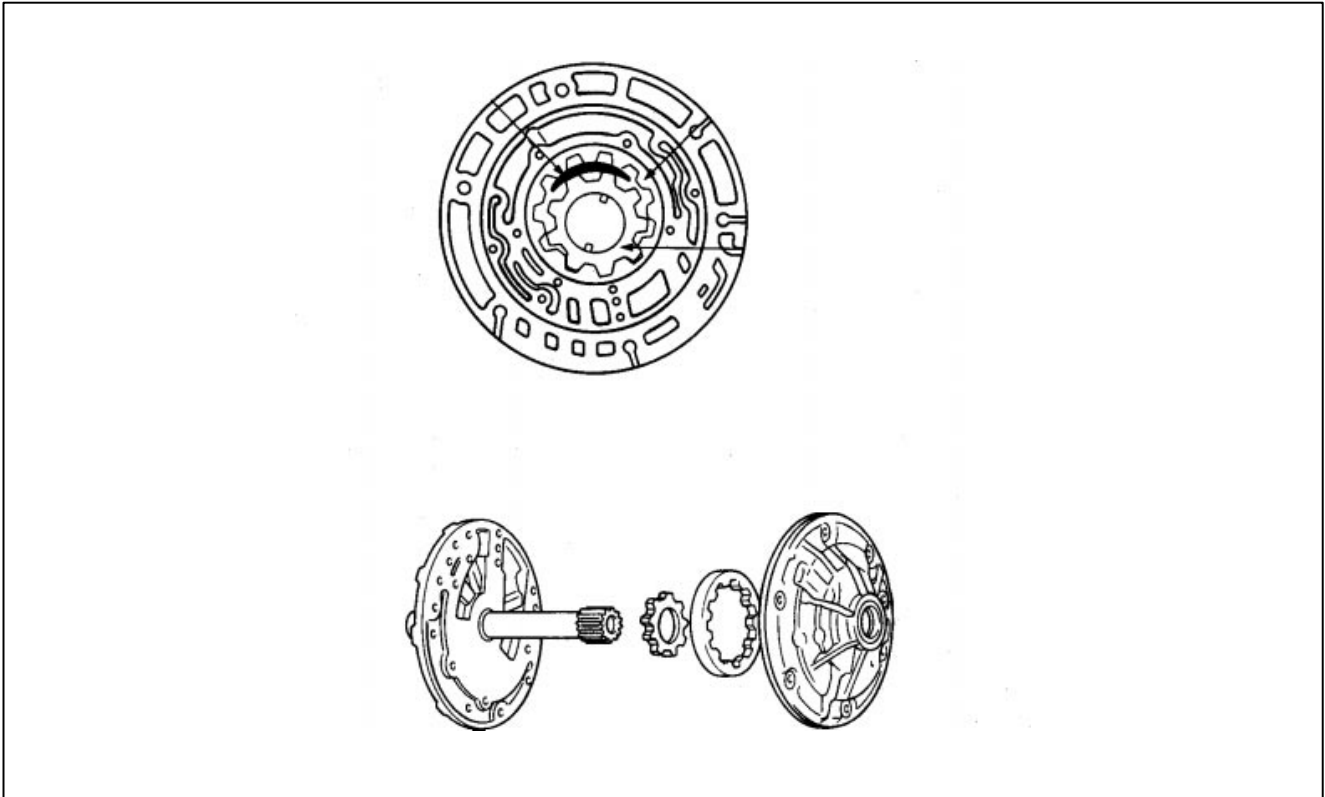


Section 7

TRANSMISSION OIL PUMP



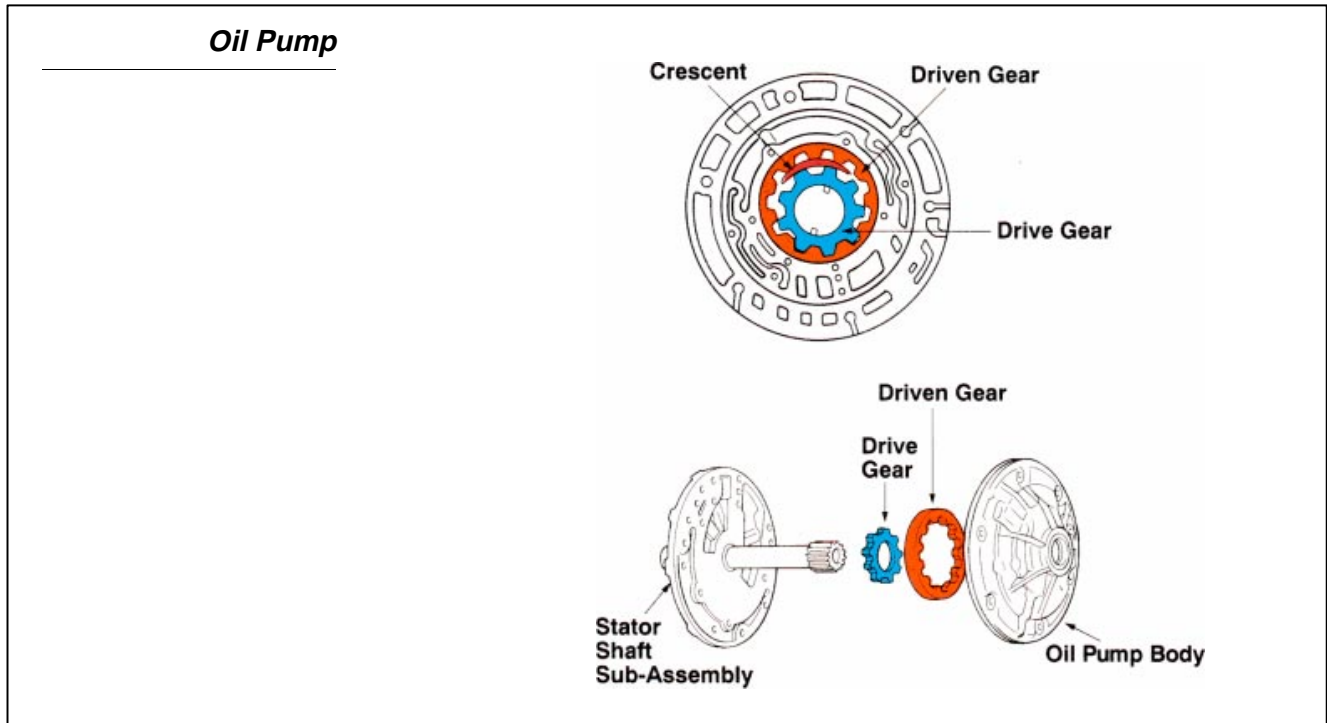
- Lesson Objectives:**
1. Demonstrate the measurement of the oil pump gears to determine the serviceability of the oil pump.
 2. Demonstrate the measurement of oil pump bushings to determine the serviceability of the oil pump.
 3. Describe the operation of the gear type oil pump.

Purpose of the Oil Pump

The pump used in Toyota automatic transmissions is the crescent type. It is designed to:

- Provide fluid to lubricate the planetary gear set.
- Provide continuous fluid to the torque converter.
- Provide a volume of fluid to the clutches and brakes.
- Supply operating pressure to the hydraulic control system.
- Provide support for the torque converter stator (stator reaction shaft) as well as the front of planetary gear set.

Oil Pump Operation The oil pump is driven by the torque converter. The center drive gear is driven by the torque converter drive hub. The external teeth of the drive gear mesh with the internal teeth of the driven gear, causing it to rotate in the same direction. Located between the two gears is the crescent, which separates the inlet of the pump from the outlet. As the gears rotate in a clockwise direction, a low pressure develops on the inlet side of the pump as the gear teeth move away from each other. On the other end of the crescent, the gear teeth come together forcing the fluid through the outlet.



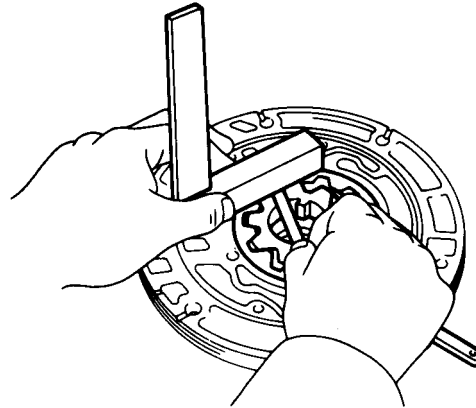
The pump therefore controls the volume of fluid being delivered. Pressure is determined by the amount of leakage and controlled drains on the outlet circuits and engine speed. The pressure regulator valve in the valve body controls pressure by allowing for leakage based on vehicle speed and engine load. Maximum pressure is regulated by the pressure relief valve that allows for leakage when the oil pressure overcomes the tension of a calibrated spring. More detail about these valves will be discussed in the section on the valve body.

The oil pump can be checked in two ways: by means of a pressure gauge set while the transmission is still in the vehicle or mechanically by the use of feeler gauges when the pump has been removed and disassembled.

Gear Height Measurement

Place a straight edge across the pump housing and drive and driven gear. Measure the clearance between the straight edge and each gear using a feeler gauge. If the clearance is greater than the maximum, the gears should be replaced.

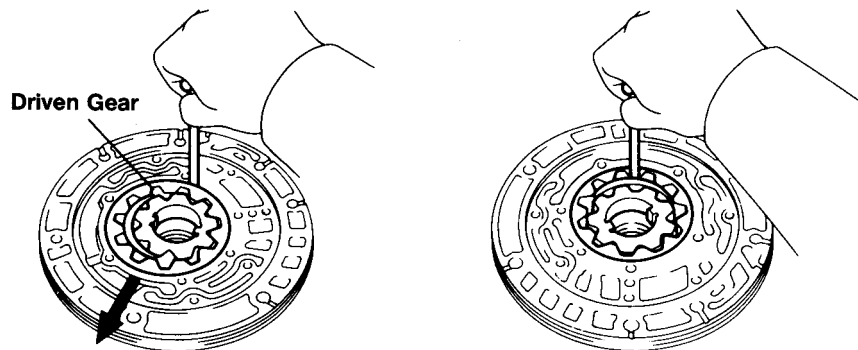
Pump Gear Height



Gear Clearance Measurement

Check pump body clearance by pushing the driven gear to one side and measuring the clearance between the gear and the pump body on the opposite side. Then measure the driven gear to crescent clearance. If the clearances exceed the maximum specification, replace the pump subassembly.

Pump Gear Clearance



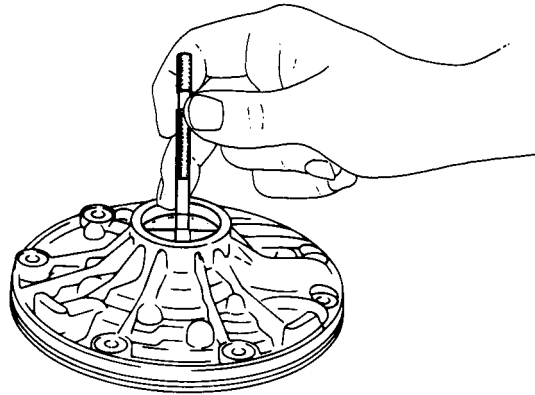
CAUTION

If the gears are removed from the pump housing, make sure that you mark the gears with machinist blue. The importance here is that both gears face up when reinstalled because the gear teeth have worn-in. It is not important that the same teeth are matched. Do not scratch the gears to mark them as this may damage the housing when the pump is assembled.

Pump Bushing Diameter

The oil pump bushing supports the torque converter drive hub. If the bushing is worn excessively, the front transmission seal may wear prematurely. To measure the diameter, first remove the oil seal and then using a snap gauge or other measuring device, measure the inside diameter of the bushing in three positions. If the largest diameter is greater than the specification, replace the oil pump body.

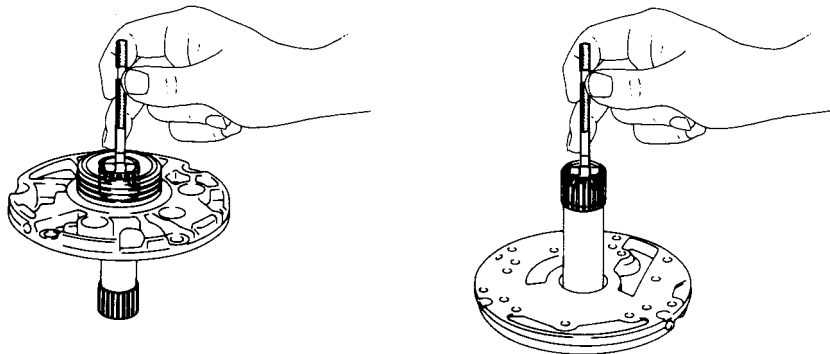
Pump Bushing Diameter



Stator Shaft Bushing Inspection

The stator shaft bushings support the input shaft of the transmission. Measure the inside diameter of the bushings with a snap gauge or other measuring device in three different positions. If the largest diameter is greater than the specification, replace the stator shaft assembly.

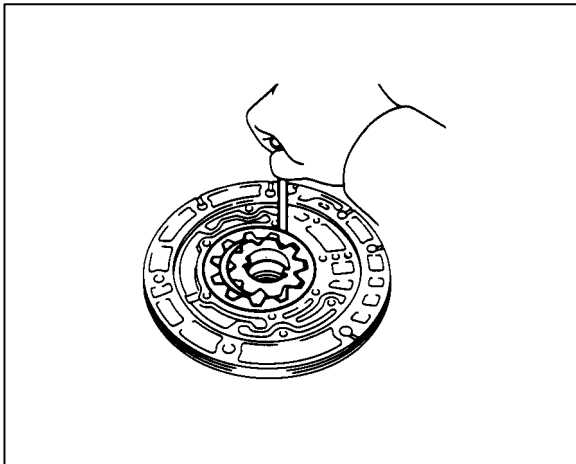
Stator Shaft Bushing



NOTE: When the stator shaft bushings are worn, also check the ring grooves of the input shaft. Worn bushings allow the input shaft to wobble and the top surface of the grooves will wear, closing the width of the groove.



WORKSHEET 3
Oil Pump Inspection



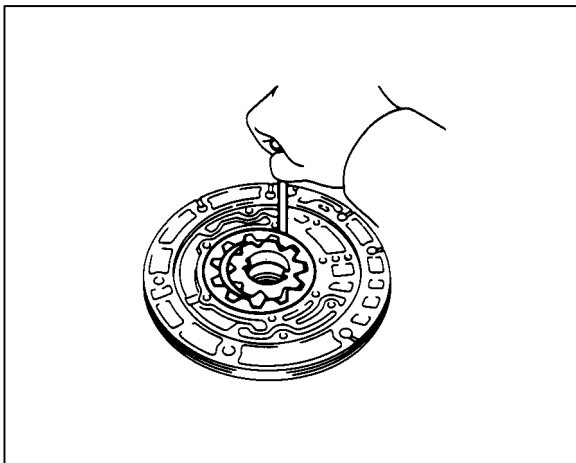
Perform the following procedures. Write in the measurement or specification in each of the boxes.

1. Check body clearance of driven gear.

Push the driven gear to one side of the body.

Using a feeler gauge, measure the clearance.

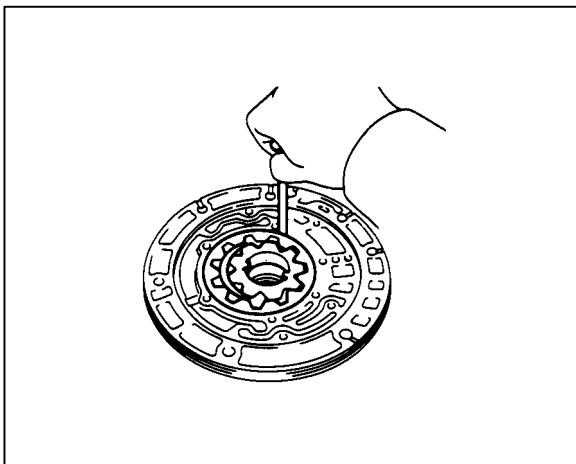
	Spec.	Measured	OK/NG
Standard Body Clearance			
Maximum Body Clearance			



2. Check tip clearance of driven gear.

Measure between the driven gear teeth and the crescent shaped part of the pump body.

	Spec.	Measured	OK/NG
Standard Body Clearance			
Maximum Body Clearance			



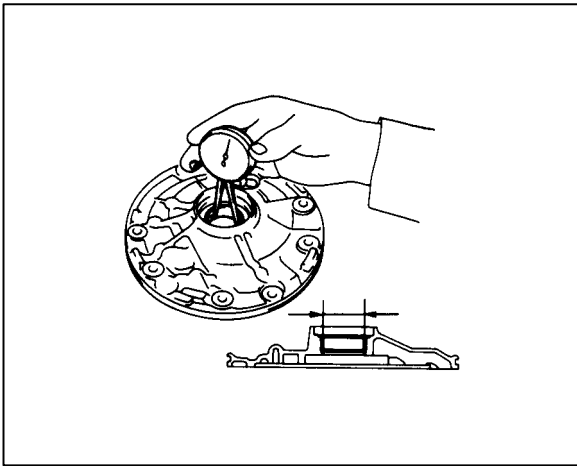
3. Check side clearance of both gears.

Using a steel straightedge and a feeler gauge, measure the side clearance of both gears.

	Spec.	Measured	OK/NG
Standard Body Clearance			
Maximum Body Clearance			



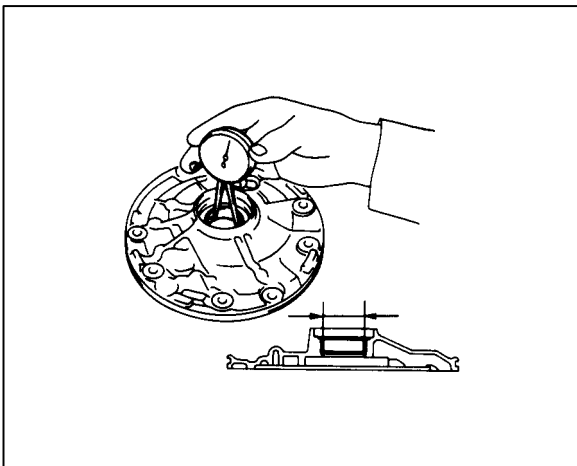
WORKSHEET 3
Oil Pump Inspection



4. Check oil pump body bushing.

Using a dial indicator, measure the inside diameter of the oil pump body bushing.

	Spec.	Measured	OK/NG
Maximum Inside Diameter			



5. Check stator shaft bushings.

Using a dial indicator, measure the inside diameter of the stator shaft bushing.

	Spec.	Measured	OK/NG
Maximum Inside Diameter			
Front Side			
Rear Side			
Recommendation			

STOP! Do not proceed! Obtain Instructor OK.