THE UPS AND Flyi.

It's a car! It's a plane! It's both! And inv

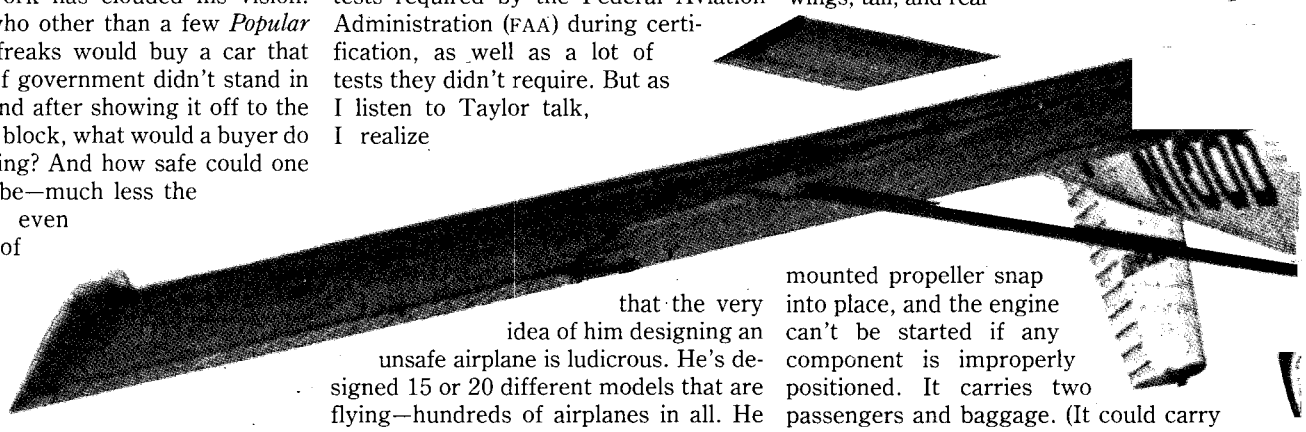
By John

On that summer afternoon in 1954, pilots at Seattle's Boeing Field could have been forgiven for shaking their heads as they watched an automobile roll down the runway, take off, and soar out of sight. Just minutes before, the automobile had been driving down the old Pacific Highway with wings and tail in tow. Moulton B. "Moult" Taylor, the car's designer and builder, was at the wheel.

Taylor had just driven from a parking spot in front of the Ben Franklin Hotel, where aviation notables attending a conference could peer through the windows of his Aerocar and examine it to the ebullient tune of Taylor's sales pitch. One of them had taken Taylor aside and said, "Mr. Taylor, one of these days the Aerocar will displace the commercial airline except on the long-distance haul." The man was W. A. Patterson, then the president of United Airlines.

Yet here I am 30 years later at Moult Taylor's diminutive airplane factory in Longview, Washington, looking at one of only seven Aerocars ever built. Something went wrong. That something, according to Taylor, was government regulation.

But even the sympathetic listener has to wonder if 71-year-old Taylor's passion for the machine that is the centerpiece of his life's work has clouded his vision. After all, who other than a few *Popular Mechanics* freaks would buy a car that flies, even if government didn't stand in the way? And after showing it off to the boys on the block, what would a buyer do with the thing? And how safe could one in the sky be—much less the thousands, even hundreds of thousands, Taylor dreams of?



He dispatches my reservations, as well as some I hadn't thought of, with a shower of ideas that pop in my ears like little firecrackers. I am talking to a rare bird who combines vision, technique, and the ability to spin wrenches, and my doubts about the Aerocar have betrayed my own lack of vision.

Who would buy it? A person who wants to get into his car at home, drive to a convenient spot towing the wings and tail on integral wheels, rig for flying in five minutes, fly at 150 miles per hour to the vicinity of his destination, unhook the wings, and drive the rest of the way. No airports, no waiting lines, no highway congestion, no 55-mile-per-hour speed limit, no rent-a-car. The Aerocar would appeal to people like sales reps for whom time is money; families off to see grandma for the holidays; commuters who have spent as much time hassling traffic lights and freeway interchanges as they care to.

Third World countries that lack a well-developed intercity highway system would benefit enormously from the Aerocar. It comes complete with its own freeway at no extra charge and sells for about the price of a new Lincoln. Not bad when compared to the traditional light planes being built today—with 1930s technology—for $50,000 on up.

Safe? The Aerocar passed all of the tests required by the Federal Aviation Administration (FAA) during certification, as well as a lot of tests they didn't require. But as I listen to Taylor talk, I realize that the very idea of him designing an unsafe airplane is ludicrous. He's designed 15 or 20 different models that are flying—hundreds of airplanes in all. He designs airplanes because that is what he loves, and they are safe because carefully designed airplanes are safe, not because the FAA is watching. The few Aerocars that went into everyday operation flew a total of 9,000 hours without serious incident except for one Aerocar pilot, a cranberry magnate with a flair for the unusual, who hit a horse while landing on a road in Cuba. (He made repairs at a country service station and flew his Aerocar back to Boston.)

Naturally, far more territory and objects are potentially vulnerable to falling aircraft than to car or truck accidents that occur on streets or highways. But as Taylor points out, the requirements for a license to operate a light plane are far more stringent than those for getting a driver's license, and pilots—unlike most car drivers—must demonstrate their proficiency at flying from time to time. Partly because of these tougher standards, Taylor suggests that general aviation is a relatively safe form of travel, and if the same standards were applied to Aerocar pilots as to general-aviation pilots, there's no reason why their safety record wouldn't be equally as good.

Practical? The Aerocar can be converted from plane to car (or car to plane) by one person in 5-10 minutes. The wings, tail, and rear-mounted propeller snap into place, and the engine can't be started if any component is improperly positioned. It carries two passengers and baggage. (It could carry three, but FAA regulations prohibit more than two; both must sit in the front seat.) The panel has all the instruments necessary for monitoring the engine and for flying under visual conditions. The steering wheel serves as the control mechanism in flight—turn the wheel to roll the airplane, pull back to climb, and so on. Moreover, the most advanced of the Aerocars is pleasing to the eye. It could pass for an Italian sports car, with the interior trimmed with leather and a

Photograph courtesy *Motor Trend*

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tor Moult Taylor won't give up his vision.

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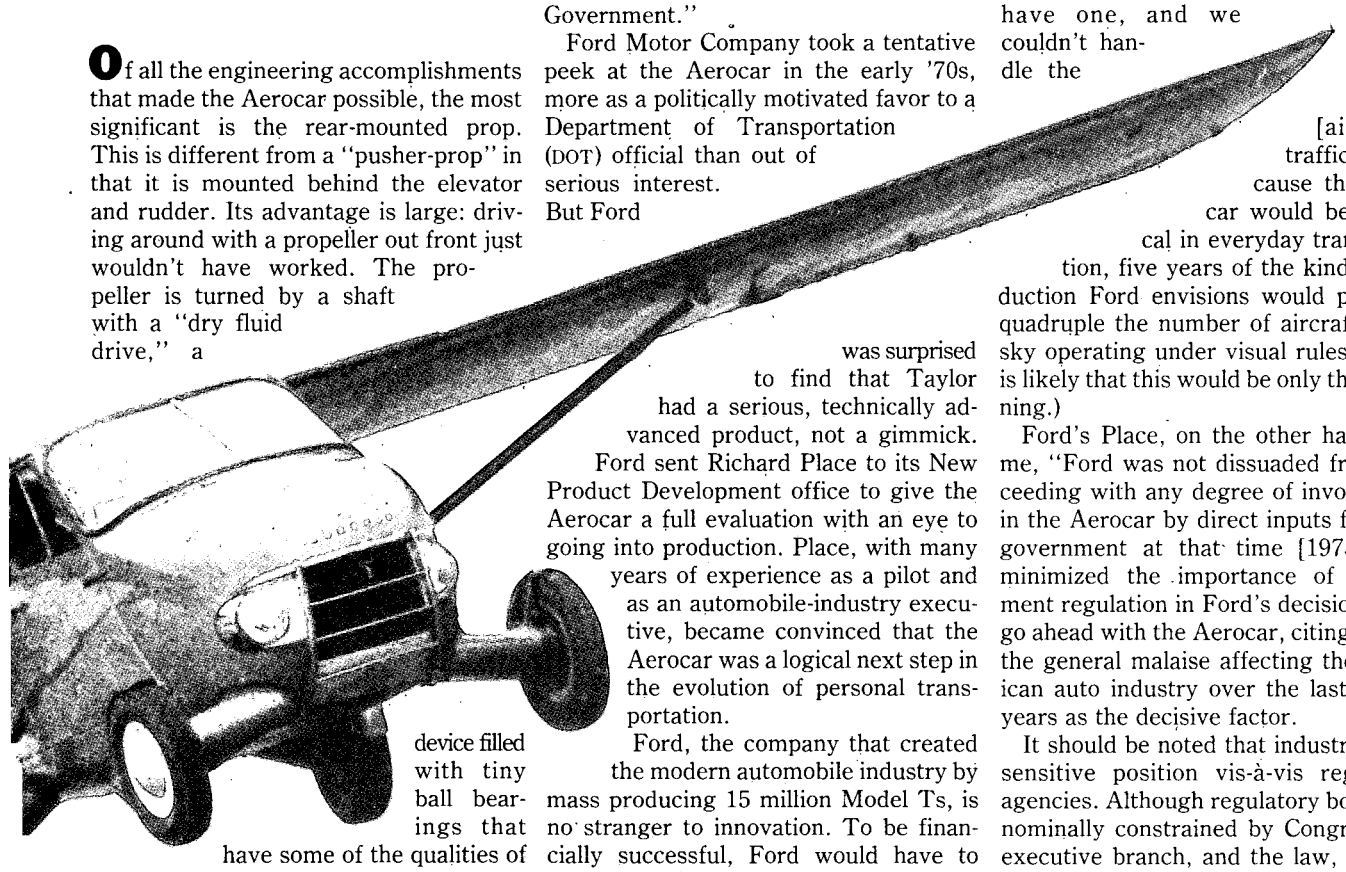
plush carpet. On the road, the Aerocar gets 15 miles per gallon; in flight, it burns 8 gallons of fuel per hour and has a 32-gallon tank.

Of all the engineering accomplishments that made the Aerocar possible, the most significant is the rear-mounted prop. This is different from a "pusher-prop" in that it is mounted behind the elevator and rudder. Its advantage is large: driving around with a propeller out front just wouldn't have worked. The propeller is turned by a shaft with a "dry fluid drive," a device filled with tiny ball bearings that have some of the qualities of fluids and some of the qualities of solids. The dry fluid drive overcomes "torsional pulsing" problems created by reciprocating engines. Thus, without it, a long shaft from engine to prop wouldn't be possible. Taylor recently did some consulting with the Air Force Association on a flying Wright Brothers replica that was having this "pulsing" problem, and he solved the problem by using a dry fluid drive.



Taylor points out that there have been no advances in *individual* travel since 1943, when I was born, and he asks, "Are we going to be stuck with the 55-mile-per-hour speed limit forevermore? Is this the fastest we are ever going to go?" And whose fault is it that we aren't going faster? "Government. Government."

Ford Motor Company took a tentative peek at the Aerocar in the early '70s, more as a politically motivated favor to a Department of Transportation (DOT) official than out of serious interest. But Ford was surprised to find that Taylor had a serious, technically advanced product, not a gimmick. Ford sent Richard Place to its New Product Development office to give the Aerocar a full evaluation with an eye to going into production. Place, with many years of experience as a pilot and as an automobile-industry executive, became convinced that the Aerocar was a logical next step in the evolution of personal transportation.

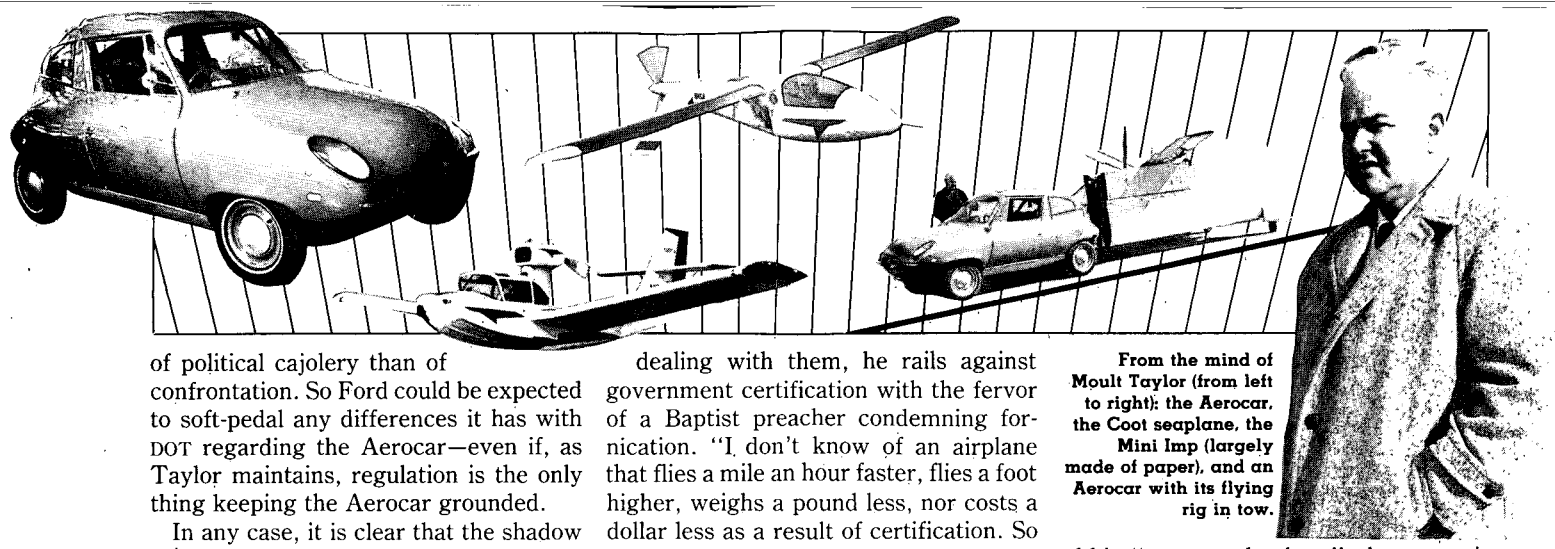
Ford, the company that created the modern automobile industry by mass producing 15 million Model Ts, is no stranger to innovation. To be financially successful, Ford would have to adapt mass-production assembly-line techniques to the Aerocar, Place believed, a step that would require a tooling investment of "hundreds, perhaps billions of dollars." And Ford would have to build a minimum of 20,000 to 30,000 a year, a massive undertaking even for a company of Ford's size.

But before decisions could be made at Ford, there were critical regulatory hurdles to be jumped. The Aerocar is a new kind of transportation. What would the Transportation Department and Federal Aviation Administration require? Did it make sense for the Aerocar to lug around the weight of federally mandated auto bumpers? Or to have a body reinforced to withstand minor collisions that wouldn't occur in flight?

Ford and Taylor both went to Washington to talk with the regulatory folks who are automatic partners in any venture of this sort—partners with veto power and nothing to lose if the venture fails. Ford's and Taylor's accounts of their experiences there differ somewhat. Taylor adamantly maintains that, although DOT wouldn't say so for the record, they've turned thumbs down on the Aerocar "because everybody would have one, and we couldn't handle the [airborne] traffic." (Because the Aerocar would be practical in everyday transportation, five years of the kind of production Ford envisions would probably quadruple the number of aircraft in the sky operating under visual rules—and it is likely that this would be only the beginning.)

Ford's Place, on the other hand, told me, "Ford was not dissuaded from proceeding with any degree of involvement in the Aerocar by direct inputs from the government at that time [1975]." He minimized the importance of government regulation in Ford's decision not to go ahead with the Aerocar, citing instead the general malaise affecting the American auto industry over the last several years as the decisive factor.

It should be noted that industry is in a sensitive position vis-à-vis regulatory agencies. Although regulatory bodies are nominally constrained by Congress, the executive branch, and the law, they actually have a great deal of discretion. Agencies routinely make costly requirements of industry, requirements that are sometimes arbitrary, politically motivated, or punitive. Most firms have developed a policy of "getting along" with their regulators by establishing a "good working relationship." Firms, especially large firms, rarely complain publicly about the agency regulating them. Ford is no exception. If Ford ever persuades DOT to give the nod to the Aerocar, it will more likely be the result



From the mind of Moult Taylor (from left to right): the Aerocar, the Coot seaplane, the Mini Imp (largely made of paper), and an Aerocar with its flying rig in tow.

of political cajolery than of confrontation. So Ford could be expected to soft-pedal any differences it has with DOT regarding the Aerocar—even if, as Taylor maintains, regulation is the only thing keeping the Aerocar grounded.

In any case, it is clear that the shadow of regulation injects an enormous degree of uncertainty for any radical departure from established practice. In such cases, regulation is often "open-ended"; that is, regulators write the rules as they go. For example, Lear has spent over $20 million trying to certify the Learfan 2100, an aircraft with a revolutionary new carbon-fiber airframe and rear-mounted propeller, and the end is still not in sight.

Despite financial and regulatory uncertainties, Ford hasn't given up on the Aerocar. Lobbying for government acceptance, Place wrote House Science and Technology Committee consultant Scott Crossfield last August, "Personally having flown for 18 years and being deeply involved in the automobile industry for 22, I'm convinced of the potential of the Aerocar," and he concluded by saying that the Aerocar was "worth a try."

It is clear that Ford isn't going to go ahead with the Aerocar without a positive commitment of support from the federal government—until regulators say, "We think the Aerocar is a good idea, and we will do what we can to cooperate."

Moult Taylor likes problems, at least problems of the physical kind that require only brilliance and a drafting table to solve. Before World War II, he was designing and manufacturing some of the first airborne radios. During the war, he headed up a Navy team that built the first successful television-controlled guided missiles. In addition to the many airplanes he has personally designed, he has done consulting for other firms. For instance, he suggested to Lear the means to overcome a certification roadblock that had the potential of permanently stalling the Lear Jet, one of the most successful aircraft designs of all time. Recently he consulted on the Learfan 2100, which sports a Taylor trademark—a rear-mounted, shaft-driven prop.

But Taylor doesn't like the political problems of regulation. After 40 years of dealing with them, he rails against government certification with the fervor of a Baptist preacher condemning fornication. "I don't know of an airplane that flies a mile an hour faster, flies a foot higher, weighs a pound less, nor costs a dollar less as a result of certification. So what the hell do we have it for?"

What about safety? Can profit-maximizing businesses be trusted to build safe airplanes without government monitoring? "If a man started building flying automobiles that the wings fell off of, do you think he'd be in business very long?"

Are market forces really enough? "Absolutely," he says. "And I'm sure that if you pulled the certification requirement entirely off of Ford Motor and they started building flying automobiles, they'd make damned sure that their flying automobile was tested and did comply with what experience has shown is necessary to make it a safe airplane. Now they have to go through all of this and that and wait for months and fill in reams and reams of paperwork, and wait until inspectors can get there. It's a time-consuming, costly thing."

And about the FAA he declares, "The administrator is a politician who doesn't know what the hell his bureaucracy is doing. The bureaucracy is a bunch of professionals who are in there year after year and can't be canned. They don't want to rock the boat. They want to keep things just the way they are.

"When we talked to them about air traffic control, they said, 'Well, no, we can't control any more airplanes. That's why we have to limit the growth of them.' But the FAA is still back in the '20s, you know. They want this man there to watch the radar scope and tell everybody when to go through the intersection. Goddam stupid operation. It should never be run that way. Hell, I can show them how to run it in five minutes with simple navigation equipment that exists today."

What about nongovernmental certification? "It would have to be a profit-making organization, or it wouldn't work. Therefore, it wouldn't be fat and top-heavy, and loaded with incompetents and all of the things that a noncompetitive situation always ends up in."

In the meantime, Taylor is content to make paper airplanes—literally. Several of his "paper technology" planes are in various stages of completion on his factory floor. The planes are, for the most part, really paper: skin, airframe, control surfaces. Taylor has developed a process of impregnating paper with epoxies to add rigidity. Taylor's paper airplanes are stronger, cheaper, lighter, and faster than the aluminum-skinned, pop-riveted anachronisms favored by light-plane manufacturers. Taylor asks, "Where the hell are Beech, Piper, and Cessna? They've been protected by certification, they paid their dues, and they said, 'We don't have to try anymore.' "

As technology develops, the Aerocar becomes even more feasible: Microcomputers can take over navigation, collision avoidance, and engine-monitoring functions; light, rugged, plastic-composite air foils can improve aerodynamic performance. Superlight composite material engines will soon be in production. Taylor proposes using two engines to push one prop—dual redundancy with no increase in weight over the old iron technology. Meanwhile, in Princeton, New Jersey, Dr. Gerard K. O'Neill is putting together a satellite and computer navigation system that could be the private sector's answer to FAA qualms about all the potential new airborne traffic.

The future of individual airborne transportation is full of promise. The question now is, Will it get its chance in the marketplace or will the regulators keep it permanently grounded?

It's too early to know. For the time being, Moult Taylor spends his time at his drafting table and on his factory floor, pausing from time to time to glare in the general direction of Washington, D.C., and to ask anyone who will listen, "Are we going to be stuck with the 55-mile-per-hour speed limit forevermore? Is this the fastest we will ever go?" ◻

John Doherty, an airline pilot, won the Washington Monthly Journalism Award for his REASON article "Collision Course" (June 1982).

Photograph of "Coot" by Jan Fardell/Other photographs courtesy M. B. Taylor

By Ted Galen Carpenter

STANDING GUARD OVER EUROPE

American troops in Europe were never meant to be a part of NATO—but they've been there for 33 years.

On April 4, 1949, in a ceremony described by the *New York Times* as a "restrained affair," President Harry Truman and 11 other heads of state put their signatures to the North Atlantic Treaty. After the signing, Truman spoke briefly and solemnly of the event. Secretary of State Dean Acheson glorified the pact in language thick with biblical allusions. On the front page of the April 5 *Times*, above a large and reverent photograph of the ceremony, ran the headline: "A Historic Event in Our Nation's Capital."

Within Congress and among the public at large, months of intense and often acrimonious debate regarding the treaty had preceded the signing. The debate continued with increasing bitterness through late July, when the Senate would vote on ratification of the treaty. Skeptics wondered how much and what kind of US arms aid would go to European nations. They wanted to know how—and by whom—the treaty's mutual-assistance agreement would be interpreted. During Senate hearings on the treaty, Truman-administration officials admitted that European negotiators had sought further American involvement, including arms aid, an "automatic war" clause, and even the provision of US troops, but the officials denied that the pact harbored any such obligations. Treaty opponents viewed those assurances with skepticism and proposed reservations explicitly protecting congressional war powers and the right to reject any subsequent arms-assistance legislation.

One issue that did *not* enter into debate, however, was the question of a large US-troops presence in Europe as part of a North Atlantic Treaty Organization (NATO) army: that possibility seemed so remote—so fully outside of any reasonable interpretation of the US role in NATO—that