Prius Brake Hydraulics

Cut Valve - SCSS

In AE this is ACC sensor #1

SMC1 & SMC2 are master cut valves

Without power (voltage) then SMC 1&2 are normally open solenoids – the other solenoids are normally closed

SLA… high pressure

SLR… low pressure or release pressure valve

…FL means Front Left
…FR means Front right
…RL means rear left
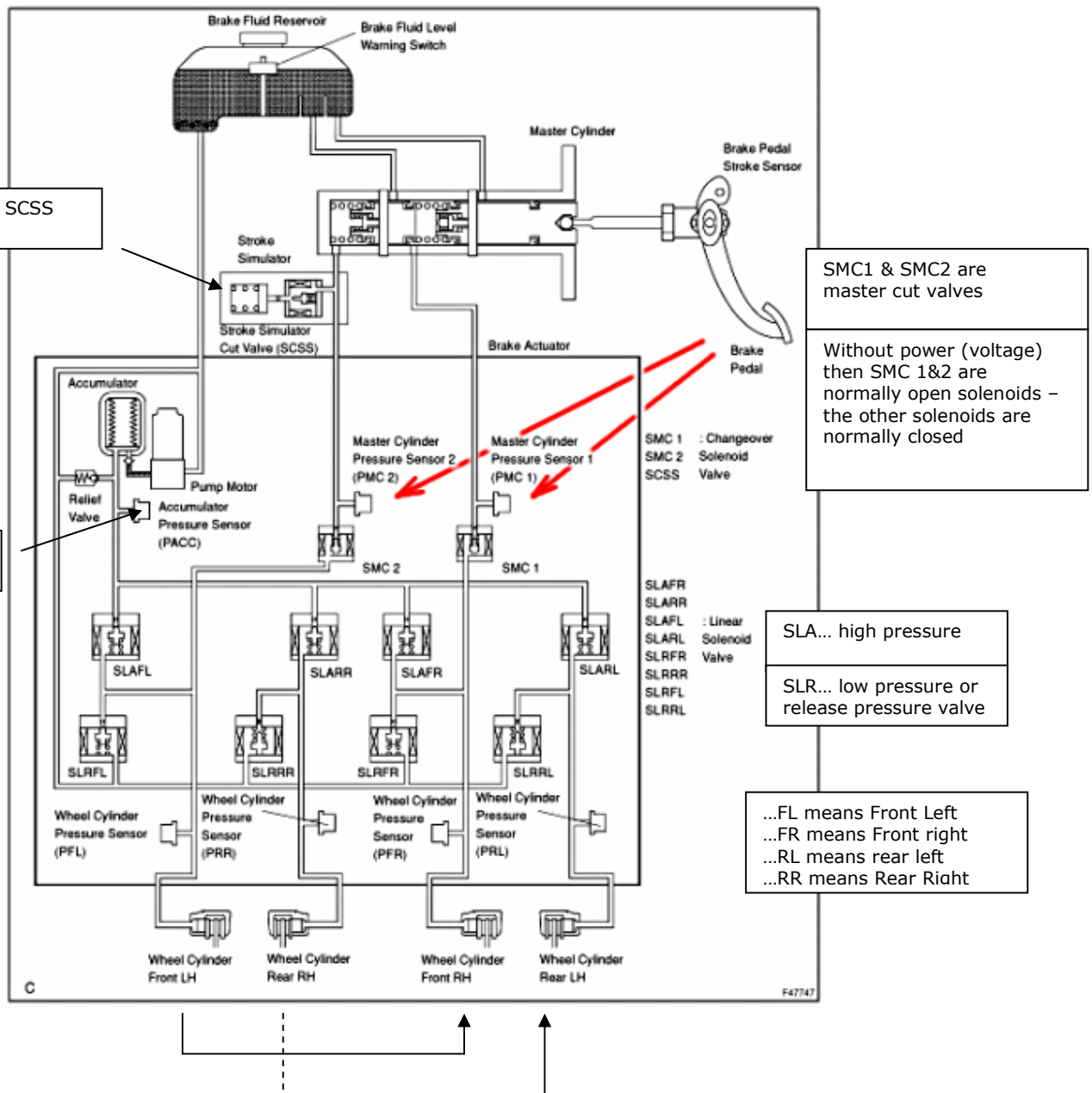…RR means Rear Right

This is the hydraulic system - double lines indicate brake pipes. In normal use SMC 1 and SMC 2 are closed, preventing flow from the master cylinder to the front pistons. Pressing the pedal increases the pressure sensed by PMC 1 and PMC 2. The fluid flows into the Stroke Simulator, which provides the pedal feel.

PMC 1 and PMC 2 feed electrically (from the sensors) into the Skid Control ECU, which decides how much braking is required. It asks the Hybrid Vehicle ECU (HV ECU) how much braking force it can provide with regen, and uses the friction brakes to make up the difference, and also any special braking to keep the vehicle stable. The pressure in the actual brake lines comes from the accumulator - basically a

reservoir of high-pressure fluid. The pump runs whenever the accumulator pressure (measured by PACC) is lower than a programmed value.

To apply the brake to a given wheel, the appropriate SLA solenoid is opened, which increases the pressure in that brake pipe - it's closed again when the appropriate pressure is reached (measured by PFL, PRR, PFR, PRL). To release the brake, the SLR solenoid is opened, which returns the fluid to the reservoir. By opening and closing these valves, it can modulate the braking force.

It's my belief that any car labeled with 'Electronic Brake force Distribution' has such a 'dual-circuit' braking system. The only wrinkle in the Prius is the interaction with the Hybrid Vehicle ECU for regen.

The box of capacitors, next to the 12V lead-acid aux battery in the rear, is a **back-up power supply** to allow some assist braking, should the 12V supply fail utterly and the Skid Control ECU no longer be able to perform its task. The fail-safe mode - where all valves close except SMC 1, SMC 2, which open - has no assist and can only brake the front wheels.

The following are actuations for AE for ABS / TCS

Function	AE as of October 13, 2013
Accumulator zero down	activates
Stroke simulator cut pattern	
Master cut valve 2 action	SMC2
Master cut valve 1 action	SMC1
ECB invalid	
Actuator bleed pattern activation	activates
Power supply bleed pattern activation 2	activates
Power supply bleed pattern activation 1	activates
Main relay 2 for ECB	
Main relay 1 for ECB	