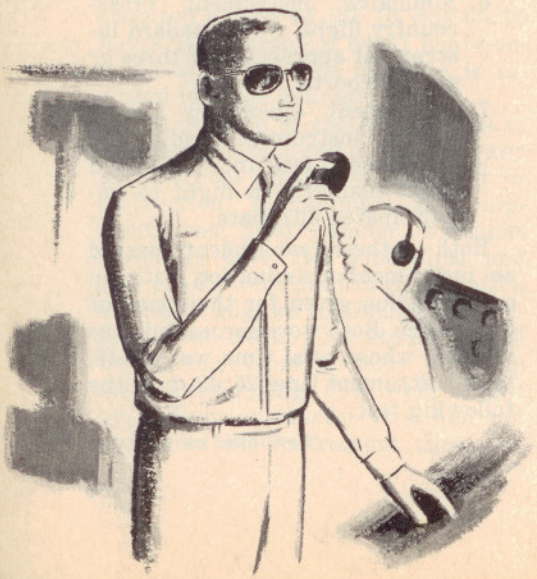
Photo by William Garnett

Is Single Engine IFR

More reliable equipment and radio aids cut hazards of lightplane instrument flights, but you should consider important factors on both sides of the question



The new procedures for instrument rating tests, the standard factory installation of gyro instruments in most new planes along with improved radio all focus new attention on an old controversy: Should single engine airplanes be flown in instrument weather?

Supporting the affirmative are greatly increased engine reliability, better flight and ground radio equipment and other cockpit aids.

As great numbers of the newer four-place planes are purchased for business use, they are expected to justify their investment by being capable of high utilization to accomplish the design purpose — reduced travel time. Someone at policy making level in the Navy once said (concerning single vs. multi-engine equipment for carriers) "If we must worry about engine failure to this extent, we may as well scrap our carriers!"

The negative side of this question finds sobering support in Civil Air Regulations relating to charter or air taxi operations. Single engine IFR flights are expressly prohibited. Thus, only private persons or busi-

Safe?

by TOM RITCHIE

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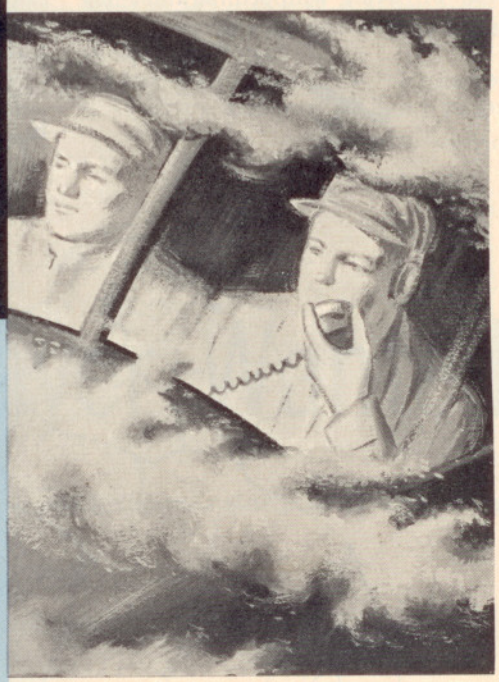
When a flyer approaches bad weather, such as Arizona storm shown at left, he often must decide whether to dodge it or go IFR



ness firms who do not carry passengers for hire are concerned with this question. The fact that our Government makes this regulation for the protection of the public emphasizes the need for thorough knowledge of the problems involved for private and business plane owners who are considering IFR operation. While checking the regulations, it is also important to note that co-pilots are required for all charter or air taxi instrument operations. The need for this regulation demands at least equal consideration with the single engine vs. multi-engine problem.

Engine failures are fortunately rare. A surprising percentage of those which do happen are directly due to operator error—improper use of fuel tank selectors, primers, mixture controls, or carburetor heat. Water in fuel accounts for others. Just plain running out of gas is another which theoretically never happens in a properly planned flight, instrument or visual. The failure due to catastrophic internal damage is fortunately quite rare and can be almost completely eliminated with adequate inspections and overhauls. It is important to note that not all engines are designed for operating in rain. Make sure the ignition harness and magnetos are designed to be water-tight before flying in rain showers. Similarly, wood propellers lose their varnish, absorb moisture and become unbalanced. The leading edges of doped fabric wings tend to erode in moderate or heavy rain.

A plan of action in the event of engine failure on instruments is quite important. This varies with the operation: use of parachutes, slow glide into the wind with flaps, or heading toward nearest known airport. All are possibilities. Some restraint with respect to en route terrain and ceilings goes far in taking the sweat out of possible engine failure. Obviously, emergency radio procedures should be instituted.

Co-pilot and equipment considerations are equally important. A brief exposure to a busy traffic control tower or center will quickly clue the need for a co-pilot. A co-pilot has his hands full with position reports, clearances and navigation. The equally exacting problem of aircraft control for instrument departure, descent and approach makes any fewer than two heads in the cockpit a dangerous operation. An autopilot is no substitute for a co-pilot, but does come in second best. Most serious instrument operators use both.

Most important is it that both pilot and co-pilot be completely qualified. A co-pilot without instrument training will not be of much help. Anyone who tries to help on the radio without knowing what he is doing becomes a liability rather than an asset.

There seems to be no limit to equipment which can be installed to make instrument flying safer, providing the airplane and pocketbook are sufficiently large. The required flight instruments are listed in CAR, Part 43: sensitive altimeter, airspeed indicator, turn and bank indicator, artificial horizon, directional gyro, magnetic compass, clock with sweep second hand. Not required, but desirable, are rate of climb (vertical speed) indicator, free-air temperature gauge, suction gauge, electric pilot head, alternate static source. Also, some alternate system of gyro operation is desirable. One method is to use an electric turn needle and suction attitude and heading indicators; another is to have both an engine-driven vacuum pump and venturi available for suction.

Radio requirements break into two categories, communications and navigation. Usually these are combined in single-engine planes, although

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there is much advantage in having a receiver available for communications only. A typical well-equipped ship would have two major units, an omni-range receiver and an automatic direction finder (ADF). The latter also is called radio compass. Each of these should have a VHF transmitter associated with it. ILS localizers can be received and used on the omni-range set in many cases. A marker receiver also is desirable; this is combined in some sets with the omni receiver. The ILS glide slope requires an extra receiver, but is not often installed in single-engine planes. Weather as low as a 300-ft ceiling and three-quarter-mile visibility may be flown with localizer only; the glide slope allows reduction only to 200/½.

Distance measuring equipment (DME) completes the navigation radio complement; however, it is rarely found in single engine planes. DME permits more precise navigation by permitting a continuous radio fix (when used with the associated omni range for bearing information), thus allowing accurate ground speed checks. Approach procedures based on both VOR and DME are usually simpler than those using VOR only. Manufacture of civil DME slowed to a trickle with a decision pointing to eventual abandonment of the present system in favor of one compatible with TACAN, a military tactical navigation system.

Communications radio is the big issue today. Two to eight transmitting channels and a tunable receiver, either VHF or low frequency, have been adequate for all VFR, and most IFR flights in the past. However, the increasing use of direct center contacts has emphasized the need for equipment ranging from 20 to 360 channels. [See "Your Radio and

AOPA'er on Indianapolis Air Board

In Paul B. Hudson (AOPA 41957) recently appointed to the Indianapolis Aviation Board by Mayor Phillip L. Bayt, the city has a man who knows the field and has devoted a large part of his business and pleasure time to aviation.

For years, Hudson has handled the aviation practice of the Indianapolis law firm, Armstrong, Gause, Hudson & Kightlinger, and since his first solo flight at Cook Municipal Airport in 1944, his personal feeling about flying has been pretty close to enchantment.

In 1948, Hudson owned a 3-place Stinson *Voyager*. That was the year he joined AOPA and immediately became one of the Association's most fervent partisans. When the Hoosier Parks Flying Club of Indianapolis was disbanded in 1950, Hudson, along with Jack Gehrt (AOPA 69636) was instrumental in seeing that surplus funds left in the club's treasury were used to buy AOPA memberships for all former members of the club who could be located, though at that time these members were scattered about the country.

Hudson is now owner of a Beechcraft *Bonanza* purchased last February from Ted B. Lewis (AOPA 105237). END

Planning a work-out for the four-place Ryan Navion in background are Paul B. Hudson with Mrs. Hudson at right, daughter Jackie, and son, Dick

Indianapolis News Photo

You" in the March issue of The PILOT.—Ed.] There is currently no requirement for private plane owners to be so equipped. However, some confusion and delay may result in the busier areas. Full knowledge of frequencies and procedures is the only answer. Even with the most elaborate radio, an unskilled pilot will create headaches for controllers and himself in a busy terminal area. Conversely, a pilot with only the simplest radio can get the job done if he knows his equipment and the facilities of towers and stations *thoroughly*.

Other desirable equipment includes windshield wipers and deicing, propeller, wing, and empennage deicing, autopilot, flight director (such as Sperry Zero Reader or ARC Course Director), and weather radar. With the exception of autopilots, such equipment is almost never found in single-engine planes, because of cost and weight considerations.

The very nature of instrument flying makes the deicing equipment a must for winter operation in almost all sections of the country. Here again, restraint must be exercised when icing is forecast, although special techniques (fast descent from on top, for instance) may help out in a tight spot. As in so many things, being forewarned is to be forearmed.

Weather radar points up a problem in instrument flying which is receiving increasing attention from CAA—the difference between hooded or otherwise simulated instrument flying, and actual weather flying. In smooth, non-icing conditions, there is little difference. However, turbulence, hail, icing, and fog present problems which simply cannot be taught in Link trainers. Until the advent of weather radar, experience, preferably obtained while flying with an experienced weather pilot, was the only way of learning to handle these conditions. Weather radar has not greatly changed this situation. Its principal value is in detection and avoidance of thunderstorm cells with their turbulence and hail. It is an effective aid, resulting in a smoother, safer flight with less time lost due to speed reductions and circumnavigation. It seems doubtful if this will ever be practical in light single engine planes, however.

Oxygen equipment is quite desirable for any instrument operation west of the Great Plains. Minimum instrument altitudes on airways are higher than necessary for VFR, and must be maintained for long periods of time, frequently well above 10,000 feet.

It appears that light single engine planes will never develop the all-weather versatility possible in heavier twins, if for no other reason than their inability to lift all the needed equipment. On the other hand, many instrument operations can be done with reasonable safety. The important points are to (1) learn what you are up against, (2) thoroughly train and retrain for it, (3) establish your own conservative limits, minimums, and checks, and (4) STICK BY THEM!

Single engine IFR air taxi operations may soon be approved if the Civil Aeronautics Board adopts a new Part 47—Air Taxi Certification and Operation Rules, as proposed in Civil Air Regulations Draft Release 57-30. This proposal would permit single engine IFR operations provided landings and takeoffs are limited to conditions equal to or better than alternate minimums—normally 800/2, 900/1½, or 1000/1. In such operations, a copilot with a commercial certificate would be required; however, in lieu of an instrument rating, 10 hours of instrument flight experience, including at least five hours of instrument instruction in flight, would suffice. The pilot in command would be required to have an instrument rating, and, additionally, to pass an instrument check within the preceding six months.

Equipment-wise, the current requirements of Part 43 are repeated, plus the provision that the turn needle and the attitude indicator (artificial horizon) must be operated from different power sources—i.e., electric and vacuum, or two vacuum. Radio requirements are not spelled out beyond the general specification that they shall be "appropriate to the ground facilities," and a requirement that the radio equipment be approved. Presumably this means CAA approved under a type certificate or Technical Standard Order, which would disqualify all but the most expensive radio units ordinarily installed in light single engine planes.

Operation in icing conditions would be prohibited unless the airplane is equipped with anti-icing or deicing equipment for wings, propellers, and other parts as are essential to safety.

Adoption of this proposal would shift air taxi operators from Part 42 rules to new Part 47. END

THE AUTHOR

Tom Ritchie, author of "Is Single Engine IFR Safe?" until recently was a Pan American World Airways copilot, flying in the Far East and Central America and the Caribbean area. He has been flying since 1948 when he obtained his private license at the age of 22. Before taking up flying as a career he was a radio station engineer and an instructor of electronics at Oklahoma City University.