

HOW-TO

Installation of THRV, Freewheel Lever and IRV Shimming

Created by L&M Concepts, LLC

Applicable Models: John Deere 2013+ X700 “Signature Series” Garden Tractor. *All Wheel Steering (AWS) and 2 Wheel Steering models (2WS).*

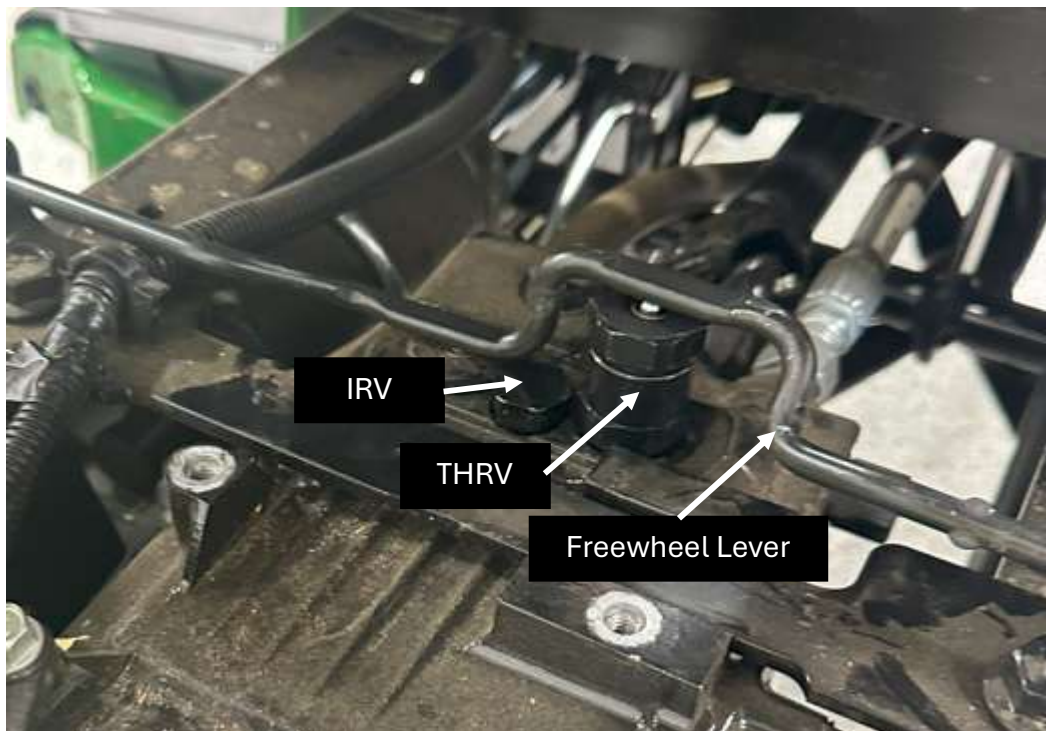


Figure 1: BW15044 John Deere AWD THRV and Freewheel (Neutral) Lever

“Enjoy Your New Capabilities”

1 THRV and Freewheel Lever Installation Instructions

1.1 Introduction

When installing a front end loader (FEL) on your X700, it is highly recommended that you install a Transaxle Hydrostatic Release Valve (THRV). This is especially important on all wheel drive tractors. When using a fully loaded loader, you have sufficient weight that ensures you have full traction. Under full traction conditions while using the tractor, if you were to come to a stop while pushing, it is possible that the transaxle could be damaged. The THRV releases transmission pressure under these conditions. On 2WD tractors, it is still highly recommended to install, but the 2WD tractor will likely lose traction. This reduces the likelihood of transaxle damage.

1.2 Applicability

This How-To is applicable to 2013+ 2 Wheel Steering and All Wheel Steering tractors. The following instructions may apply to the “Ultimate series” X700 as well as X485/X495/X585/X595, but the process steps may be slightly different.

1.3 Parts Needed

BW15044 – John Deere THRV (AWD)

BW15043 – John Deere THRV (2WD)

M146148 – John Deere Free Wheel Lever (FWL)

Implement Relief Valve Shims (various thicknesses)

1.4 Tools Needed

- Nitrile Gloves
- 3/8” ratchet
- 13mm Socket (shallow and deep well)
- Various Socket extensions
- 13mm wrench
- 19mm combination wrench
- 27mm wrench or adjustable wrench
- Hex wrench set
- Drill

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- Drill bit set
- Zip Ties

1.5 Preparation

- It is recommended that you wash your tractor and frame to remove any dirt/dust/grass where the sub-frame mounts will be located.
- Read full Installation Instructions thoroughly.
- Take pictures before you disassemble anything to aid in reassembly.
- If you have any questions, please email us at: sales@landmconcepts.com

2 Disassembly

First step is to remove the rear seat pan/fender assembly.

1. You don't need to remove the seat. Move the seat all the way forward exposes two cap screws. Remove the two screws.
2. Disconnect the seat safety switch (Figure 2). Cut the zip tie.
3. Remove 2 bolts (4 total) from where the seat pan meets the "running boards". There are two on each side (Figure 2).
4. Loosen or remove the gas tank retention rod (under left fender near fuel cap (Figure 3). You can leave in place and swing out of the way or just remove. Your choice.
5. Remove fuel cap. The gas models have a tether (reach down and bend retention feature to get it out of the tank), I don't think the diesels have a tether.
6. Lift up rear of seat pan and find/unplug tail lite electrical connector. It is near the left taillight. You could also remove two bulbs from each side of fender (protect them so they don't get damaged. You would then also need to remove the 12v plug from adapter socket on right side, under fender. Unplugging the entire harness is usually easier.
7. Tip rear of seat pan up, so you can feed the seat safety switch through the seat pan.
8. You should now be able to lift rear of seat pan by grabbing the handles (from the back of tractor) and lifting up so you can tilt up and away from running boards and then just walk it out...seat and all. It is kind of heavy with the seat, but it is nice to not have to remove it. Having a helper makes this much easier.
9. Set assembly on floor

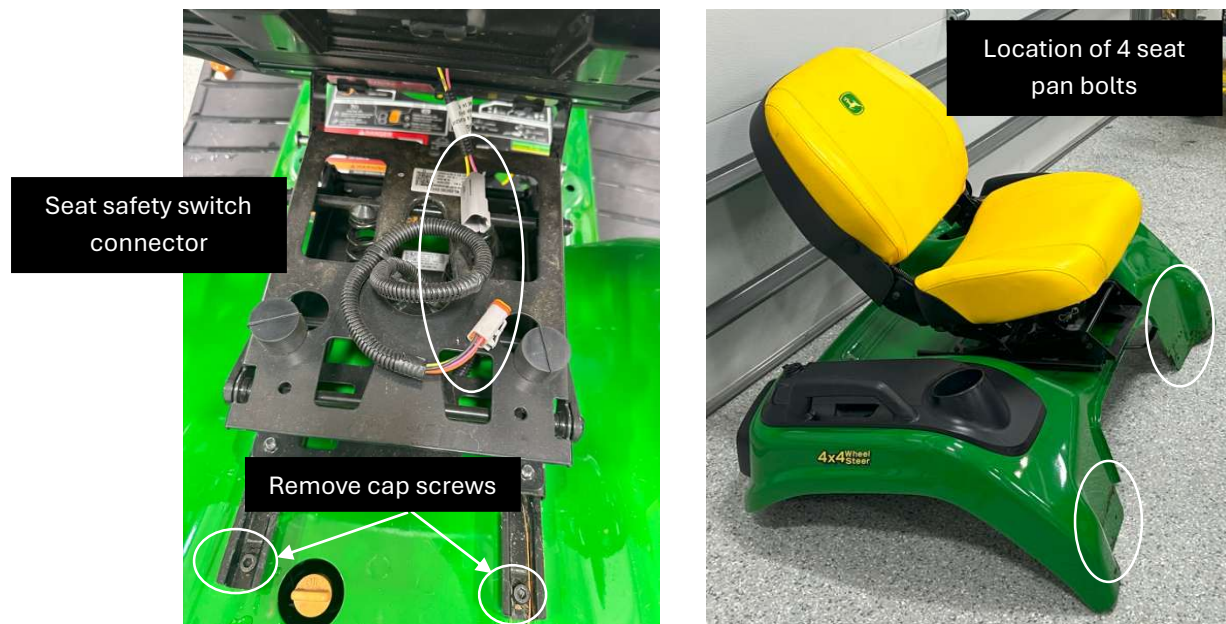


Figure 2: Electrical Connectors and Seat Pan Bolts

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Figure 3: Seat pan gas tank retention rod



10. Remove fuel tank bracket (two bolts) and set aside (Figure 4).
11. Get a ratchet strap, rope, etc and tilt/tie up rear of tank to the steering wheel. You have now exposed the Freewheel Lever and relief valves (Figure 5). You do not need to disconnect the fuel tank hoses.

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12. Reinstall the fuel cap to keep fumes down.
13. Remove hitch pin from FWL. Remove plastic cap off FWL and manipulate the FWL out of tractor (it can only go one way out because of flatten spots on FWL)
14. Clean this area well (air, brush, etc). You don't want debris getting into the transaxle in the next step.



Figure 4: Fuel tank strap



Figure 5: Fuel Tank tilted up and out of the way.

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15. Remove Freewheel Lever by removing “hitch pin” clip and feeding lever through brackets. You don’t need to remove brackets, just work the lever rod out.
16. Shimming (skip this section if not shimming)
 - 16.1. If you are going to shim your hydraulic pressures to get more lifting capacity, now is the time. You can see the one washer/shim in Figure 8. This is as the tractor came from John Deere. It is stock (approx. 1000psi).
 - 16.2. Determine current hydraulic pressure
 - 16.2.1. Lower the tank and **warm up engine**.
 - 16.2.2. Install hydraulic gauge (0-2000psi gauge is best) in one of the 4 hydraulic ports on the SCV (hydraulic valve that you connect your implement hoses to).
 - 16.2.3. Run engine at wide open throttle. Actuate hydraulic levers on column to determine which lever (and direction) gets movement on the gauge.
 - 16.2.4. When you’ve determined which lever and direction. Actuate the lever and hold it there while you record your hydraulic pressure. Hold it for a bit (5sec or more) before taking the reading. Stock is usually around 1000psi. I’ve seen them approach 1100 stock though. Take a picture or write it down.
 - 16.2.5. Shut off Engine, lift tank and remove the IRV (center valve) in Figure 6. Be careful not to remove o-ring or factory shim.
 - 16.2.6. Add shims to IRV (on top of the existing one). I added 0.7mm to get to 1225 psi. You will want to measure as you are making changes. Don’t blindly use my numbers, but you can start with 0.7mm (if you are 1000psi stock). Reinstall the valve and repeat the pressure test you did above. If you land between 1225psi and 1300psi, consider that good. If you are above those numbers, remove 0.2mm and remeasure. If you are below those numbers, add 0.2mm and remeasure. It is not recommended that you go above 1300psi.
17. Remove the center valve (Implement Relief Valve (IRV)) with a 19MM socket. Remove this first because it makes the next step easier.
18. Remove the right valve with a 27MM wrench (adjustable is fine)
19. Remove stock THRV (I don’t know what the stock one is called) and replace it with the new “tall body” one (BW15044 – AWD, BW15043 for the 2WD tractors). (Figure 7)
 - 19.1. The stock THRV is two pieces. You will remove the top portion easily, but then you need to remove the bottom portion that is usually slightly stuck in the bore. Use a small needle nose pliers to grab the side of the cup and wiggle it out. It will come, just take your time.
20. Reinstall the center valve cap and torque both IRV cap and THRV to “good-n-tight”...or find the spec yourself). I’d guess 20ft-lbs. Don’t over torque.

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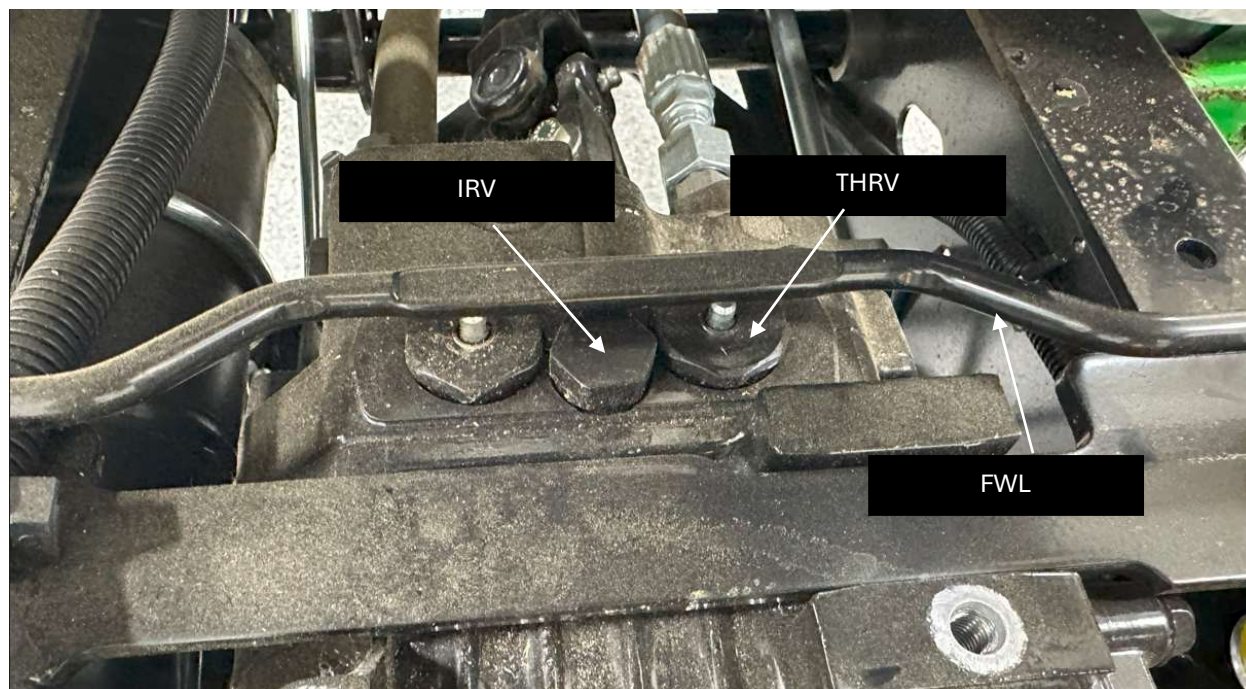


Figure 6: IRV, THRV and Freewheel Lever

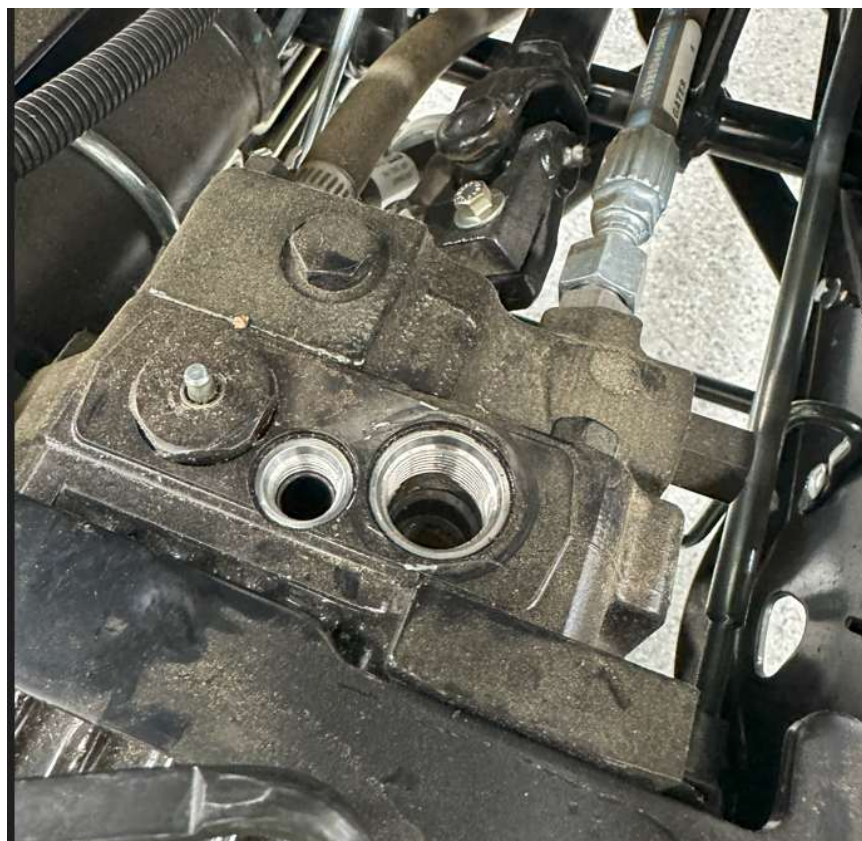


Figure 7: IRV and stock THRV removed



Figure 8: Implement Relief Valve (IRV) and factory shim

3 Reassembly

1. Drill a hole in FWL the same size and in same location (and orientation) as the stock lever (I'm not sure why the replacement doesn't have the hitch pin clip hole. (Figure 9)
2. Snake the FWL into position and install hitch pin clip (Figure 10). Install the plastic cap removed from the stock FWL. (Figure 11)

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Figure 9: Drilling FWL for hitch pin clip



Figure 10: Hitch Pin Clip installed in new FWL

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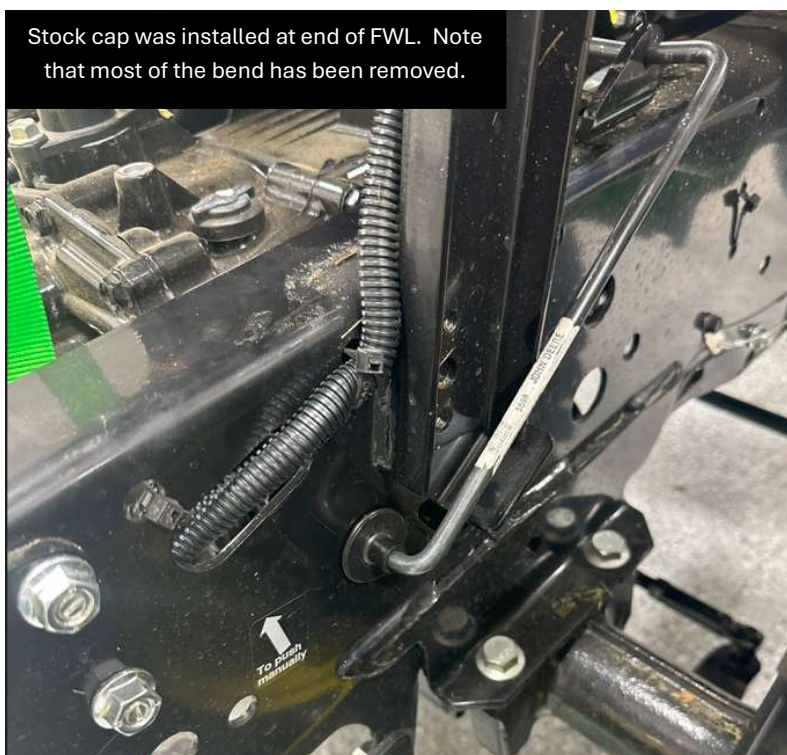


Figure 11: Plastic cap reinstalled on FWL



Figure 12: Install complete

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3. Lower the fuel tank and fasten tank retention bracket back into place.
4. Remove the fuel cap before reinstalling seat pan. It helps to tip the pan to the running boards and then setting the back of the seat tray down.
5. Reverse all remaining disassembly steps for reassembly.
 - 5.1. Make sure you route the seat safety switch like it was (refer to your pictures) as you lower seat pan (Figure 13).
 - 5.2. If you disconnected taillight harness, don't forget to connect it.
 - 5.3. If you removed the taillight bulbs, carefully reinstall lights and 12V adapter plug(refer to pictures so you get the correct one in the correct lens)
 - 5.4. Install the running boards bolts first...tighten by hand/don't cross thread at this time.
 - 5.5. Install two cap screws under seat
 - 5.6. Fully tighten the running board screws followed by cap screws.
 - 5.7. Reinstall tank retention rod near fuel cap.

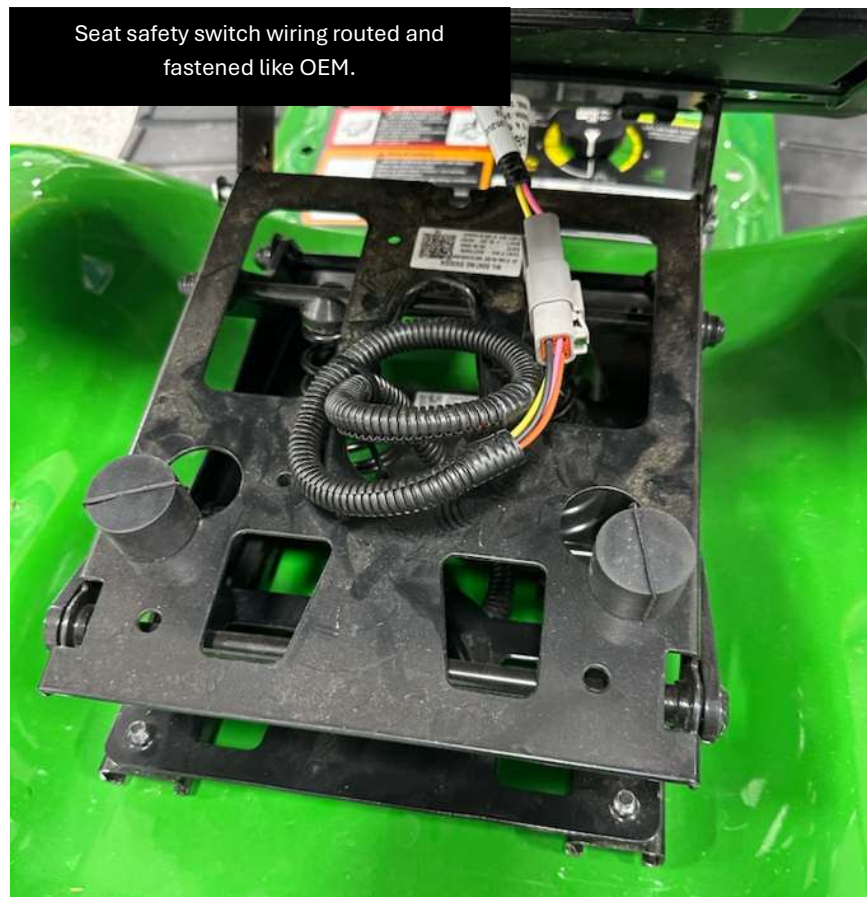


Figure 13: Safety switch harness routing.

6. Grab a cool drink to celebrate, you are done!