Saab Transaxle Repair

PART ONE

If you've done any work on Saabs, you're already familiar with the 900's unique drivetrain layout. No other car since the BMC Mini has had the transaxle mounted directly to the bottom of the engine block. Fortunately, the Saab design provides separate lubrication for the engine and transaxle.

This setup makes it impossible to remove the transaxle without taking the engine along with it. Saab technicians don't consider this as big a deal as you or I might, and can have both units out of the car in a fairly short time. If you're thinking about doing any Saab transaxle repair, a good engine hoist and the special tools mentioned in this article should be considered essential.

The heart of this article concerns the repair of the transaxle pinion shaft bearings as well as the pinion housing that the bearings and races ride in. The pinion shaft also serves as the mainshaft for the transaxle. This design puts a lot of stress on the pinion bearings and housing.

Part failures in this area can happen in several different ways or a combination of ways. Opinions on the reasons for these failures are about as varied as the failures themselves. Here are a few:

- **Always keep clean lubricant and enough of it in the transaxle.** If the transmission is leaking, the lube level should be checked frequently until the leak can be repaired. There are plenty of places for leaks to start on this transaxle.
- **The correct lubrication is also very important to this transaxle.** Since it's mounted directly below the engine, the transaxle is subjected to a great deal of heat. Saab recommends that you use 10W-30 or 40 motor oil or EP 75 gear lube in this transaxle. Some Saab technicians swear by synthetic oils or a combination of motor oil (either regular or synthetic) and gear lube.
- **The pinion bearings may fail, especially if gear lube change intervals are ignored.** Some technicians feel the bearings are just too small for the job. Even though many 900s are turbocharged and some even have sixteen valve heads, Saabs were never designed for the Stoplight Grand Prix. If you do hole shots in a Saab, something expensive is going to break.
- **The four bolts holding the pinion housing into the transaxle case may loosen and back out.** This can occur on any year 900. Always use threadlocker and properly torque these bolts during reassembly.
- **The area most likely to cause problems on 900s up**

to 1983 is the pinion housing. Saab has used several different types of housings, starting with cast iron on the 99s and early 900s. At least two different cast aluminum designs followed on later models.

- **If the transaxle is apart for any reason, it's a good idea to inspect the pinion housing carefully.** It usually cracks where the flange area meets the round machined surface of the housing. Cracks may start out too small to see without magnafluxing.
- **Symptoms of a cracked housing include**: difficulty shifting gears (especially fifth), excessive drive train backlash, and lots of noise.
- **If the housing has broken all the way around, the jagged pieces can lock the transaxle**; especially when backing in reverse.

If any or all of the above symptoms are ignored long enough, other internal parts will be damaged and the whole transaxle ends up as a boat anchor.

The reinforced aluminum housing brought into production in late 1983 seems to have finally cured the cracking problem. Now there's only the bearings to worry about.

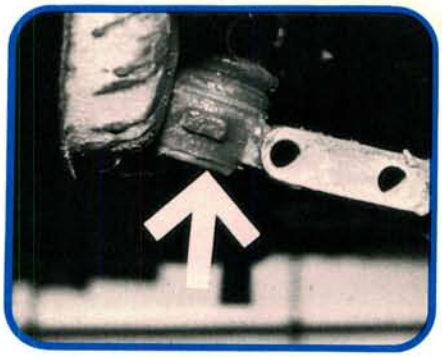
The transaxle used for this article (out of a 1982 model 900) had close to 100,000 miles on it and showed no visible housing cracks. The housing was replaced with the latest design because the owner wanted to get another 100,000 miles out of the car.

The transaxle has to be completely disassembled to get to the pinion housing and bearings. It didn't seem right to cover pinion housing and bearing service without detailing the steps leading up to it. So we're going to make this a two-part Saab story. This month we'll start with transaxle removal, disassembly, and overhaul tips, then finish up next month with pinion housing service and transaxle reassembly.

—By Karl Seyfert

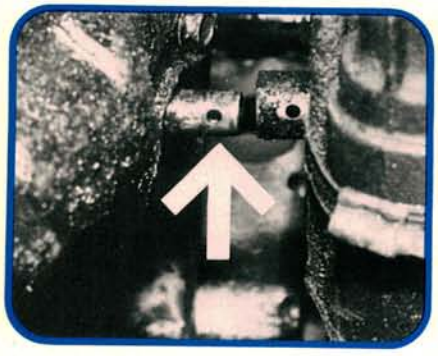
1

Engine and transaxle removal could be an article all by itself. If you're a first timer, consult a service manual for more detailed information. Remove the right front wheel; then raise the lower control arm with a jack. Placing this tool (arrow) under the upper control arm unloads the lower ball joint.



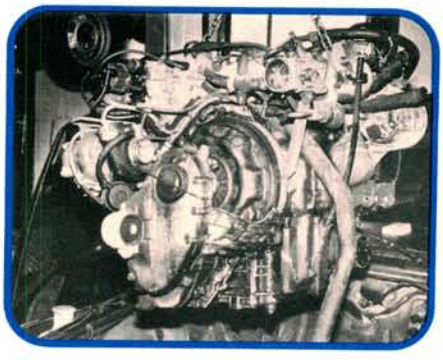
2

Remove the boot clamps from both inner CV joints and slide the boots back. Remove the two bolts holding the right lower ball joint (arrow) to the control arm. Push the right spindle and hub assembly outward until the right tripod joint clears the inner CV joint. Prop the ball joint in this position.



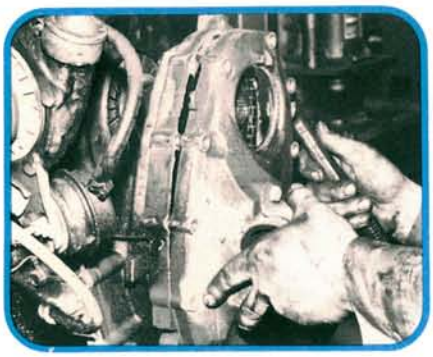
3

The engine and transaxle can be removed after moving the right front suspension. It's a close fit and involves some wiggling. The engine and transaxle must be pushed to the right to clear the left axle tripod joint before the engine can be lifted. Drive out the pin and separate the shift linkage (arrow).



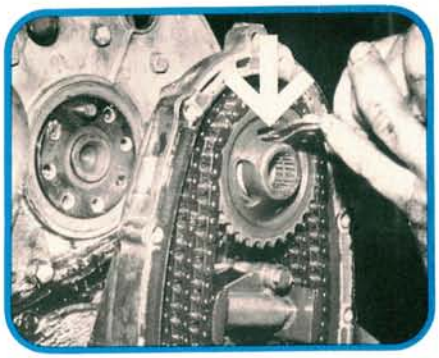
4

Install a spring retaining tool in the pressure plate before disconnecting the clutch hydraulics. Consult a manual for the specific parts that must be removed before the engine and transaxle can be removed. This was a 900 Turbo so there were extra parts to remove before they were hanging high.



5

If you don't want to wrestle with the transaxle on a bench, leave it attached to the engine. Refer to the "Saab Clutch Replacement" article in the February 1989 issue of *Import Service* for details on 900 clutch removal and replacement. Start by removing the primary gear case front cover.

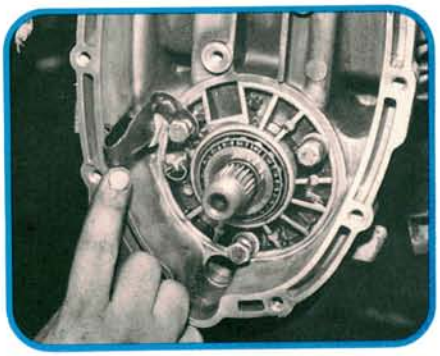


6

Inspect the three single roller chains for wear and excessive slack. The tensioner can only take up so much slack. Reach through the slot in the upper gear (arrow) to release the snap ring. Then remove the peened nut securing the lower sprocket. Now you can slide the chain and gears past the tensioner as an assembly.

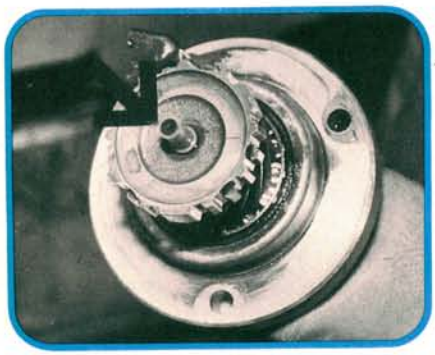
7

Remove the chain tensioner. Note the small hole (white arrow) in each tensioner piston. These must face the rear for proper tensioner operation. The tensioner check ball (black arrow) should move freely. Use thread sealer on the tensioner bolts during installation to prevent oil leaks.



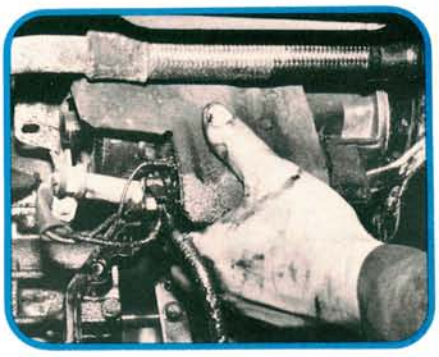
8

This oil pickup feeds oil from the chains back to the input gears. If the chains were loose, look for wear on the oil pickup. Loose chains can jump teeth, just like timing chains. The real fun starts when the chains wear a piece off the oil pickup and the piece starts working its way through the transaxle.



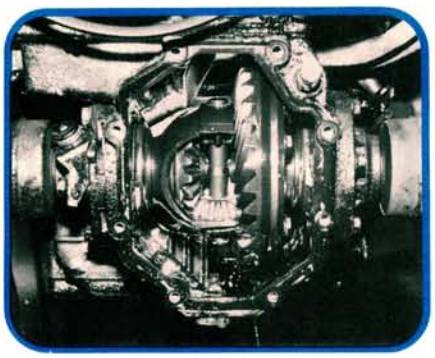
9

Remove the input gear and bearing housing at the bottom of the primary gear case and check its condition. The plastic oil tube at the end (arrow) will break if the pinion bearing housing has broken, since this will let everything rock back and forth inside the case.



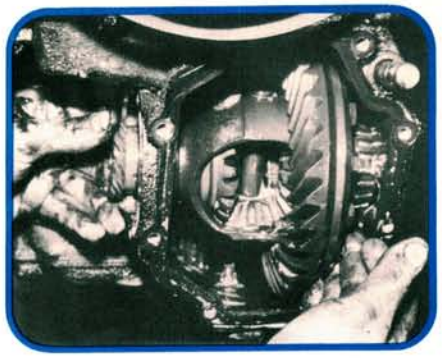
10

Remove both side covers from the transaxle. The starter motor may interfere with removal of one long bolt in the rear side cover. The starter also blocks some engine to transaxle bolts, so remove it now if the engine and transaxle are going to be separated. Don't forget the starter ground wires during reassembly.



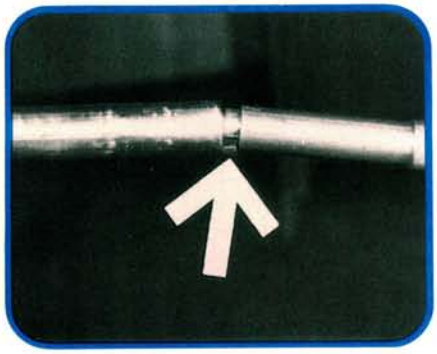
11

Remove the differential cover. Remove the bolts from both differential side bearing carriers. Remove the left carrier carefully to avoid damaging the plastic speedometer gears. The shims between the carriers and the case adjust side bearing preload and backlash. Keep each shim with its proper seat.



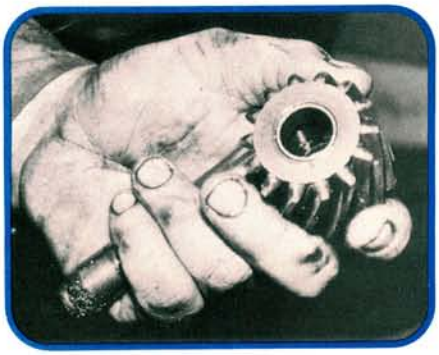
12

Position the differential as shown or it won't come out of the case. Push it to the left, then swing the right carrier bearing out of the case. Protect the plastic speedo gear. Remove the lockplate (not shown) to the right of the pinion housing. Note the position of the cluster gear and reverse shafts.



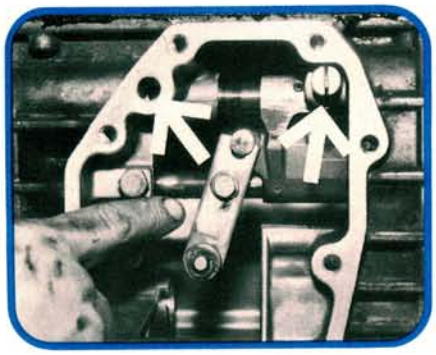
13

Saab gear shaft removal tool #83 90 049 grabs the notch at the end of the cluster gear shaft (arrow) and reverse shafts. It also makes positioning the shafts easier during reassembly. Pull the reverse gear shaft out completely. Back out the cluster gear shaft about eight inches at this time.



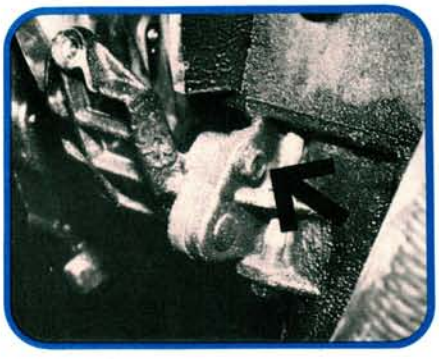
14

Remove the reverse idler gear and give it a close inspection. If the customer has been doing rolling-reverse engagements, the ends of the teeth may be getting a little iffy. These still looked pretty good after almost 100,000 miles.



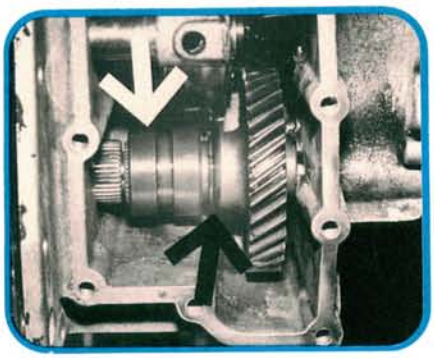
15

With the reverse idler out of the way, take a good look at three things in this area. Make sure this reverse shift lever isn't bent. Remove the detent spring and ball from their hole (left arrow). Keep an eye on the stopper pin (right arrow). It likes to fall out on the floor when you're not looking.



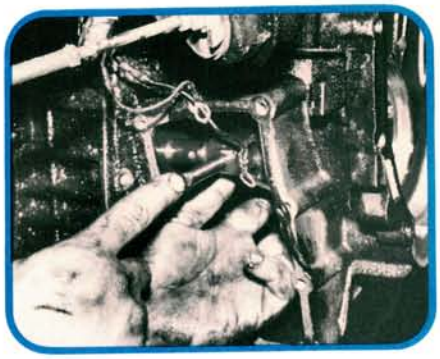
16

Remove all primary gear case bolts, including the two in the flywheel area. Don't forget this one (arrow) hiding below the left corner of the block or it's good-bye case. We're not going to remove the case yet, only move it back far enough to remove the constant mesh input gear.



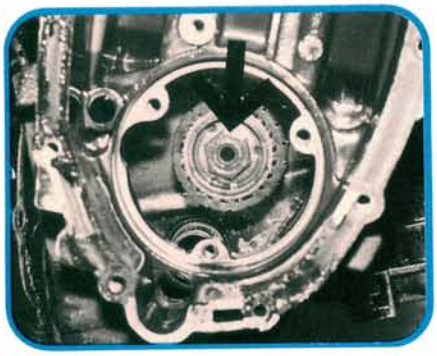
17

Use angle-tipped snap ring pliers to move this snap ring (black arrow) out of its groove. Then slide it to the end of the input gear. Now push the collar (white arrow) that splines the input gear to the cluster gear away from the cluster gear. Angle the gear and collar through the opening in the case.



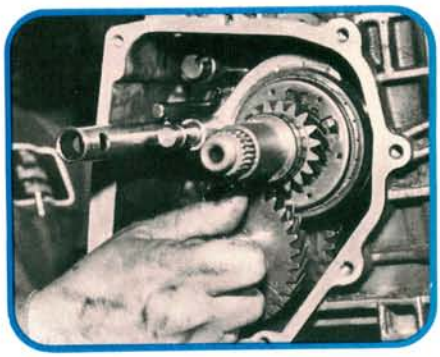
18

Remove this pin holding the fifth gear shift fork to the selector shaft. Slide the shift fork and collar forward on the selector shaft, then swing both to the side and out through the opening in the case. Note the position of the shift collar teeth.



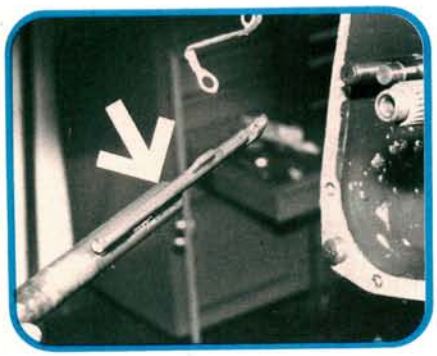
19

Remove this nut (arrow) at the end of the pinion shaft. It's peened in three places, and shouldn't be reused. Remove the fifth gear and synchronizer assembly from the pinion shaft. Once they're out of the way, remove the primary gear case.



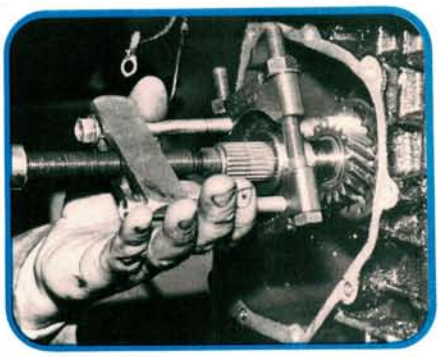
20

Inspect the cluster gear and pinion shaft end bearings in the primary gear case. They'll both have taken a beating if the pinion bearing housing is cracked. Pull the pinion shaft all the way out, then remove the cluster gear. Inspect the caged roller bearing in the far end of the cluster gear.



21

Remove the reverse gear selector shaft (arrow). Some gears ride on removable races, not directly on the pinion shaft. The factory tool bolts to the case and pushes the pinion shaft out the back of the case, leaving the gears and races behind. The races can be removed without using the factory tool, however.

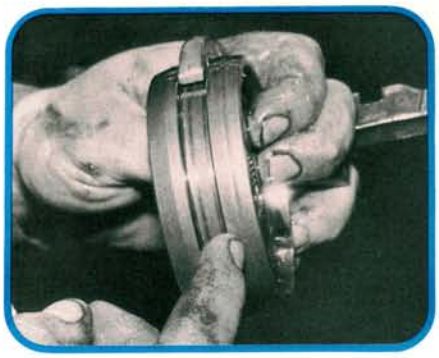


22

Without the factory tool, you just have to improvise. The gear races can be removed individually. Attach a gear puller to the oil groove of the front pinion shaft bearing race as shown. The gear races aren't really a press fit, just an interference fit. Use the puller to back the race off the pinion shaft.

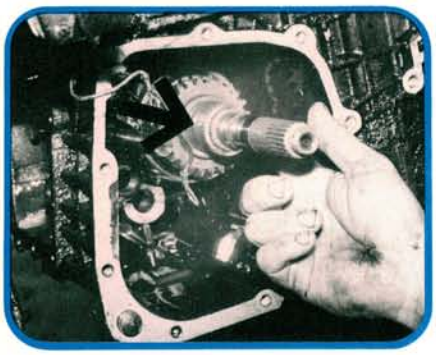
23

Remove fourth gear and its synchronizer assembly. Remove the three-four selector shaft. Take out the three-four synchronizer hub, sleeve, and selector fork. Inspect the sides of the selector fork for wear in the area where it rides on the synchronizer sleeve.



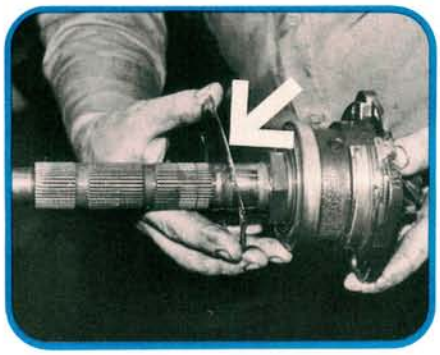
24

Both synchronizer sleeves have this distinct ridge on their outer edge. Saab manuals don't specify correct position. The inside of the sleeve looks the same on both ends. Saab specialists tell us that the notches usually face second and third gears. When in doubt, put them back like you found them.



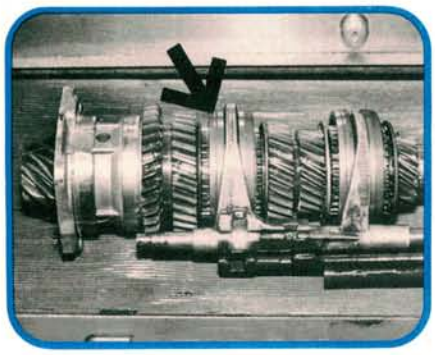
25

Continue removing gears, shift forks, and bearing races. A pointed, hooked seal puller will fit into the oil holes of the gear races (arrow). Tap the seal puller carefully to remove the race if it's stuck. Move to the opposite side of the race if it begins to cock on the pinion shaft.



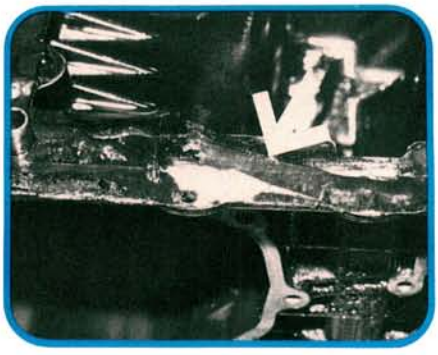
26

Remove the four pinion housing bolts, then pull the pinion shaft out through the rear of the transmission. Pinion depth is set by these shims (arrow) between the housing and the transaxle case. Don't reuse shims that have been damaged by a broken housing or loose pinion housing bolts.



27

We reassembled the gears, synchronizers, and selector levers and rods so that you could see how everything fits together in the case. If you hadn't noticed, the one-two synchronizer sleeve was assembled backward. It should have its groove (arrow) facing the groove in the three-four sleeve.



28

The case is a lot easier to handle with everything out of it. This gasket had split (arrow) and slid into the case, causing a large engine oil leak. There aren't any case bolts here. We'll give everything a good cleaning and be back next month to put the whole thing back together again.