Ford 8N Tractor Overhauls - Governor

By

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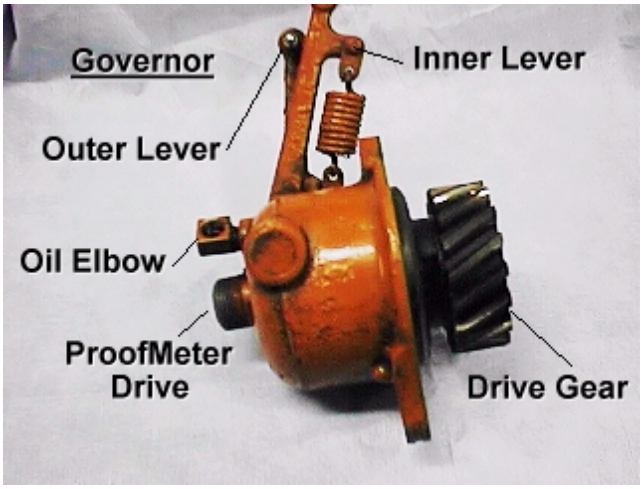
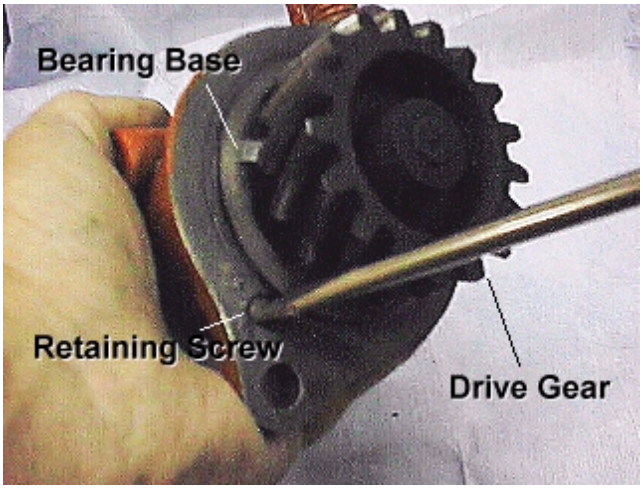


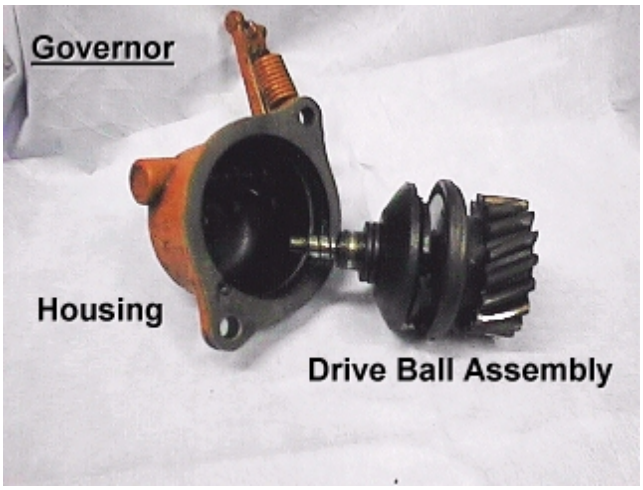
The Governor maintains a constant engine speed by manipulating the carburetor throttle control based on the calibrated position of a set of spinning steel balls connected by gear to the camshaft. As engine speed decreases, the balls spin with less centrifugal force and collapse toward the center of their shaft which causes a fork actuated plunger to increase the throttle position until the engine regains its speed. The Governor is lubricated by an oil line connected to the oil filter, and drives a proofmeter (mechanical tachometer and hour meter) through a cable. There are two bolts that retain the Governor housing to the engine.

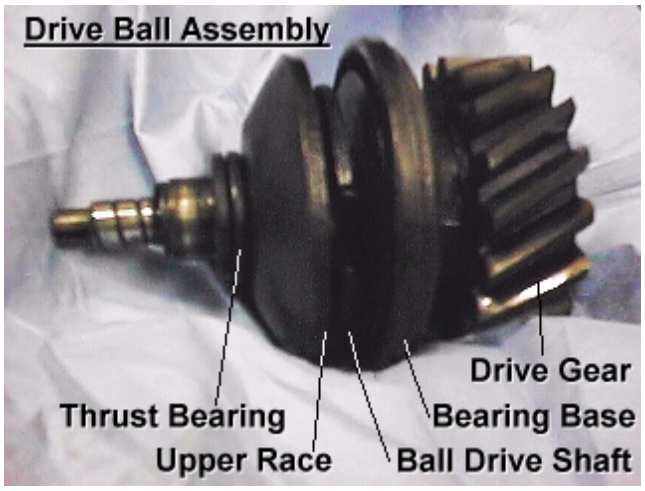
Mark the linkage between the Governor and the carburetor and the dash-mounted speed control lever. Use masking tape and a marking pen to clearly show how they are to be reconnected after overhaul. Believe me, swapping the linkage will make your tractor run very poorly, if at all. One machine screw retains the drive gear and shaft to the Governor housing.



The overhaul kit consists of new steel balls, new lower race and bearing. New thrust ball bearings and gasket. The Governor fails by developing flat spots on the steel balls and corresponding wear marks on the lower race. These flat spots cause the balls to 'stick' in one position at the wear spots on the lower race rendering the Governor unresponsive to engine speed changes.

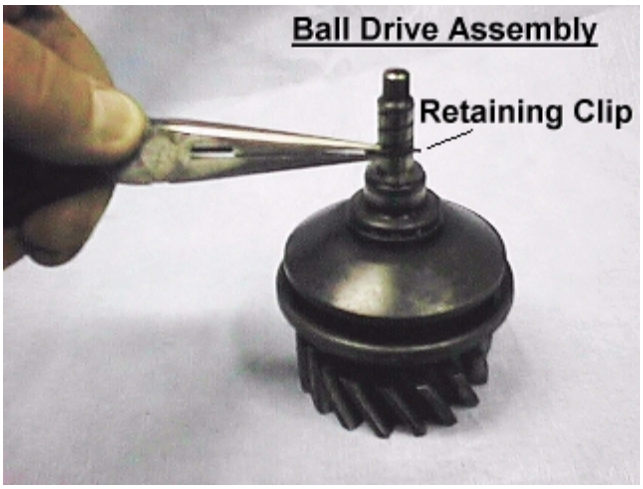
With the retainer machine screw removed, extricate the Drive Ball Assembly from the housing. Clean the housing mating surface free of any gasket material. Place a steel rule across the mating surface to identify if the housing is warped. If it is, the mating surface can be renewed by sliding the housing face down across a piece of 80 grit industrial sandpaper glued to a flat plate or board. Apply even pressure, rotating the housing constantly and checking with a steel rule regularly. The drive ball assembly consists of the drive ball shaft, gear, fiber spacer, lower race, thrust ball bearings, washers and clip.

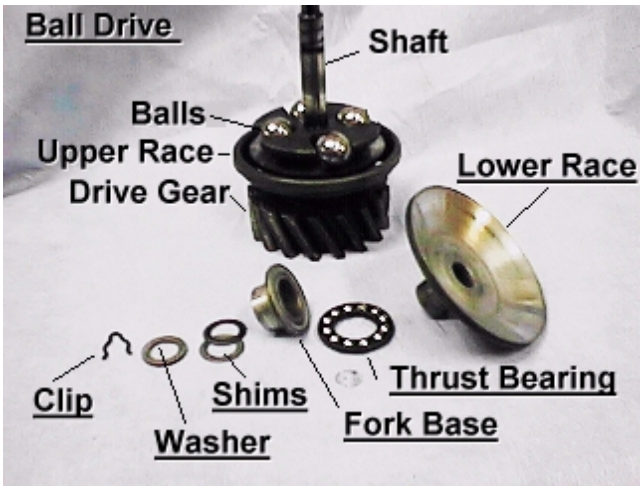




From left to right, Ball Drive Shaft Proofmeter drive end, retaining clip, washer, shims, fork base, thrust ball bearings, upper race, steel balls, ball retainer, lower race, bearing base, fiber spacer, and drive gear.

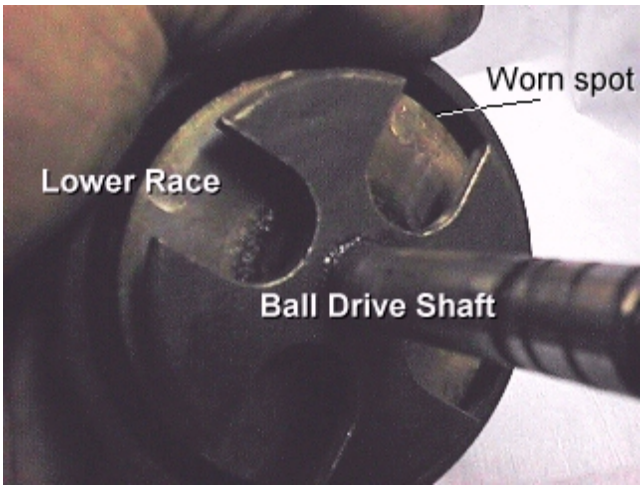
Starting from the Proofmeter drive end of the shaft, remove the clip. If there is a new one in the rebuild kit discard the old one. Slide the washer, shims, fork base, thrust ball bearings and lower race off of the shaft.





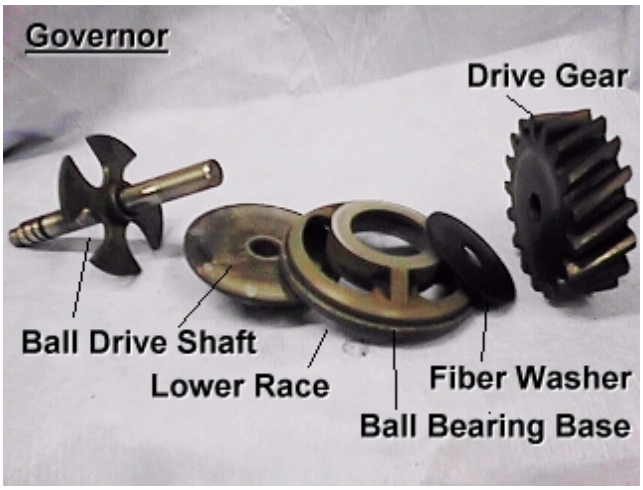
Remove the steel balls. They just fall out - nothing is holding them in at this point. Discard the thrust ball bearings. Clean the lower race of any varnish buildup.

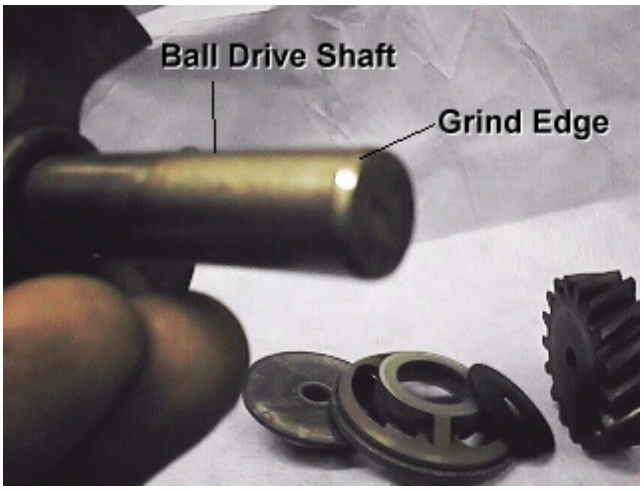
Examine the steel balls for flat spots, and the upper race for corresponding wear marks. If the steel balls are completely round and smooth and the upper race is free from any wear marks, consider other causes for the Governor not being responsive, such as binding in either of the external arms, broken or maladjusted spring, or broken drive gear. Renew as necessary. Replace the steel balls and race in any event.



Looking down the Drive Ball Shaft towards the drive gear, with the steel balls removed, it is possible to easily identify wear marks on this lower race. It will be replaced, and is the cause of this Governor sticking.

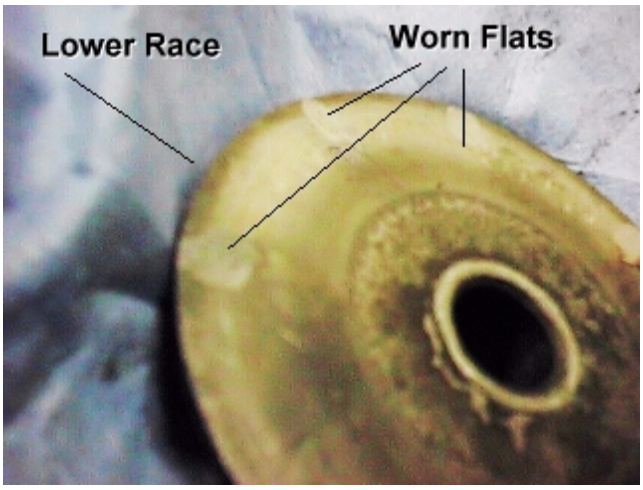
The drive gear is pressed on the ball drive shaft and needs to be driven off in order to gain access to the lower race for replacement. Rest the drive ball shaft in a vise with the bearing base resting on the opened jaws of the vice. With a suitable size drift, carefully drive the shaft out of the drive gear. Pay attention to which way the drive gear mounts to the shaft. Paint a small dot on the side of the gear away from the bearing base to assist in reassembly. Remove the fiber spacer, lower race and bearing base from the shaft when it has separated from the drive gear.

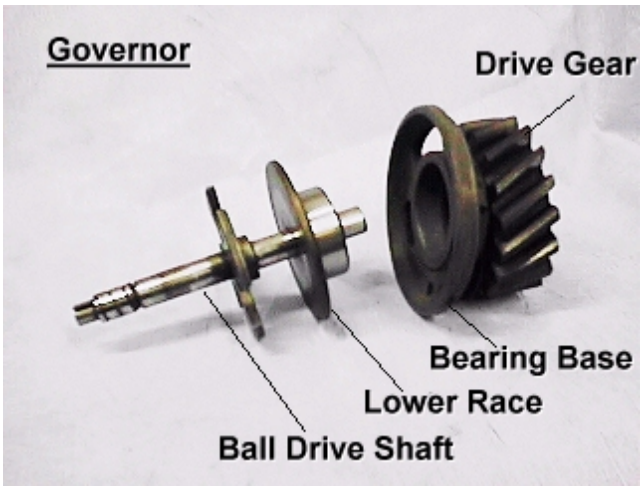




Beating on the end of the shaft with a drift will deform the shaft end somewhat. Grind a small chamfer on the end of the shaft to make reassembly easier.

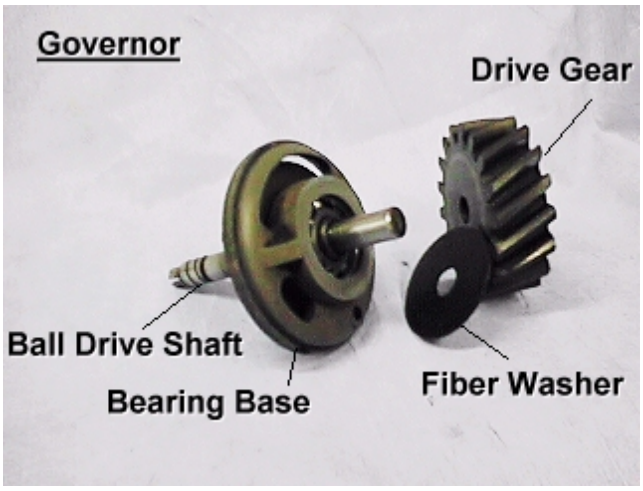
Once the lower race is off of the shaft, the wear marks become evident.

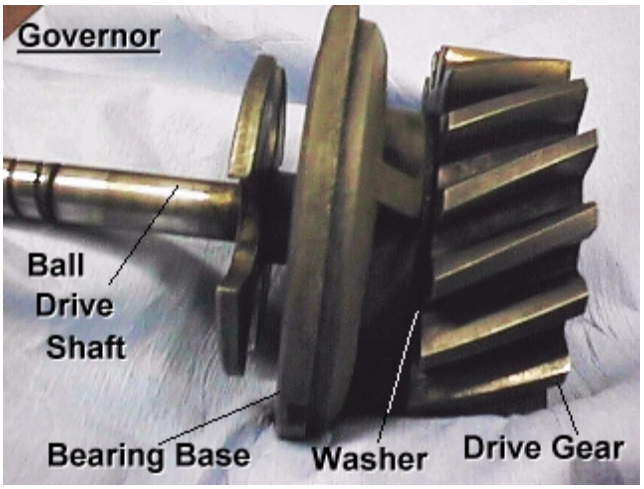




Reassembly is pretty much the reverse. Slide the new lower race and bearing from the rebuilt kit onto the ball drive shaft. Note the orientation of the lower race to the bearing. Fit the bearing base on the shaft up next to the lower race engaging the lower race bearing. Slip on the fiber spacer.

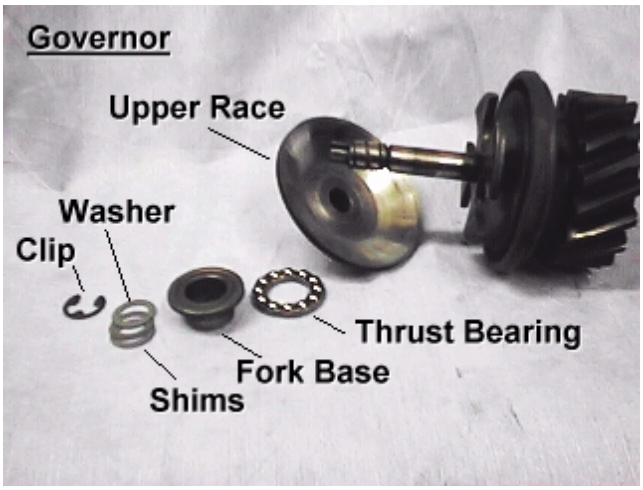
Stand the ball drive shaft on the Proofmeter drive end. Position the drive gear on the shaft with the painted dot you put on it during disassembly facing away from the bearing base.

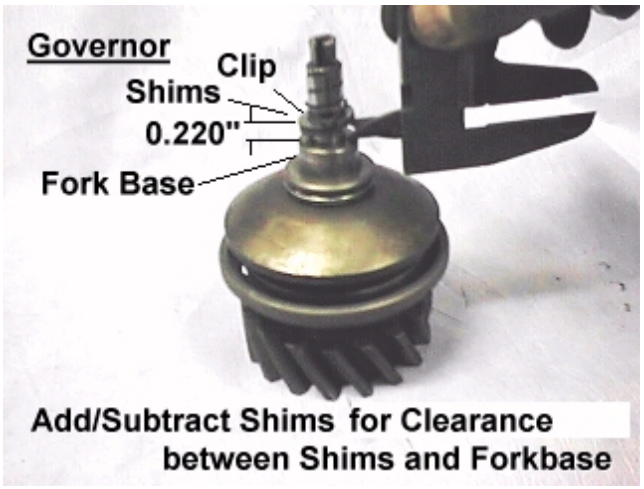




Tap the face of the drive gear with a dead blow hammer until it is seated flush with the end of the drive ball shaft. Make sure the lower race and bearing spin freely on the shaft

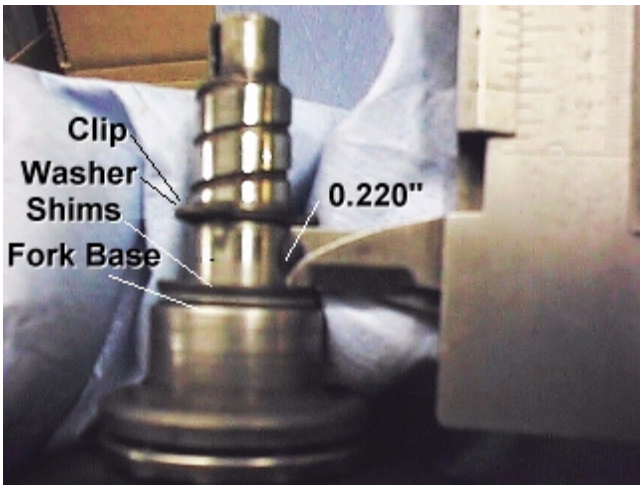
Turn the shaft over and rest it on the drive gear. Position the four new steel balls in the ball retainer and slip the upper race onto the ball drive shaft to hold the balls from roaming around your shop floor. Slide on the new thrust ball bearings, then the fork base. Again, identify the correct orientation of the fork base when you place it on the shaft. Next comes the shims - install all of them in the kit for now, though you might have to remove one or more in the next adjustment step. Temporarily install the washer and clip for the next adjustment step.

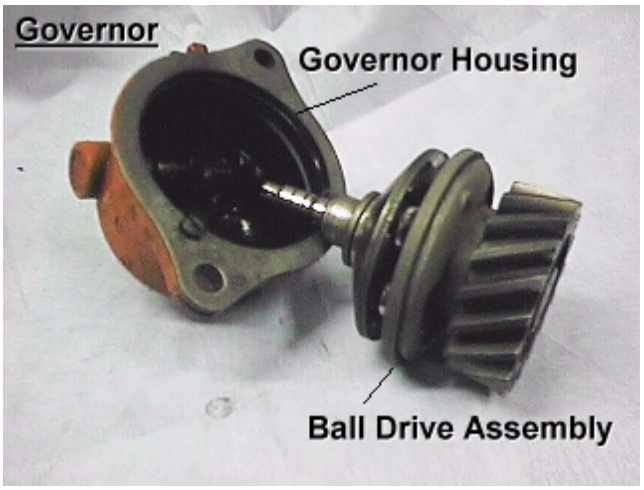




The adjustment of the thrust shims on the shaft is straight forward. With the ball drive assembly resting on the drive gear face, push down on the fork base while lifting up on the stack of shims under the washer against the clip. The distance between the top of the fork base and the bottom of the bottom shim above it should be 0.22" (less than 1/4").

Alternatively, you can measure the clearance between the top of the top-most shim, to the bottom of the washer under the clip. Again, add or subtract enough shims to create this 0.22" clearance.





When the thrust measurement is right, reinstall the ball drive shaft into the Governor housing. Hold the bearing base against the housing and ensure that the shaft spins freely without binding or grinding noises.

With the ball drive shaft seated in the housing, rotate the bearing base until the retaining screw recess in the bearing base line up with the recess in the housing. Install retaining machine screw. Install one or two gaskets (depending on how successful you were in getting the housing mating surface completely flat) and reinstall the Governor onto the engine. Tighten the two bolts. Attach the oil line and reconnect the linkage from the throttle and from the dash-mounted speed control lever following the marking you made on the tape.