Flathead Steering

Steering Gear Adjustments: 1937-48

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The worm and roller type gear was used from 1937 to 1948. Ford used the Gemmer model 305 in Fords from '37 to '40 and in Mercurys from '39 to '42. From 1941 to '48 (Ford) and from 1946 to '48 (Mercury) Ford used their own manufactured version which was similar to the Gemmer 305 gearset. Some minor differences in parts occurred over the years

Cross Section of Steering Gear: 1937-48

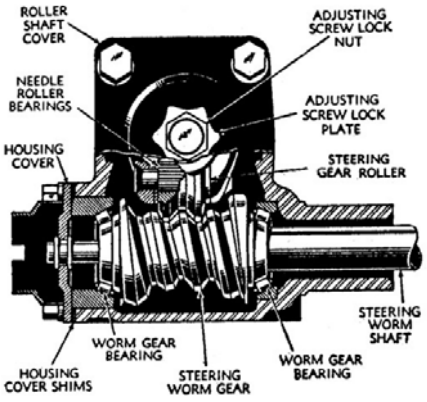
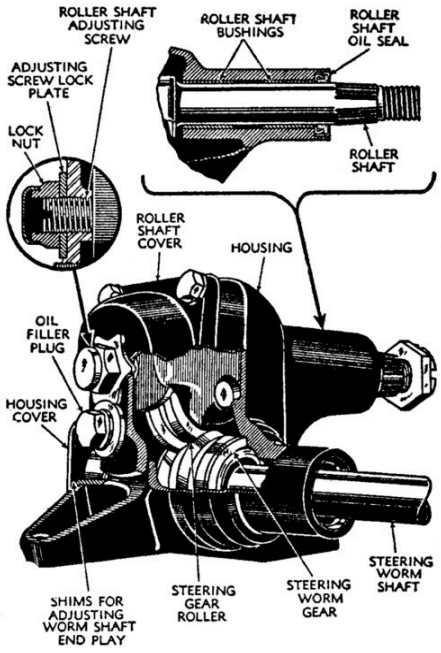


Figure A

Steering Gear Cutaway for 1937 to 48



Cutaway sectional view of steering gear to show location of adjustments for taking up cross shaft end play. The roller shaft bushings and oil seal are shown in the insert at the upper right corner of the illustration.

Figure B

Worm and Roller Type Steering Gear

Worm Shaft End Play

Check by turning steering wheel one turn to right, secure wheel, shake front wheels (drag link must be disconnected). Check movement of steering wheel hub on column jacket. If endplay is perceptible make adjustments.

The end play in the steering column shaft is controlled by shims and the body (Figure A). To take up worm shaft end play, loosen the 4 housing cover screws about 1/8" and remove top shim. The housing cover should not be removed completely because there is danger of the bearings falling out of place. The shims can be pulled out one at a time after the housing cover screws have been loosened enough to drop the cover 1/8". Tighten cover screws and check adjustment. The shaft should be free to turn with no perceptible drag yet have no end movement.

Cross Shaft End Play

Check by turning steering wheel to center position (turn wheel back 1/2 the total number of turns from either end-stop or place marked spoke straight up or straight down). Shake the steering wheel at ball end. If play or backlash exceeds1/32", adjust the cross shaft (roller shaft) position as follows:

To adjust cross shaft end play:

1) Turn the steering wheel to the center position of its travel (drag link disconnected).

2) Remove the lock nut and plate (Figure B) from the roller shaft adjusting screw and turn the roller shaft adjusting screw just enough to remove excess play from between the roller teeth and worm. Check this by the amount of play felt at the pitman arm. It is better to leave a slight amount of play at this point than to tighten too much.

3) Replace the plate and lock nut with the plate in the locked position against the roller shaft cover and tighten the lock nut.

4) Turn the steering wheel past the center position of its travel in both directions to see that the adjustment is not too tight. Wheel should turn freely without stiffness at any point.

5) Set the front wheels in the straight ahead position and the steering wheel in the center position of its travel. Adjust the drag link so that it is exactly the right length to connect the pitman arm and steering arm without changing the position of either the front wheels or the steering wheel

6) Connect the drag link to the pitman arm and steering arm

NOTE:

Read steering gearbox adjusting comments by Brian Falkner of New Zealand, an early V8 enthusiast with experience doing this job. Click here for his notes.

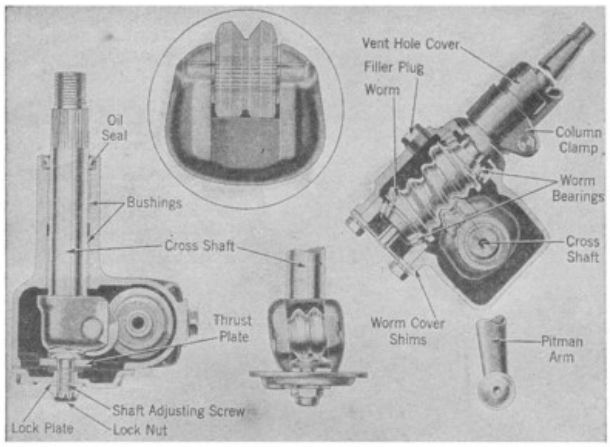


Figure C

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Ford Flathead Steering Box Assembly & Adjustment.

Subject: Steering box assembly & adjustment

From: Brian Falkner (New Zealand

This applies to all boxes from 1937 to '53 [& '54 to '56 F-1 Trucks]

Terminology: Bolts = capscrews, Spring washers = split washers

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The first step in steering box re-assembly, is adjustment of worm bearing pre-load assuming all parts are spotless, surfaces flat, thread holes de-burred, sector shaft a nice snug hand-push fit in the housing bushes..... [Later boxes used needle roller bearings, so did some 1936 car boxes]

Clamp the housing firmly in a vice so the shaft will be angled slightly uphill or near horizontal position & the worm easily visible. Lube the bearings with a heavy gear oil, I like Wynns gear oil additive which is thick, sticky and translucent.

The '37-'39 boxes have a lower shim plate with a brass stator-tube guide [for light switch rod & horn wire]. This is usually loose and is a cause of oil leaks so solder it up. The 40-48 car plate has a more solid steel tube for the horn wire only and is usually leak proof, use one of these if you have a dash mounted light switch in your '37-'39.

Make sure the shim plate is flat & not warped, select a wad of shims [if you have the originals, measure the total thickness, it will be a good place to start from], and place them on the plate leaving the really thin ones off. These you will need for fine adjustment later. Always position the thinner shims last. Use two bolts with spring washers as guides throughout the shim selection process otherwise it can get frustrating.

Bearing pre-load is a 'feel' adjustment. You don't need any special tools to get it right. This 'feel' will be with your thumb & forefinger turning the shaft. Manuals will show a mounted steering wheel & scales to measure pre-load in pounds, usually 3lbs. I prefer feel.

First you get to the stage where obvious play is almost nil then proceed slowly, replacing thicker shims with the very thin shims you have aside. At this stage you need all four bolts tightened firmly to obtain the correct feel. If you can feel the rollers turning in a lumpy sort of way then it's too tight, it must feel firm but smooth, don't accept near enough, this adjustment must be exact and the key to obtaining this is the final selection of thin shims...cut & punch your own if you have to.

If at this stage you notice your hollow shaft is not very straight, you can improve on this by bending by hand as long as the box is held firmly in the vice. A little out of line is not a worry, say a half inch at the end, any more it will pay to mark the spot & bend carefully, as necessary. Take your time, no hurry, patience is the key here. The shaft is not hardened steel so it's fairly easy to bend. Any doubt, take it to an engineer.

Steering Freeplay adjustment: Ford max is 1.5"

Next is the installation of the sector shaft & adjuster plate assy. Position the sector shaft into the box, turning the shaft as it slides through the new, lubed, seal so as not to mark it. Place the sector in the middle of the worm. Remove the filler cap.

Use some oil or grease to stick the gasket to the plate, guide the adjuster stud & washer into the slot of the sector,...37-48 washers are offset so you may notice! ...., screw the adjuster out so the roller won't bind on the worm then push the assy down into bolt on position. Use two bolts at first, making sure while securing that the roller is free of the worm.

Place the drop arm on the sector end & tap it lightly onto the tapered spline in a position that allows lock-to-lock travel with your hand on it. It must be enough to require a firm tap with a light hammer to free again. No nut is required, this is for adjustment purposes only. Later F100's must be clamped.

Find EXACT halfway steering position as that is where all adjustment is done. No where else. This can be ascertained by measuring the drop arm travel and or number of turns of the steering shaft. If the roller is clear, place & secure the other two bolts. To adjust roller to worm clearance you will need to see through the filler hole to check when the roller makes contact & starts to turn.

Again, this is a 'feel' adjustment with some visual.

One hand will hold the drop arm firmly, moving it to & fro until all play is 'only just' removed via a screw driver turning the adjuster clockwise.

The twist travel of your wrist turning the shaft will be enough to feel resistance when the roller contacts the worm, it will be only about a half turn either way when resistance/contact is lost, THAT is the adjustment area . When it feels maybe a little firm, that is the time to pop on the special Ford star shaped lock washer, Ford part# 78-3564, [37-48 cars], and tighten the capped nut [11/16"spanner I think]. What happens is, the tightening of the nut pulls the adjuster up a tad, enough to change the setting you thought you had.

A correctly adjusted box will feel a very, very slight resistance when turning the shaft through the central position.

If you have a used sector shaft, chances are there is play in the roller, be careful NOT to try to adjust this play out. This is where visual adjustment is important. You will be able to see the roller move when you push & pull on the drop arm. Stop adjustment as soon as the roller contacts the worm. That [agreed/acceptable] roller play will equate to about an inch + at the wheel which is quite ok.

So, we are not simply adjusting freeplay, we are adjusting the critical roller/worm contact. Get this right, it will be a pleasure to drive and your box will last for years, get it wrong [usually too tight] and the worm in particular will wear prematurely. Take you time throughout this procedure, try it tight & try it loose, the experience will guide you to the obvious and correct adjustment.

This should give you the reason why it is very important to have your steering wheel correctly aligned with the front wheels. The sector needs to be in the central position on the worm with the vehicle pointing straight down the road. Adjust your draglink to correct.

More notes from Brian…….

How much to tighten the shim plate bolts? Snug 'em up is fine. To determine the correct 'snug' feel, torque those 5/16" NC thread, 7/16" head, bolts to the normal 25Lbs. It is important NOT to over tighten the shim plate bolts as the plate will bend, crush the shims and maybe cause a slight leak.

I never used any sealant on these areas, no need if you have flat surfaces & a gasket. Flattie steering boxes are not subject to temp differences or internal pressure.

The adjuster cap nut was designed by Ford & never changed from 37-48 because there was no need to, get used to it.

Hmmm, you probably don't realize that the star washer holds the stud & itself in place via the outside star pattern resting on the stamping of the plate. The star washer is designed to go with the sharp, stamped edge, down for a better grip on the plate. The washer also acts like a gasket.

This system does not normally leak so a gasket is not needed under the nut. Because the F1 plate is on the side not the top as in 37-47 cars, you could place some flexible sealant on the washer to be sure. If you use an open nut, oil WILL leak out & moisture & dirt WILL get in.

The 'finger tight' filler cap usually has some writing on it that says, "use heavy gear oil", that meant 600w. I don't like dirty black molasses looking oils but I do like the heavy additive oils like STP, Wynns, Morey's, Bardahl [is that still available?], or whatever. It's a personal choice thing, just make sure it's around 600W. The worm & roller can be subjected to an incredible amount of force especially when parking or moving off. 85-90W tends to find its way out of steering boxes and doesn't offer enough protection for the worm & roller.

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