

Breaking Into Lock Out Hubs

Not so many years ago, four wheel drive meant a rigid front axle and a leaf spring suspension design that hadn't changed much since the days of the buckboard. To complete the package, power was transmitted to the front wheels through universal joints that didn't take kindly to radical changes in direction. Tire companies loved these vehicles almost as much as their heavily muscled owners.

Things started to change when small four wheel drive pickups began to grow in popularity. Today we call it all wheel drive instead of four wheel drive, and it's available on a range of vehicles that includes a lot more than trucks. All wheel drive is now sold primarily as a foul weather safety feature.

Even the most unfriendly climates don't require full time all wheel drive operation, however. And if the vehicle is going to spend most of its time on paved roads, full time all wheel drive operation puts an unnecessary strain on drivetrain components, increases steering effort, and decreases fuel mileage.

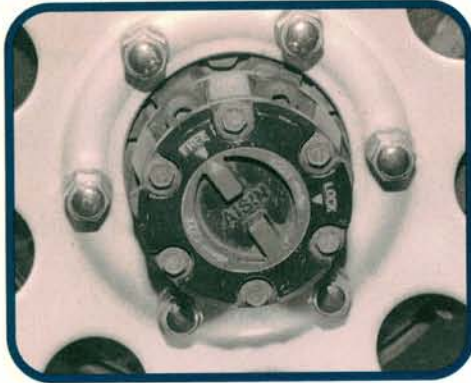
The auto manufacturers have developed many very sophisticated systems so that drivers can choose between two and four wheel drive operation. These systems range from fully automatic to completely manual.

We'll concentrate on the low tech end of the spectrum this time with maintenance tips for manual lockout hubs. If you're just breaking into the light utility vehicle service market, this article will help you repack the wheel bearings and repair the lockout hubs on Japanese pickup trucks.

A 1989 Isuzu pickup was used for our photographs. While the construction of individual components may vary from one manufacturer to the next, all import manual locking hubs share the same basic design. Our Isuzu hubs were manufactured by Aisin, a supplier to Toyota, Mazda, and others. The specifications listed apply to the Isuzu only. Check a service manual for service specifications applicable to your vehicle.

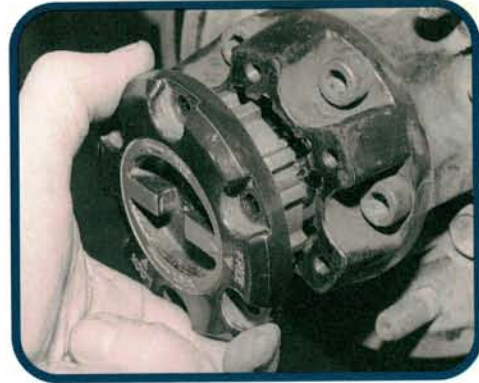
- By Karl Seyfert

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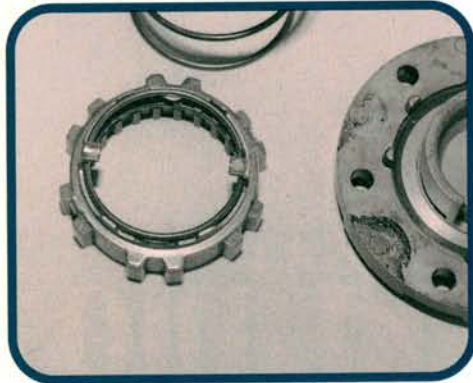
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The owner may not use four wheel drive more than a few times each year. A lot can happen while the hubs wait to be used. Try operating the lockout control. Does the control move smoothly and engage the hub properly? Check the hub for signs of external damage. Has the owner been beating on it with a hammer?



2

To begin disassembling the lockout assembly, remove the six hubcap bolts. Pull the hubcap straight out of the lockout housing. Check the condition of the paper gasket on the back side of the hubcap. This gasket is the lockout hub's first line of defense against dirt and water.



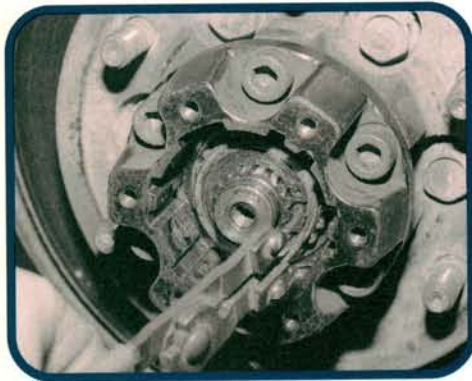
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When the lockout control is turned toward LOCK, a spiral ramp moves the hub clutch to engage the inner hub. To disassemble the hub clutch and hub cap, turn the hub clutch fully clockwise then depress the clutch to free the spring. During reassembly, the follower tabs must sit between notches in the hub clutch.



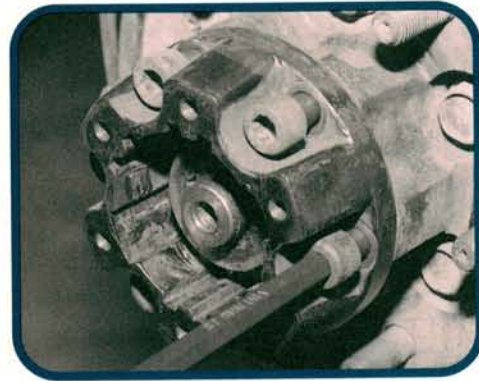
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Remove the snap ring, then disassemble the hubcap. Keep your eye on the small detent ball and spring. A dried out o-ring seal between the hubcap and selector control may cause difficult lockout operation. Damaged o-rings can also let water into the hub assembly. Lube the o-ring, then reassemble the hubcap.



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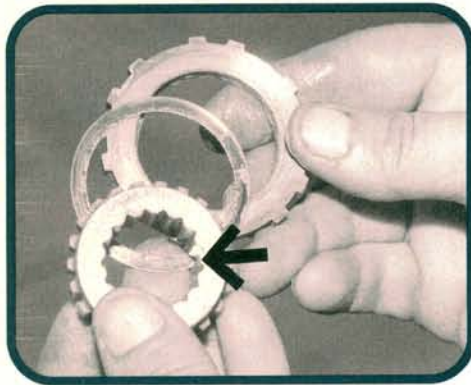
Inside the lockout housing, the outer end of the drive axle is supported by a hub ring, thrust washer, and inner hub. The hub ring is splined to the lockout housing, while the inner hub and drive axle free-wheel until four wheel drive is selected. Remove the drive axle snap ring and shims.



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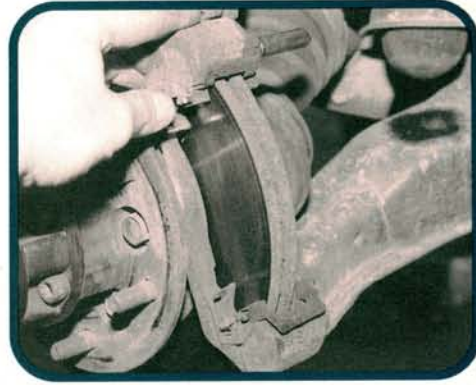
Six large hex head bolts secure the lockout housing to the hub. Mark the housing for index, then have an assistant apply the brakes while you loosen the bolts. If you've already removed the caliper frame, brace a pry bar between the lug studs, then loosen the bolts with a breaker bar.

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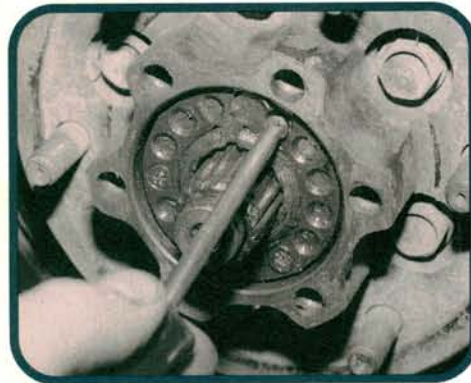
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Remove the housing parts from the lockout housing for inspection. Remove the large housing snap ring, then slide the hub ring out of the lockout housing. Remove the smaller snap ring, then inspect the bronze bushing and thrust plate for wear. Also inspect the inner hub splines (arrow).



8

The caliper, brake pads, and caliper frame must be removed to make room for the hub and rotor. If you're doing a wheel bearing repack only, remove the two large caliper frame bolts and position the caliper assembly out of the way. Suspend the assembly with mechanic's wire to avoid straining the brake hose.



9

A flat wheel bearing lock washer maintains the wheel bearing preload adjustment. Three very soft countersunk screws attach the lock washer to the bearing nut. Make sure your screwdriver tip is in good condition before attempting removal. Someone had already rounded off most of these.



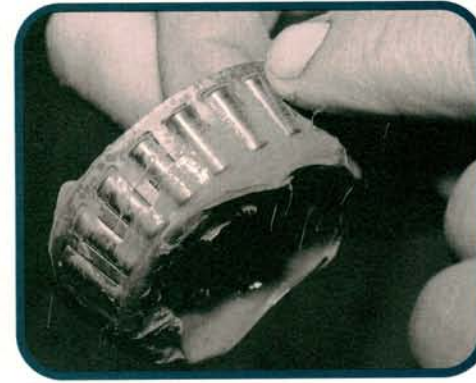
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Now remove the lock washer to reveal the hub nut. Factory techs use a special tool to engage the hub nut's two round holes. Both of our hub nuts were only finger tight. That should give you some idea just how long it had been since the last time the wheel bearings were repacked.



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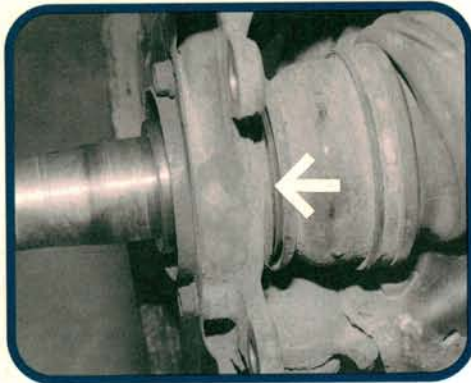
We removed both hub and rotor assemblies. New grease seals must have been hard to find the last time the bearings were repacked. The old, slightly distorted seals had been reused. At 78,000 miles, the condition of the wheel bearing grease indicated the bearings were long overdue for a repack.



12

A rusted bearing cage on the right axle indicated the old grease seal let water into the hub. Wheel bearing repacks are recommended at 30,000 mile intervals. This mileage usually matches the service life of the front pads. Repack more frequently if the truck is driven off road or through high water.

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A leaking drive axle seal at the inside of the steering knuckle can also allow dirt and water to find their way to the wheel bearings. A leaking seal may also cause drive axle needle bearing damage. A damaged needle bearing may go unnoticed until four wheel drive is selected and the lockout hubs are engaged.



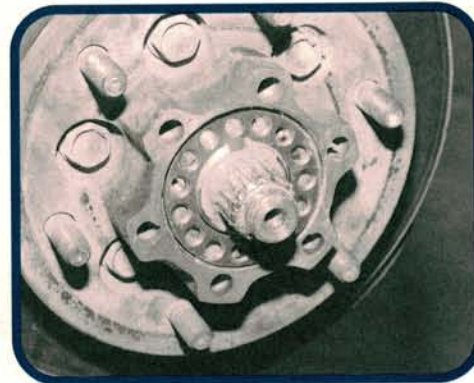
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After repacking the wheel bearings, we reinstalled the hub and rotor. The hub nut has very fine threads. Carefully install it with the countersunk screw holes facing outward. We didn't have the factory hub nut tool, so we "customized" a socket designed for the hub nut on a domestic four wheeler.



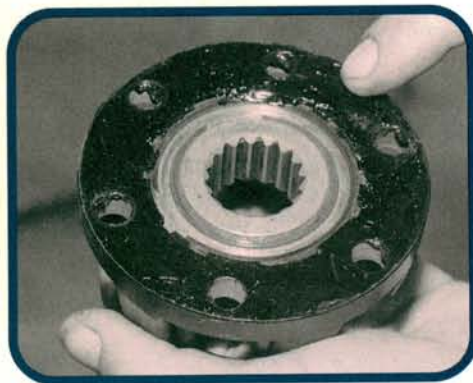
15

The square tool pegs fit into the round hub nut holes after some time at the grinder. Preload the bearings by torquing the hub nut to 29.4 Nm (21.7 ft lb). The factory recommends a rotating resistance check with a fish scale. If you don't have the scale, use your sense of feel to reach the proper final adjustment.



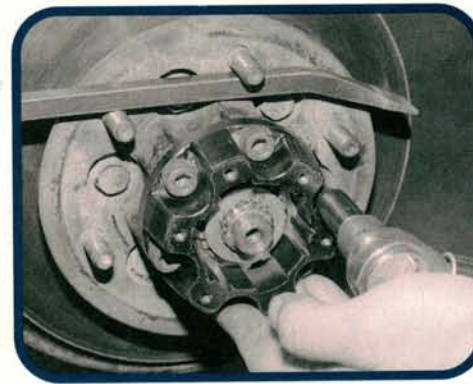
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The lock washer must also be installed with its countersunk holes facing out. If these holes don't line up with the hub nut holes, rotate the lock washer 180 degrees and try again. If the holes still don't line up, tweak the hub nut just enough to bring them into alignment. Add thread locker to the lock washer screws.



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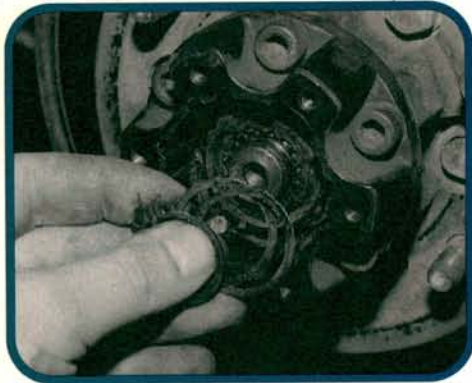
The lockout housing mounts directly to the machined surface of the hub without a gasket. Clean both surfaces, then spread a very thin coat of Loctite 515 or equivalent over the lockout housing surface before reassembly. This is the hub's only defense against invading dirt and moisture.



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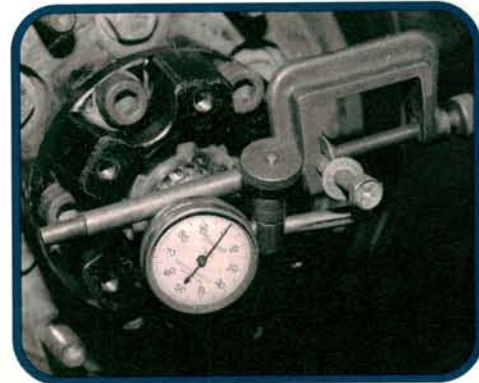
Apply thread locker to the lockout housing bolt threads. To hold the hub stationary while torquing the bolts, slide a bar between two lug studs and brace it against the frame. Tighten the lockout housing bolts evenly to a final torque spec of 58.9 Nm (43.4 ft lb).

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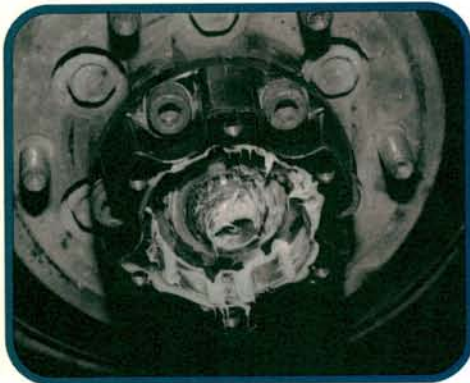
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Reinstall the drive axle shims and snap ring. Clearance should be as close to zero as possible (0.0 to 0.3 mm or 0.0 to 0.01 in). This clearance shouldn't change unless wheel bearings or lockout parts were replaced. Four different shims are available to adjust the clearance.



20

The manual specifies a feeler gauge measurement between the shims and the snap ring. It's difficult to get a feeler gauge inside the lockout housing. We substituted a dial indicator attached to the hub assembly and indexed on the axle shaft. Shim clearance was determined by moving the axle shaft in and out.



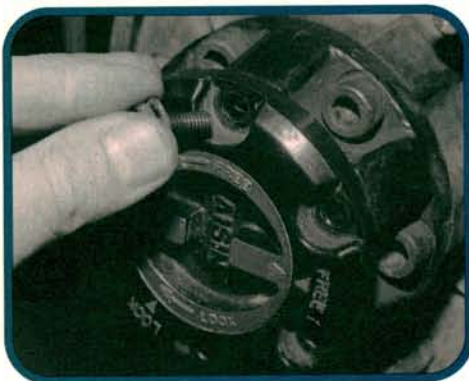
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How much grease inside the lockout housing is enough? What's the right kind of grease? Lack of grease has caused lockout failures on some Isuzus, and too much grease can cause difficult operation in cold weather. We lubricated all splined surfaces with a lithium based grease for easier hub clutch movement.



22

Before reinstalling the hub cap assembly, make sure the hub clutch is properly indexed. Turn the lockout control to the FREE position, then turn the hub clutch counterclockwise until it is fully retracted against the hub cap. Lightly grease the clutch splines, then slide the hub clutch into the housing.



23

Apply thread locker to the hub cap bolts, then torque them evenly to 11.8 Nm (8.7 ft lb). Move the lockout control from FREE to LOCK to make sure the hub is completely engaging and disengaging properly. Rotate the hub to a different position, then repeat the procedure to check for proper operation.



24

Reinstall the caliper frame, brake pads, and caliper. We happened to notice this torn caliper slide boot while reinstalling the caliper. Reinstall the wheel and torque the lug nuts to specification. Road test the truck for proper lockout hub operation and you're done.