

Model A Ford Mitchell Overdrive Installation

by Tom Endy 2022

Preparation:

The installation procedure is based on knowledge that the differential is in good condition and does not require overhaul. The differential will not be disassembled during the procedure. To accomplish the installation, the rear end is removed from the car, the drive shaft is removed from the differential assembly and is replaced with a stub shaft supplied with the overdrive kit. The overdrive unit is installed in place of the standard torque tube. The rear end is then reinstalled in the car. It is not necessary to drain the oil from the differential banjo.

Jack stands:

Place the car on four jack stands with sufficient height to allow work to be performed safely underneath the car. Two jack stands are placed under the front axle, the other two are placed underneath a frame section at each side at the rear of the car, forward of the radius rods.

Floorboards\U-joint housing\speedometer cable:

Remove the front floor board. Remove the speedometer cable from the front of the torque tube. Disconnect the U-joint housing by removing the cotter pins and removing the eight 9/16 hex bolts and nuts that secure the three housing pieces to the transmission rear bearing retainer.

Rear end removal:

Remove both back wheels and remove the cotter pin, 15\16 hex nut, and flat washer from each rear axle. Leave the brake drums in place. Install the thread protectors on the ends of the axles. Install the spring spreader to the rear spring. Remove the cotter pins and clevis pins from the rear service and emergency brake levers at both cross shafts. Remove the 1\2 hex bolt and nut securing the brake rod anti-rattle springs on each rear radius rod. Remove the shock arm links from each side by removing the long cotter pin and backing off the threaded insert (If dog bones are installed instead of shock arm links, remove them by unbolting the bolts and nuts that secure them). Place the rolling cradle underneath the car to accept the rear end when it is lowered down. Place the rolling floor jack under the banjo. Remove the cotter pins and the two 5\8 (or 11\16) hex nuts and cross piece retainer from each rear spring shackle. Tap the shackles out with a hammer and a punch. Ease the jack back slightly to clear the spring and lower the rear end to allow the end of each axle to rest in the supports on the rolling cradle. It may be necessary to collapse the spring slightly. Pull the rolling cradle back to disengage the drive shaft from the U-joint. Lift the front of the torque tube up to clear the service brake cross shaft and roll the rolling cradle back more and allow the front of the torque tube to rest on the front of the cradle. With the rear end free, roll it out from under the car. Tie wrap the four brake rods to the radius rods to secure them.

Speedometer housing removal:

remove the two 3/8 hex bolts and lock washers at the front end of the torque tube and remove the speedometer housing. There should be a gasket under the housing. None of these parts will be re-used.

Front torque tube roller bearing assembly removal:

Reach through the hole where the speedometer housing was removed and pry loose the circular snap ring from around the drive shaft. Slide it forward and off the end of the drive shaft. Next slide the speedometer drive gear, thrust washer, and roller bearing off the end of the drive shaft. Use a screwdriver to push everything forward. None of these parts will be re-used.

Radius rods:

Remove the cotter pin, 13/16 hex bolt, and 7/8 hex nut that secure both radius rods to the front end of the torque tube. The rear of the radius rods are to be left attached to their respective backing plates.

Torque tube removal:

Cut the safety wire from the six 9/16 hex bolts that attach the torque tube to the banjo and remove the bolts. The torque tube can now be removed by sliding it forward and off the end of the drive shaft. There should be a gasket between the banjo and the torque tube. The Model A Ford torque tube will not be re-used.

Drive shaft removal:

Do not attempt to remove the drive shaft by loosening either of the two large nuts that secure the pinion bearings. The two nuts are for the purpose of establishing the pinion bearing pre-load and should not be disturbed. Install the pinion puller tool to the drive shaft and pull the entire pinion gear assembly out from the banjo still attached to the drive shaft. As the bearing assembly and drive shaft are removed, the radius rods will come to rest on the front support of the rolling cradle. This will keep the banjo and axles level and prevent oil from spilling out of the banjo flange.

Pinion gear assembly removal:

Place the drive shaft (with pinion assembly still attached) in a vice. Remove the cotter pin from the 15/16 hex nut securing the pinion gear to the end of the drive shaft and back the nut off 1/4 of an inch. Slide the backing tool over the front of the drive shaft until it is up against the threaded sleeve of the pinion gear. Place the gear puller to the other end of the drive shaft with the point end in the detente in the end of the drive shaft. Place the arms of the gear puller around the backing tool. Tighten the gear puller until there is sufficient tension against the drive shaft. Smartly tap the end of the gear puller with a hammer. Alternately tap and tighten the gear puller until the pinion assembly comes loose from the drive shaft. Remove the nut and pinion assembly from the drive shaft. The Model A Ford drive shaft will not be re-used.

Stub shaft installation:

Place the stub shaft supplied with the overdrive kit in a vice. Apply anti-seize compound to the taper on the stub shaft and slide the pinion assembly that was removed from the drive shaft over the tapered end of the stub shaft. Make certain the locking key is in place. Install the nut on the end of the stub shaft and torque to 90 ft lbs. Tighten the nut again until the cotter pin hole is lined up with one of the castles. Install the cotter pin and bend the legs forward along one side of the nut. **Do not bend the cotter pin legs over the end of the drive shaft as it will interfere with the ring gear carrier.** Check that the threaded end of the stub shaft does not extend past the end of the nut by more than one thread. If it does it may be prudent to grind the stub shaft flush with the nut. Any excessive extension past the nut may interfere with the ring gear carrier after installation.

Pinion gear assembly installation:

Take the pinion gear assembly now attached to the stub shaft back to the rear end and place the bearing race onto the edge of the hole in the banjo flange. Gently tap it in place with a brass hammer to start it into the hole. Make certain that it is evenly started. Place the special tool, which is a cut down section of a torque tube in place on the banjo flange. Install six studs with nuts into the banjo flange. Alternately tighten each of the six nuts to draw the special tool (4) down onto the banjo. This action will pull the pinion race into the hole in the banjo. While tightening the six nuts frequently turn the stub shaft by hand to properly engage the pinion gear with the ring gear as the assembly is drawn into the banjo. When the bearing race is completely seated remove the special tool and the six studs and nuts.

Overdrive unit installation:

Tilt the front of the rear end up so that it is vertical. Apply grease to the spline coupler supplied with the overdrive kit and place it over the end of the stub shaft. Place a gasket over the banjo flange and install six studs into the six bolt holes in the banjo flange. Put the overdrive unit in gear by moving the shift lever in either direction. Place a one and 1/16 inch, 6 point, 1/2 inch drive socket over the spline at the front end of the overdrive drive shaft and slide the overdrive unit down over the stub shaft. It will take at least two people to position the overdrive in place. Turn the overdrive drive shaft with the socket wrench until the stub shaft spline coupler engages with the spline inside the overdrive unit. Allow the overdrive unit to slide down over the studs aligning the overdrive unit such that the bolt hole for the two radius rods will be correctly on the bottom. Remove the six studs and install the six bolts, torque then securely and safety wire. Connect the front end of both radius rods to the front of the overdrive. The bolt goes in from the right side, the nut is on the left. Torque the bolt and install a cotter pin. The overdrive unit attached to the rear end is now ready to be re-installed in the car.

U-joint housing:

Install the cup shaped part of the U-joint housing to the transmission rear bearing retainer with a new gasket installed on each side of the mounting flange. Orient the two holes in the cup at the 3 and 9 o'clock position. Pack the U-joint and the inside of the cup with grease before setting it in place. Match up the holes with the transmission rear bearing retainer and install two nuts and bolts finger tight on opposite sides to temporarily hold it in place. Put the transmission in neutral.

Rear end\overdrive installation in car:

Apply a coat of grease to both sides of the bell at the front end of the overdrive and slide the rolling cradle under the car. Place the front of the torque tube up over the service brake cross shaft and slide the rear end forward to engage the drive shaft spine with the U-joint spline. A pair of channel locks around the shank of the U-joint will aid in turning the spline to secure engagement. Place a rolling floor jack underneath the banjo and jack the rear end up so the shackles may be installed. When installing the shackle nuts, tighten them down firmly, then back them off a half a turn. They must be free to rotate. Install cotter pins in the shackles. Re-install the brake rods and shock arms. Re-install the brake rod anti-rattle springs to both radius rods. Re-install the other two U-joint housing parts with the eight bolts and nuts that secure them. Torque the bolts sufficiently and install cotter pins. Install the rear axle nuts and flat washers and torque to 90 ft lbs. and tighten to the cotter pin holes and install cotter pins. Re-install the wheels, torque the 13/16 lug nuts to 60 ft lbs. Remove the rolling cradle and the spring spreader.

Overdrive manual:

Refer to the overdrive manual supplied with the overdrive kit to install the speedometer extension cable, vent valve, and shifting mechanism. The manual will also provide **oil service** and operating instructions. Apply sealer to the set screw that retains the speedometer extension cable to prevent an oil leak.

Floorboards:

It will be necessary to cut a slot in the floorboard and the floor mat in order to accommodate the overdrive shifting lever. A wooden template is available for the purpose, if one is not available make a template from cardboard by cutting it to fit in place of the floorboard. Cut access holes for the transmission shifter, the brake handle and an area where the overdrive shifter is located. Insert the template in place and tape up the overdrive shifter hole to provide a narrow slot that will accommodate the full travel of the shifting handle. Transfer the template to the actual floorboard and cut the slot with a saber saw. Re-install the altered floorboard and floor mat. **Remember to put oil in the overdrive.** The task is complete.☺

Special tools:

(1) A Model A Ford rear end cradle made of tubular steel, mounted on casters, that supports the rear end at three points. Two locations are at the ends of each axle shaft, the other is about one foot back from the front of the torque tube. The cradle is used to assist in the removal and re-installation of a Model A Ford rear end.

(2) A pinion assembly puller tool that clamps tightly onto the drive shaft and pushes against the banjo flange to remove the pinion bearing assembly from the banjo. The Mitchell Company now provides just such a tool.

(3) A pinion gear removal tool made of a four inch square, 1/2 inch thick steel plate with a hole slightly larger than the drive shaft bored through it. The tool is used to provide backing for a gear puller to pull the pinion gear off of the drive shaft.

(4) A pinion assembly installation tool made from the banjo end of a Model A Ford torque tube cut off to a length of about four inches. The tool is used to re-install the pinion assembly back into the banjo. The Mitchell Company provides a similar tool as part of the pinion puller tool described above in (2).

