

Overview of hybrid transmissions

RWD or AWD usable as RWD:

Lexus IS300h:

150429MIRA9: It should be shortened and lightened GS450h transmission without renaux gears.



Specifications

Gasoline Engine:	178 hp (133 kW), 2.5-liter Aluminum Alloy Engine
Electric Motor:	141 hp (105 kW), Permanent Magnet Motor
Transmission:	Automatic Only
HV Battery:	230.4 Volt Sealed NiMH-Battery
Curb Weight:	3,571 - 3,792 lbs/1,620 - 1,720 kg
Fuel Tank:	17 gals/66 liters
Frame Material:	Steel Unibody
Body Material:	Steel Panels except for Aluminum Engine Hood
Seating Capacity:	5 passenger



Lexus GS450h:

150439MIRA9:

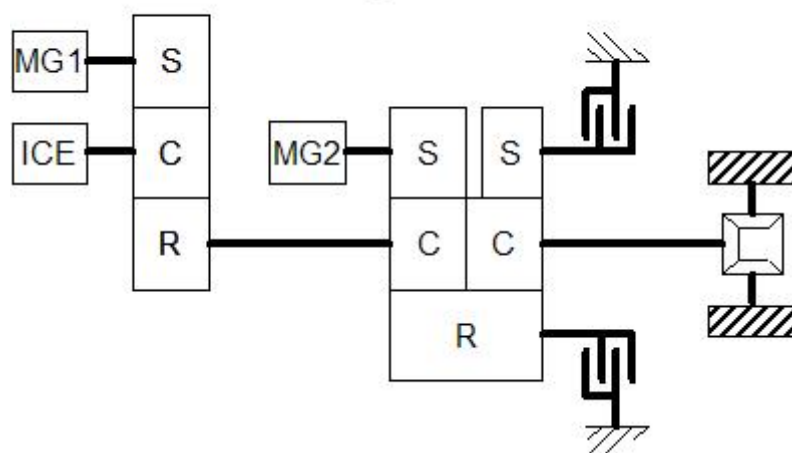
- some resources (EVALUATION OF THE 2008 LEXUS LS 600H HYBRID SYNERGY DRIVE SYSTEM from U.S. Department of Energy Vehicle Technologies) say LS600h and GS450h are the same, but official dismantling manuals declares less power for MG2 of GS450h (147 HP)
- MG1 should be the same motor as MG2 of Camry



WEIGHTS	
Kerb weight (min. – max. kg)	1,825 – 1,910
Gross vehicle weight (kg)	2,305 – 2,325
Towing capacity – braked (kg)	1,500
Towing capacity – unbraked (kg)	750

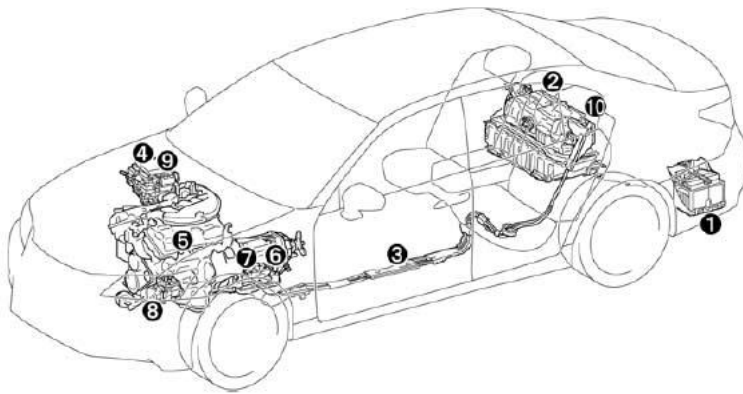
ELECTRIC MOTOR/GENERATOR		
Motor type		Permanent magnet, synchronous
Max. voltage (V)		650
Max. output (bhp/kW)		197/147
Max. torque (Nm)		275
HYBRID BATTERY		
Battery type		Nickel-metal hydride
Nominal voltage (V)		288
Number of cells		240
Battery capacity (Ah)		6.5
Battery peak output (bhp/kW)		52/39
LEXUS HYBRID DRIVE SYSTEM		
System type		Series/parallel full hybrid
System output (bhp/kW)		341/254
TRANSMISSION		
Type		E-CVT
Gear ratio	Low	3.900
	High	1.900
	Differential	3.266
PERFORMANCE		
Max. speed (mph)		155
Max. speed in EV mode (mph)		24.9
Max. range in EV mode (miles)		0.62
Acceleration 0 – 62mph (sec)		5.9
STEERING		

GS450h / LS600h



Specifications

Gasoline Engine:	289 ps (213 kW), 3.5-liter Aluminum Alloy Engine
Electric Motors	200 ps (147 kW), Permanent Magnet Motor
Transmission:	Automatic Only
HV Battery:	288 Volt Sealed NiMH-Battery
Curb Weight:	4,112-4,211 lbs/1,865-1,910 kg
Fuel Tank:	17.5 gals/66.3 liters
Frame Material:	Steel Unibody
Body Material:	Steel Panels except for Aluminum Engine Hood
Seating Capacity:	5 passenger







Lexus LS600h:

150439MIRA9:

- some resources (EVALUATION OF THE 2008 LEXUS LS 600H HYBRID SYNERGY DRIVE SYSTEM from U.S. Department of Energy Vehicle Technologies) say LS600h and GS450h are the same, but official dismantling manual declares less power for MG2 of gs450h.
- MG1 should be the same motor as MG2 of Camry?

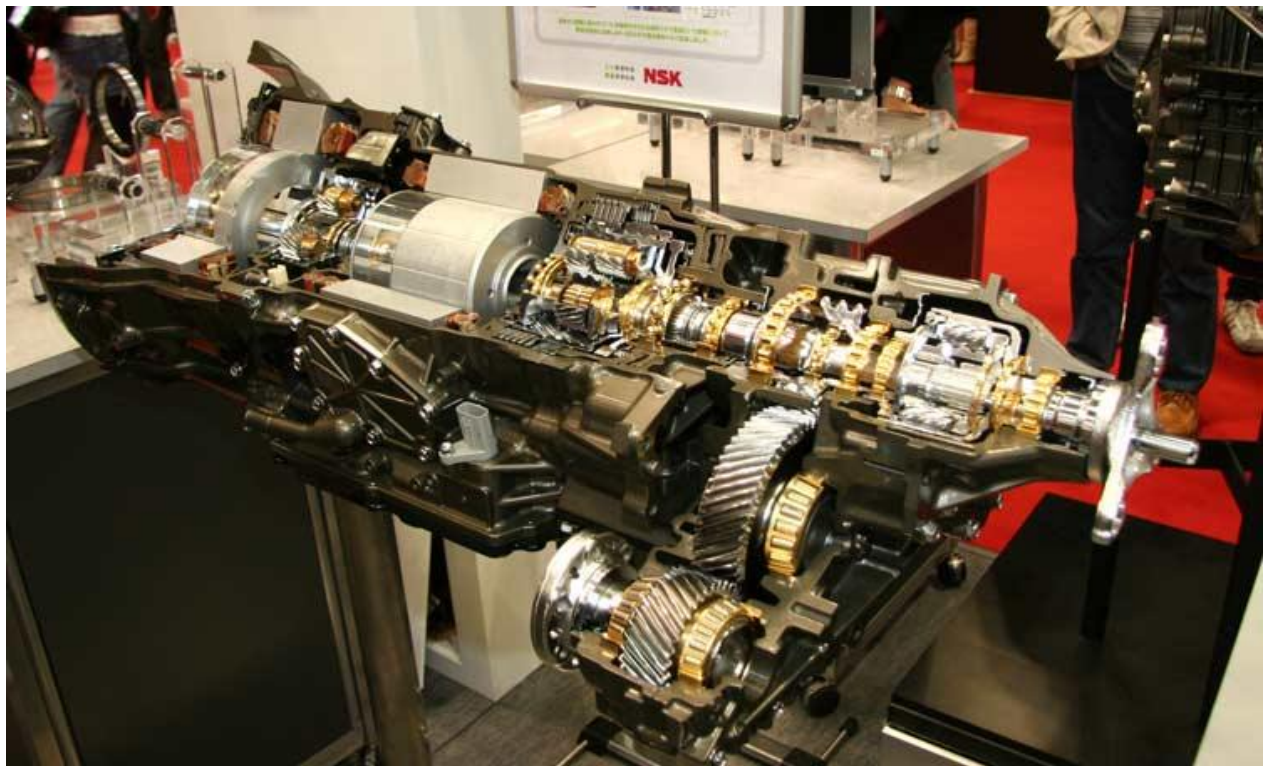
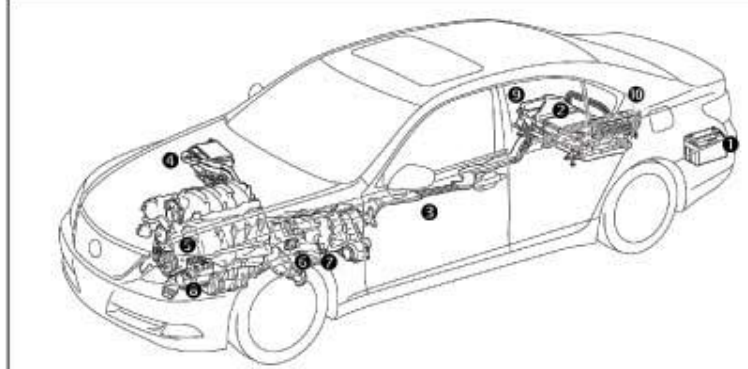


Design Feature	2008 LS 600h	Hybrid Camry	2004 Prius
Motor peak power rating	165 kW @ 5250 rpm (disputed)	105 kW @ 4500 rpm (disputed to be 70kW)	50 kW @ 1200–1540 rpm
Motor peak torque rating	300 Nm	270 Nm	400 Nm
Rotational speed rating	10,230 rpm	14,000 rpm	6,000 rpm
Separate generator used?	Yes (although the motor also serves as a generator during regenerative braking)	Same as Lexus	Same as Lexus
Generator specifications	Not published	Not published	33 kW
Source of power to MG2	Battery and/or ICE via generator	Same as Lexus	Same as Lexus
PMSM rotor design	Interior PMs with triangular configuration	Interior PMs with “V”	Similar to Camry
Motor winding configuration	Parallel	Parallel	Series
Number of rotor poles	8	Same as Lexus	Same as Lexus
Bi-directional dc-dc converter output voltage	~288–650 Vdc	250–650 Vdc	200–500 Vdc
Bi-directional dc-dc converter power rating	36.5 kW	30 kW	20 kW
PMSM cooling	Same as Camry, yet with oil squirters for stator	Oil circulation and water/glycol heat exchanger	Same as Camry
Inverter/converter cooling	Water/glycol loop	Same as Lexus	Same as Lexus
Hybrid transmission	Same as Camry, yet Ravigneaux high and low gear used for speed reduction	Planetary gears used for speed reduction and power split	A single planetary gear used for power split
Fan-cooled high-voltage (HV) Ni-MH battery	288 V, 6.5 Ah, 36.5 kW	244.8 V, 6.5 Ah, 30 kW	201.6 V, 6.5 Ah, 20 kW

Specifications

Gasoline Engine:	390 hp (290 kW), 5.0-liter Aluminum Alloy Engine
Electric Motor:	221 hp (165 kW), Permanent Magnet Motor
Transmission:	Automatic Only
HV Battery:	288 Volt Sealed NiMH-Battery
Curb Weight:	5,004-5,357 lbs/2,270-2,430 kg
Fuel Tank:	18.5 Imp gals, 22.1 US gals/84 liter
Frame Material:	Steel Unibody, Steel Panels and Aluminum Engine Hood

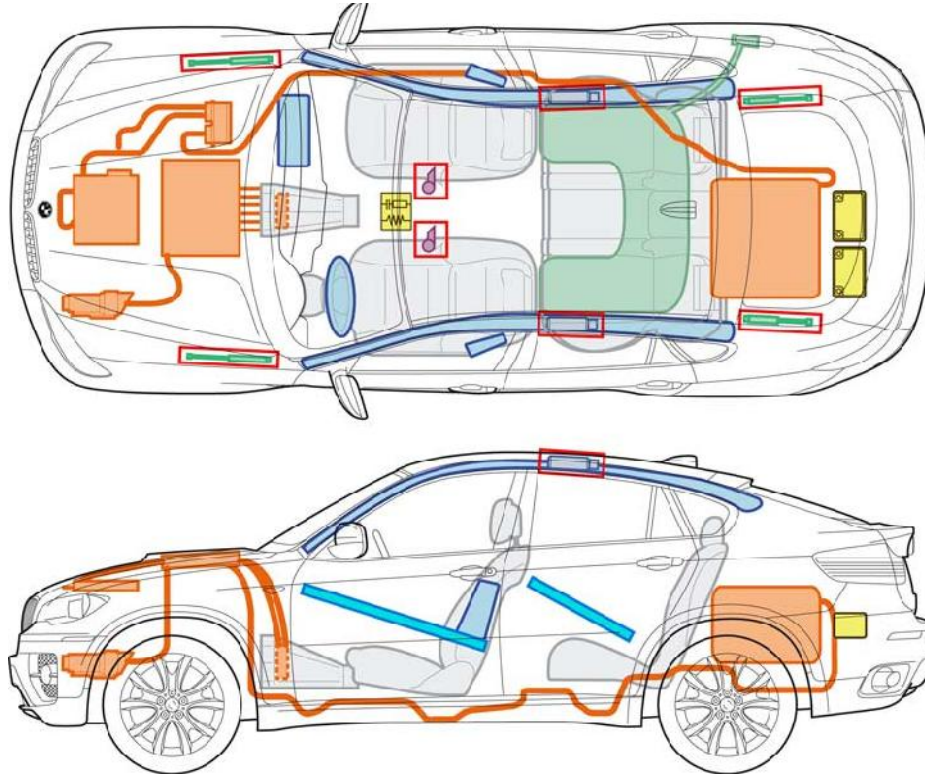
This illustration is for an LHD model.





BMW X6 active hybrid and BMW 7 Active hybrid, also ML450 hybrid:

150429MIRA9: not sure the differences yet, should be the same ZF 8P70H hybrid transmission. ATZ 02/10 article says both motors are 67 kW/280 Nm and that 7 speeds are actually 4 speeds split into two modes.



Vollhybridgetriebe / Full hybrid transmission		8P70H
Antriebsart Type of drive		Standard Standard drive
Eingangsdrehmoment Input torque		max. 650 Nm
Eingangsdrehmoment E-Maschine Input torque electric motor		max. 230 Nm
Nasse Anfahrkupplung Wet clutch		max. 440 Nm
Standard-Übersetzungen / Standard ratios		
Gang / Gear	1	4.714
	2	3.143
	3	2.106
	4	1.667
	5	1.285
	6	1.000
	7	0.839
	8	0.667
	R	-3.317
Getriebespreizung Transmissions spreading		7.05
Masse ohne Anbauteile (incl. Öl) Weight without ancillaries (incl. oil)		≈ 110 kg
Ölmenge Oil capacity		≈ 6,5 dm³
Ölwechselintervall Oil change intervals		60.000 km 60.000 km

Development code	8P70H
Derived from standard transmission	8HP70
Max. input torque capacity	- Combustion engine 650 Nm - Total 700 Nm
Max. input speeds	1 st - 7 th gear: 7,200 rpm 8 th gear: 5,700 rpm
Starting element	- Integrated, wet multiple disc clutch - Maximum stall torque 440 Nm
Space requirements	Comparable to 8HP70 (Length identical, no additional diameter requirements)
4x4 suitability	Suitable without additional installation space
Gear ratios / spread (identical to 8HP transmission family)	1 st gear: 4.714 2 nd gear: 3.143 3 rd gear: 2.106 4 th gear: 1.667 5 th gear: 1.285 6 th gear: 1.000 7 th gear: 0.839 8 th gear: 0.667 Reverse gear: - 3.317 Ratio spread: 7.071
Hybrid functions	- Full electrical drive - Start, stop combustion engine at vehicle standstill and while electrical drive - Start at e-motor-speed of 0 rev/min - Brake energy recuperation - Coasting
Weight (incl. E-Motor and transmission fluid)	106 kg

Fig. 7 shows the transmission with the electric motor.



Figure 7: The 8P70H transmission with the Electric Motor.

8P70H

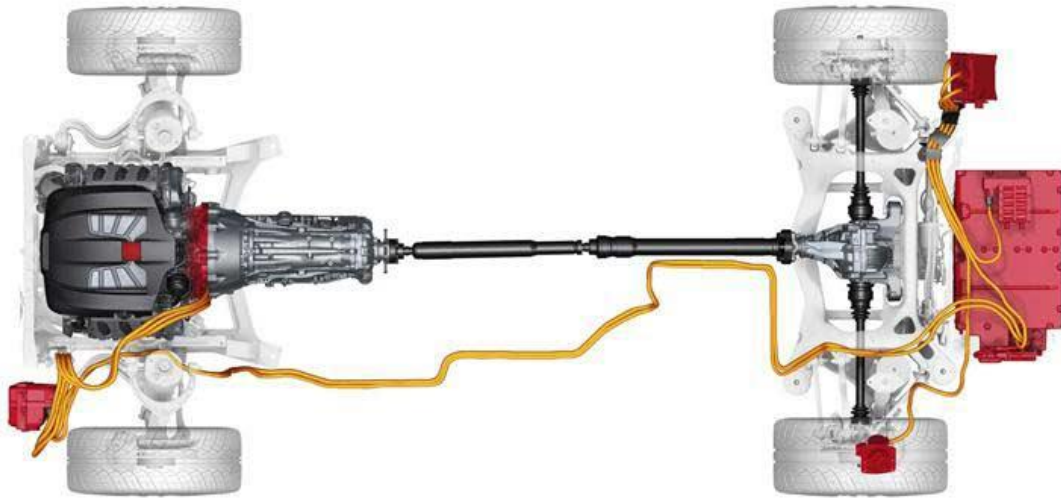
8-Gang-Vollhybridgetriebe für Pkw

8 speed full hybrid transmission for cars



Panamera hybrid:

150429MIRA9: motor is between ICE and transmission. It should be powerful and flat. Automatic transmission itself is not interesting for us.



Porsche Cayenne / VW Touareg:

150429MIRA9: pictures only





FWD cars and not very usable AWD cars:

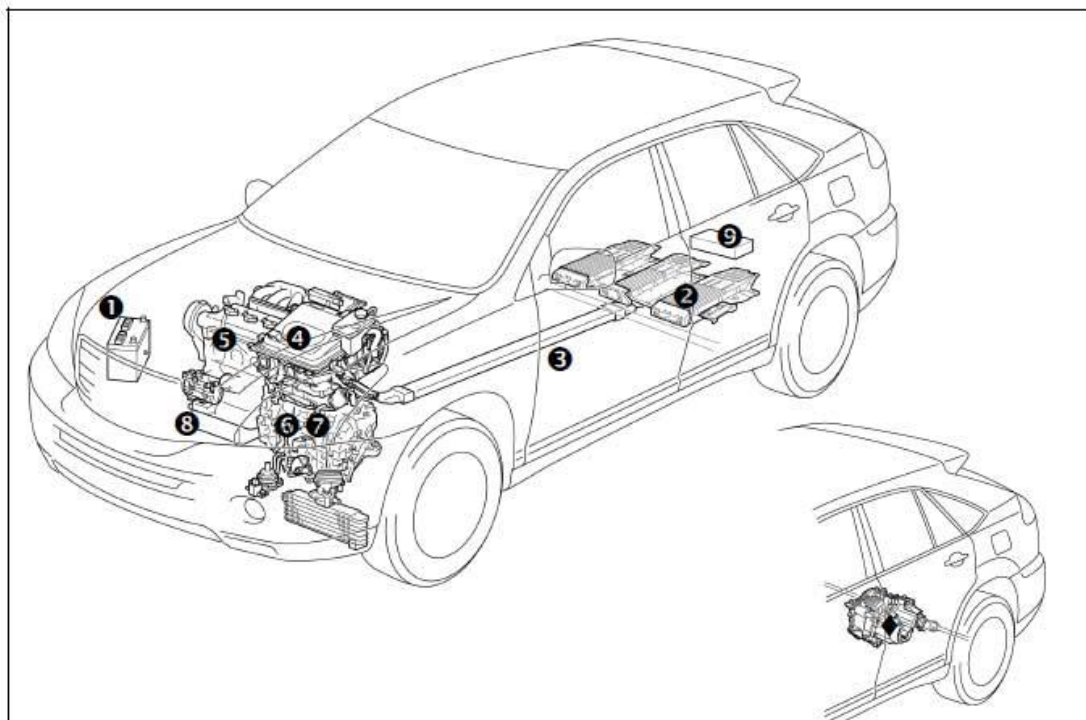
Lexus RX450h:

150429MIRA9: AWD version has 3 motors! The most interesting one is inside rear differential.



Specifications

Gasoline Engine:	208 hp, 3.3 liter Aluminum Alloy Engine
Electric Motor:	Front: 165hp, Permanent Magnet Motor Rear: 67hp, Permanent Magnet Motor (4WD Model Only)
Transmission:	Automatic Only
HV Battery:	288-Volt Sealed NiMH
Curb Weight:	North America: 4,190lbs (2WD) North America: 4,365lbs (4WD), Europe: 4497lbs (4WD)
Fuel Tank:	14.3 gals
Body Material:	Steel Panels





1 rear diff



2 three motors inverter

Lexus CT200H:

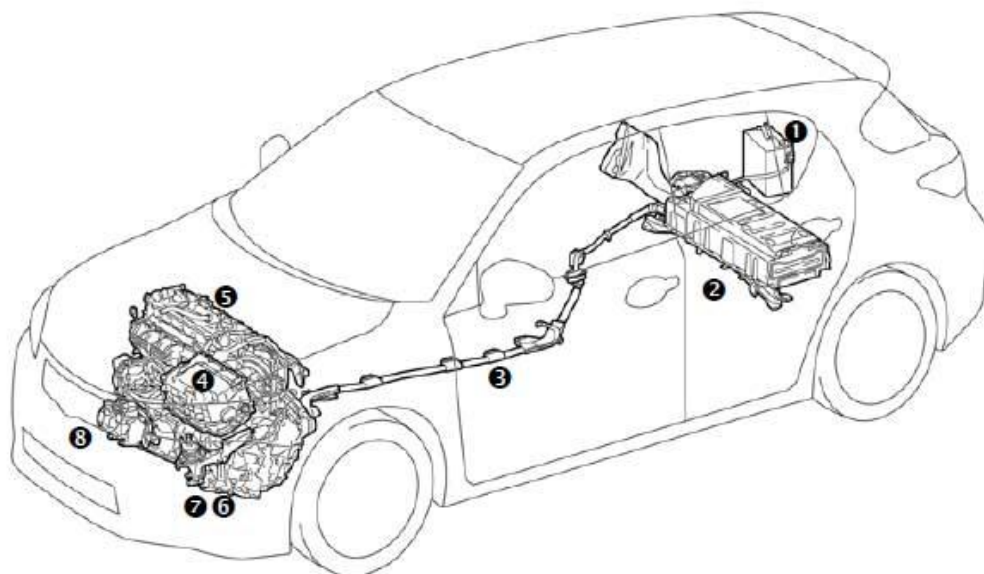
150429MIRA9: specification only



Hybrid Component Locations & Descriptions (Continued)

Specifications

Gasoline Engine:	98 hp (73 kW), 1.8-liter Aluminum Alloy Engine
Electric Motors	80 hp (60 kW), Permanent Magnet Motor
Transmission:	Automatic Only (electrically controlled continuously variable transaxle)
HV Battery:	201.6 Volt Sealed NiMH-Battery
Curb Weight:	3,230 lbs/1,465 kg
Fuel Tank:	11.9 gals/45.0 liters
Frame Material:	Steel Unibody
Body Material:	Steel Panels except for Aluminum Hood and Hatch
Seating Capacity:	5 standard



Other potential donors of e-parts: Volt, Leaf, Mondeo, Passat, Golf, A6, Escape, Jazz, Prius, etc.?