



SuperMaxx UltraLite 7.5 Differential Kit Instructions

□ UE-D75-ST1 UltraLite 7.5 Differential Kit



Serial # _____ (from the outside of the package)

Warranty: Lifetime for manufacturing defects.

Severe abuse policy: 30% off replacement. So if the replacement part is \$10 you pay \$7

Parts MUST be returned to Unlimited, Inc to be eligible for warranty or severe abuse replacement.

Warranty or severe abuse should be sent directly to Unlimited. Sending through point of purchase will only delay the process.

We make every effort for perfection, but there are always some machining marks in any CNC product. If something is unacceptable to you we will happily replace the part(s). You must return the part(s) new and unused to Unlimited, Inc before replacement is shipped.

If something does not go together please don't force it – find out why. If a screw seems too short or doesn't go in easily, get a longer screw or clean out the threads, don't strip the holes or bust off the screw. If you have a hammer in your RC toolbox, put it back in the garage where it belongs. Please use common sense when assembling these kits. Mangled parts will not be covered under warranty just because I didn't tell you not to do something in the instructions –I do try to be as thorough as possible, but I can't possibly think of every single variable that could happen.

I should note, these instructions are *differential* assembly instructions.

They do not cover basic aspects of E-Maxx, T-Maxx, Transmission, Chassis, Bulkhead, Motor, Electronics, Suspension or Driveshaft instruction.

If you are SCRATCH building a truck you will need to get instruction for the *non-differential* portion from either Traxxas or the manufacturer of that item.

I would appreciate it if you give me the opportunity to correct any problems before broadcasting them to the world. I am a small company and negative publicity can do a lot of harm. I will do all that is possible to make you happy. E-mail me at MonsterMaxx@att.net

Thank you for choosing Unlimited, Inc and congratulations on purchasing the most robust, finely engineered and highest performing upgrades available for your Maxx.

Robin Oury, Unlimited, Inc, 500 Dunwoody Drive, Simpsonville, SC 29681

Kit Parts			Breakdown and replacement part numbers		
Part#	Qty	Description			
	2	SuperMaxx 7.5 UltraLite Differential Housing	SuperMaxx 7.5 UltraLite Differential Housing		
	2	SuperMaxx 7.5 Pinion Drive Cup	2	Two Case halves making up the housing	
	2	SuperMaxx 7.5 Output Drive Cup (2)	SuperMaxx 7.5 Pinion Drive Cup		
	1	SuperMaxx Setup Set for 2x OFN18890	1	Pinion drive cup	
OFN18890	2	SuperMaxx 7.5 Gear Set (made by Ofna)	SuperMaxx 7.5 Output Drive Cup		
			2	Output drive cup w/ shaft	
			SuperMaxx Setup Set for 2x OFN18890		
			18	Shim .0025" x 8mm x 10mm (ring and pinion setup)	
			8	Shim .010" x 8mm x 10mm (ring and pinion setup)	
			4	Shim .005" x 6mm x 14mm (used inside carrier on output shafts)	
			4	Shim .010 x 6mm x 8mm (used on output shaft)	
			2	M2.5x14 Dowel Pins	
			2	M2.5x14 Dowel Pins (modified)	
			4	M3x6 SHFH (for setup only)	
			2	M5x4 SHSS (Pinion Drive Cup)	
			OFN 18890's Gear Set (made by Ofna)		
			1	OFN19001 Ring Gear	
			1	OFN19028 Pinion Gear	
			1	OFN19004 Diff Case (carrier)	
			1	Plastic Carrier (sometimes called Differential Cup)	
			2	O-Ring, approx 6mm x 2mm	
			1	O-Ring, Aprox 22mm x 1mm	
			1	OFN19002 Spyder Gear Set	
			2	Large Bevel Gears	
			4	Small Bevel Gears	
			2	Shafts	
			4	Shim .010" x 4mm x 8mm	
			1	OFN18076 Bearing Set	
			4	Bearing 8x16x5-2RS	
			This may or may not come with a large black shim similar to the SuperMaxx's Supplied 6mm x 14mm. Do not use this shim		

1. **Remove Bulkhead Assemblies** from your truck

- 1.1. Remove the shock tower, bumpers, bumper braces (if necessary) and anything else necessary to remove the stock differential. *Shown photo has the bulkheads stripped of the suspension, though this is not required.*



2. **Fit differential housings to bulkheads**

- 2.1. While this may not be necessary, since the stock support collar floats, the dimensions to the support pin hole in the bulkheads have not been tightly controlled in the past and it may be necessary to fit the new differential housing to the bulkhead. We had to pick a standard to make them to so we choose the Traxxas Aluminum Bulkheads as our standard. This means that in most cases this operation will not be necessary, but it may be. Simply elongate the hole a little bit for the support pin. Do this in the direction parallel to the top of the chassis deck. Easiest to use the end mill type bit in your Dremel for this operation. Work slowly, it's easy to take material off, and hard to put it back. Do both bulkheads until the housing fits nicely and the bulkheads close as they should.



3. **Building the Gearbox** – First lay everything out

in a staging area to work from. Prepare another surface next to this where you will work. I lay paper towels down for this purpose. Familiarize yourself with the parts.



- 3.1. **Prepare the Cases** – do not mix these up, they are matched pairs. It might be wise to mark them to prevent this from ever happening.

NOTE: Setting up a differential means that you may assemble it and disassemble it many times over it's life. This can lead to stripped out holes. To ensure this never happens we install Helicoils in the housing threads. These look like small hardened steel wires shaped like a thread. Do not try to pull these out, they are meant to be there. They should give you long life ensure you never strip out a housing. You do need to make sure you use metric M3x.5 screws that are in good condition. Failure to do so may damage a Helicoil. While they can be replaced, it means either you have to send it in or buy a Helicoil kit.

- 3.1.1. Remove the M3x8 SHCS (Socket Head Cap Screws) from the case and set aside.

- 3.1.2. The cases fit snugly into each other, twist them to remove any burrs left from the manufacturing process.

- 3.1.3. Now separate them, and wipe off any polishing residue or burrs left over and set aside. You may find that they have such a perfect fit that you have nothing to grab to separate them. You can use your razor knife in the pinion area to start a gap. The polishing materials may leave some blackish staining between the case halves. There is no way to prevent this, nor will it harm anything.



3.2. Prepare the carrier and ring gear. Do not install the spider gears yet. You will do this only after you have correctly set up the ring and pinion.

3.2.1. Carefully inspect the mating surfaces of the carrier and the ring gear for burrs or debris. Clean/de-burr as necessary.

3.2.2. Assemble the ring gear to the carrier with the 4 short M3x6 SHFH (Socket Head Flat Head Screws). You will use the longer ones in final assembly, but the short ones are fine for setup and save effort. Tighten them evenly in an “X” pattern. This is very important and will insure the ring gear is flat and perpendicular to the axis.

3.2.3. Scribe a line on the ring gear which aligns with the hole in the side of the carrier. You will want to reassemble it the same way every time. Failure to do so may throw off the ring and pinion setup in the next step

3.2.4. Check to make sure you do in fact have the ring gear on straight, it is possible to get it on cocked, and still have the screws tight – it will be severe and noticeable to the naked eye.

3.3. Set up Ring and Pinion. Proper setup of the ring and pinion is critical to long life and smooth operation. Ideally you will end up with perfectly smooth operation and very little backlash. This can be time consuming, but the efforts are well worth it. The good news is that you only have to do this once over the entire life of the ring gear. A good setup will ensure a very long life. Setup requires shimming for backlash and pinion depth. This must be done for all gears, whether they are 1:1 or RC or any other type of gear mesh. While we hold very tight control over the case dimensions, variations in gear manufacture, different gear manufacturers (you are not limited to the included differential style) assembly and other factors require setup. We have allowed for this in the case design. It is not possible to have a ‘one size fits all’ and get a high precision fit. Low precision loose fits are possible in the ‘one size fits all’ category, but gear life and strength are sacrificed. Take your time with this, the rewards are worth it.

3.3.1. Determine the amount of shims required for the Carrier. The Distance between the bearing seats is greater than the width of the carrier and bearings, so shimming is necessary to take up this slack. You want to end up with neither slack, nor pressure (pre-load) on the bearings.

3.3.1.1. Put two of the .010” thick shims on each side of the carrier and a bearing on after.

3.3.1.2. Fit the housing on. Be very careful to get the bearing in straight. There is a very small amount of clearance and the bearing cannot go in cocked, forcing it will only damage things. We 100% inspect these with gage pins to ensure the bearings will fit.



3.3.1.3. Gently squeeze the housing. Don't force it. You will probably see a small gap, as normally .040" of shim (four of the .010") is too much, though it's a good starting point. If a gap, go to step 4, if fully closed go to step 5.

3.3.1.4. If there is a gap (and there probably is) take a guess at how much to take out. Normally this will be ~.010". So replace the two .010" shims two of the .0025 shim per side. Repeat step 3.

NOTE: it's easiest to push the carrier out of the housing by pushing on the bearing. This will push the bearing and housing out w/o risking the shims coming off and getting mixed up.

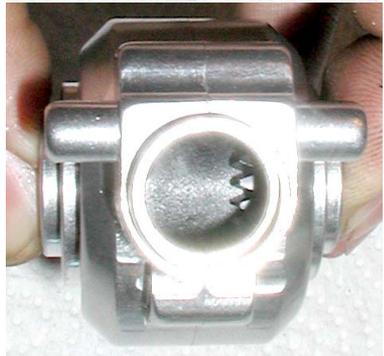
3.3.1.5. If the case closes, turn the housing up so you can see down the pinion hole. Hold the bearings between your fingers and try to push them back and forth, while watching the ring gear down in the pinion hole. If it moves add a shim.

3.3.1.6. Once close, install the case screws and check again. Repeat until you can tighten the case screws and have the proper fit.

3.3.1.7. Record the total of the shims necessary.

	Front	Rear
.0025"		
.010		

This will be the amount of shims you need to take up the clearance. This total will not change, though how much is on each side of the carrier may.



3.3.2. Ring gear to pinion setup. You will now setup the ring and pinion. You will do this by moving shims from side to side on the carrier, and by adjusting the amount of shims on the pinion which will adjust the pinion depth.

3.3.2.1. Begin with two of the .010" shims on the pinion shaft, then install the 2 bearings, slip it down into the housing and put the pinion drive cup on, gently squeeze them together as you snug up the M5x5 SHSS (Socket Head Set Screw).

3.3.2.2. Set the ring gear (with shims and bearings) down inside one of the case halves. The inside of the cases have been marked with an "N" for "Nitro" and an "E" for "Electric." You will put the ring gear on the side that is correct for your application.

The reason for this is that by putting the ring gear on one side or the other it will reverse the direction of rotation for the input shaft for the same output direction (forward motion of the truck.) The pinion for Nitro trucks rotate one direction and Electrics rotate the other; therefore it is necessary to install the ring gear on the correct side for your application. If you don't, the truck will go backwards when it should be going forward.

3.3.2.3. Set the pinion assembly down in the case, put the other case on and close it up. Gently squeeze the cases again like you did when setting up the carrier. Close this up evenly, remember these are high precision cases, getting them cocked like in this picture can damage the seating areas.

3.3.2.4. Spin the pinion. Feel for free, smooth motion. You will probably not get it as this setup is usually too tight.

3.3.2.5. Since this is usually an interference setup, but gives you a good starting point, remove one of the .010" shims on the pinion shaft and try again. When you go to reassembly, hold the carrier in the housing perpendicular and look for a small gap between the end of the pinion and the body of the carrier. You do want a small gap here.

3.3.2.6. Check for free movement. It is normal for one spot in the rotation to be slightly tighter than the rest as no ring and pinion no matter how precision is perfect, you are shimming for NO tight spots w/o having excessive backlash.

3.3.2.7. Now comes the tricky part, you must decide to take either shims out on the pinion or transfer them from one side to the other on the carrier. Try to do this in balance, neither shifting the carrier too far nor the pinion too far. **I normally find that in the end I have between .005" and .010" shims on the pinion and .010"-.020" more shims on the carrier side than the ring gear side.** Pay attention to what your ears are telling you as you go through this process. When you get it, even the 'sound' will be nicer, motion will be smooth, and backlash will be minimal.

3.3.2.8. Add the case screws and check again. The final squeeze down of the screws may affect what you've done so far, in which case you'll need to do a little more shimming.

3.3.2.9. Remove the pinion set screw, apply Red Loctite to it and reinstall. **TIGHTEN.** While I normally caution people not to overdo it with fasteners you **MUST** make sure you get this one good and tight. Some guys will even go so far as to take a small drill bit and spot face the pinion shaft where the set screw will seat. The jury is still out on the usefulness and wisdom of this modification.

3.3.2.10. Leave assembled for now. You will install the output shafts before disassembly so you cannot lose the shims or the location of the shims.

Some potential mistakes:

Not counting correctly when moving or exchanging shims.

Not having the bearings fully seated in their pockets

Not installing the pinion drive cup consistently.

Take your time on this step. A good setup only needs be done once as long as you are consistent in the way you assemble the gears.



3.4. Install the output shafts and spyder gears

3.4.1. First inspect the shafts for burs around the dowel pin holes.

3.4.2. Install the .010" x 6mm x 8mm shim over the output shaft. Nine times out of ten these are required, though from time to time variations in the ring gear or carrier will require their removal. While this is not a requirement, I personally like the nice snug fit this shim can give the system when it's necessary.

3.4.3. Put a small amount of grease on these shafts. Less is more, excess will only make a mess.

3.4.4. Slip these into the ring gear and the carrier. It may be necessary to push them hard, though they should rotate freely once fully seated.

3.4.5. Now remove the housing screws, push on the output shafts to separate the carrier from the housing.

3.4.6. Check that you have in fact marked the ring gear so you can put it back on in exactly the same orientation, failure to do so may change the ring and pinion setup.

3.4.7. Remove the four M3x6 SHFH screws and separate the ring gear from the carrier.

3.4.8. Put a small dot of grease down in the o-ring pocket, slip the o-ring over the shaft, and the .005" x 6mm x 14mm large shim over the shaft. Seat fully by pushing on the shim.

3.4.9. Install the drive dowel pins. There are 2 different dowel pins.

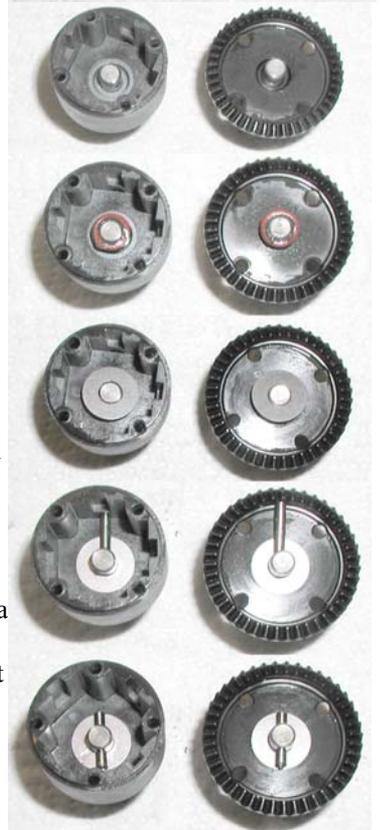
3.4.9.1. The one that comes to a point is for the ring gear side and is necessary to clear the teeth when installing. The tapered part goes into the shaft first on both.

3.4.9.2. If it feels like the dowel pins are going in hard this may not be a bad thing, but you want to check that it's not binding up. Get the pin in a little and try to move the shaft. If it's over tight, disassemble and remove the .010" shim you put on the shaft. This is only a concern one out of ten times.

3.4.9.3. Push both pins in until they are even.

Note: I like to use a set of baby hemostats to hold the pin and a small flat screwdriver to push it in.

3.4.10. Put a small dot of grease on the back of the large bevel gear and install it. While the grease is not really needed here, it will keep the bevel gear from falling off when you install the ring gear.



3.4.11. Install the M4x4 SHSS (Socket Head Set Screw) in the side of the housing, plugging the dowel pin access hole. Make sure this is below the surface of the carrier or the tip of the pinion will hit it as the carrier rotates. Do not put it in too far though or it can apply pressure on one of the small bevel gears.

3.4.12. Install the small bevel gears on the shaft facing each other with a shim on each end.

3.4.13. Drop into the case and seat, aligning the flat on the shaft up.

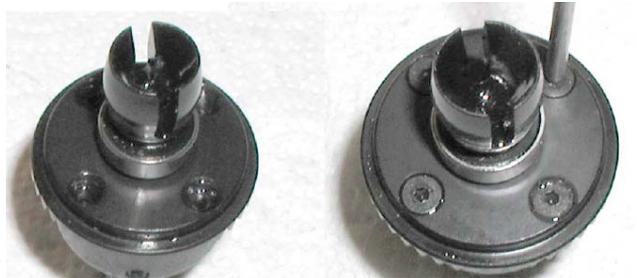


3.4.14. Repeat for the other one and install in the carrier such that the two shafts' flats face each other and interlock.

3.4.15. Install the o-ring over the carrier. Do not try to 'roll' it in place or as soon as you let go it will pop back off. Get it as far on as you can, then stretch it the rest of the way on.

3.4.16. Fill with your preferred silicone oil (see appendix A for more info on silicone oil weights) or grease until the side gears are covered, any more is excessive and will only make a mess when you install the ring gear.

3.4.17. Install the ring gear using the longer M3x10



SHFS (Socket Head Flat Heads), make sure you align the mark you made with the plug hole. Torque evenly in an “X” pattern just like you did the first time. This will ensure the ring and pinion sets up the same.

3.4.18. Check that the gears operate smoothly. If not, try backing out the set screw a little like in step 3.4.11.

3.5. Final assembly of the housing.



3.5.1. Reassemble the housing one more time dry to make sure you haven't thrown something off. All's well? Good.

3.5.2. Take the carrier out, grease the teeth as shown. Do not use excessive grease. It only makes a mess and makes it harder to service the differential later. **Do not use Silicone oil here**, the thick silicone oil will severely slow the truck down.

3.5.3. Install in housings and close the case up for the last time.

3.5.4. A little blue Loctite on the case screws will ensure they don't back out.



4. **Install differential in your truck** by reversing the disassembly process.

5. ***Go out for a short test run***, bring it back in and check it over carefully before going out and running hard.

And that's about it folks. If I've missed anything e-mail your suggestions to MonsterMaxx@att.net and I'll add it to the next version of the instructions.

Now check everything over and go have some fun.
After your first run re-check everything carefully.

Thank you for your support,
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Appendix A: Silicone oil and what it does.

Heavy weight Silicone oil can ONLY be used inside the differential carrier (where the spider gears are). The purpose of this thick oil is to create resistance in the gear movement. This resistance translates into a type of limited slip differential. When one wheel lifts, instead of all the power going to that wheel with no traction, the heavy oil resists gear movement and does not allow all the power to be transferred to that wheel with no traction. The wheel that's still getting traction will get some of the power, how much depends entirely on the thickness of the oil.

The downside to this is that if the oil is too thick, the differential will act like a spool and won't allow differentiation to occur. So if this is in the rear of the truck, and you are turning (one wheel traveling further than the other), both tires will slip in relation to the ground, you've broken traction and the truck spins out. If this is in the front, the truck will be 'pushy' and will resist steering.

There is quite a range of these oils available from 1,000 wt to 100,000wt. The extremes should not be considered except in isolated cases. You'll find the truck is happy somewhere in the 5k to 30k range. The heavier oils should be used in the front. This helps 'pull' the truck thru a corner.

If the event is important, and you won't have time to change the lube in the event you've guessed wrong, be conservative. A truck where the lube is too light is still drivable, where if it's too heavy, the truck will not steer well (front too heavy) or will spin out when exiting the corners under power (rear too heavy.)

NEVER EVER use silicone oils on the ring and pinion. This would be like applying the brakes all the time.

