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INTEGRAL TRANSFER-CASE OVERDRIVES.

Assembly instructions.

Enclosed you may find the operation steps for the disassembly of the Toyota Landcruiser transfer case. / Pictures and text taken from the authentic Toyota Landcruiser repair manual./ We call your attention, that the overdrive installation can be done without overhauling the transmission, and removing the shift shaft guide, and disassembling the extension housing. /figures 2-29 and 2-33/ But if you are involved in such a major operation, you have a good and easy chance to take a professional look at everything. Concetrate your attention to the bearings and seals, and replace them, if they are worn out. This extra care pays off very well.

As we tell to everybody, the best thing is to pull out the transmission and the transfer-case in one unit, do the job on a bench, and put it back in the very same place, where it was before. You do not have to change anything, do not have to alter the drive-shafts.

The only exception is the rear motor-mount, which has to be moved appr. 2 " towards the rear end.

The official Toyota-text calls very often for special tools. Neither of them is a "must". With a moderate set of tooling and metric wrenches the job can be done easily. You need special tool only to remove the counter-shaft bearings of a 4-speed transmission. /Fig. 2-85./

We anticipate, that everybody, who reads this instruction, possesses the necessary basic knowledge, how to handle jobs of this kind. Therefore we tell the necessary operation-steps, and hope, everybody knows, how to press a bearing onto a shaft, etc.

Contrary to the general opinion, we found, that it is not enough to apply any liquid sealant, -like Permatex 2B,- only on one side of the paper-gasket. Furthermore: Use thread-sealant around the threads and heads of all screws and bolts. Almost unbelievable, but we found in some cases, that the front, and rear output-shafts leak the oil through the U-joints, along the not tight enough splines. Therefore we suggest to apply silicone- sealant to both splines.

There is only one operation-step, which needs some extra care: Removing transfer output shaft. Use a small arbor-press, and if you do not have the special tool /Fig. 2-39/, -as very many people don't, including ourselves,- your only concern should be, that the big gear is supported from two sides in a fairly horizontal position, meanwhile the smaller gear is free to be pushed through the big hole. Our experience shows, that after several years of use, the rear bearing sits quite tight on the shaft, and it is some times hard to break it loose. Therefore we try to discourage anybody to solve the problem in the good ancient way, using a big hammer. Incorrectable damages can occur very easily.

After removing the transfer-case from the transmission, only the inspection cap, the 2 roller-cages from the cluster shaft, and the output shaft, from U-joint to U-joint, including the shifting mechanism, will be reused. Clean them and check them properly. Similarly check and clean all the new parts. Be sure, that the synchro-mesh selector assembly will not fall apart, because it is not a real happiness to put it together.

After these preparatory steps we suggest to make several dummy assemblies without gaskets, seals, sealants, etc. This way you will be familiar with the process, and can do the job fast, so the silicone sealant will not be dry even before you close the two halves together. During the dummy assemblies do not use the ball and spring in the actuators, and do not remove the detaining shaft.

Building together the overdrive:

Apply silicone to the idler-shaft cover and tighten the 6 screws. Put grease into the seal-seat and press the seal in, with lips showing towards the transfer-case. Carefully push the spacer-sleeve into the seal, apply the gasket and sealant, and push the front part of the housing against the transmission. Using the 3 long Toyota bolts and the 2 new bolts, locate the housing, and tighten the 2 new bolts to 25 - 30 ft-lb torque. Remove the 3 long Toyota bolts. /Fig.1./

Push the first splined bushing against the spacer, and carefully push the smaller driver gear over that. Red-painted end comes first. /Fig.2./ Our bushings are broached, so they fit perfectly on the new shafts. It is common, that after several years uf use /and some times misuse/, the shaft has some deformation, and in this case our bushing is tight. If this is your case, you have to polish your shaft a little bit, as long as the bushing goes freely.

Push the synchro-mesh selector assembly over the shaft until it hits the splined bushing. Be sure, the 3 little spring-loaded driving keys are in the notches of the bronze ring. /Fig.3./ Red painted end comes first.

Using grease, hold the second bronze ring on the selector hub, with keys in the notches, and push the second splined bushing, together with the bigger driver gear onto the shaft, until it hits the selector-hub, and put the rear spacer-washer around the sticking-out end of the bushing. /Fig.4.and 5./ Locate the hi-lo shifting lever.

The pictures show a 4-speed transmission. At the 3-speeder version the bushing of the overdrive gear has no internal splines.

Do not use the bearing yet, but apply some kind of spacer, and by the nut, keep the whole input-shaft assembly together. /Fig.6./

This time check it, that both gears are turning absolutely free.

Put the spring and the ball into their hole, use a piece of half inch bar, or the Toyota bolt as a pilot, pushing the ball into its nest, carefully push the actuator rod through its hole, against the lips of the urethane seals, until the ball jumps into the first notch.

Pull back the selector-ring towards the overdrive gear, that it covers the driver splines. From beneath, push the shiftfork into the groove of the selector-ring and move the other end into the slot of the actuator-block. /Fig. 7./ Push the shaft of the shiftfork into its position. /Fig.8./

Connect the actuator rod to the PTO-lever, and tighten the nuts. This way you can check the proper travel of the actuator. Everything is still dry, nothing moves yet as smooth as it will later, but if you align the teeth of the 5 splines, /2 gears, 2 bronze rings, 1 driver-hub/ you can move the actuator back and forth. You will experience considerable drag because of lack of oil, but that is OK. You also have to feel, that the spring-loaded detent sits firmly in its seat and provides a positive detaining action. To move it out from its position, a little extra push is needed. This extra strong detent action prevents popping out of gear even under the most severe conditions.

After having finished the front part turn to the cover.

Push the idler shaft tru the hole, reaching out about 1 inch. Put the roller thrust bearing assembly around that, so, that the thinner washer touches the aluminum housing, then comes the roller cage, and the heavier washer.

Push the rear output bearing into the hole, that the rear end is about flush with the housing surface, and keep the thrust washer handy. /Fig.9./ Place the big output gear in its location simoultaneously with the cluster-assembly. Push the output shaft into its position, and do not forget the 2 thrust washers and the slip-yoke selector ring. Put the shift-fork-assembly in its position, and you are ready to move in. /Fig.10./

There is another way to do that too: Press the cone of the taper-bearing onto the shaft after the big gear and the thrust washer, but do not do anything yet with the cap. You can move the 2 units in position this way too, and you can push the cap over the cone from outside.

Regardless which method you use, it is very important, that the cones of the 2 taper bearings push the 2 thrust washers hard against the shoulders of the shaft.

Now push the idler shaft all of the way out, but do not use the little retaining plate. Take your stock roller-cages from the cluster-shaft, put the on the cluster-shaft, using the new, longer spacer. Applying grease, put the second roller-thrust bearing and the small O-ring onto the end of the shaft. Once again: The heavy washer touches the steel, and the thinner one the aluminum. /Fig.11./ The small O-ring is very important: It keeps the thrust-bearing from falling off during the assembly, and does not allow the thinner washer to slide into the groove.

Move the overdrive selector towards the transmission, and using the long bolts, align the rear part. Turn the hi-lo selector-arm about 45° out of the box, so it will engage easily into the slot of the shift-fork.

After this, without any hammer-like object, only by hand, start to push the two halves together. Be sure, that the gear-teeth engage properly. Do not use force, if you experience any resistance, investigate and correct it. When the idler-shaft starts to move in into its hole, it is moving against an air-sack. It is the only place, where you can use a light hammer. But move very slow, giving time-intervalls, that the air could disappair without damaging the silicone.

Hopefully, during the dummy assemblies you have established, that everything is OK. So stop about 1 inch earlier, and provide the blue silicone. Be sure, it fills out the irregular groove, to form an O-ring-like line. Apply the silicone as fast as you can, and close the two halves. Tighten the bolts immediately, but do not forget the thread-sealant. Apply the thread-sealant at the breather valve too.

Remove the spacer from the end of the input shaft, check the thrust-washer being in proper place, and use grease to keep it in there. Very gently push the bearing over the shaft, use the washer and tighten the nut, to appr. 100 - 120 in-lb. Using the paper-gasket, replace the inspection-cap.

Now replace the whole extension-housing assembly for the front-drive and the speedometer-drive housing. Use the sealant and paper-gasket for the extension-housing, but do not use the sealant yet for the speedo-housing. You have to establish the necessary preload for the taper-bearings. Toyota uses shims to do that. Although they are very inexpensive, we can not supply them, because nobody knows, how many you will need.

You have to apply as many, that after tightening the speedo-housing to the box, with paper-gasket inbetween, and the parking-brake-drum replaced, it withstands a certain torque. Do it in this way: Put the lo-hi shifter in neutral, and wind string around the bolts. /Fig.12./ You also can yuse spring-loaded scale. Disconnect the front-drive too. In this condition the output-shaft has to withstand 9 lbs. pull, but has to turn at 13 lbs. The breaking point can be anywhere between 9 and 13. After you found the proper shim size, apply the sealant and finish the assembly. Do not forget to fill up your transmission and transfer-case with oil.

That is all. Good luck and happy overdriving!