

BCS Tiller Gearbox Teardown/Service:

FIRST: Remove tiller from tractor, and remove hood assembly from tiller.



1. The nuts that hold on the main drive hubs (19mm or 22mm, depending on model year) can either be removed using a long extension on a ratchet down the “pipe” in the center of the spacers, or by removing the tines from the main drive hubs first, and then removing the nuts. **Both sides must come off!!**



2. The tine hub assemblies can generally be knocked loose by striking the side edge of the hub you are removing with a brass hammer **WHILE** holding the entire assembly off the ground **by that hub**, so gravity & impact can separate the taper-shaft fitting (If the tines were removed to access the nut, you can hold the edge of the hub with a vise-grip). If the hubs will not come loose this way, then a gear-puller can be used for removal (requires removal of tines from main hub).



2A. If the hammer method works, you will be left holding the tine/hub assembly when the shaft breaks loose and the gearbox drops away. (Might put some cardboard or wood down, to cushion the fall.)



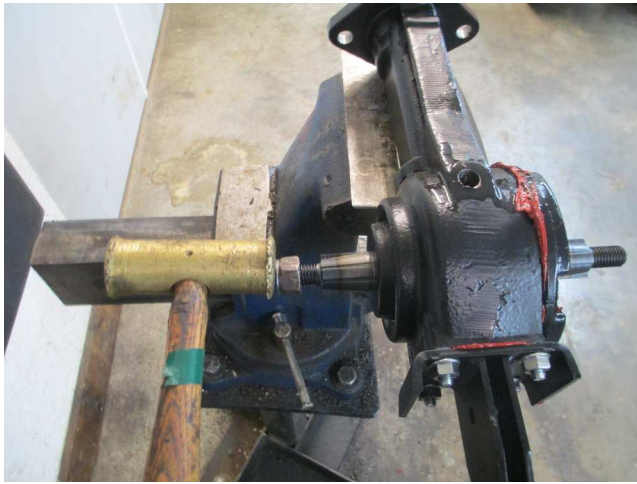
2B. Repeat procedure on the other side.



3. Remove the drain plug and drain contents of gearbox.



4. A 13mm socket removes the four fasteners that hold the side gearbox cover on.



5. Driving on the side of the shaft opposite the cover, use a brass hammer to knock out the shaft, which pushes off the gearbox cover. PUT A NUT ON THE SHAFT (even with end) TO PREVENT DAMAGE TO SHAFT THREADS!!



6. Note the use of silicone gasket maker. Silicone should be reapplied when reassembled. NOTE: May have to use one or more gaskets (part # 580.43407) to set the gear lash properly (BCS does not list this part on the new part listings, but we have them!!).



7. The shaft can be driven out of the cover with a brass hammer, while holding the cover, or positioning the cover over an open vise, etc. to support it. Again, BE SURE TO HAVE A NUT ON THE THREADS!



8. On older units, it is not uncommon for the cover-side bearing to come apart, leaving the outer race of the bearing in the cover. If this happens, it can be “walked out” with chisels (increasing size as it moves out...wedge under one side, then the other).



9. Once it is far enough out, the race can be hit from the other side with a punch to get it the rest of the way out. (switch side-to-side, so it comes out relatively straight)



10. If the bearing (8 & 9) did come apart, the inner race remains on the shaft. It can be removed using the tools pictured, or by carefully grinding through the inner race on one side, so it will “open up” and fall off the shaft easily. (BE CAREFUL not to damage the seal-surface of the shaft, or the shaft is ruined!) NOTE: a good machine-shop can get these races out too...



11. Seals should always be replaced, and can be removed with a flat screw driver (tap lightly in between seal & gearbox edge, then twist)



12. After seals are removed, thoroughly scrape behind where seal sat...there will be a lot of dirt packed in there.



13. If input shaft needs service, remove the rear cover.



14. The shaft is held in either by a snap-ring on the front (Spline-drive models, pre-1994) OR by a bolt holding the 3-tooth coupler on. If the former, pry out the front seal with a screwdriver and remove the snap-ring with a snap-ring pliers. If the 3-tooth type, hold the coupler with a pliers while loosening the bolt, then remove the coupler. Then drive the shaft out with a long punch or rod.



15. Before re-assembling, thoroughly scrape all gasket surfaces. A razor blade works well for this.

16. If there is any foreign material in the gear-case (dirt, water, metal bits from broken gears or worn bearings, etc.), the gear-case must be thoroughly washed out before re-assembly, or the foreign material will ruin the gears and bearings. Best to wash with a parts washer, but you can improvise with a bucket and some kerosene or diesel fuel and a brush (an old toothbrush works well). Towel out the residue as best as you can, or blow out with an air compressor (may have to do both).



17. Installing new seals: This is an odd seal installation...typically, when installing a seal, you driving on the OUTSIDE of the seal... but because of the way this gearbox is built, you are actually driving on the INSIDE of the seal where it is “open”, and you have to be much more conscious about not damaging it. We find that using the FLAT BACKSIDE of a large socket (larger than the seal) works very well.



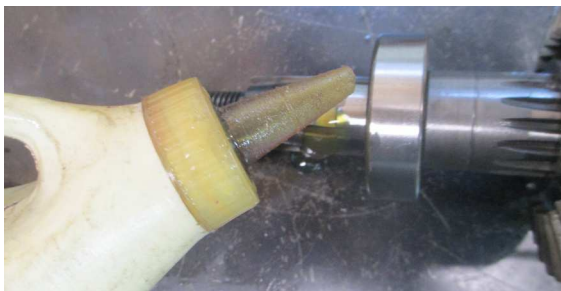
18. Oil the outer edge of new seal first, then, with the flat side of the socket against the seal, use a hammer to tap seal evenly into place.



19. If you took the input shaft & bearings out, FIRST drive the front bearing back into the front of the gearbox. Then, install the rear bearing on the shaft. THEN, find a piece of pipe or a socket that has a diameter that will support the inner race of the front bearing, AND let the shaft project through it. Set the gearbox up on the pipe as shown...



20. ...the pipe holds the bearing IN the front while you drive the shaft into place from the rear. When done, replace the front oil seal.



21. Apply some oil to the side shaft prior to inserting through the new seals, and be careful for sharp edges on the shaft that might cut the seal.



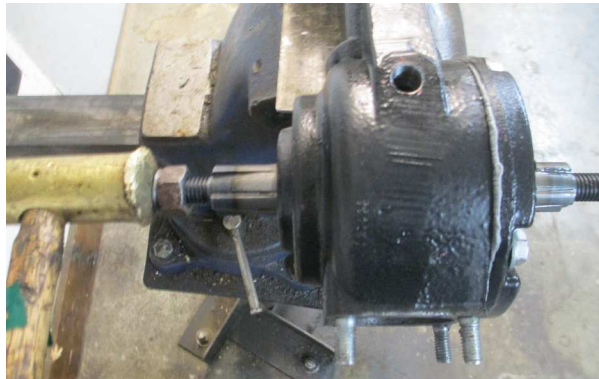
22. With the bearings installed on the shaft, drive the shaft back into place in the gearbox...note the nut on the shaft end again, to protect the threads. NOT A BAD IDEA to get a spare nut from us when you order your new seals, etc...so you can “beat up” just one old nut, and throw it away when done with repair!!



23. Making sure to apply some new silicone sealant. And as we mentioned earlier, you might need a gasket as well, for proper gear spacing, particularly if you changed the bearings or a gear/s. Install the side cover, tapping evenly all the way around so it goes on straight. Once it gets close to the gearbox, you can draw on **EVENLY** with the 4 fasteners.



24. Tighten down fasteners. Should be about 18 ft.lbs. of torque.



25. This is critical: after the cover is tight, put your “beater nut” on the side of the shaft **OPPOSITE** the cover, and whack it a few times. This gets the two gears **AS FAR APART** as possible, so you can accurately check the clearance between the gears. To check this: rotate the input shaft by hand back & forth slightly...you **SHOULD** be able to feel just a tiny bit of movement in the input shaft **WITHOUT** the side shaft moving...this means there is **SOME** clearance between the gears. If there is **NO** “space”, then the gears are too tight, and you will have to pop the cover back off (repeat step 5) and install one more gasket than you had in there (if you had one in there, it can be re-used). Repeat steps 22—24 (although if the cover is still on the shaft, it makes it a bit easier). Repeat step 25, and if there is clearance now, great. Otherwise, repeat process again. In rare cases, we have had to install 3 gaskets!! But you don’t to just throw a bunch of gaskets in to start with...if you have **MORE** gaskets than you need, there will be too much space in between the gears, and they will fail prematurely.

26. With gearbox **LEVEL**, fill gearbox 1/2 full with 80W90 gear oil. Synthetic is best if you want to pay the extra cost. Make sure to wait a while before final level check, because oil has to run up through rear bearing on input shaft to fill front cavity. (Of course, if you had it off, you would have put the [rear cover](#) on before this...make sure to use a new gasket [or silicone] when re-installing.)



27. In case you hadn’t figured it out: **THIS** is the reason that oil seals fail on tiller shafts! A little preventive maintenance goes a long way...If you till in tall weeds or other fibrous material, **TAKE A FEW MINUTES** to clean out around the tiller shaft several times a day!! Otherwise the stuff winds in there super-tight, and will get behind the “cups” that are on the flanges to help protect the seals...and then you have ruined seals, and an oil leak. You then end up spending **LOTS** more time & money replacing oil seals, and possibly bearings & shafts if you let it go too long. *****MAKE SURE** to scrape out the insides of the “cups” on the flanges, and the area they fit into on the gearbox, before re-assembling the tines on there!!

QUESTIONS? Call Earth Tools at 502-484-3988 or e-mail service.earthtools@gmail.com