

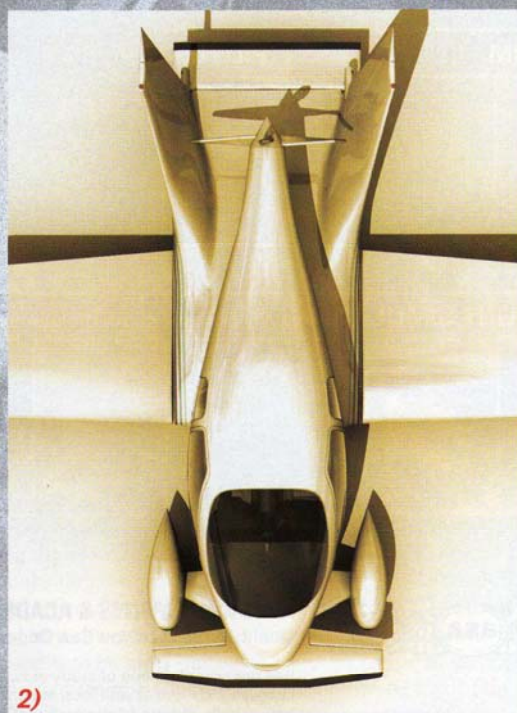
MIT: Finally
A Real Air Car

THE IDEA'S BEEN AROUND, BUT NOW

AIR CARS!



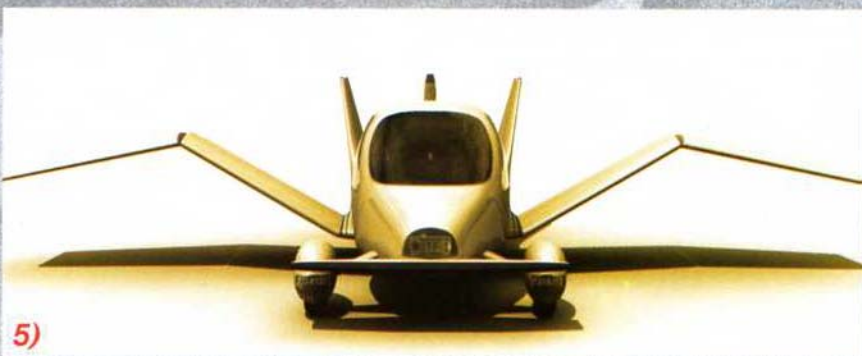
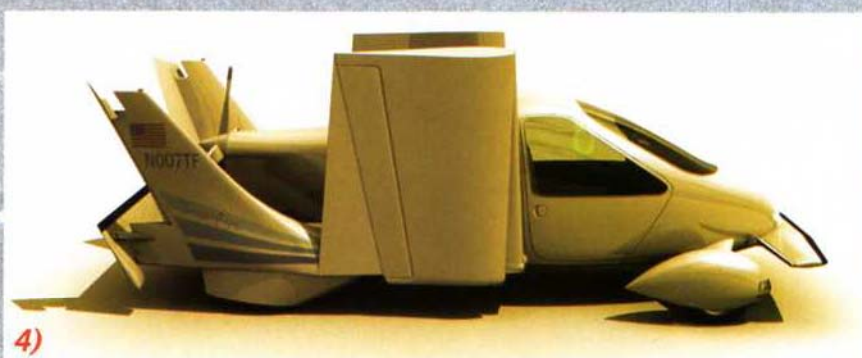
In the *Fifth Element*, Bruce Willis' character drives a flying taxicab for a living. In the Harry Potter films, young wizards cruise over Hogwarts in an aviating blue Ford Anglia. And in *Back to the Future*, Marty McFly travels through time in style, riding in a slick, airborne DeLorean. So far, the flying car is just an out-of-this-world mechanism that appears in futuristic movies of questionable quality, fantastical children's films and cult classics. More realistically, however, "personal air vehicles" may be appearing in a more familiar venue very soon: your garage. MIT aerospace engineer Carl Dietrich is spearheading contemporary efforts to perfect a roadable aircraft. Of course, he has a long line of predecessors to thank.



Not long after the Wright brothers successfully demonstrated the viability of sustained flight in 1903 at Kitty Hawk, N.C., enterprising inventors became interested in integrating aviation to motor vehicle technology. Fifteen years later, in 1918, Felix Longobardi secured the first patent for a flying car-type vehicle. This multi-dimensional "combination vehicle" was an aircraft/automobile/gunboat, which, as it turns out, remained an idea that existed only on paper. Though he didn't receive the patent, Glenn Curtiss had been working on designs for the Autoplane since 1917. The three-winged Curtiss Autoplane received a patent in 1919; though Curtiss achieved a handful of skips, the Autoplane was not capable of sustained flight.

It wasn't, however, until Waldo Waterman came along that a flying car actually, well, flew. The Arrowbile, developed in 1937, was a hybrid Studebaker-powered aircraft with a propeller at the car's rear. Though several Arrowbiles were produced and were, reportedly, capable of sustained flight, lack of funding prevented the project from further development. In 1950, Robert Fulton's Airphibian became the first roadable aircraft to be certified by the Civil Aeronautics Administration (aka the CAA, which later became the FAA). Unlike its predecessors, Fulton's Airphibian was a plane that was adaptable to the road, rather than a car adaptable for aviation. Though the vehicle could quickly convert into a car (with its removable wings) and was technically a success, the project was not then seen as a marketable design.

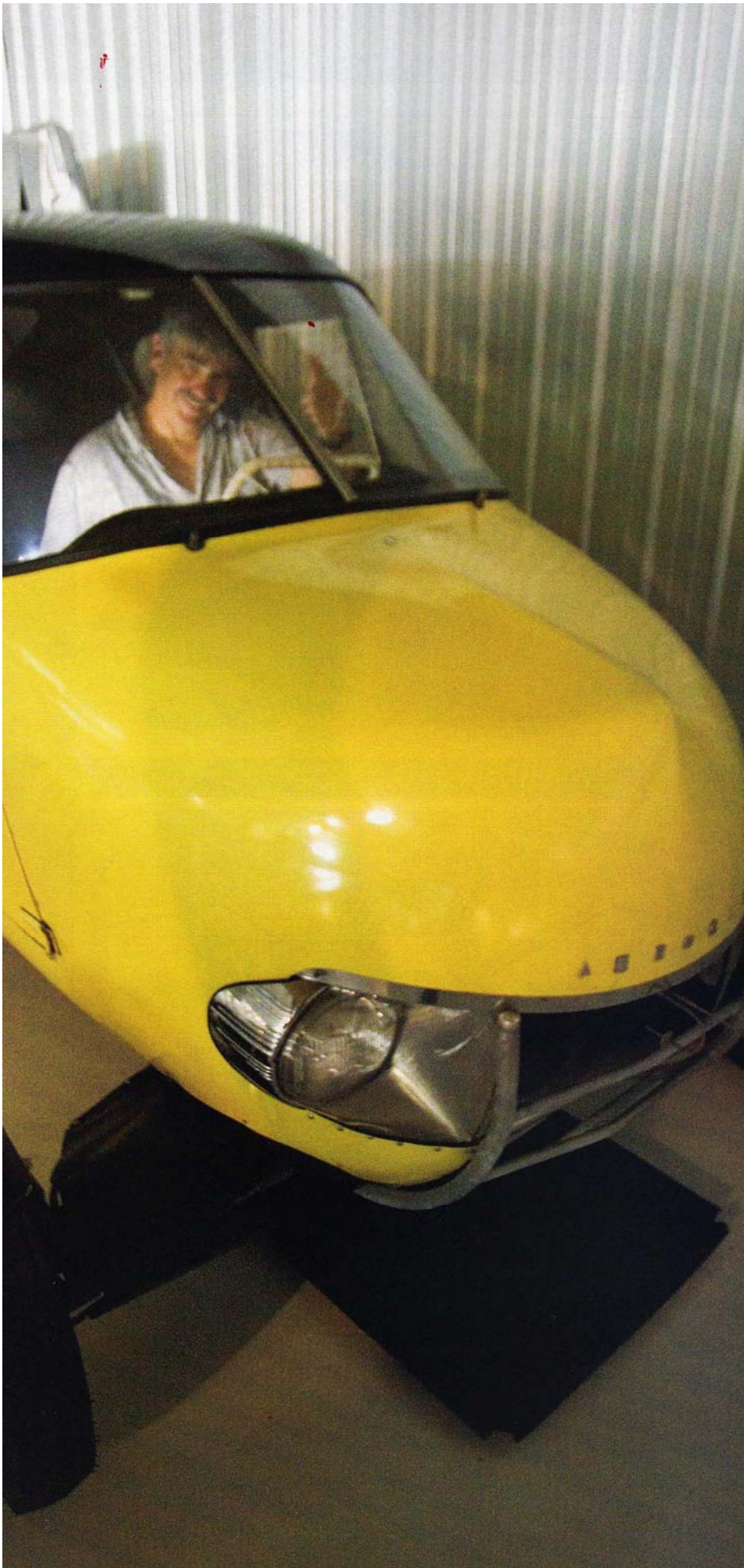
In the late 1940s, the ConvAIRCAR took the stage as the most viable roadable aircraft in the race to get a car/plane on the market. With the end of World War II, flying cars were an escape that signified the great future that would follow the world's emergence from years of constant warfare. Additionally, aircraft manufacturers were shifting from military to con-



sumer production. Consolidated Vultee Aircraft Company in San Diego, Calif., was just such a company that invested heavily in developing its flying car technology. Consolidated Vultee asserted, "The market for this flying automobile will be far greater than a conventional light plane because the purchasers can obtain daily use from the car to get more out of his [sic] investment."

Central to the ConvAIRCAR were its flight attachments, which an owner would attach to or detach from an ostensibly ordinary motor vehicle. The ConvAIRCAR could get 45 miles

- 1) The Transition may be the first successful personal air vehicle.
- 2) The dual-use vehicle has a length of 20 feet.
- 3) From the back, the dual-use vehicle bears closer resemblance to an airplane than to a car, underscoring that it's a roadable airplane rather than a flying car.
- 4) In driving mode, the vehicle's 27-foot wings fold for easy on-the-ground movement.
- 5) The Transition, viewed from the front, as it "transitions" between flying and driving modes.



per gallon and had a “plastic-impregnated” fiberglass body that weighed 725 pounds. All signs pointed to go, but ConvAIRCAR’s rise came to an end after it crashed during a test flight.

Portending the utility of light helicopters, Ford Motor Company performed serious studies on the practicability and achievability of a flying car in the 1950s. Ford concluded that the roadable plane would indeed be technically feasible and economically sound, and could be marketed to several spheres: police and emergency services, the military and personal luxury transportation—all of which are spheres now served by rotary crafts. In the 1970s, Ford considered marketing and producing Moulton Taylor’s Aerocar—the closest any flying car has come to being mass produced—but the plan never took flight. As with its fellow predecessors, Taylor’s Aerocar suffered from its desire to be two things at once but not performing very well in either capacity.

Nowadays, 29-year-old graduate student Carl Dietrich, who studies aeronautics and astronautics at the Massachusetts Institute of Technology, is at the forefront of emerging roadable aircraft technology, a marriage between aviation and motor vehicle technology. He won the 2006 Lemelson-MIT Student Prize, which

awards \$30,000 to the student with the most innovative project. He's currently working on the "Transition," so-called because it's a vehicle that will be able to transition from the road to the air and back again. So far, the prototype resembles a compact SUV with wings that can fold up. "Aerospace engineering and dual-use vehicles have been a lifelong interest for me" says Dietrich. "A place like MIT has tremendous resources for new ventures, and roadable aircraft are just

that. In the past, a number of ventures have been developed and have tried to generate interest from car manufacturers. The volumes we intend to produce don't justify car manufacturer involvement."

Dietrich, who hopes that the Transition will be a reality by 2009 or 2010, says, "We expect to have a flying prototype around the end of 2008, then we'd like to have our first delivery at the end of 2009. The reason for the big lag between the first prototype

and its delivery is that we need to crash test the vehicle. We have to destroy the first few products off the line. Not many aircraft developers have to do that. We, however, have to demonstrate that the vehicle will be safe [as a car] through a crash." Dietrich also asserts that the development team is looking into a ballistic recovery system, like the one employed in Cirrus aircraft, for the Transition. However, he's unsure whether regulations will permit the dual-use vehicle to be equipped with such devices. "We're not sure if driving around with a little rocket is going to be okay," he adds.

The PhD candidate told Bloomberg News that about 75 pilots have expressed interest in putting deposits on the groundbreaking plane, which will be offered at an introductory price of \$148,000. Dietrich formed Terrafugia (an amalgamation of Latin words for "escape" and "land") with fellow MIT students Anna Mracek and Samuel Schweighart—all three hold private pilot licenses—to develop the Transition.

"We're still at a very early stage," notes Dietrich. "We've got a design of the vehicle's outer mold line—we know what its outside shape is going to look like, so we can predict all the aerodynamic forces through a high-level of accuracy. We know how it should behave aerodynamically. We're at the early stages of designing the Transition's internal parts."

Rather than a replacement, the Transition would serve as an alternate for the family car. The vehicle would weigh nearly 1,320 pounds, hold at least two adult passengers plus their luggage, use a 100 hp engine and travel 500 miles on a full gas tank. The owner would store the Transition in a garage, just like any other car, then drive it to the nearest local airport and lower the 27-foot wings for takeoff. The Transition would cruise at a typical general aviation altitude of several thousand feet, with the ability to climb as high as 12,000 feet. The vehicle could transition back into a car after landing.

"It should make traveling 100- to 500-mile distances a lot more convenient," stresses Dietrich. You drive to the nearest general aviation air-

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Moulton Taylor's Aerocar had removable wings and offered a unique blend of flying and driving. Though Ford expressed interest in marketing the vehicle during the 1970s, the Aerocar was never mass produced.

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port. With a few exceptions, there's typically a general aviation airport within 20 to 30 miles of wherever you live, so traveling by roadable aircraft makes a lot of sense. You bypass any traffic along the way, you land at the airport nearest your destination, plus you save yourself the hassle of moving bags between car and airplane, as well as hangar fees."

The FAA's fall 2004 decision to create the new light sport aircraft category has further facilitated the process of bringing the Transition into the air for the Terrafugia team. "Once that came out, it seemed like a huge opportunity from a business point of view. Lots of people have made roadable aircraft, but nobody has succeeded on the business side," says Dietrich. Under the relaxed LSA regulations, which reduce the training required for piloting such vehicles, the Transition would be categorized as a personal air vehicle requiring a sport pilot's license to fly. Pilots of such aircraft could have access to the more than 5,000 local airports in the United States, many of which are underutilized.

Dietrich, however, wants to stress that this is *not* a flying car. "The term 'flying car' makes you think of George Jetson; it implies that any Joe Schmo can just drive it around without a pilot's license. We're a little paranoid that the Transition is going to be confused with that image. There are some very important distinctions. You need to be trained to use our vehicle. To take full advantage of the Transition, you'll need a pilot's license. One big advantage is that if the weather gets bad, you can divert to the nearest airport, and then keep driving under the weather. Whereas, if you're just flying, you'll have to wait until conditions are flyable. The Transition is really a roadable *airplane*, an airplane that has the additional feature of being able to drive on the road." Now that's the kind of car most pilots would like to see in the passing lane!

For more on the Transition, log on to Terrafugia's Website at www.terraflugia.com. PJ

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