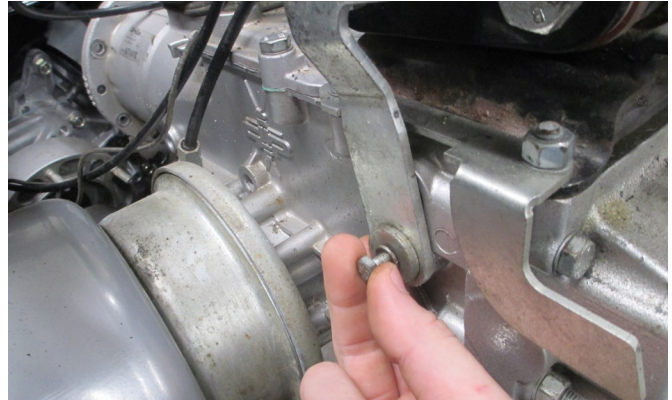


GRILLO G110 TRANSMISSION DISASSEMBLY (rear chamber)

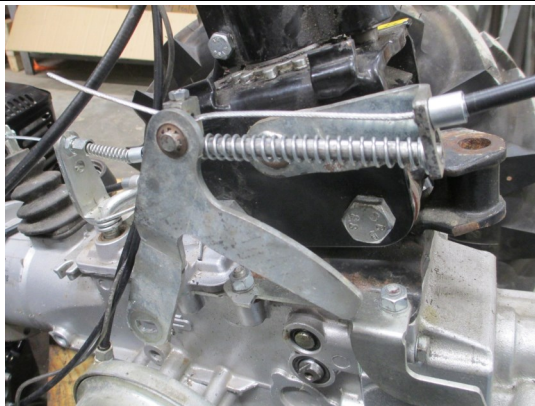
Before starting this project, have the implement removed from the tractor and the handlebars in the "Front-PTO" position



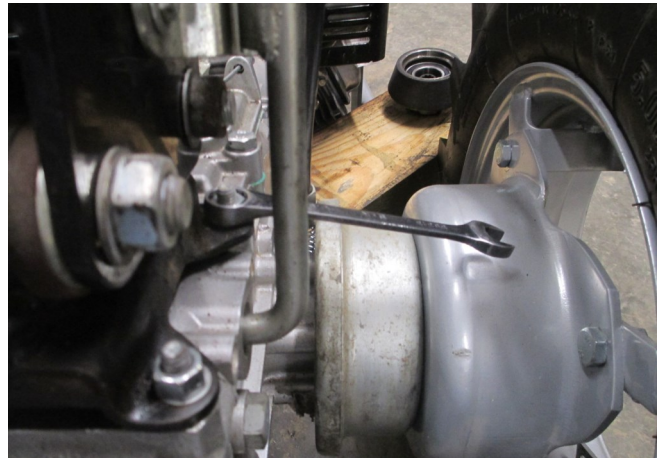
1. First, drain the gear oil out of the tractor transmission. The oil drain plug for the tranny is located on the lower / rear part of the right side (arrow indicates approximate location). The plug removes with a 19mm wrench or socket.



2. Remove the bolt & washers that holds the Forward / Reverse lever to the side of the tranny (10mm head).



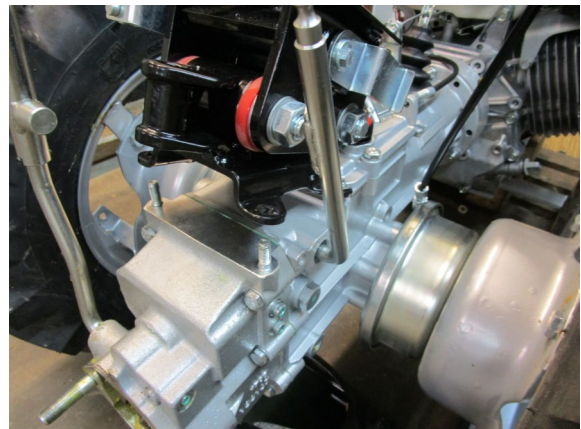
3. Take the lever off where it was attached to the tranny...it can "hang" by the cable and upper linkage. NOTE that the hole in the lever has 2 "flat" portions to fit onto the "flats" on the shaft...when you re-assemble this later, make sure to get it lined up!



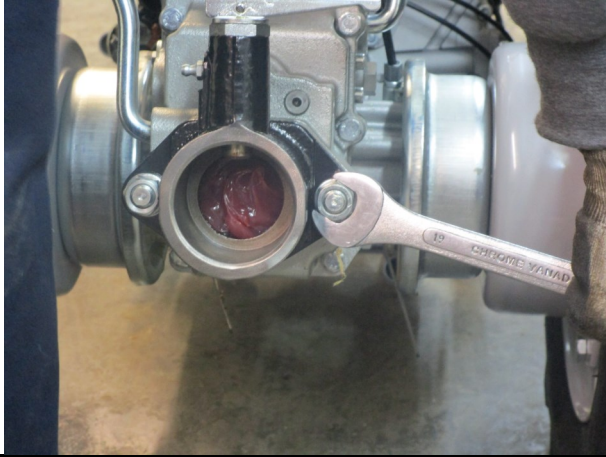
4. Remove the 4 nuts holding the black handlebar base-plate to the top of the tranny housing. (Careful...the weight of the handlebars will make the whole assembly fall toward the engine! Support the handles with something temporarily)



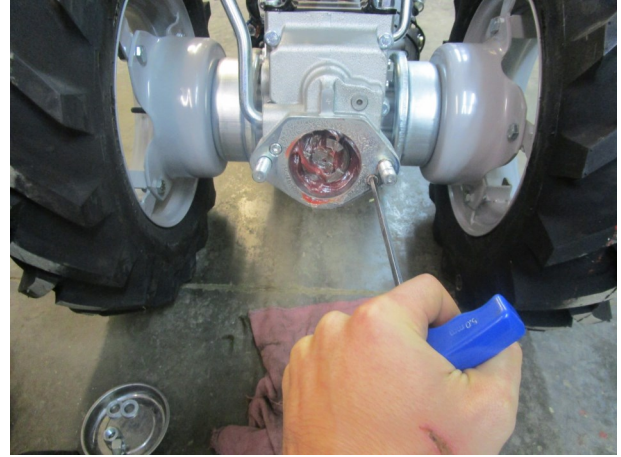
5. On the side of the tranny with the forward / reverse linkage, remove the "limiter" plate.



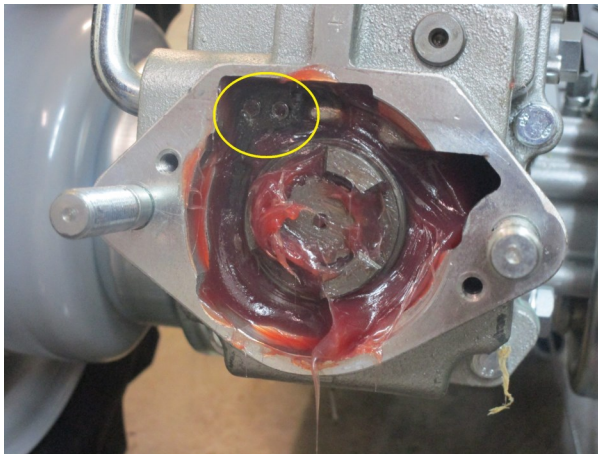
6. The whole handlebar assembly can now "lean" toward the engine. Adjust your temporary support so that the "lean" is just enough that the REAR studs are now out of the holes in the black base plate (as shown)



7. Use a 19mm wrench to remove the PTO stud nuts and “female” half of the quick coupling.



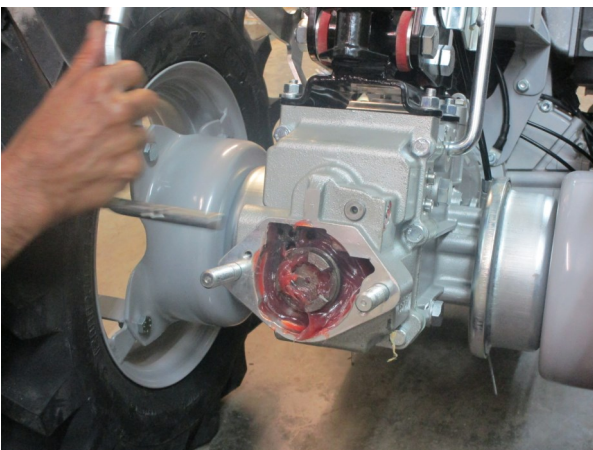
8. A 5mm allen wrench is then used to remove two bolts that hold on the reinforcement plate. Remove the plate.



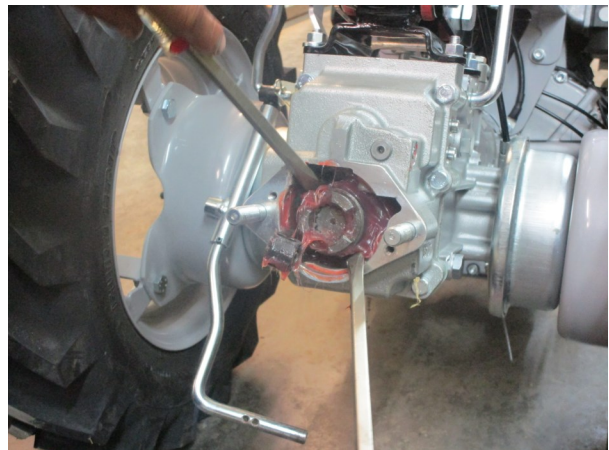
9. Remove grease in the PTO cavity. Two roll pins couple the outer pto lever and the shifting lever. The outer lever slides through the inner one and has matching holes.



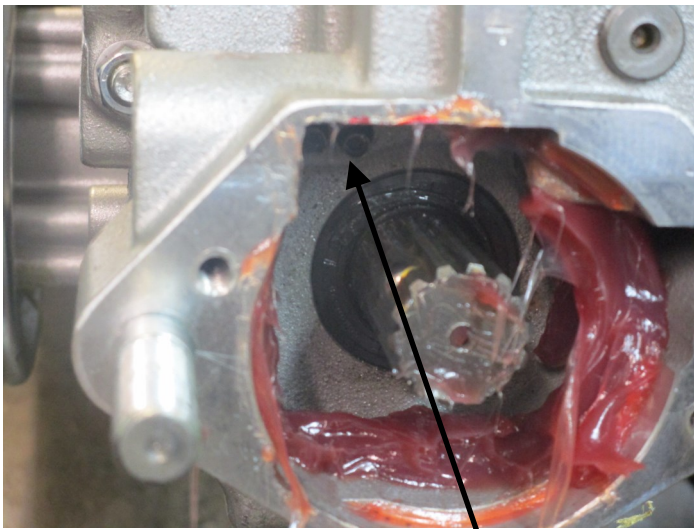
10. Place the PTO lever into the disengaged position. Use a 3/16” punch to drive out the two roll pins. The pins will go into a recess in the back upper corner of the housing, where they can be retrieved later.



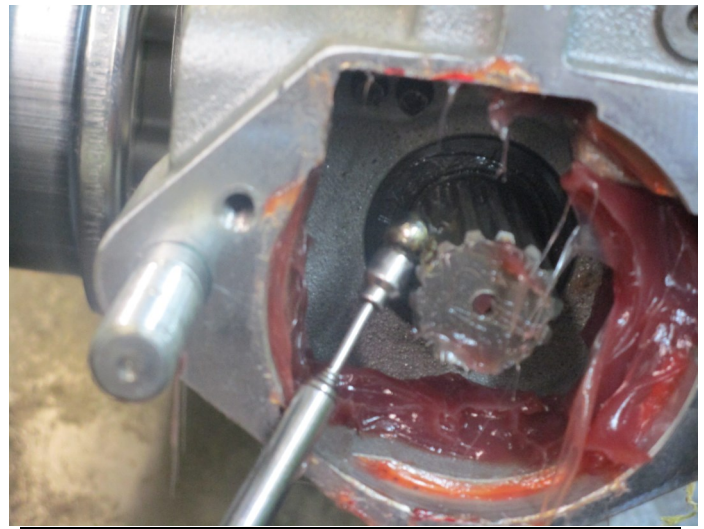
11. When the pins are removed, the outer lever should slide out with relative ease. Might have to twist it forward & back a bit.



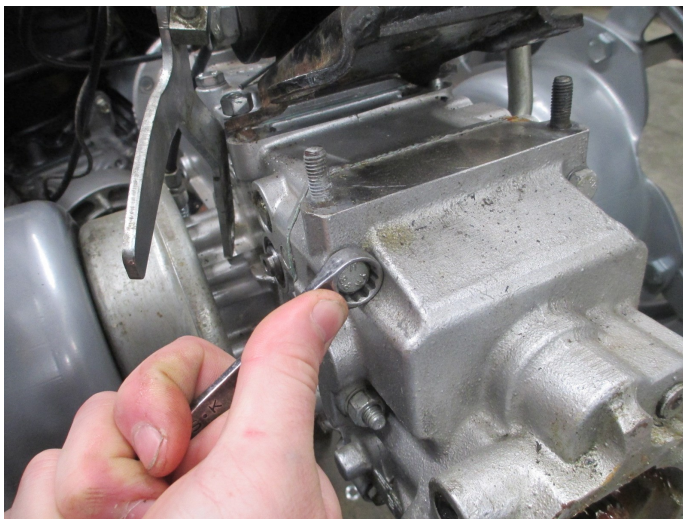
12. Flat head screw drivers or pry bars (one on each side) can be used to “pop” the sliding PTO coupler off the end of the PTO shaft.



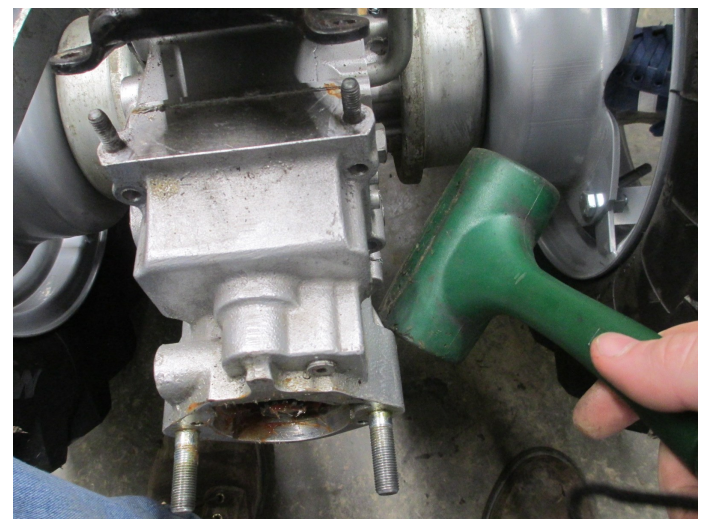
12. You can see the recess for the roll pins to fall into once they are driven out, in the picture on the left. Recover the roll pins with a magnet or long-nose pliers.



14. The detent ball and spring are located in a hole in the side of the shaft; watch out for them! Sometimes the ball will fall out when you pop the coupler out.



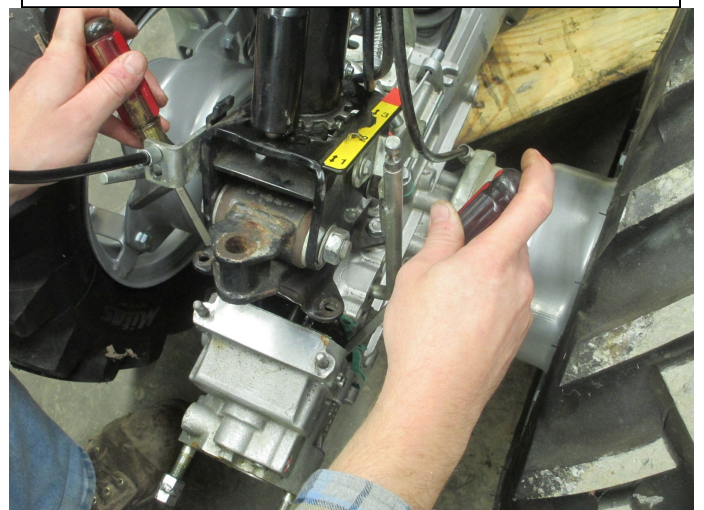
15. Remove the 6 fasteners (5 bolts and a nut) that hold the PTO cover onto the tranny housing (takes 13mm wrench or socket)



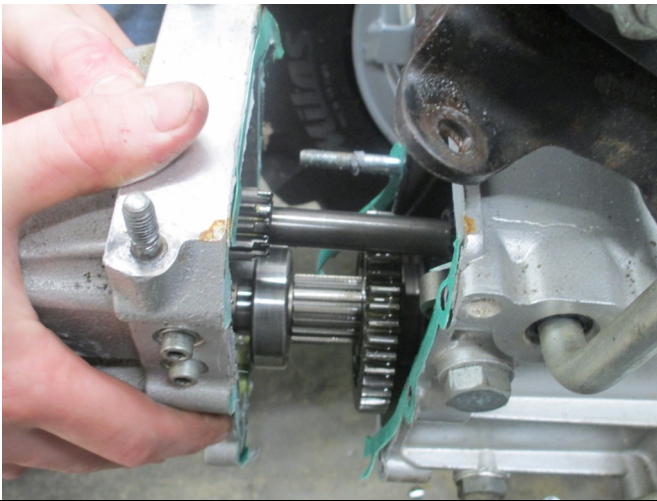
16. Break the cover loose from the gasket surface by striking it on each side with a rubber mallet (a "dead-blow" type works best)



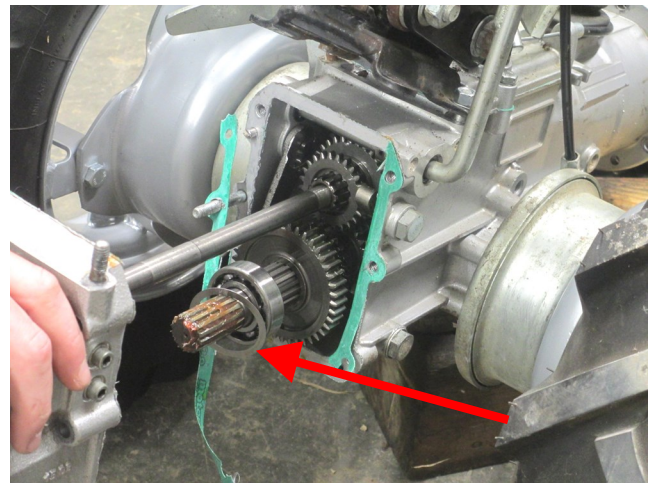
17. When a gap opens up, insert a good-sized flat-tip screwdriver in between the cover and the tranny...



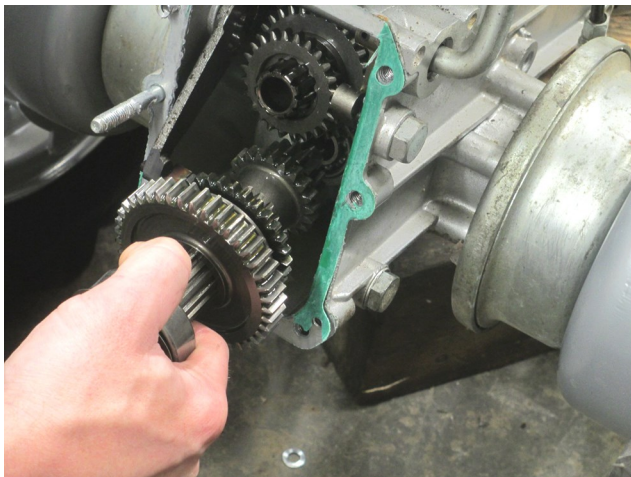
18. ...and get a second one on the opposite side. Gently pry with the screwdrivers, working the cover slightly from side to side...



19a. ...until the cover comes off.



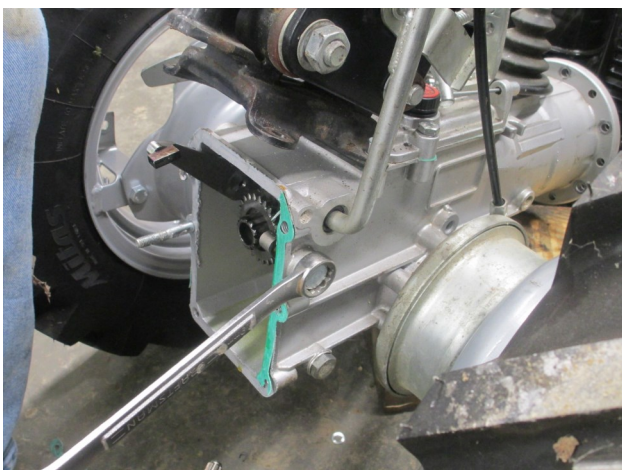
19b. NOTE: If the PTO shaft bearing has a thin "shim washer" behind it (see arrow above). MAKE SURE it goes back into place when re-assembling! (It can be inserted into the "recess" inside the cover)



20. The lower shaft (PTO shaft) can be removed if needed...just wiggle it around and pull. Once it comes back enough for the front bearing to come out, you'll have to move it to the right a bit to get the forward / reverse linkage out of it's "slot".



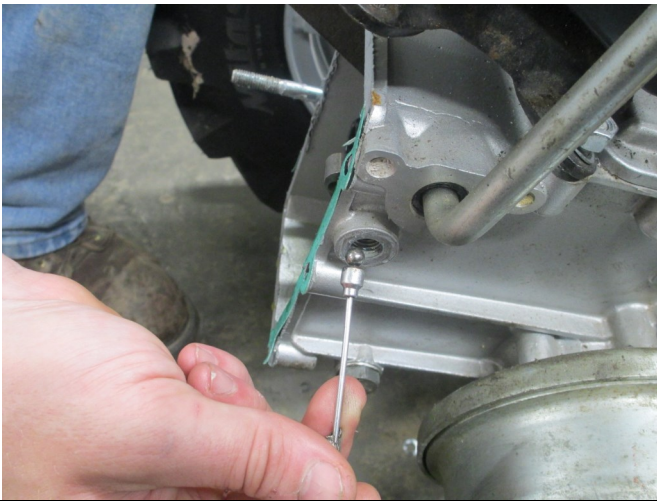
21. If you need to remove gears from the upper shaft (or the upper shaft itself), you'll first need to remove this bolt, which is the gearshift lever "detent" holder.



22. This bolt is usually Loc-tited in place. Put a 19mm wrench on it, and after breaking it loose, screw it back and forth a few degrees to help break the Loc-tite free. Once it loosens up a bit, remove it.

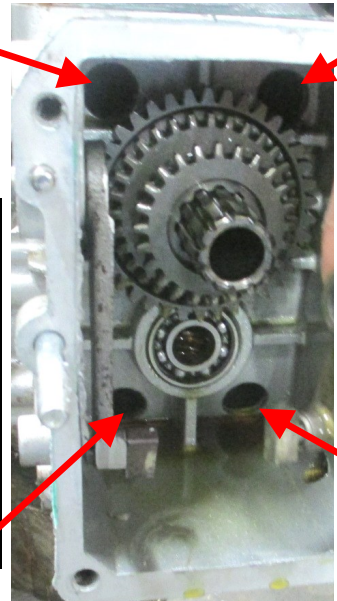


23a. This bolt is HOLLOW, and it houses a spring, which pushes on a detent ball...this is what "clicks" when you shift gears...

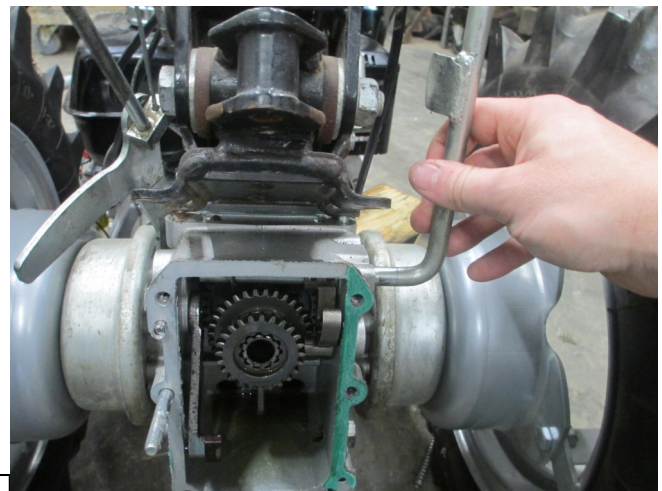


23b. ...NOTE: The ball will likely stay down in the hole in the tranny after you remove the bolt...retrieve it with a magnet.

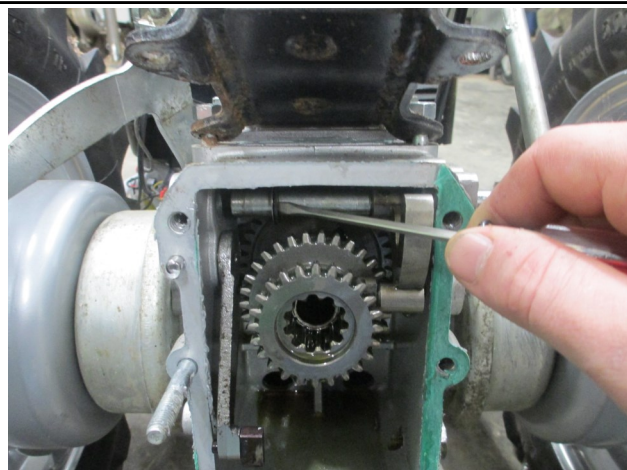
24. Take some pieces of rags and plug up the 4 holes (2 top & 2 bottom) that allow oil to flow between the front and rear chambers of the tranny.



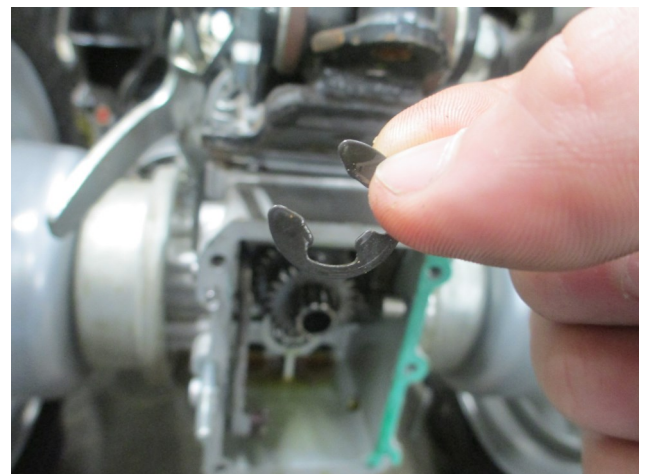
25. Next, using a 3/16 pin punch and steel hammer, drive out the 2 roll pins that hold the inner gearshift linkage to the outer shift rod (NOTE: If you hadn't plugged those holes up, likely one of the pins would have fallen through into the "front" chamber...meaning a LOT more disassembly to get it out!)



26. After removing the pins, wiggle / rotate the gearshift rod and slide it out to the right about an inch or so...



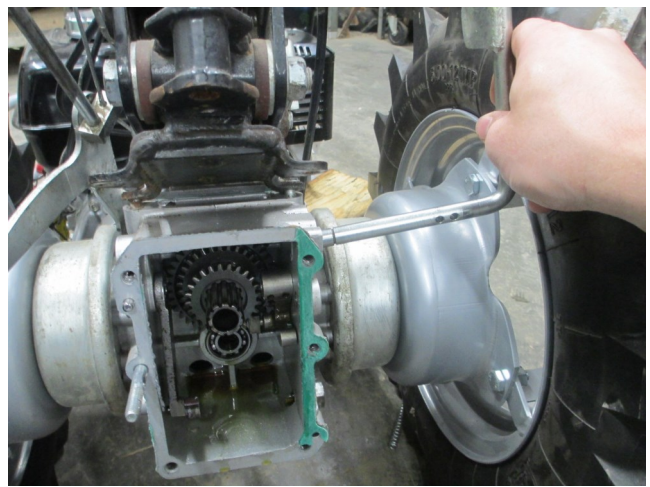
27. ...and this allows you to see the E-clip on the rod, which has to be popped off in order to get the rod all the way out. A small flat-tip screwdriver can be used to pop the clip off the shaft.



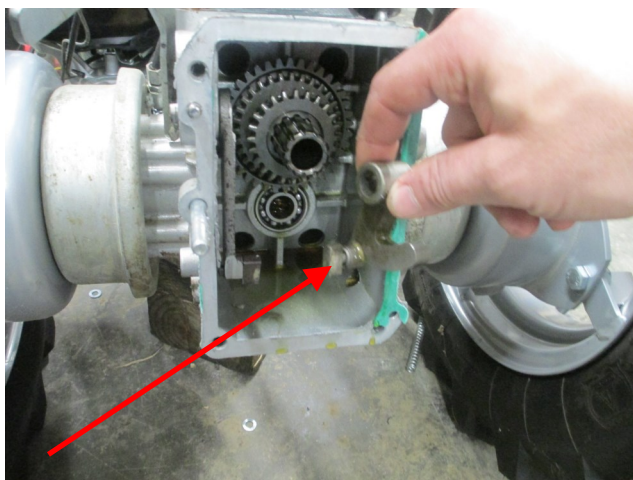
28. This is what the E-clip looks like.



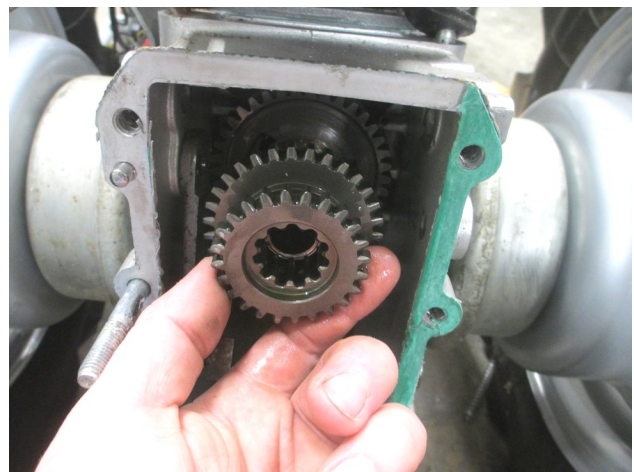
29. ...There is usually also a shim washer next to the E-clip. Slide it off and keep track of it!



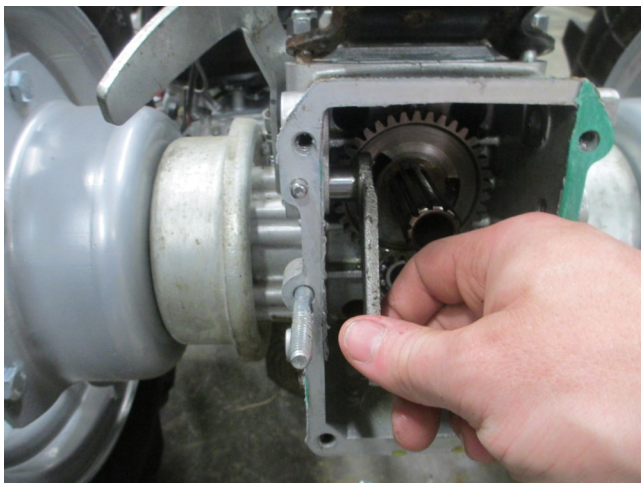
30. You can now slide the gearshift rod out of the tranny.



31. The inner shift linkage will just drop out. NOTE: Don't lose the little "shifting shoe" in the bottom of the linkage! It can fall out!! The "shoe" is what rides in a slot on the shifting gear, to move it back & forth.

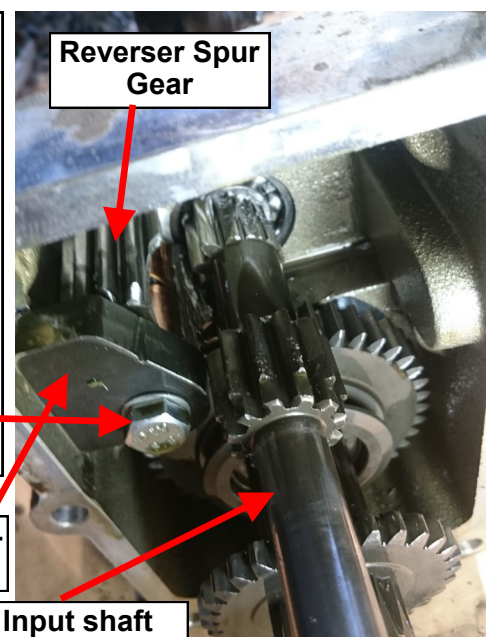


32. The upper shifting gear will now just slide out.



33. The forward / reverse inner shift linkage can now be removed as well. SAME THING...do not lose the little "shoe" on the bottom of this one either!!

34. The PTO cover houses the "reverser spur gear", and also the main input shaft (the really long shaft) is likely still in it as well. To remove these, first remove this bolt... (13mm head)



Reverser Spur Gear

Spur Gear support bracket

Input shaft



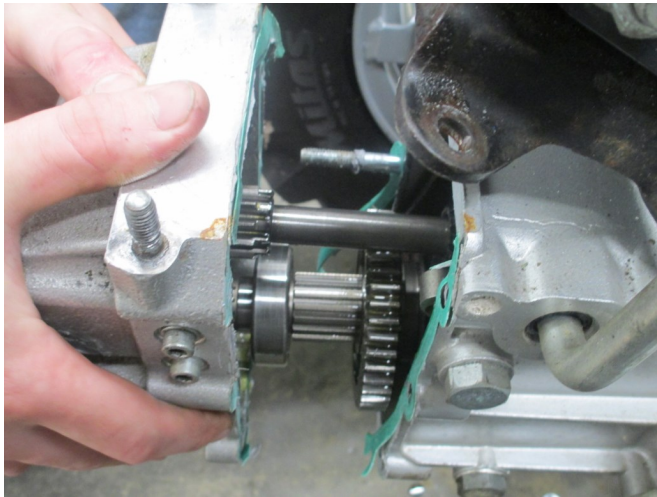
35. ...Then, on the **OUTSIDE** of the cover, there are 2 Allen-head bolts (takes a 5mm Allen wrench) Remove these...they are usually Loc-Tited in place, so you may have to work them back and forth a bit before they will come out easily.

36. Once the fasteners are removed, you can remove the spur gear support bracket and slide the gear off. The input shaft can now just be wiggled around and pulled out of the PTO cover.

IF THERE ARE BROKEN GEARS OR BEARINGS, MAKE SURE TO FLUSH THE TRANNY OUT WELL WITH SOLVENT (diesel fuel or kerosene work well) **TO REMOVE ALL THE METAL DEBRIS.**

Replace all parts needed, and re-assemble in reverse order. **MAKE SURE** to line up the shifting “shoes” in the “slots” of the gears that they go in! (both the forward / reverse **AND** the gearshift levers)

Use a new gasket on the PTO cover (we also recommend a light application of silicone gasket maker, just to be safe), and also install new oil seals if you think you may have damaged any during disassembly (or if any were leaking prior to the teardown) Installing new roll pins in the shifting linkage is also a good idea.

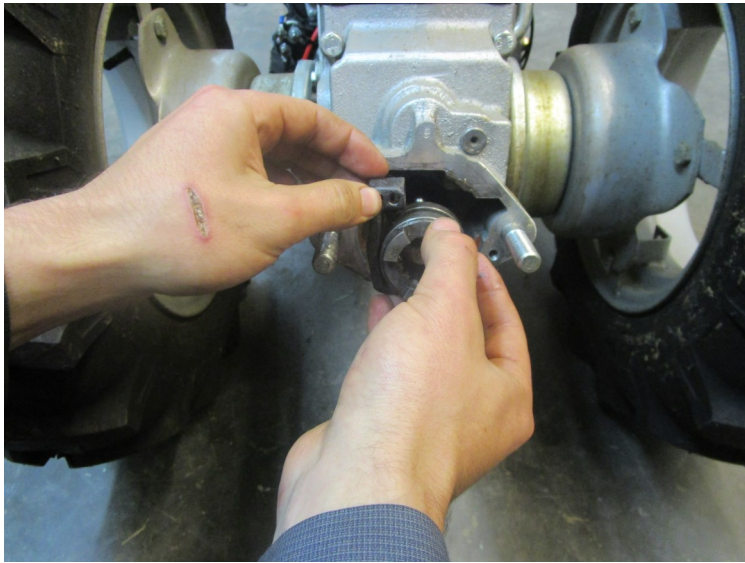


37. Before installing the PTO cover, put a little bit of grease on the tip of the long input shaft. Then, slide it in slowly, and when it gets about 4 inches or so from mating, you may feel a bit of resistance...this is the shaft going through the front oil seal. **ROTATE THE SHAFT** a bit to “help” it through the seal. (When the cover gets even closer, you might feel resistance as well...this is the final gears needing to “mesh”. You can reach through the open “crack” between the cover and the tranny with a screwdriver, and rotate the gears just a tad...the gears should mesh, and you’ll be able to get the cover on with some light taps with a rubber mallet)

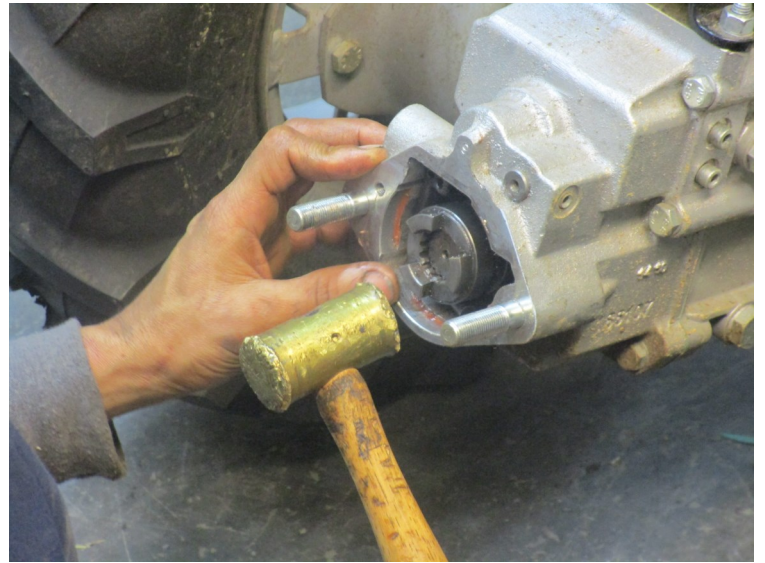
38. Now that the PTO cover is back on, it’s time to re-assemble the PTO shifting assembly.

HOW THE SYSTEM WORKS: The sliding coupler has 2 circular grooves inside it that correspond to the “engaged” or “disengaged” PTO positions. As the coupler is moved in or out by the linkage, the spring-loaded ball “pops” from one groove to the other, to hold the coupler in place.

First step, if needed, is to “rotate” the PTO shaft so that the hole for the PTO detent ball & spring on the “upper” side, which is the most convenient for getting the spring & ball installed. To do this, you can crank the engine slowly [with red clutch lever depressed] to turn the shaft to an appropriate position. Then drop the spring into the hole. Then, put a small glob of grease in top of the spring, and place the ball on top (the grease helps “stick” the ball there during re-assembly)



39. As in the picture above, the PTO shift lever must be fitted into it's corresponding groove on the outside of the PTO coupler **WHILE** reinstalling the PTO coupler.



40. The taper on the back end of the PTO coupler can be used to push the ball down in to its hole as you slide it onto the shaft. Then, making sure the splines (grooves) on the PTO shaft are aligned with the PTO coupler, push the coupler hard onto the shaft to compress the ball down into place (a tap with a hammer or block of wood may be helpful).

41. Re-assemble the rest of the components in reverse order of disassembly. **MAKE SURE** PTO area in tractor is at least 3/4 full of grease!! **DO NOT** engage the PTO lever to test the work performed until everything is reinstalled. Otherwise the PTO coupler will slide off the PTO shaft!

42. Re-fill the tranny with approved gear oil, (list of approved oils here: <https://www.earthtools.com/pdf/yellow-metal-friendly-gear-oils-test-results1.pdf>), adjust any cables or linkage as needed, and take your Grillo G110 back to work in the garden!!

QUESTIONS? EARTH TOOLS: 502-484-3988 or service@earthtools.com