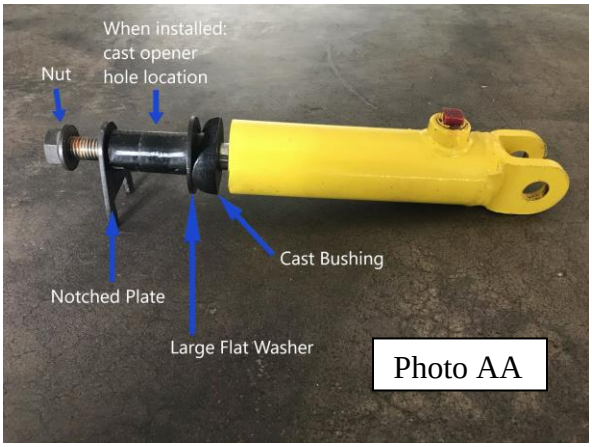
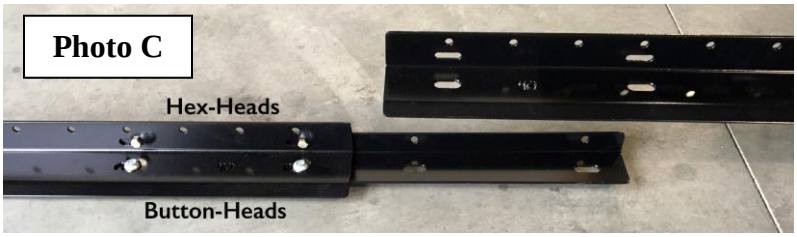


Photo AA

U.S. Patent 9,930,822; other Patents Pending.
Instr. revised 20 December 2019.

Installing Brackets and Trays:



Step 1: Install Brackets on Center Section's Frame Tubes. (See Photo D).
Use bracket #0017A for front rank and #0017 for back rank. Bracket #0017 – mount immediately ahead of OEM hydraulic lines and touching them (*farther forward creates clearance issues when folding*) (see Photo D).

Step 2: Splice the Center Section Trays. (See Photo C)
Connect left & right trays (marked '60-ft' & 77.25" long) with splicer using the ½ x ½" button-head bolts and flange locknuts (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.

Step 3: Fasten Center Trays to Pedestal Brackets.
Use ½" x ½" button-head bolts using blue Loctite (provided).

Step 4: Install FRONT RANK Wing Trays and Brackets.
(No trays are used for back rank wings.) Install Brackets #0016 (See Photos E & F1). Note, Photo F1 doesn't show woven nylon hose protectors installed—see Photo F2).

Photos show our old-style steel clamping brackets to secure hose to tray. We now use rubber-lined hose clamps instead (see Photo Q).

Installing header hoses: *use schematics*

Step 1: Assemble header hoses & fittings per schematics provided for each drill section. *These are ¾" hoses of different lengths (which are the numbers—in inches—on the hose in schematic).* Put all pieces together, finger tight. On T-fittings for drop hoses that are ¾", install the reducer fitting to ½" JIC.
NOTE: on front rank, where the hinges are, slide woven nylon hose protectors over the header & bridge hoses while assembling (see 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.

Step 2: Tighten all fittings on header hoses such that *all ½" fittings for drop hoses (to cylinders) are aimed horizontal & rearward (¾" fittings for feeder hoses from the manifold should be pointed straight up; ¾" fittings for cross-flow hoses should also be pointed straight up).* 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.

Step 3: Lay the assembled header hoses on the designated location on each drill section.

Step 4: Install drop hoses (the ½" hoses from the header hose to cylinder). *The length needed for each cylinder is on the schematic:* S = 21", M = 31", L = 38", XL = 44", XXL = 60". Tighten all fittings. Route hoses for clearance when folded; zip-tie where needed (see Photos G, H, J, & consult your chalk marks for pinch points).


Photo G

Step 5: Install 'bridge' hoses at the hinge points for the wings—these are ¾" hoses (lengths indicated in schematic) that join the header hoses. For *front rank,* route bridge hoses *above* the frame when joining the inner & outer wings.
For *back rank,* route bridge hoses *below* the frame when joining the inner & outer wings.
Tighten all fittings. Tether the hoses so they stay away from pinch points at the hinges (see Photo G).

Step 6: Install Cross-Flow hoses (See Photo F3)
(These are ¾" hoses with large elbows built-in)
For *center section,* use the 56" cross-flow hose to connect the front & back ranks.
For *outer wings,* use the 68" cross-flow hoses.
Tighten all fittings.

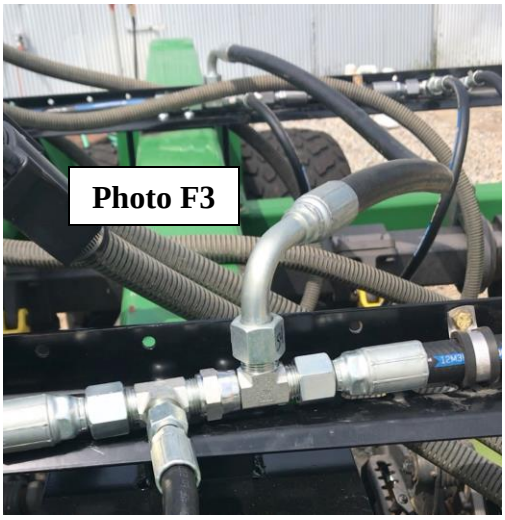


Photo F3

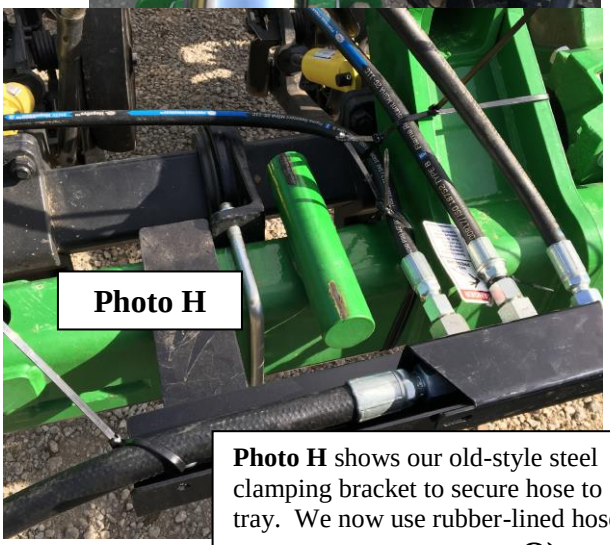
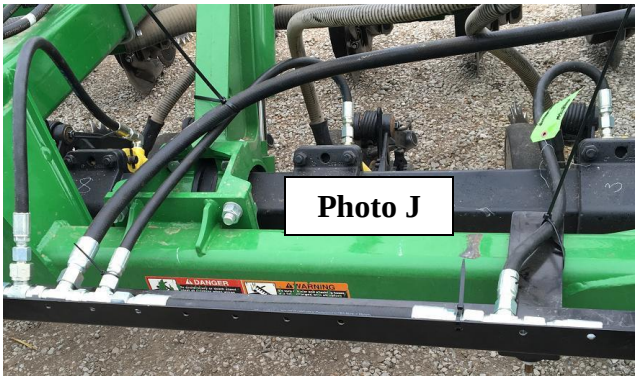


Photo H

Photo H shows our old-style steel clamping bracket to secure hose to tray. We now use rubber-lined hose clamps instead **(see Photo Q).**

Step 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 (see photo M (next page) and photos below).



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

Step 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:

Step 1: See Photo M & M2. (Note: hoses/fittings assembly may vary for your drill)
Attach the Manifold to the Bracket using (4) screws with countersink heads (use blue Loctite, provided).
Attach Bracket to the frame —do not tighten yet.

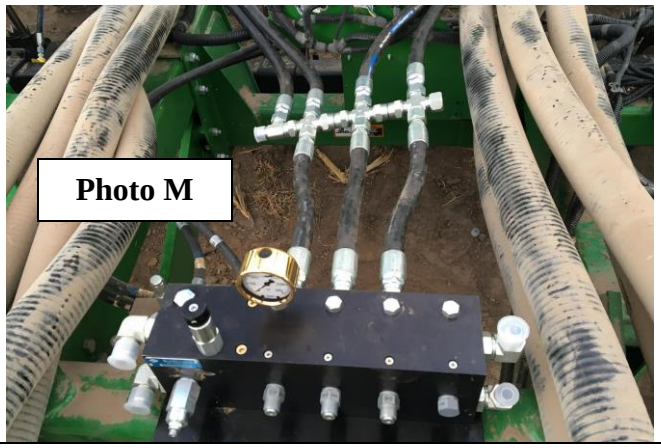


Photo M

Manifold installed on a 60-ft drill. 3 cartridges used, 3 short feeder hoses going into 4 long 222" feeder hoses, with fittings for 2 accumulators to plumb into the ends of equalizer fittings.

Photo M2

3 cartridges, 3 short feeders going into 4 long feeders, with fittings for 1 accumulator.

Step 2: Connect Feeder Hoses and Equalizer Fittings
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 ¾" 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. Using the equalizer fittings, connect the 3 short feeder hoses just rearward of the manifold (see Photo M). The long 222" feeder hoses join these equalizer fittings and go out to the appropriate fitting on each header hose for the inner wings. (See Photo M and reference schematics)

Step 3: Connect hoses from Manifold to Tractor
Using port #1 on the Manifold's RH side (RH when facing tractor) (these are engraved 'P1' & 'T1') screw in the 90º elbows, then connect the 165" x ¾" hoses and then to the tractor, using 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 the drill's tongue (large zip-ties provided).

Step 4: 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 will have plugs.

Step 5: Tighten the flange locknuts that hold the UniForce manifold bracket onto the frame.

Step 6: If an accumulator is used, install it – see separate instructions.

Securing the header hoses:

Step 1: Slide the header hoses from side to side until the drop hoses and various fittings are in their best location. Using the hose clamps (see Photo Q), secure the header hose to the trays (center ranks & wing's front rank). Tighten locknuts.

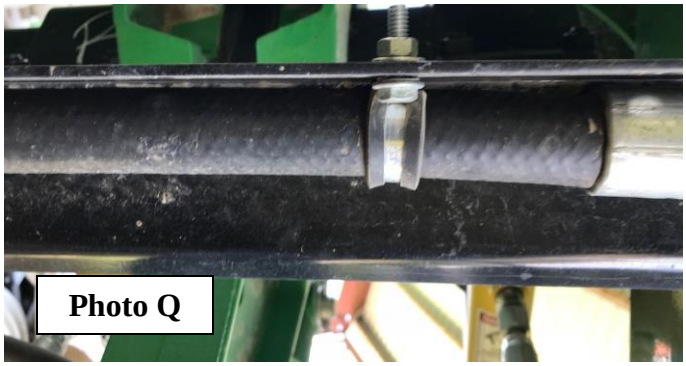


Photo Q

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

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

Step 4: On the woven nylon 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.

Prepare the system: *Purge all air out of the system*

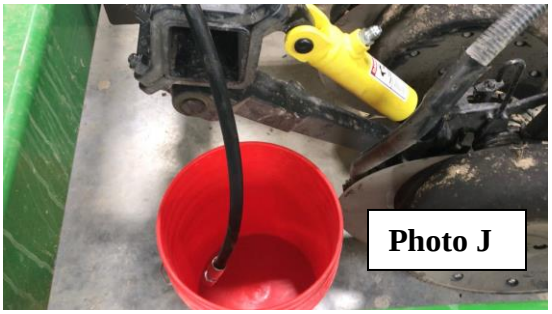


Photo J

Step 1: Set tractor's flow for UniForce circuit to 5%. Rotate rockshaft into 'down' position, the UniForce cylinders must be collapsed as far as possible.

Step 2: Place a 5-gallon bucket at each outside end of wings on front and back ranks (4 total buckets). Undo the drop hose from the cylinder and let it drop into the bucket. (See Photo J)

Step 3: Activate circuit. *Note: the pressurized hose should be the one going into the top port ('P1') on RH side of UniForce manifold;* if not, reverse hoses at tractor remote. After several minutes, oil will start pouring into the buckets (it won't geyser out, due to the low flow). It will be foamy/bubbly. You will need to add hydraulic oil to the tractor during or after this process.

Step 4: When the oil on one end is no longer foamy, and is a steady stream (not sputtering), shut off circuit. Re-secure drop hose onto cylinder.
Repeat Step 3 and 4 for the all ends.

Once air is purged and all four drop hoses reinstalled, pressure will now be building in the system.
For Step 5 and 6: Use caution when tightening leaky fittings. **If you need to change a fitting, or undo to reroute a hose after the system is charged with oil and pressurized, use extreme caution! All hydraulic pressure must be released first! This can be dangerous, even deadly, if not done correctly.**

Step 5: Activate circuit. Turn knob on the Valve Block clockwise to build pressure up-to 800 psi – check for leaks. Increase to 1200 psi – check for leaks. By now the openers should be trying to raise the frame. Increase to 1800 psi – check for leaks. Increase to 2000 psi – check for leaks. The UF cylinders should be extended & transport ties should be off the ground.

Step 6: Cycle rockshaft up and down a couple times with UniForce circuit activated and increase tractor's flow circuit. *This will also expose all fittings that aren't properly tightened.*
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.

Operation & adjustment

Step 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.

Step 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.

Step 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).

Step 4: Keep UniForce system pressurized at all times – including turnaround passes, transport and folding to prevent openers from bouncing and causing damage to themselves, or other structures.