DECLARATION OF SCOTT ANDREWS

I, Scott Andrews declare as follows,

1. I hold a B.Sc. degree in Electrical Engineering from the University of California, Irvine and a M.Sc. degree in Electronic Engineering from Stanford University. I have been involved in the development of hybrid vehicle technology with a variety of organizations. For example, at Toyota, I supported the assessment of new power transistor technology and manufacturing methods for the first generation Prius hybrid vehicle powertrain controllers. Also, in 2003, I developed a hybrid vehicle design with a colleague who later co-founded the vehicle company Tesla Motors. The goal of the design was to create a high performance vehicle that would use (i) electrical power to provide high torque on demand and (ii) a conventional small internal combustion engine to power the vehicle under low power/low torque demand driving. This work also led to an overall vehicle systems engineering methodology wherein all of the vehicle sensors, actuators and processes were treated as objects in a database system that provided a fully back annotate-able connection between use case descriptions and component and process specifications. In other positions, I have been responsible for the research and development projects relating to numerous vehicle information systems, user interface systems, sensory systems, control systems, and safety systems, and I also had the opportunity to collaborate with numerous researchers and suppliers to the

auto industry. I currently consult with the U.S. Department of Transportation, major carmakers and suppliers on vehicle information systems, safety systems, and communication systems. I am also a member of the Institute of Electrical and Electronics Engineers (IEEE), the IEEE Standards Association, the Society of Automotive Engineers (SAE), the Institute of Navigation (ION), and the International Council on Systems Engineering (INCOSE). My qualifications are further set forth in my *curriculum vitae* (Exhibit A). I have been retained by Volkswagen Group of America, Inc. in connection with its petition for *inter partes* review of U.S. Patent No. 7,104,347 ("the '347 patent"). I have over 20 years of experience in fields relevant to the '347 patent, including experience with automobile electronic control systems.

2. I have reviewed the '347 patent, as well as its prosecution history and the prior art cited during its prosecution. I have also reviewed U.S. Patent Nos. 7,237,634 ("the '634 Patent"), and 8,214,097 ("the '097 Patent") which share substantially the same specification as the '347 patent, as well as the prosecution history of both patents. I have also reviewed Paefgen et al., Der Audi Duo – das erste serienmäßige Hybridfahrzeug, ATZ Automobiletechnische Zeitschrift 99 (1997) ("Paefgen"), U.S. Patent No. 5,495,912 ("Gray"), GB 2318105 ("Probst"), U.S. Patent No. 5,697,466 ("Moroto"), U.S. Patent No. 5,823,280 ("Lateur"), and U.S. Patent No. 5,343,970 ("Severinsky '970").

The ’347 Patent

3. The ’347 patent describes a hybrid vehicle that includes an internal combustion engine, an electric motor, and a battery, all of which are controlled by a microprocessor in accordance with the vehicle’s instantaneous torque demands (*i.e.*, road load). The engine is capable of operating efficiently between a lower-level setpoint (“SP”) and a maximum torque output (“MTO”). The vehicle can operate in a number of operating modes, including a “low-load mode” (also referred to as “Mode I”), in which the vehicle is propelled only by the electric motor, a “highway cruising mode” (also referred to as “Mode IV”), in which the vehicle is propelled only by the engine, and an “acceleration mode” (also referred to a “Mode V”), in which the vehicle is propelled by both the engine and the electric motor. The microprocessor determines the mode of operation based on road load. If the road load is below the setpoint (SP), the vehicle operates in Mode I (motor only); if the road load is between the setpoint (SP) and the maximum torque output (MTO) of the engine, the vehicle operates in Mode IV (engine only); if the road load is above the maximum torque output (MTO) of the engine, the vehicle operates in Mode V (motor and engine).

The Volkswagen and Audi Development of Hybrid Vehicles

4. Since the mid-1970s, Volkswagen and Audi have been developing hybrid vehicle technologies, including hybrid drive systems that control the application of

torque from an internal combustion engine, an electric motor, or both, depending on driving parameters.

5. For example, Audi developed first (1989), second (1991), and third (1996) generation Audi Duo hybrid vehicles, as Audi "consider[ed] it useful to combine the combustion engine with an electric drive," both to reduce emissions and provide sufficient mobility for longer distances. *See* Paefgen, at p. 317. The third generation vehicle, described by Paefgen in June 1997, was a parallel hybrid drive using a turbo diesel direct injection engine (TDI), a lead battery, and a polyphase synchronous drive (electromotor). *See* Paefgen, at pp. 318-319. Both the engine and electromotor applied torque to the front wheels. *See* Paefgen, at p. 317; Fig. 4 (below).

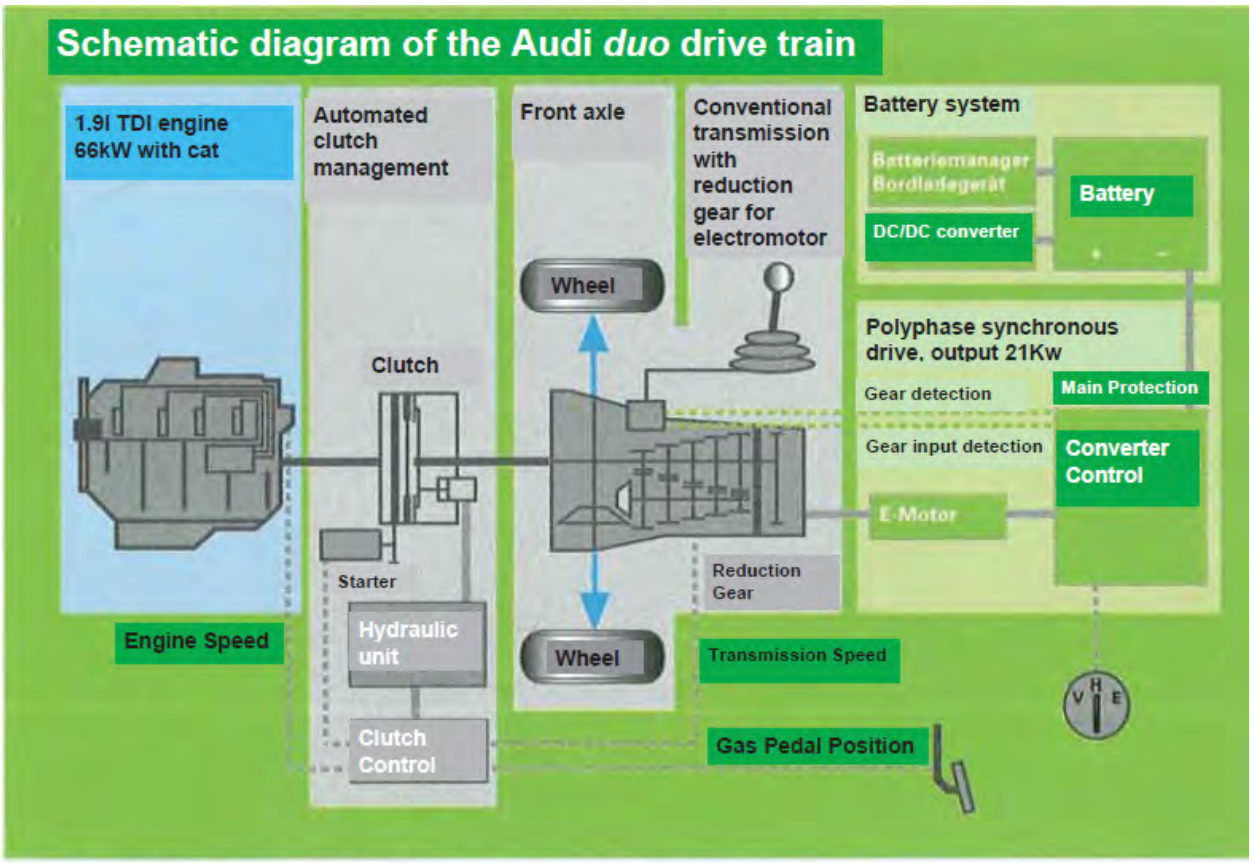

Bild 4: Prinzipdarstellung des Antriebsstrangs

Fig. 4: Sketch of the drive train principle

6. Paefgen explains that, in hybrid operation, switching between the internal combustion engine and the electric motor, "occurs automatically depending on the requirements of the driving operation." *See* Paefgen, at p. 319. The Control Drive for this system is illustrated in Figure 5 (below).

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