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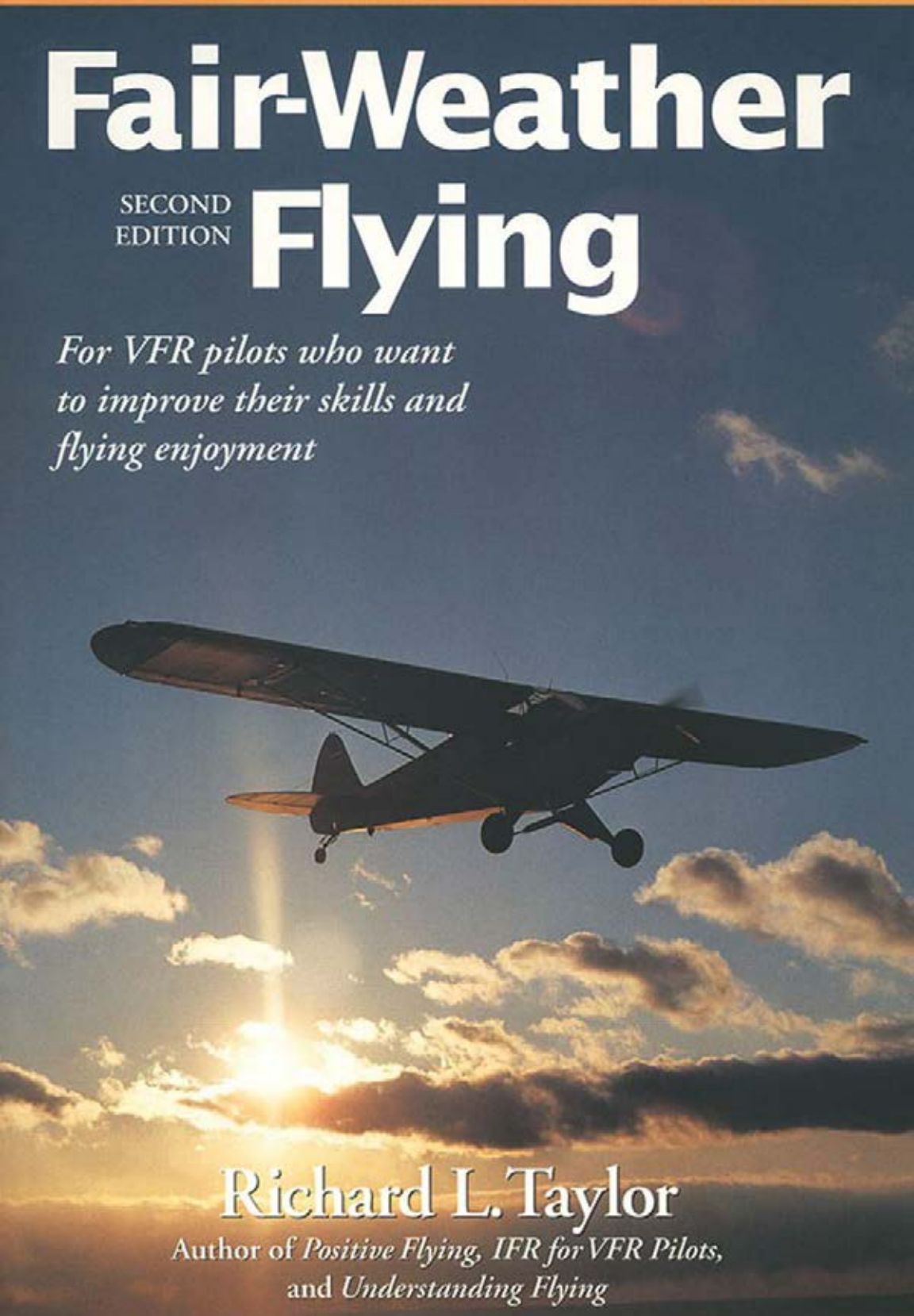
Fair-Weather Flying

SECOND EDITION

For VFR pilots who want to improve their skills and flying enjoyment



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Contents

1

Fuel Conservation Techniques

"IT SEEMS TO ME I've heard that song before. . . ." You sure did, back in '73 and '74 when OPEC turned the tap on the oil supply, and we all got very concerned about stretching each gallon of avgas. The aviation press was full of ways to make the supply go farther; the FAA came up with profile descents, Fuel Advisory Departures (ATC procedures to minimize engine running time for aircraft destined for an airport experiencing prolonged delays), and so on. The campaign to conserve fuel was as much moral and patriotic as economic then, because the problem was shortage, not price. For whatever reasons, more fuel appeared, and the emphasis on making each gallon go farther softened somewhat; but the fat's in the fire for good now, and they—whoever "they" are—are really hitting us below the belt . . . right in the old wallet.

While there are no hard figures to back it up, it's a pretty good bet that most of us are in the habit of letting out the reins on our airplanes, using all that power we paid for to get us from here to there in the least time possible; and with good reason, because up until now, saving time *has* been more economically sound than saving gasoline. Whether you're a renter or an owner, chances are that the proportion of total

cost represented by fuel has increased nearly 100 percent in the past several years. And if you intend to contain the expense of flying within reasonable bounds, it makes sense to start whittling away at the highest-cost portion of the bill. There *are* ways to get the job done with considerable fuel savings and only a slight time penalty; there are also fuel-conservation techniques which look good on the surface, but which make hardly any difference when you're operating a light, reciprocating-engine airplane.

A STRAIGHT LINE IS *STILL* THE SHORTEST DISTANCE

Fuel conservation should begin when you spread out the charts to plan a trip. Inclement weather, restricted airspace, and reluctance to fly over water are common obstacles to emulating the crows, but the pilot who draws a straight line from here to there and stays on it religiously is the pilot who will use the smallest amount of fuel, all other conditions being the same. There are at least two ways to handle the problem of restricted airspace; get a clearance to go on through (if appropriate), or plan the flight to avoid the area with the least possible course deviation. It's the zigs and zags that add to the mileage. If you've become accustomed to flying from one VOR to the next, give some consideration to dead reckoning when the radio stations aren't located in a straight line; the VORs can serve as checks along the way, but by ironing out the wrinkles in a long trip, you'll save some additional fuel. (Weather avoidance and overwater flights will have to be handled on a case-by-case basis.)

Instrument pilots run up against more formidable obstacles when they elect to go direct, because the interests and safety of a lot of other folks have to be accommodated. For the most part, the published preferred routes are as "direct" as you're likely to get, especially in heavy-traffic parts of the airspace . . . otherwise, why would there be preferred routes? But when published airways take on the appearance of a dog's hind leg, and the choice of routing is up to you, lay out your course in a straight line, bend it where necessary to cross

convenient VORs, file direct, and hope for the best. Even when ATC turns down your request and clears you via airways, there's nothing wrong with asking again when you're airborne; on many occasions, a controller can let you go direct after you're in the system, when he can see that there's no conflict. Save a mile here, a couple of minutes there; every little bit adds up.

The pilot flying an RNAV-equipped airplane has a built-in fuel saver, one that gets more significant with airplane size and higher fuel consumption. With a few exceptions, and those mostly in congested areas where such random navigation apparently can't be handled by the ATC system, controllers will honor requests to go "RNAV direct." Properly used, area navigation always results in straight-line navigation, and the corners you don't have to turn become fuel you don't burn. How much? Well, it depends a great deal on a pilot's pre-RNAV techniques, but there are operators who are realizing five- to seven-percent time and fuel reductions by using RNAV whenever possible. It's not a staggering amount, but sometimes enough to pay for the RNAV equipment in a relatively short period of time, and from there on out, it's all money in the bank . . . or fuel in the tank. Generalization Number One: Flying in straight lines saves fuel.

The straight-line technique is not a mind-blowing revelation, it produces generally small-scale results, and adherence to a policy of direct flights is often beyond your control; so what else is available to make your fuel-conservation efforts worthwhile? The operational areas that must be considered are airspeed, altitude, weight, winds aloft, mixture management, and power setting. Some of these are very important, some are nearly negligible in their effects on fuel economy. One at a time then, airspeed first.

The fuel-conservation qualities of slow flight were not divined yesterday. In a 1906 letter to Octave Chanute, Wilbur Wright described some of the general features of the flying machines he and his brother had invented: ". . . the weights of the various power machines ranged from 750 to 925 pounds, and the horsepower from 12 to 20. The speed of minimum

power consumption is below that at which the machine usually flies [my italics]." The Wrights, homegrown, self-taught aeronautical engineers that they were, had become very aware of lift-drag relationships. Unfortunately, their machines were so festooned with drag-producing wires and wood struts that they had to fly at full power just to stay in the air. Today's airplanes are aerodynamically cleaner than Wilbur or Orville would have dreamed, and given the option of flying at any one of a rather wide range of speeds, the effect of *reducing* airspeed is a dramatic one in terms of fuel consumption.

Figure 1–1 is a plot of airspeed versus fuel flow (or power required—for a recip-propeller combination, there's no difference), which shows that in general, power requirements

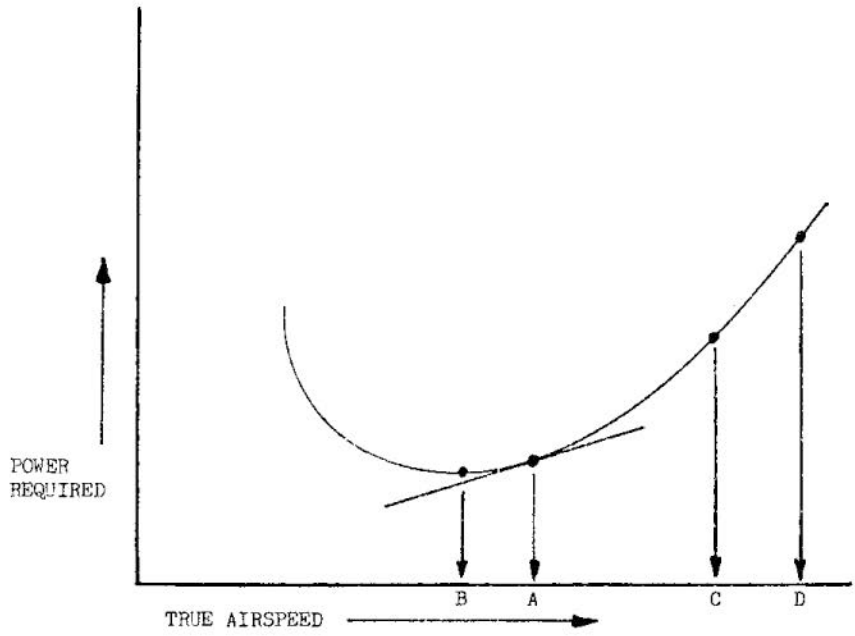

Figure 1–1. True airspeed vs. fuel flow.