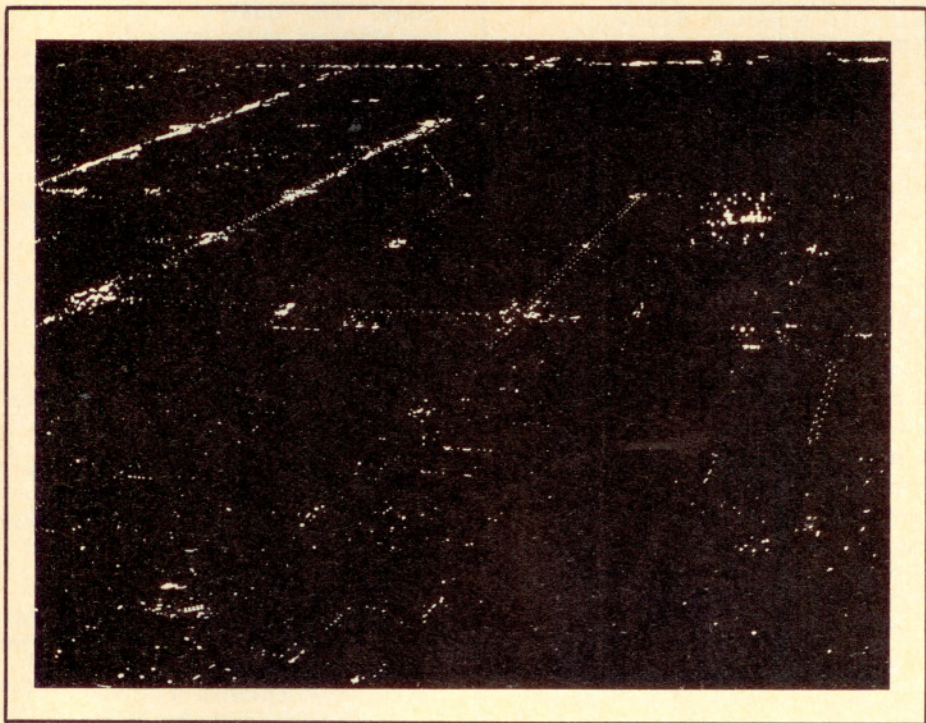


Meticulous preflight skull work, rooted in a healthy pessimism, is the . . .

# KEY TO SINGLE-ENGINE NIGHT FLYING

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■ ■ “Expect the worst,” an old saying has it, “then you’ll never be disappointed, and most often you’ll be pleasantly surprised.” It’s a saying that any safety-conscious pilot would do well to take to heart—especially if he flies at night.

This is not to say that night flying is some kind of awesome ordeal to be avoided if possible. On the contrary, few things in aviation can match the thrill of night flight in cool, calm air,

high above the patterned, shimmering iridescence of city lights, or over black-velvet stretches of open countryside, crisscrossed here and there with the snakelike, luminescent trails of night-lighted cars.

More to the point, perhaps, is the fact that night flying has its practical side. There are slightly more than 8,700 hours in a year, two-thirds of which most of us must spend in the mundane

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pursuits of sleeping, eating, and making a living. Of the remaining third, a substantial chunk is generally devoted to the amenities of social life. Even with weekends and holidays, then, unless you fly at night, there's precious little time to fly—and even less in the winter months.

Moreover, night flying has certain distinct advantages. Traffic is generally lighter, and such planes as are aloft are—thanks to nav lights, strobes, and rotating beacons—much easier to spot in most cases. Generally, too, radio frequencies are less crowded, and—despite certain problems to be treated later—visibility can be better than in daylight, since smoke and haze tend to “settle out” at night, making well-lighted objects stand out like jewels against black satin.

Poetry, practicality, and advantages notwithstanding, however, night flying still entails certain potential hazards.

Doubtless the first thing that comes to mind is the possibility of engine failure. Off-airport forced landings can be bad enough under a bright sun, but at night . . . ?

The only reasonable approach to the problem of night engine failure lies in planning and preparing for its “certainty.” The safety-conscious daytime flier is always on the lookout for a suitable spot below, “just in case,” and the same principle applies at night. The only difference is that for night flights, looking for suitable spots begins *on the ground*, with chart, plotter and computer at hand.

Whether your intended flight is to be over a congested, sprawling metropolitan area or over open country, route your course and choose your altitudes—agl!—so that you are always within gliding reach of an airport or some reasonably flat, unobstructed area. Next, compute your time, speed and distance (TSD), and translate them into checkpoints at 10- to 20-mile stretches along your course line.

Now, should the engine quit in mid-flight, if you've been watching your clock and chart, you'll know where you are and which of your preselected spots to head for. What's more, when you start heading for it, you'll be more able to tell the man on the other end of your mike where to come looking for you. This kind of TSD-airport routing may cost you upwards of 20 minutes or so of extra flying time, but what is it they say about the long way around being the safest way home?

If your intended flight is indeed over a wide metropolitan area, it may appear that the number of available landing spots comes down to little more than the actual number of airports. In the Los Angeles area, for example, about 30 airports are sprinkled about in a 3,000-square-mile area. If they were all evenly spaced, a pilot would never be more than six or seven miles from any one of them, but of course they aren't—which is the reason night flight over that

megalopolis is best conducted along a course adjacent to airports and high enough to reach the nearest.

When you're flying at night over open country, rural airports may be few and far apart, but they have a helpful characteristic: they almost always lie along well-traveled roads and highways. Not that the road or highway itself is necessarily a suitable landing place (a point to be elaborated shortly), but it offers a good navigational checkpoint and can “indicate” accessible landing spots. How? Well, if you've studied your route beforehand—and that includes studying its topography—you'll know, in terms of TSD, which stretches adjacent to that highway are open, reasonably flat, and reasonably free of obstructions.

But what do you do if, despite all your best-laid plans, you still get caught out of range of an airport or a known open area? It's virtually impossible, assuming you've charted wisely and done your skull work, but let's say it happens.

There's no pat answer to this one, and each pilot will have to dope out a general plan of his own. The long-standing idea of heading for a darkened area, especially if you're caught over a city, is partly valid, since (1) such an area, seen from a distance, could suddenly blossom into a lighted airport once you're in range (runway lights, being directional, are nearly invisible at times); and (2) the odds favor avoiding houses, powerlines, light poles, etc. But if you've really done a job of preparation, you might do better to head for a partly lighted area, signifying that big parking lot or race course or golf course or beach—those spots that you circled on your chart in addition to the available airports.

Expressways, freeways, and streets may seem very inviting when your engine quits over the city—likewise that highway below, if you're out over open country—and admittedly there are a lot of “old hands” who'd advise aiming for them. But aside from the possibility of colliding with traffic, the overhanging web of wires and powerlines attending most roadways could turn an easy night emergency into a nightmare.

As to the technique of the actual night forced landing, a variety of opinions abounds. Many high-timers insist that “it's just another landing”—and it might very well be, if you're coming into one of your preselected airports. Certainly, you'll want to carry the airspeed that gives you your best glide ratio, at least until you're on final. But once you are indeed on final, you may have to do some fast thinking, good planning, and your very best flying. Remember, there's no “go-around” this time. For most urban pilots, accustomed to extended traffic patterns and power approaches, this generally translates into carrying enough extra altitude to make sure you've “got it made,” then getting rid of that excess quickly with either a well-

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executed slip or the judicious use of flaps. (And, incidentally, plenty of daylight practice in these techniques—preferably with an able instructor sitting right seat—is also part of “expecting the worst.”)

If it's a moonless night and you're out over a black-velvet stretch of open country when you get caught (which in this man's book means you really haven't done your preflight skull work), the following is the best advice I've encountered: Tighten your seatbelt and, if you have it, your shoulder harness; slow up to about 5 mph above stalling; be ready to kill your master switch the moment terra firma shows in your landing lights; and let her settle on in.

In addition to possible engine failure, there are other potential hazards attendant on night flying—and again, expecting the worst and preparing for it should be the bywords where each of these is concerned.

Take the matter of vision and visibility at night. The lights of airborne planes, of airport beacons, of roads, highways, and city streets, all contribute to superior visibility on CAVU nights, but the physiology of the night flier's eyes can offset this advantage. You'll find it virtually impossible, for example, to spot a plane climbing up toward you against a background of city lights, or one upon which you may be descending over the same panorama of lights.

Another example of night-vision peculiarities: Against the solid-black background you're likely to encounter over open country, it's all but impossible to tell the distance between you and a solitary white light ahead. Similarly, the so-called autokinetic effect of night vision can make a stationary light appear to move.

Perhaps the most troublesome vision problem, however, is so-called night blindness.

Vision depends upon two types of cells in the back wall, or retina, of the eye. Grouped in the center of the retina are the “cones,” cells that are receptive to color. Around these are the “rods,” cells that respond to gradations of light and shadow, and that normally provide peripheral vision. When the general level of light drops below a certain point, the cones become virtually ineffective, and the rods (which are vastly more sensitive) must carry on more or less on their own.

Because of this, night fliers have a “blind area” dead ahead, and lights or objects at 12 o'clock can be virtually invisible until a pilot shifts his line of vision slightly, allowing the rods to do a better job of “seeing,” thanks to their greater sensitivity. But this very sensitivity can contribute to another kind of “blindness” if the rods are subjected to a light of great intensity—the sudden flare of a cigarette lighter or flashlight in the cockpit, the blue-white glare of terminal building lights as they flash by on takeoff or landing, runway and

approach lights set too high by someone in the tower (don't be afraid to ask the man to turn them down a bit).

Such overpowering light can effectively “knock out” the rods for as long as 15 minutes or more. Still another weakness of the rods is their “color-blindness”; hence it's possible that the green flash in the alternating white-green-white of an airport beacon might go unnoticed, even if the pilot is looking slightly to one side of it.

Understanding this much about night-vision problems allows you to prepare for them. And preparation in this case is a matter of utilizing a few common-sense rules, first and foremost of which is “scan, don't stare.” Keep your eyeballs moving, both inside and outside the cockpit. Staring brings on autokinesis; scanning prevents it. Staring makes impossible the judging of distance between you and a white light; scanning, by permitting time-interval changes in angles and perspectives, makes it possible. Staring makes you blind dead ahead; scanning brings all things into the scope of the rods. Staring makes a green light seem white; scanning, by allowing such few cones as are still operative to do their work, restores that welcome emerald hue.

The next rule for good night vision may seem like heresy; in fact, a good many experts still contest its validity. Nonetheless, it's a good idea to have a small amount of subdued white light burning somewhere in the cockpit. For long years now, the idea behind nothing but red instrument lights—indeed red any-kind-of-lights in the cockpit—has been that red has little effect on the rods, therefore allowing the eyes to see the panel and cockpit interior without compromising night vision. But as an FAA aeromedical man pointed out at a recent West Coast seminar for CFIs, white light—providing it's very dim—is equally harmless to the rods, while having the advantage of keeping more of the cones activated. In other words, a dim white light actually serves to enhance night color-perception and to reduce that dead-ahead blind spot. It is perhaps for this reason that some of the newer planes have white-lighted panels, light intensity being controlled by a rheostat switch.

The remaining potential hazards of night flying are relatively uncomplicated and easily prepared for. They can be summarized briefly as follows:

- For extended flights above 5,000 feet msl, carry and use supplemental oxygen. A lowering of oxygen content in the blood stream adversely affects night vision, and this lowering can begin at five grand. You can, of course, make it a point to stay below 5,000 feet, but then you might find yourself suddenly out of gliding range of one of those preselected landing spots at a very inopportune moment.

- Keep night cross-country flights shorter than daylight ones, and double your usual fuel reserve. Night flying over a long-haul trip can be

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soporific, even with passengers along, and the sleepy pilot is the pilot most likely to get lost and fly around until he runs out of gas. So, if a 500-miler be-fogs your brain in daylight, better keep it under, say, 250 at night. And if you figure 45 minutes is a decent daytime fuel reserve, certainly 1½ hours is a good bet after dark.

- Know how to fly the bird you're in solely by reference to the instruments, and make sure those instruments are working properly. CAVU weather and bright, full moons are, unfortunately, all too rare in night flying. And even if the weather briefing you got beforehand (and you did get one, didn't you?) shows not a hint of IFR conditions, things can sometimes change in a hurry. Without warning, the stars above and the lights below can suddenly vanish; without warning, hazy little glows can suddenly form around your nav lights. When this happens, the wise pilot will kill his strobe and beacon (favorite lures for that vertigo that may be waiting inside a cloud), get on the gauges instantly, and do a smart one-eighty.

- File a flight plan and report your checkpoints to each flight service station along the way. Or, alternatively, file and ask for radar-following—a service to VFR pilots that is already nearly universal. In the first instance, you'll be obliged to keep your TSD estimates up to snuff, and you'll be in frequent radio contact with people on the ground who can be most helpful should anything go wrong. In the second, you'll be in continuous contact with people who can not only advise you of the proximity of other traffic, but who can vector you to a nearby airport or known unobstructed area if, despite all your preplanning and care, you do have to put your plane down in a hurry.

- Preflight your bird with a flashlight and utmost care, and don't forget to take that flashlight with you when you go. If your plane is well-maintained and you've done a good job of preflighting, electrical failure is unlikely, but if it happens, you'll need that flashlight. The best night vision in the world can't read charts and instruments in a totally dark cockpit.

- Know the location of uncontrolled airports and the meaning of the various light-gun signals every tower is equipped to send. With or without total electrical failure, you could lose your radio, and the implication here is, I believe, quite clear.

- Undoubtedly there are further words of wisdom and advice that could be added to this or any other treatise on night flying. But in one sense, every possible hazard has been dealt with in this article through the agency of our central idea: Expect the worst, then prepare for it.

Then go out and expand your flying time in a world of black velvet, still night air, and jeweled iridescence. □