In the last issue of *GEARS* we looked at a Saturn that was losing reverse — an all-too-common condition in these units. In this issue, we’ll take a look at the Saturn TAAT transaxle, and talk about some of the general issues you should be aware of when working on these units.

The 1st clutch return spring assembly has lighter springs than the 2nd, 3rd, and 4th clutch return spring assemblies (figure 1). The difference is obvious with just a visual inspection. The wire diameter on the 1st clutch return springs is about 0.055”; the 2nd, 3rd, and 4th clutch return spring wire diameter is about 0.073”. Mixing these up can cause delayed engagements or harsh shifts.

The output shaft forward and reverse dog clutch assembly can be a source of confusion. The dog clutch hub is assembled onto the output shaft with the wide ends of the slots facing toward 2nd gear (figure 2). The groove on the outside of the dog clutch sleeve faces toward the reverse gear.

Inspect the differential carrier carefully. Pay close attention to the pinion shaft fit in the carrier (figure 3). The bore in the carrier can become elongated, allowing the pinion shaft to move.
The 1st clutch return spring assembly has lighter springs than the 2nd, 3rd, and 4th clutch return spring assemblies (figure 1). The difference is obvious with just a visual inspection.

The dog clutch hub is assembled onto the output shaft with the wide ends of the slots facing toward 2nd gear.
back and forth. Eventually the roll pin will break, which lets the pinion shaft slide out, resulting in internal parts and case destruction.

Always replace the input and output shaft nuts when working on a TAAT. They’re single-use, interference-fit locknuts that come with a special locking compound applied to the threads. Torque the input and output shaft nuts to 111 foot-pounds (150 Nm).

This transaxle has a 1st design input shaft that uses a spiral lock ring to position the input shaft to the converter O-ring (figure 4). The spiral lock ring fits closer to the turbine splines. A misplaced O-ring or spiral lock ring will cause TCC apply problems and trouble codes. ATRA bulletin #639 (available from ATRA Online) shows the correct installation of the O-ring and snap ring on the shaft.

The input and output shaft bushings and shaft tubes should be inspected as part of regular overhaul procedure. You can check the fit of the tubes in the bushings by cutting a narrow strip of scotch tape (1/16” wide) with scissors, and sticking it at the very end of the tube on one side. Allow some of the tape to hang off of the end of the tube and fold it in slightly (figure 5). The end of the tube should not fit into the shaft bushing without damaging the tape. The shaft bushings can become loose and move out of position in the shaft, or wear and cause crossleaks in the clutch and lube circuits. Measure the depth of the bushings in the shaft by inserting the tube into the shaft until you feel it just contact the edge of the bushing. Mark the tube at this point with a pen, or by just holding your thumb in place. Remove the tube from the shaft and measure the distance from the end of the tube to your marking point (Figure 6). The input
shaft bushing depth should measure 5.125" + or - .125". The output shaft bushing depth should measure 9.16" + or - .020". Make sure there is no wear or scoring on the ends of the shaft tubes where the bushings ride. These procedures are outlined in detail in ATRA bulletin #733.

**Vehicle Inspection**

Whenever you remove the transmission from any vehicle, there are some other items you should check while the transmission is out.

Remove and inspect the flexplate: Mark its position on the crankshaft with a dab of paint or whiteout (figure 7). Saturn flexplates don’t have an offset bolt hole pattern, so they can be bolted on in any position. Reinstalling the flexplate in its original position will help avoid any mysterious balance problems and vibrations. While you have the flexplate off, inspect it carefully (figure 8). They can crack around the bolt holes, and sometimes the cracks are hidden under the bolt heads so you won’t see them until you unbolt it from the crank.

With the flexplate off you can get a good look at the rear crankshaft seal to see if it’s leaking. Even if you decide not to tackle a rear seal replacement, record any evidence of leaks on the repair order.

You should also check crankshaft thrust clearance with a dial indicator (figure 9). It’s fast and easy to do, and will help you avoid transmission, converter, or noise issues down the road. Prying the crankshaft back and forth at the front pulley, the Saturn we worked on last time had 0.008” of thrust clearance. The specifications are 0.002” – 0.0089” with a maximum of 0.0098”, so that crank wasn’t going to fall out on the road anytime soon.

Inspect the alignment dowels and the pilot hole in the crankshaft for wear or damage, and don’t forget to flush the cooler so you can do a flow test after the unit is installed.

Any leaks, damaged CV boots, bad mounts, etc. should also be identified, so if the customer decides to have them repaired, you can perform the work while the transmission is out of the vehicle, and these items are easily accessible.

Two things to watch out for when installing the transaxle are the engine coolant temperature sensor, and the grounds that attach to the top two bellhousing bolts. The engine coolant temperature sensor is on the back of the cylinder head, just above the top edge of the bellhousing (figure 10). If you get a little too enthusiastic when jacking the transmission into the car, you may end up breaking this sensor.

There are four ground eyelet connectors that bolt to the studs on the top two bellhousing bolts: two on each stud. When looking at the bellhousing from the driver’s side, the computer grounds are on the left stud, and battery negative goes to the right stud. Needless to say, these are important grounds that need to be cleaned and reinstalled. And don’t forget to plug in the intake air temperature sensor, or you’ll get an annoying MIL beaming in your eyes, with a matching DTC.

**Adaptive Learn Systems**

For the computer to allow an adaptable shift event, certain criteria have to be met:
About Saturn TAAT Transaxles

- The engine and transmission have to be up to operating temperature, engine running in closed loop
- No trouble codes in memory

...and many newer vehicles will disable all adapts if the fuel level is below 1/8 tank. These are important requirements to remember, because you can drive a car all day long, and that hard 1-2 shift isn’t going to get better until you:

A) Put some gas in the tank...

B) Check the codes and take care of whatever’s necessary to turn out the MIL...

C) Fix whatever is not allowing the engine to run in closed loop.

D) Fix whatever it is that is not allowing the engine/transaxle to warm up to operating temperature, or...

E) Fix whatever is preventing those temperature signals from reaching the computer.

Once you’ve taken care of any of these problems, the computer should allow you to perform the adaptive learn procedure, as discussed in ATRA bulletin #635. Always perform this procedure after any transmission repair, to make sure the transmission is performing the way it’s supposed to.

While there’s nothing mysterious or exceptionally difficult about the Saturn TAAT transaxle, successful rebuilding or repairs depend on becoming familiar with its idiosyncrasies, and following proper diagnostic and repair procedures.