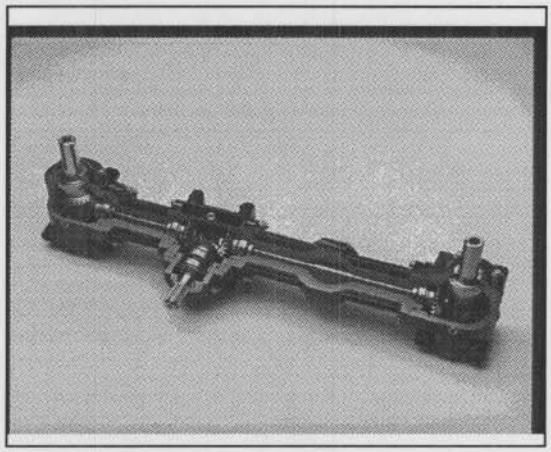
DDS SERVICE MODULE

GEAR BOX REMOVAL AND DISASSEMBLY PROCEDURE:

1.Drive roll pin from PTO shaft. Tilt the deck to the upright position. Remove blade bolt and remove blade with adaptor attached

Remove the pipe plugs from the bottom of the gear box and let all the fluid drain out of each individual box.

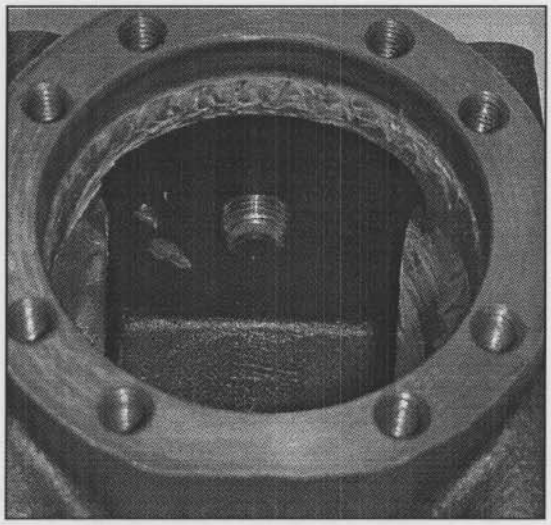
Replace the plugs and remove the gearbox from deck.



continued:

Remove the magnetic plug from the center box. It should be covered with a layer of fine metallic particles. Clean the plug thoroughly and set it aside for re-use.
The gearbox is modular and each gearbox can be repaired indavidualy. Dissasemble only the gearbox in need of repair.

Note: All parts are assumed to be re-used unless they are supplied with/in replacement kits.

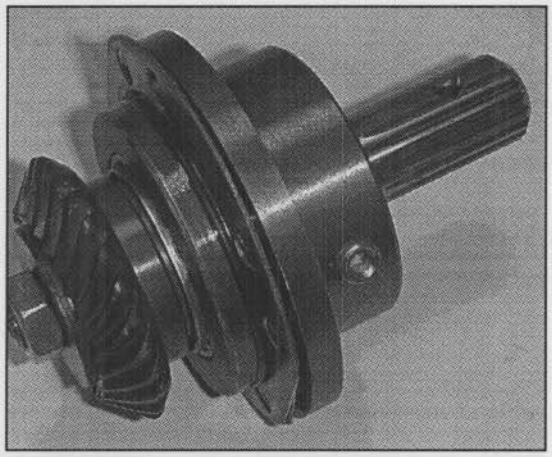


continued:

Remove the screws from the pinion housing and carefully remove the pinion assembly.
Note: Keep the shims with the pinion assembly so that you have the correct shims to re-assemble or have an idea of the shims to start with at re-assembly (remove o'ring on pinion pilot before removing shim).

Remove the screws from the end caps and remove the cross shaft assemblies.

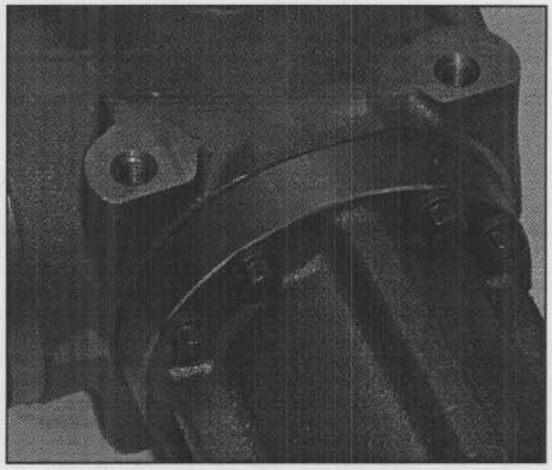
Note: The removal of the shafts from the end open caps may cause damage to the seals and the seals may need to be replaced. If the old seals are to be saved (we recommend replacing all of them), cover the keyways with tape.
Note: You may feel more comfortable marking the respective parts to ease in the re-assembly; however, all the end caps and cases are interchangeable.



Pinion Shaft Disassembly:

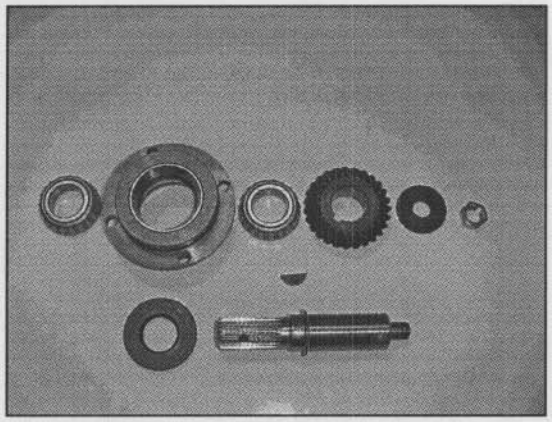
Remove the screws from the tubes to separate them from the center case. Secure the pinion-assembly shaft with a vise (take care not to damage shaft) and remove the lock nut and washer from the shaft.

Note: Eventhough the end caps are interchangable the bearing cones are not.



continued:

Place the pinion assembly into a press with the threaded end of the shaft up and the back of the gear supported. Remove the gear by pressing it out (or use a gear puller or a split bearing puller). Remove the woodruff key with pliers or vise grips.Support the outer flange surface of the pinion housing on the press. Push through the threaded end of the pinion shaft to remove the outer bearing cone , seal and shaft from the pinion housing.Remove the inner bearing cone. If the bearings are to be replaced, remove the bearing cups from the pinion housing with a puller. If one is not available, gently tap opposite sides of the back of the bearing cups with a flat punch so that they are removed evenly and no damage occurs to the pinion housing. **Note**: The removal of the shaft from the housing may cause damage to the seal and the seal may need to be replaced. Remember to cover the keyway with tape if you're re-using the seal.



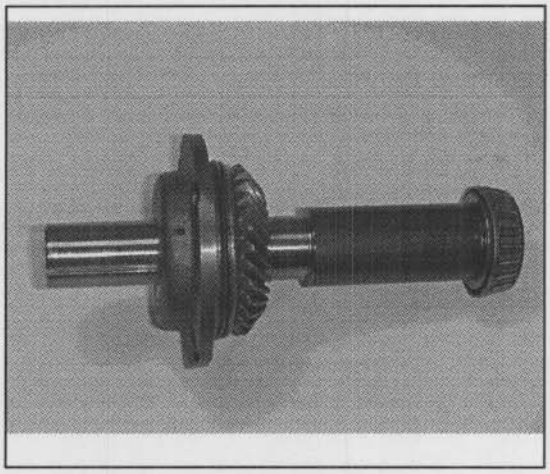
Cross Shaft Disassembly:

Disassembled the cross shafts by placing the shaft assembly in a press with a pipe or tube large enough for the shaft to fit through, but small enough for the gear to sit on, between the press anvil and the gear.

Push the shaft through the bearing cone and gear. Remove the woodruff key.

Invert the shaft and rest the opposite bearing cone on the pipe and press anvil. Push the shaft through the other bearing cone. Note: Do not press on the bearing cage or bearing damage will occur.

If the bearings are to be replaced, remove the bearing cups from the end caps with a puller or follow the procedure in the pinion shaft disassembly notes.

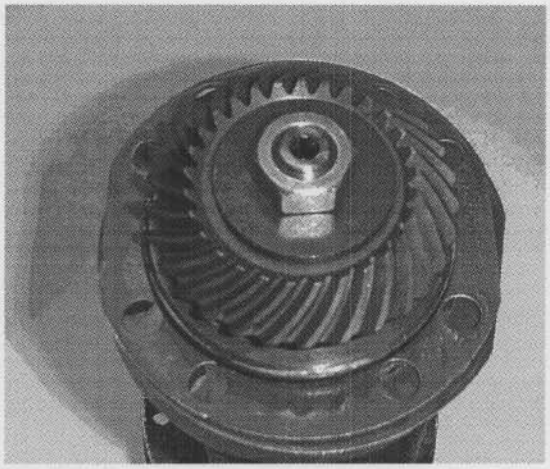


Tube Disassembly:

Secure the snap ring side gear with a vise or clamping devise (do not damage gear) and remove the lock nut and washer from the shaft.

Place the tube assembly into a press with the threaded end of the shaft up and the back of the gear supported. Remove the gear by pressing it out (or use a gear puller or a split bearing puller).

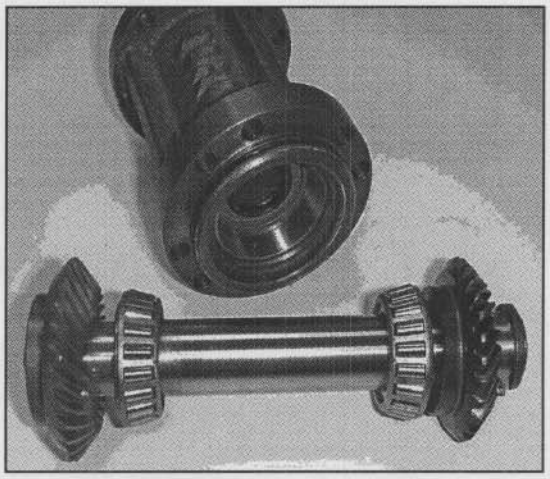
Remove the key.



continued:

Support the outer flange surface of the tube assembly on the press with the threaded end up. Push the threaded end of the shaft through the bearing cone and seal **Note:** The removal of the shaft from the tube may cause damage to the seals and the seals may need to be replaced. If the old seals are to be saved (we recommend replacing all of them), cover the key-ways with tape.

Press the gear and bearing cone slightly back form the snap ring. Remove the snap ring. Support the gear and press the shaft out. Remove the key and press the bearing cone from the shaft.



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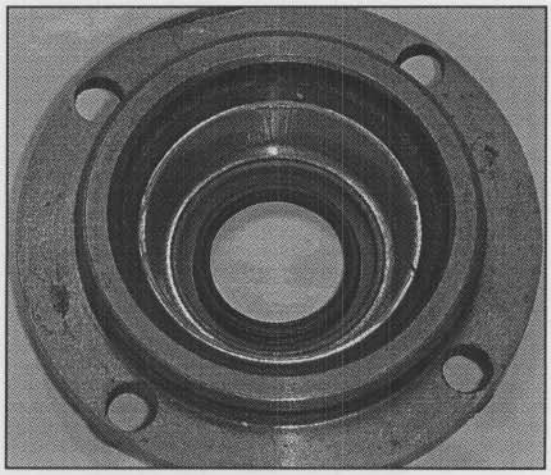
If seals are to be replaced (recommended), remove seals. If the bearings are to be replaced, remove the bearing cups. Note: The removal of bearing cups from blind or inaccessi-ble holes can be done as follows: Weld a bead circumferen-tially around the inside of the bearing cup at about midpoint of the cup width. After welding, turn the part over to allow the cup to fall out during the cooling process. Be sure to remove seals before welding to reduce fire hazard.



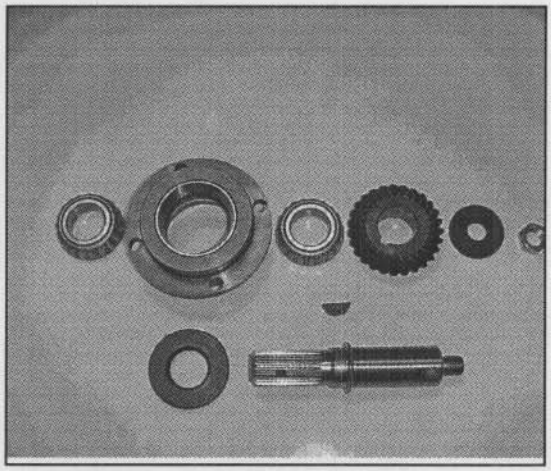
Bevel Gearbox Pre-Assembly Procedures

All parts, including the cases and tubes, should be cleaned thoroughly with a non-flammable, non-toxic solvent. Any kind of build up of corrosion or sludge should be removed. Whenever the pinion housing and end caps are removed, it is recommended that the seals and shims be replaced.
Before reassembling the gearbox, visually inspect the pinion and cross shafts for grooving in the shaft seal areas. If the shafts are to be reused, polish out any imperfection with a fine grade of emery cloth. The polishing motion should be in a circular direction.
If you're replacing the bearing cups in the pinion housing, end caps or tubes, be very careful to remove any dirt or foreign matter that might be in the counterbores before pressing in the new cups.
Note: Store shafts in freezer if possible and gears in a warm place assembly will be easier.

PINION SHAFT RE-ASSEMBLY:
(Assemble in reverse of the disassembly instructions)

The bearing cup must seat squarely in the counterbore. If the cup must be tapped into place, use a rubber hammer to protect the cup surfaces, or use a light hand press. Do not insert seals at this time.

When re-assembling the pinion shaft assembly and the cross shaft assembly, be sure all the parts are pressed against one another and that no foreign object (folded shim, cut o'ring, etc.) is between them. **Note:** The bearing cones and gears will have an interference fit with the shafts. The bearing cones may require heating to assemble but most likely will not.
Note: Store shafts in freezer if possible and gears in a warm place assembly will be easier.



continued:

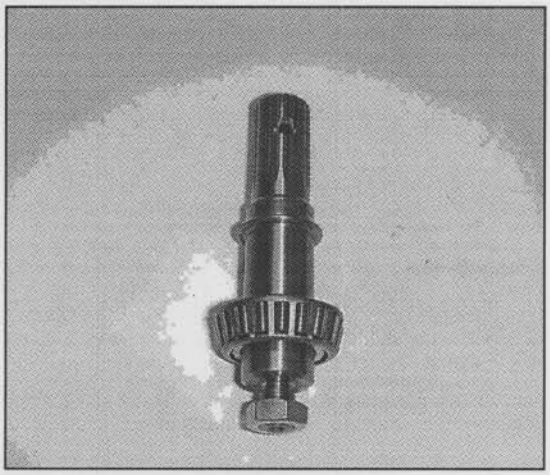
Press the outer bearing cone (with cone directed towards the threaded end of shaft) on the shaft using the plate, pipe or tube.

Place the threaded end of the shaft into the pinion housing, and press the inner bearing over shaft and into the pinion housing with the pipe until both bearings are seated, but the shaft still rotates freely.

Install the woodruff key and press a left-hand (smaller) gear on the shaft.

Assemble the pinion washer and lock nut on the shaft. Secure the assembly in a vise and tighten the lock nut enough to draw gear and washer until the bearings bind slightly.

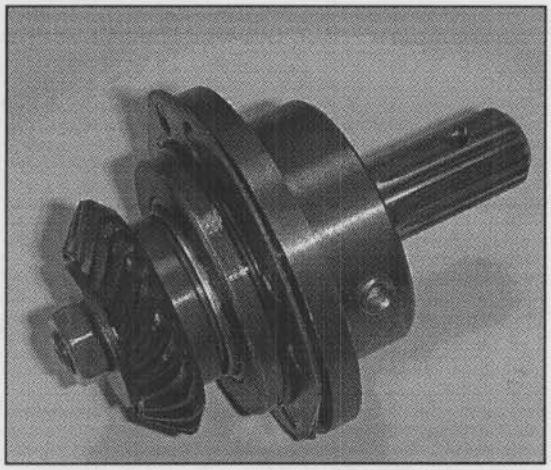
Back off the nut about 1/8 of a turn.



CROSS SHAFT RE-ASSEMBY:
(Assemble in reverse of the disassembly instructions)

Rest the pinion flange on the vise and rap the nut/shaft end sharply with a dead blow or weighted plastic or rubber hammer. This will free up the bearings so that they will rotate freely with no noticeable endplay

Install the woodruff key using a light hammer.



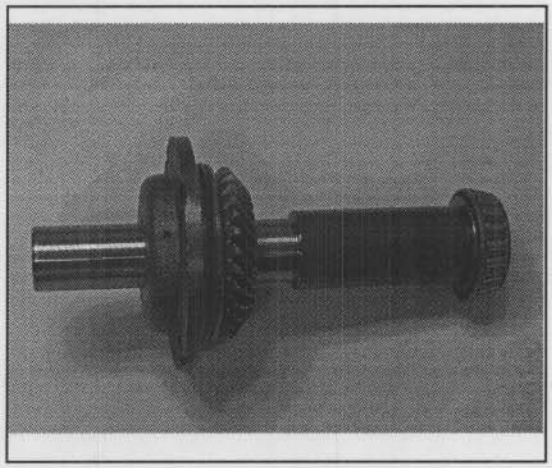
Cross Shaft re-assembly:
(Assemble in reverse of the disassembly instructions)

Set a right-hand (larger) gear on a plate with a hole in it that will allow the shaft to go through (or use a pipe or tube). Align the key with the keyway and push the shaft into the gear until it is tight up against the shoulder.

Press the bearing onto the cross shaft (cone away from gear) until it is tight against the gear.

Turn the shaft over and repeat the procedure pressing the bearing tight against the shoulder.

Install seals and bearing cups if necessary. Note: The seals in the tubes are installed with the cavity directed outwards to exclude the oil from entering the tubes. When installing the seals, press on the outer metal case, not the seal lip area.

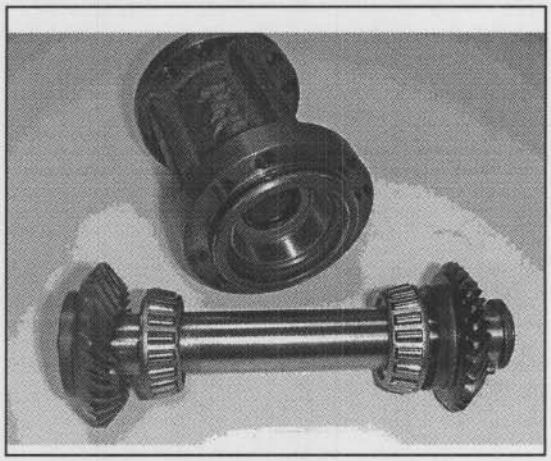


Tube reassembly

Press the bearing cone (cone directed inwards) on the snap-ring side of the shaft using the plate, pipe or tube (avoid seal areas).

Install the woodruff key and press a left-hand (smaller) gear on the shaft until it clears the snap ring groove.

Install the snap ring and press the gear and bearing back up against the snap ring.



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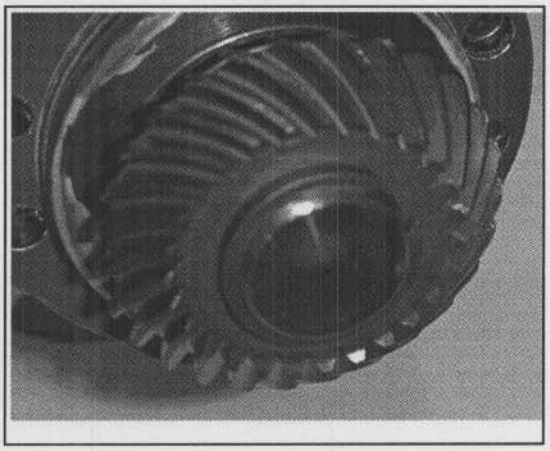
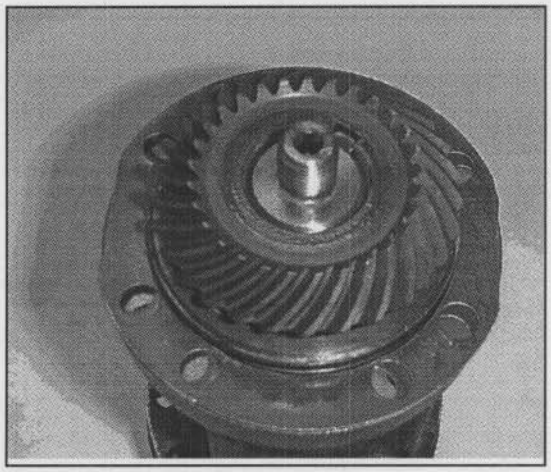
Tape the keyway (or use a seal bullet) and slide the shaft through the tube. Note: The snap ring side of the shaft should be oriented in the tube so that the gear and part of the bearing cone stick out past the end of the tube. If the bearing cone and part of the gear are recessed in the tube, then withdraw the shaft from the tube and insert in the opposite side of the tube.

Support the tube assembly on the flat end of the snap-ring side of the shaft and press the bearing cone over the threaded shaft end.



continued

Install the woodruff key and press a right-hand (larger) gear on the shaft until the gear is tight up against the bearing but the shaft still spins freely in the tube (the seals will create some drag). If you get the tube assembly to tight, loosen the nut about 1/3 of a turn and press on the nut side of the shaft while supporting the snap-ring side tube flange. This should provide about .005" shaft endplay.
Install shims on the end caps using the same shims (or the same number of shims) as removed.
Install o'rings on the end caps and install the end caps on the gear side of the end boxes. Note: If o'rings are used, no sealant is required. To ease assembly, lightly grease the bores the o'rings will be sliding into. Fasten the cap to the gearbox using the 12-point screws. Note: Screws should be re-coated with Loctite before installing. Note: All 12-point screws on the assembly must be torqued to 300 lb-in.

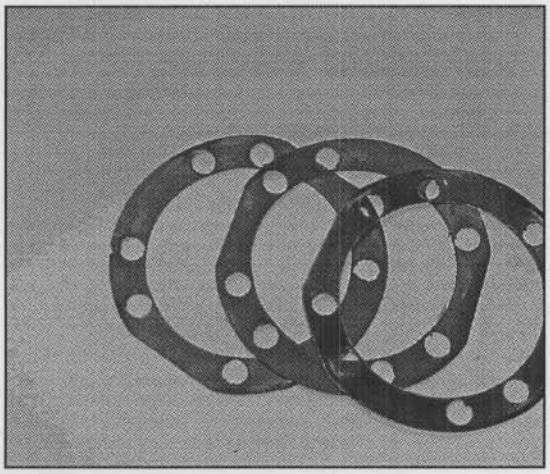


Gearbox Re-Assembly & Backlash Adjustment:

Insert the cross shaft assembly carefully through the opening in the case and into the end cap.

Install the opposite end cap using the same shims (or same number of shims) as removed.

Bearings are then adjusted by adding or removing one shim (generally blue, .005") at a time (preferably form the non-gear side end cap) until the shaft rotates freely. Do not vary shims by more than one shim at a time per side and of the same color code.



continued:

Install o'rings on the tubes and install the snap-ring side of the long tube assembly in the end box with the gear closest to the output shaft using the same shims (or the same number of shims) as removed. Note: Install the tubes so that the Toro emblem will be directed upwards and away from the mower when the completed gearbox is installed.

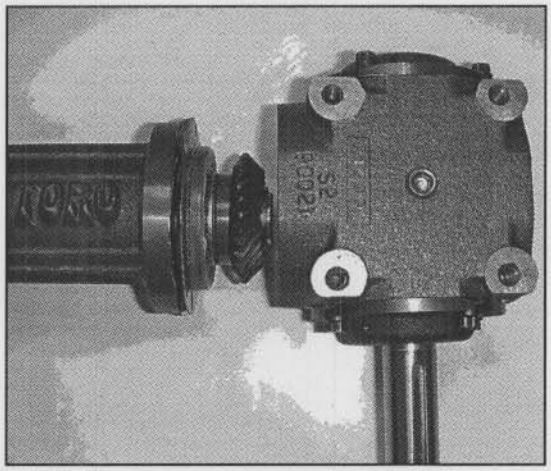
Check that the subassembly rotates freely and has a small amount of backlash (the freedom of rotational movement between the two shafts in the subassembly) in the gear set. If shimming needs to be adjusted, add or remove shim in .005" (blue) increments from the tube joint on the assembly.

Install the snap-ring side of the short tube assembly in the end box with the gear farthest from the output shaft using the same shims (or the same number of shims) as removed and adjust as shown in step 7.

continued:

Install both tube subassemblies in the center box using same shims (or the same number of shims) as removed. Note: Lay the box out with the short-tube assembly on the left with the end-box shaft pointed down (towards you).

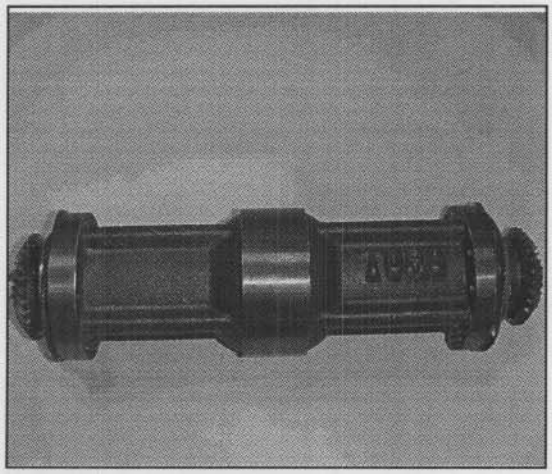
Install the center box at 90 degrees (pointed up at you).



continued:

Install the long-tube assembly on the right, with the end-box shaft pointed down also. Once again, install the tubes so that the Toro emblem will be directed upwards and away from the mower when the completed gearbox is installed. The outside boxes must be supported on the mounting pads and kept parallel to meet a .010" shaft parallelism requirement to prevent blade height mismatch on the final mower assembly.

Install the pinion shaft assembly in the center box using same shims (or the same number of shims) as removed. Note: Before installing the input shaft assembly, turn the output shaft keyways so that they are 90 degrees to each other.



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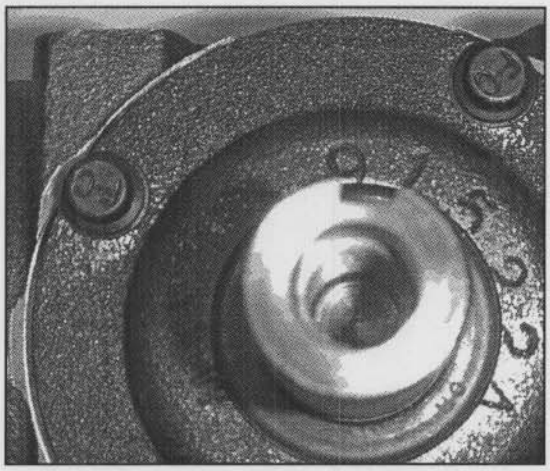
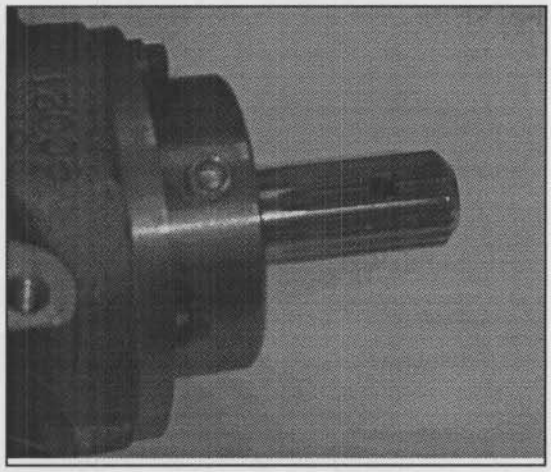
Check that the final assembly rotates freely and has a small amount of backlash between the input and the tube subassemblies. Adjust the backlash by adding or removing shim in .005" (blue) increments from the pinion subassembly.



Oil seals can now be installed into the end caps of the end boxes and the pinion housing of the center box.

Slip the pilot sleeve over the end of the shaft move it all the way down against the bearing. Note: If a pilot sleeve is not available, the keyways may be taped to protect seals during installation.

Oil Seal Installation:

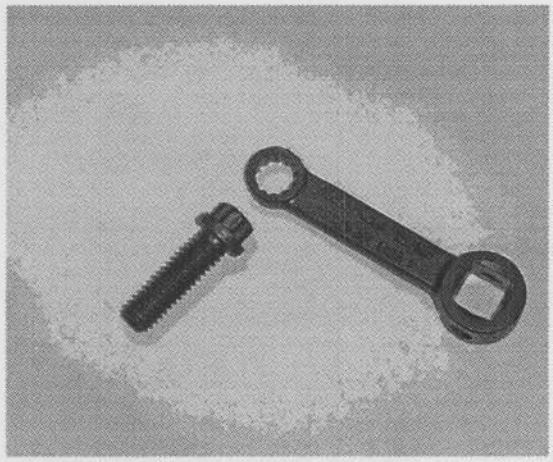


Lightly grease the seal lip and slip the seal over the end of the tapered end of the pilot sleeve or taped shaft end. Make sure the seal is facing the right way. Tap the seal down until the seal is seated in the housing or end cap. Note: It is preferable to use a metal plate or something to tap on rather than the seal face. Also, keep the seal square during installation (don't pound one edge down and then the other).

Install plugs except the fill plugs. Note: Plugs should be recoated with Loctite before installation. Note: The magnetic plug for the center box should be located on the same side as the end box or output shafts.

Install 5.5 oz. (160 ml) of transmission fluid in each of the three boxes in the assembly and install the remaining plugs.

Preventative Maintenance:



Oil leaking from the pinion housing caps, Cap Screws or pipe pluges might be corrected by re-tightening or by removing and re-coating with loctite before tighting.

Oil Leaking from the seals will require the replacement of the seal.

Special Tools: Use Snap-On 5/16ths tool to easily remove and install greabox bolts.