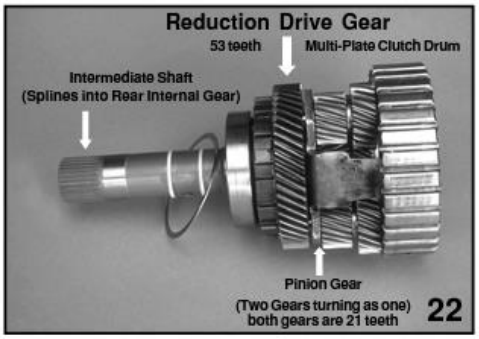
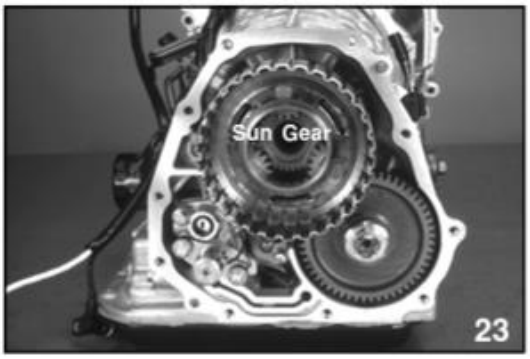
Variable Torque Distribution (VTD)

Variable Torque Distribution (VTD) is an addition to the current 4EAT transfer section. VTD is designed to smoothly transfer and divide the power from the engine to the wheels. This new system for North America is equipped on all Subaru vehicles with Vehicle Dynamic Control (VDC).

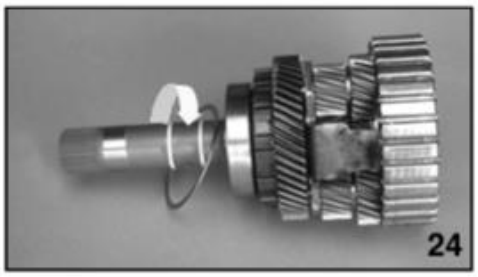
The view of the extension case area is similar to the current 4EAT Phase 2. The difference is the Reduction Drive Assembly.



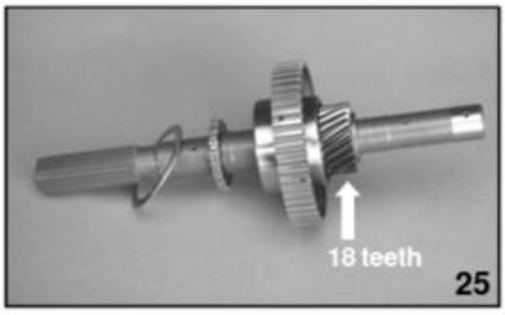
An Intermediate Shaft is splined to the Rear Internal Gear, carrying power to a Sun Gear. The Sun Gear is made onto the end of the Intermediate Shaft. The rotating Sun Gear delivers power to a set of Pinion Gears.



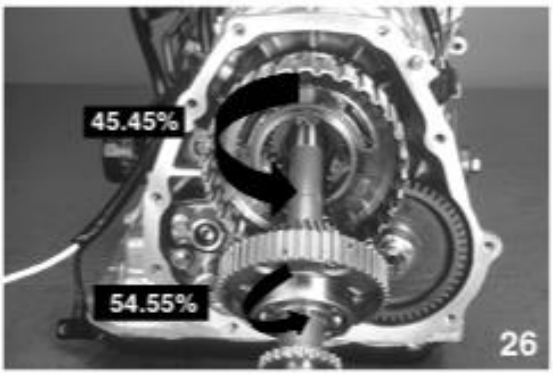
The Pinion Gears are two gears made together. The smaller gear and larger gear have the same number of teeth. The Intermediate Sun Gear drives the smaller Pinion Gear and the larger Pinion Gear.



The Pinion Gear is secured to the carrier and delivers power to it. The carrier will now rotate, driving the Reduction Drive Gear. This supplies power to the front wheels. At the same time, the larger Pinion Gear is driving the Rear Drive Shaft.

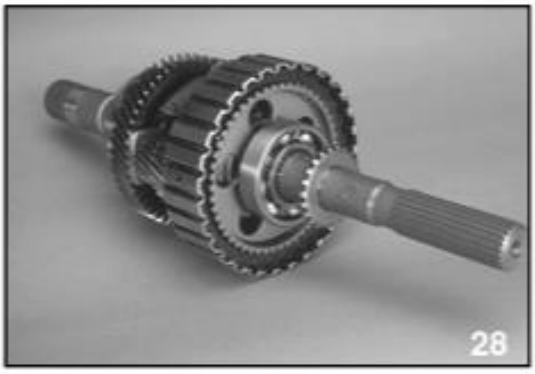


A Sun Gear made on to the end of the Rear Drive Shaft receives the power and transfers the power to the shaft.
The final drive shaft is splined to the Rear Drive Shaft. This carries power to the rear differential.



Assuming the friction of the front and rear tires is the same, the power is split 54.55% to the rear and 45.45% to the front.

The Front Wheels load the reduction drive and driven gears.
The Rear Wheels load the Rear Drive Shaft and Pinion Gears.
Driving the vehicle results in the Pinion Gears rotating and advancing around the Intermediate Sun Gear.
The Intermediate Sun Gear has 33 teeth; the Small Pinion has 21 teeth.
The Rear Drive Shaft Sun Gear has 18 teeth; Large Pinion has 21 teeth.
You can calculate the power split by dividing 18 by 33 for the Rear Wheels. The remaining power drives the Front Wheels.



The TCM adjusts the duty ratio of the MPT clutch to maintain the optimum transfer of power.
A large speed difference in the rear to the front wheels results in the MPT clutch locking the Rear Drive Shaft to the carrier.
Power is then split 50% to the front and 50% to the rear.