C. Drivetrain

1. Drive modes

a. New Sport mode (all models)

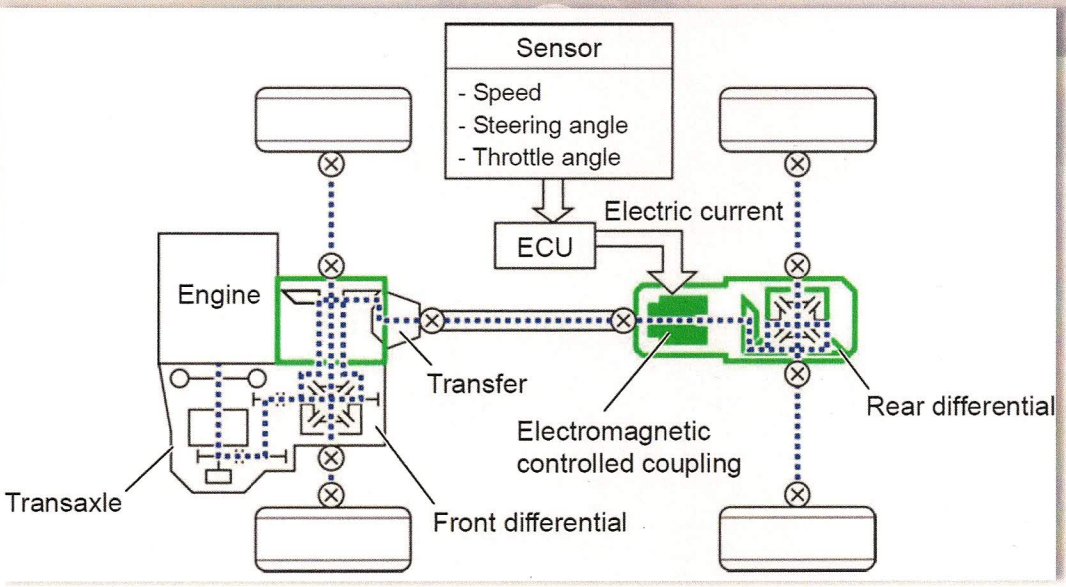
1) Improves throttle response by making it less progressive and more linear and responsive
2) Changes control parameters in transmission lockup and shifting for quicker shifts and engagement
3) Reduces Electronic Power Steering (EPS) assist by approximately 20% to improve steering feel and increase feedback
4) On AWD models, Sport mode adds many unique performance features (detailed in the AWD section of this document)

b. New ECO mode:

1) Regulates A/C output and other comfort features
2) Increases fuel efficiency
3) Decreases throttle responsiveness

D. AWD with Dynamic Torque Control

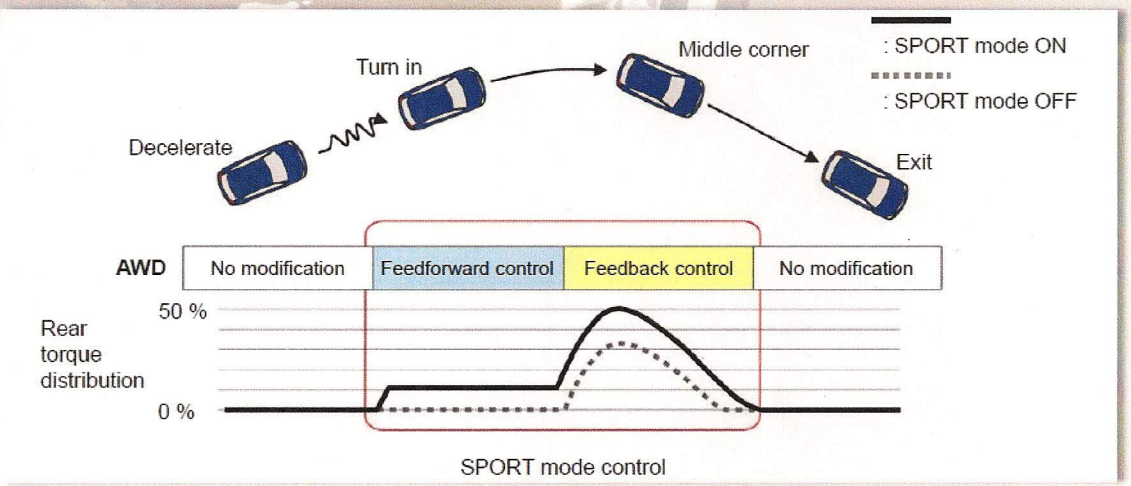
1. The Integrated Dynamic Drive System is a sophisticated, high-speed interactive management system which coordinates control of the Toyota RAV4's new Dynamic Torque Control 4WD, Vehicle Stability Control (VSC), and Electric Power Steering (EPS) systems to enhance the compact SUV's performance, handling, and safety
2. The AWD control system constantly monitors driver's actions and vehicle dynamics every 6/1000 of a second to transfer power where needed



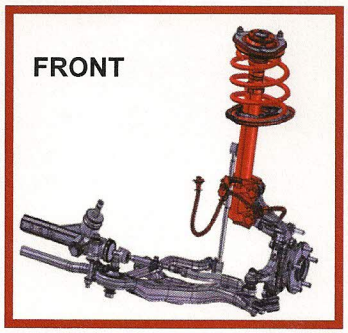
3. An electromagnetically-controlled coupling located on the front of the rear differential uses signal information from the ECU to distribute the necessary amount of torque from the front to the rear wheels when needed
   - **a.** ECU sources data from wheel speed, steering angle, yaw rate, Gx & Gy, and brakes.
   - **b.** Differs from previous generation RAV4's AWD system by incorporating additional data and controls to and from the engine control, automatic transaxle, and Electric Power Steering systems
   - **c.** Changes result in improved fuel efficiency, start-off stability, and optimal handling, which allows the driver to track the intended driving line and in all driving conditions
4. The system features three unique drive modes:
   - **a.** Auto mode
     1) Operational when Lock and Sport mode are not selected – the "default" mode
     2) When accelerating from a stop, up to 50 percent of torque can be distributed to the rear wheels to ensure stability (like a full-time AWD system)
     3) While cruising at speed, torque distribution to the rear wheels is eliminated to improved fuel efficiency
     4) Under braking in all modes, AWD is disengaged to maximize the effects of ABS and VSC
   - **b.** Lock mode
     1) When accelerating from a stop, maximum torque is transmitted to the rear wheels to enhance traction in muddy or snowy conditions
     2) Useful for getting out of conditions where the vehicle is stuck and needs immediate power to all four wheels to get free
     3) At speeds of approximately 25 mph, Lock mode automatically disengages and switches to Auto mode

c. Sport mode (all new for 2013 model year)

1) Changes control parameters for the AWD, transmission software, throttle responsiveness, and EPS assist for a more dynamic response on dry pavement for maximum AWD traction
2) Adds Pre-Torque Feedforward Control
   a) Optimizes AWD response to driver inputs to proactively provide the driver with sportier, more predictable and intuitive driving dynamics by blending in up to a 10 percent distribution of torque to the rear wheels at initial turn in to help improve steering response and stability through corners
   b) By proactively distributing torque based on steering angle and speed of input, the driver experiences more stable and predictable handling, allowing them to better stay on his/her intended driving line in all conditions
   c) Most other AWD systems are purely reactive in comparison
3) Utilizes Yaw Rate Feedback Control:
   a) Power distribution based on dynamic motion and feedback sensed through steering angle and cornering forces
   b) Aggressively adjusts front/rear torque distribution as necessary up to 50 percent to rear to help vehicle rotate through corner and lay down power efficiently
   c) If slippage occurs, works to quickly adjust torque distribution to correct wheel slippage and restore traction
   d) VSC retuned so it is less obtrusive
4) Enhances driving pleasure by improving handling stability more suited to sporty driving



SPORT mode control

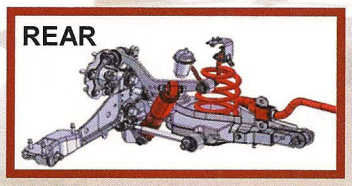


E. Suspensions

1. Front: MacPherson strut type
2. Rear: Trailing-Arm Double-wishbone type
   - **a.** Larger stabilizer bar used to balance roll rigidity and stabilize vehicle stance when cornering, inspiring confidence and improving steering feel
3. Spring and dampening rates optimized
4. Friction reduced in struts and bushings

F. Electronic Power Steering (EPS)

1. Gives driver more confidence
   - **a.** Provides a stable steering "feel" when corning
   - **b.** Provides precise steering feedback



G. Fuel Economy

1. FWD (all grades):
   - **a.** 24 (City) / 31 (Highway) / 26 (Combined)
2. AWD (all grades):
   - **a.** 22 (City) / 29 (Highway) / 25 (Combined)

Fuel Economy (MPG) **(+) denotes MPG improvement versus previous generation RAV4**		2.5L			
		FWD	(+/-)	**AWD**	(+/-)
New RAV4	**City**	24	**+2**	22	**+1**
	Highway	31	**+3**	29	**+2**
	Combined	26	**+2**	25	**+1**
		2WD		**4WD**	
Current RAV4	**City**	22	-	21	-
	Highway	28	-	27	-
	Combined	24	-	24	-

VII. SAFETY

A. Active Safety

1. Star Safety System™ features are included that help the driver maintain control of the vehicle when cornering and braking
   - **a.** Enhanced Vehicle Stability Control (VSC)
   - **b.** Traction Control (TRAC)
   - **c.** Anti-Lock Brake System (ABS)
   - **d.** Electronic Brake-Force Distribution (EBD)
   - **e.** Brake Assist (BA)
   - **f.** Smart Stop Technology (SST)
2. Brakes
   - **a.** Ventilated disc brakes in front
     1) LE: 10.8-in. x 0.98 in. rotor size (diameter x thickness)
     2) XLE/Limited: 11.7-in. x 1.10-in. rotor size (diameter x thickness)
   - **b.** Drum-In type solid disc brakes in rear
     1) Increased size from previous generation
     2) 11.1-in. x 0.472-in. rotor size (diameter x thickness)

B. Passive Safety

1. Supplemental Restraint System
   - **a.** Includes a class-leading eight standard airbags (source: manufacturer's websites, August 2012)
     1) Driver and front passenger Advanced Airbag System
     2) Driver knee airbag
     3) Front passenger seat cushion airbag
     4) Driver and front passenger seat-mounted side airbags
     5) Front- and second-row Roll-Sensing Side Curtain Airbags (RSCA)

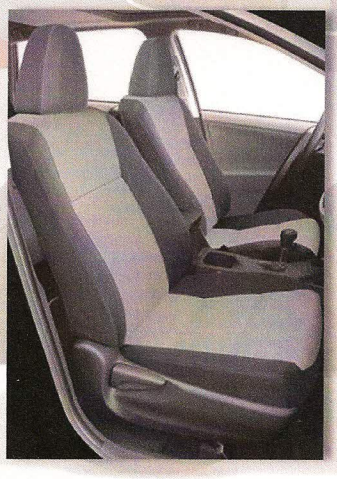
b. New features

1) Two-chamber side airbags
   a) Separate inflation pressures for the chest and hip chambers
2) Front passenger seat cushion airbag
   a) Mounted inside front passenger seat cushion just under front passenger's thighs
   b) Secures the position of the front passenger's hips when inflated, which helps prevent the hips and body from moving forward in certain types of front collisions
3) Driver knee airbag
   a) Helps mitigate impacts to the driver's legs in the event of a collision

c. Improved Features

1) A sub-vent hole is now in the passenger seat airbag to optimize the inflation rate

2. Seatbelts



a. Front driver and front passenger seatbelts

1) Equipped with a pre-tensioner that takes up seatbelt slack to prepare occupants for the air bags, as well as force limiters that limit the amount of force the seatbelt puts on your chest during an impact

b. Selectable force-limiter function (front passenger seat only)

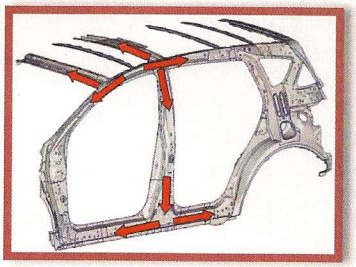
1) The selectable force limiter helps reduce pressure on the occupant's chest by determining the load on the passenger (high or low) during a collision

c. Three-point ELR (Emergency Locking Retractor) seatbelts are now included for rear seats

1) Previous generation RAV4 did not include this feature for the rear seatbelts

d. ALR (Automatic Locking Retractor) on all seatbelts

e. LATCH anchors included on outboard second-row seats with top tethers on all three rear seats



(Cabin Impacts)

3. Collision Protection
   - **a.** The use of high-strength steel helps distribute collision energy
   - **b.** Two impact beams in each of the rear doors increase impact absorption
4. Other Passive Safety Features
   - **a.** Whiplash Injury Lessoning (WIL) seats
     1) Rigidity, shape, and seatback positioning in the front seats help restrain the head and torso simultaneously during impact