Octovalve Position Mapping for Thermal Demands

Demand	Source/Sink	Octovalve Position	Heat Pump	Concept
Cabin Heating	Ambient	Mode 3	On	Radiator absorbs ambient heat, coolant transfers it to evaporator for refrigerant heating.
	Powertrain	Mode 4	On	Series loop uses powertrain heat, coolant warms evaporator for cabin heating.
	Battery	Mode 5	On	Battery loop to evaporator transfers battery heat to refrigerant for cabin heating.
Cabin Cooling	Ambient	Mode 5	On	Powertrain loop to radiator rejects heat; battery loop supports evaporator cooling if needed.
	Battery	Mode 5	On	Battery loop to evaporator, heat rejected to battery via condenser and coolant.
Battery Heating	Powertrain	Mode 4	Optional	Series loop transfers powertrain heat to battery, bypassing radiator.
	Ambient	Mode 3	On	Radiator heat to coolant, then to battery via condenser and pump.
Battery Cooling	Ambient	Mode 2	Off	Series loop with radiator dissipates battery heat to ambient air.
	Cabin	Mode 5	On	Battery heat to evaporator, rejected via refrigerant to cabin or ambient.
Powertrain Cooling	Ambient	Mode 5	Off	Parallel loop connects powertrain to radiator for heat rejection.
	Battery	Mode 4	Optional	Series loop transfers powertrain heat to battery if cooler, though ambient is preferred.

Mode Descriptions

- **Mode 2: Series Cooling**
  This mode connects the battery and powertrain in a single coolant loop that includes the radiator, primarily for cooling both components simultaneously.
- **Mode 3: Ambient Heating**
  This mode uses ambient air as a heat source to warm the cabin or battery. The battery and powertrain are in parallel loops.
- **Mode 4: Heat Scavenge Heating**
  This position connects the battery and powertrain in series, bypassing the radiator to use only internal heat for cabin or battery heating.
- **Mode 5: Parallel Cooling**
  This mode separates the battery and powertrain into independent coolant loops. Battery actively coold, powertrain passively cooled