

Toyota W50 Transmission

We're gathered here today to say a few kind words about a venerable Toyota rear drive transmission called the W50. The W50 can be found in many late '70s and early '80s rear drive Toyotas (Celicas, Coronas, and 2WD trucks).

We tagged the W50 for an overhaul for the same reason we covered the Toyota A40 automatic in April of last year. If you're going to start somewhere, you might as well start at the beginning. The W50 is as close to the beginning as we're going to get. Toyota has spun at least three other "W family" five speed transmissions (the W52, W55, and W56) off the original W50 design. The W50 is the father of them all.

The W50 has four main external parts:

- A separate aluminum bell housing
- A cast iron case housing
- A cast iron intermediate bearing plate
- An aluminum extension housing

The cast iron case housing was the first thing to go when the W50 went on a diet in its later incarnations. Internal parts remained much the same.

Other Toyota transmissions from other "letter families" may not bear such a strong family resemblance to the W50, but they're definitely related. Late model Toyota rear drive holdouts like the Supra and some pickup models use transmissions that can trace their family tree back to the W50.

The W50 is a sturdy unit that will easily make it

past 100,000 miles with just a little preventive maintenance. Like any self-respecting manual transmission, the W50 probably wouldn't object if you changed its gear lube once in a while. Unfortunately, the average owner places about as much importance on changing the gear lube as he does on checking the air in his spare tire.

The first components to feel the effects of this neglect are the bearings, and the countershaft bearings in particular. Bearing failure tops the W50's list of shortcomings.

End play (or thrust clearance) is particularly important on the W50. It doesn't pay to take the transmission apart, throw some new parts at it, then put the whole thing back together without measuring and adjusting the thrust clearances to specifications. Excessive thrust clearance will play havoc with internal transmission parts and bring your transmission overhaul back to haunt you sooner rather than later.

The W50's snap rings are made from a particularly brittle metal. Excessive thrust clearance or other problems may cause these rings to break, which only adds to the thrust clearance problem. The snap rings are easily distorted or broken during disassembly. We found out first hand when we distorted the rear countershaft bearing snap ring. For this reason, we'd have to list snap rings as "must replace" items during an overhaul.

The rear transmission mounts fail on W50s from time to time. If you're diagnosing a transmission that jumps out of gear, be sure to give the rear mount a look before you pull the unit. Unwanted drivetrain movement can easily knock the transmission out of gear, especially under load.

Once you've taken the plunge and removed the transmission from the car, take measurements as you disassemble the transmission. Write down your measurements as you go, then compare your measurements to the allowable tolerances. If you come up with a measurement that's outside the allowable tolerance range, you'll know to look for wear in that area.

We'll list the major clearance specifications for you here in the introduction. That way we won't have to repeat the zeros and decimal points quite so many times in the photo captions.

— By Karl Seyfert

FIRST, SECOND, THIRD AND REVERSE IDLER GEAR THRUST CLEARANCES

Standard Clearance: 0.15-0.25 mm (0.06-0.010 in)
Maximum Clearance: 0.30 mm (0.012 in)

MAINSHAFT FIFTH GEAR THRUST CLEARANCE

Standard Clearance: 0.10-0.25 mm (0.004-0.010 in)
Maximum Clearance: 0.30 mm (0.012 in)

MAINSHAFT GEAR OIL CLEARANCE

First Gear

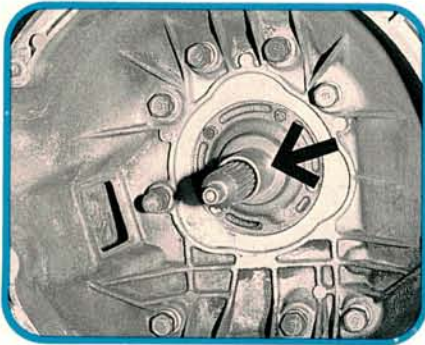
Standard Clearance: 0.009-0.053 mm (0.0004-0.0021 in)
Maximum Clearance: 0.06 mm (0.0024 in)

Second and Third Gears

Standard Clearance: 0.06-0.10 mm (0.0024-0.039 in)
Maximum Clearance: 0.15 mm (0.0059 in)

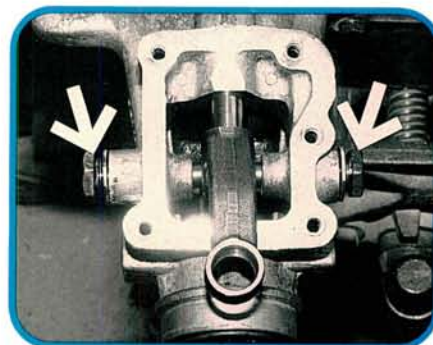
Fifth Gear

Standard Clearance: 0.009-0.051 mm (0.0004-0.0020 in)
Maximum Clearance: 0.06 mm (0.0024 in)



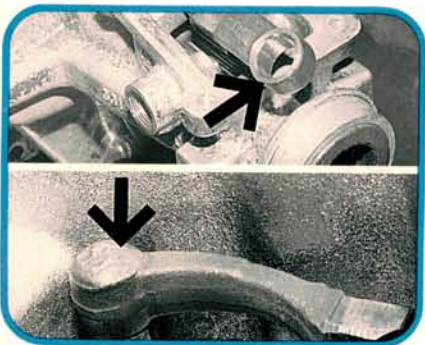
1

Remove the release fork and bearing. Check the front bearing retainer's sliding surface for wear. Then take a good look at the slave cylinder. Plenty of transmission damage can be caused by a leaking or sticking slave cylinder. Remove the bell housing bolts, then remove the bell housing.



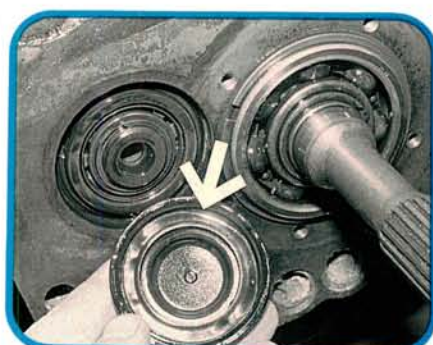
2

Remove the speedometer driven gear and back-up light switch. These steps aren't mandatory, but they make it easier to remove the extension housing and center case housing. Remove the shift lever retainer, then remove the caps, washers, springs, and restrictor pins (arrows) on either side of the shift lever.



3

Remove the extension housing bolts. Turn the shift lever counterclockwise, then pull off the extension housing (upper photo). It may take some persuasion from a soft-faced hammer to get it moving. Flip the extension housing over and inspect the weld on the end of the shift lever (lower photo).



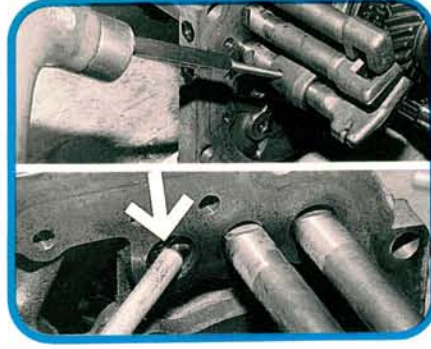
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Remove the front bearing retainer, gasket, and countershaft bearing cover. Don't lose the countershaft bearing shim that's hidden under the cover. Remove both front bearing snap rings, then separate the center case from the intermediate bearing plate (no chisels please).



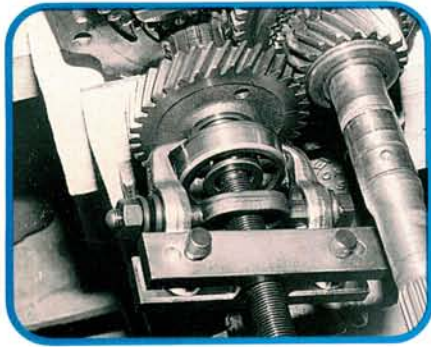
5

Mount the intermediate bearing plate in a vice using soft jaws or two blocks of wood. Clean the rust out of the hex-headed detent spring plugs before trying to remove them. A dab of valve lapping compound on the tip of your hex bit will improve your grip. The thin-shouldered plug goes on top during reassembly.



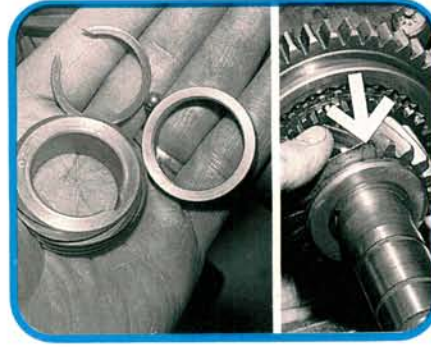
6

Remove the detent springs and balls, then drive the roll pins out of the shift forks (upper photo). Remove the selector shafts, starting with the fifth/reverse shaft. Use a magnet to remove the interlock pins from the intermediate bearing plate (lower photo). Inspect the selector shafts for wear.



7

Gotten tired of reading "Remove the" yet? There's more. Remove the counter gear bearing snap ring, then use a puller to remove the counter gear rear bearing. You may need a puller to remove the countershaft fifth and reverse gears. A standard steering wheel puller will fit the holes in fifth gear. Ours slid off by hand.



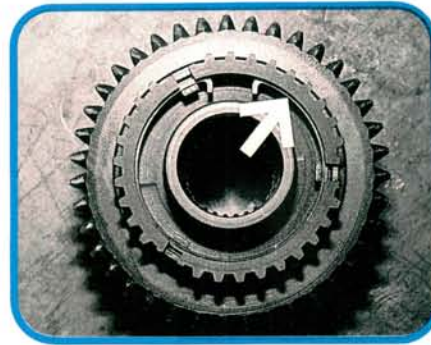
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Remove the speedometer gear, snap ring, locating ball and spacer (left photo). Use a press or long-legged puller to remove the rear mainshaft bearing. Measure the fifth gear thrust clearance (right photo). Thirteen selective snap rings are available to adjust thrust clearance.



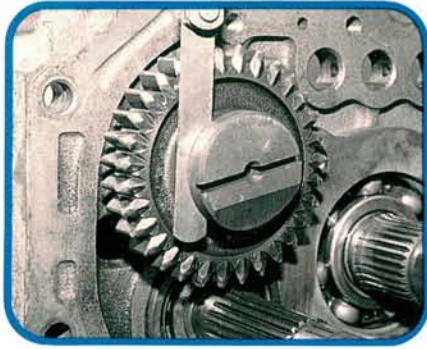
9

It takes two screwdrivers to remove the mainshaft fifth gear snap ring. Take careful aim and keep your eye on the snap ring. It likes to fly off to parts unknown. Remove fifth gear, then the fifth/reverse hub assembly. Don't drop the locating ball under fifth gear's inner race.



10

Disassemble the fifth/reverse hub assembly on the bench and check for worn synchronizer parts. This is the only hub that has this extra snap ring (arrow). The snap ring limits shift key travel and must be reinstalled facing the front of the transmission. Remember hub offset location during assembly.



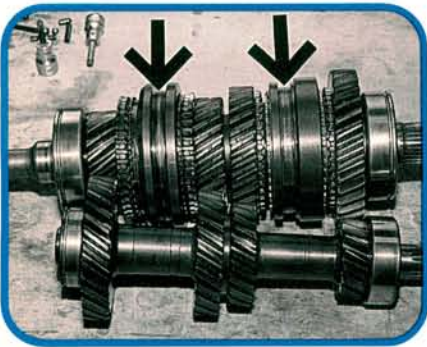
11

Measure the reverse idler gear thrust clearance. If the thrust clearance is too great, check for a worn spacer between the idler gear and the intermediate bearing plate. Reinstall the retaining clip with its bent corner facing away from the bearing plate.



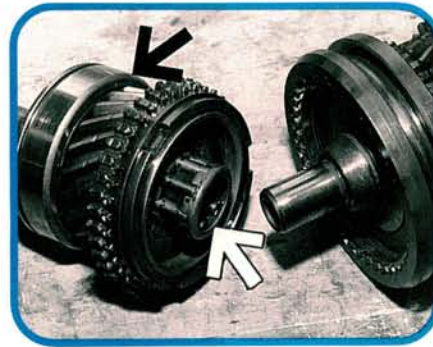
12

Use an impact driver to loosen the output shaft center bearing retainer bolts. Apply thread locker during reassembly. Remove the mainshaft intermediate bearing snap ring. Now push the output shaft and counter gear out of the bearing plate as an assembly. Soft-faced hammer persuasion may be necessary.



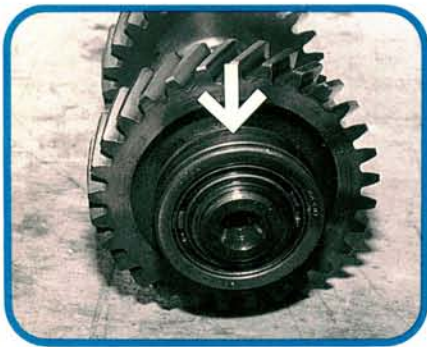
13

Check this photo of the mainshaft carefully before you dive in. The shoulders on the first/second and third/fourth hub sleeves are both offset and must be reinstalled as shown. Once you disassemble the mainshaft down to the synchronizer hubs, you'll find that they may be offset as well.



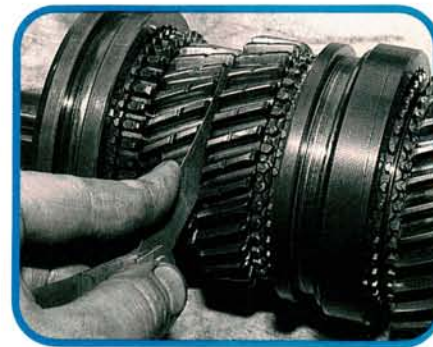
14

Separate the input shaft from the mainshaft. Check the internal needle bearings and races for wear (white arrow). You may need to change to a different snap ring thickness if the input shaft bearing is replaced (black arrow). A tight snap ring fit cuts axial play to a minimum.



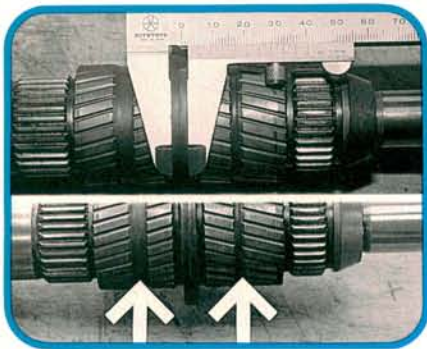
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Check all the bearings carefully. Toyota technicians tell us that bearing failures are the most common problem in the W50 family. Countershaft and input shaft bearings usually lead the list. Sloppy bearings will increase the wear on other parts of the transmission. This transmission needed all new bearings.



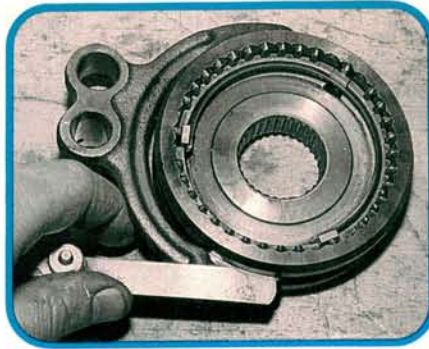
16

Measure the first, second, and third gear thrust clearances before disassembling the mainshaft. The third/fourth synchronizer hub and third gear are held in place by a selective snap ring, and are pressed off the front of the mainshaft. Everything that's left is pressed off the mainshaft from the rear.



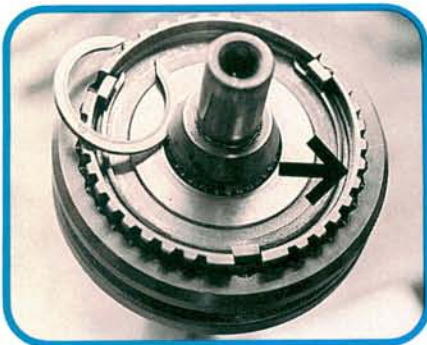
17

Inspect the mainshaft's gear and bearing contact surfaces for wear or damage. Minimum output flange thickness is 4.8 mm (0.189 in) (upper photo). Minimum gear bushing diameter is 40.8 mm (1.606 in) (lower photo). Use v-blocks and a dial indicator to check mainshaft runout (0.05 mm/0.0020 inch maximum).



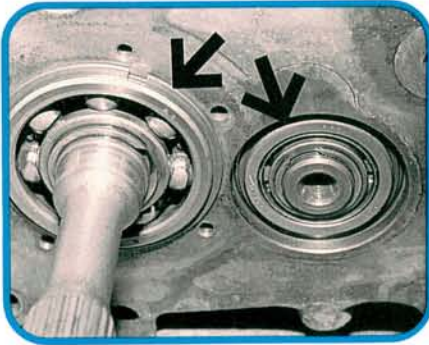
18

The three most important things on this transmission are end play, end play, and end play. Too much end play can cause the transmission to jump out of gear and puts extra stress and wear on the shift forks and hub sleeves. Clearance between the forks and sleeves shouldn't exceed 1.0 mm (0.039 in).



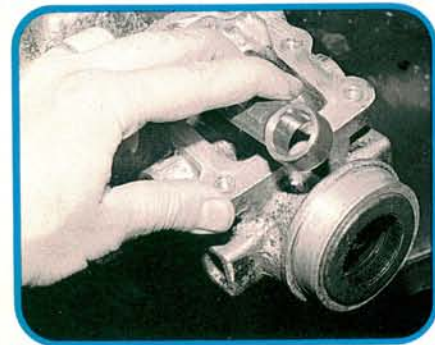
19

Worn bearings may cause a noise that sounds like marbles rolling around in the transmission. A replacement third/fourth synchronizer hub is available to correct a rattling noise during light acceleration in first or second gears between 2000 and 3000 RPM on W55 transmissions.



20

We'll hit the high spots instead of going through a step-by-step reassembly process, since we'll be retracing our steps for the most part anyway. The input shaft, center mainshaft, and front countershaft bearings are all installed with their snap ring grooves facing outward toward the ends of the shafts.



21

You've got to hold your mouth just right to reinstall the extension housing. The gear selector shafts must be in neutral. Rotate the shift rod counterclockwise, then push it all the way forward. Partially install the housing, then fish with the rod until the rod hooks up with the selector shafts.



22

Finish installing the extension housing, then temporarily install the rest of the shift linkage. It's reassuring to know that all of the gears are engaging before the transmission goes back into the car. After the transmission is reinstalled, make sure the shift boot allows full engagement of all gears.