

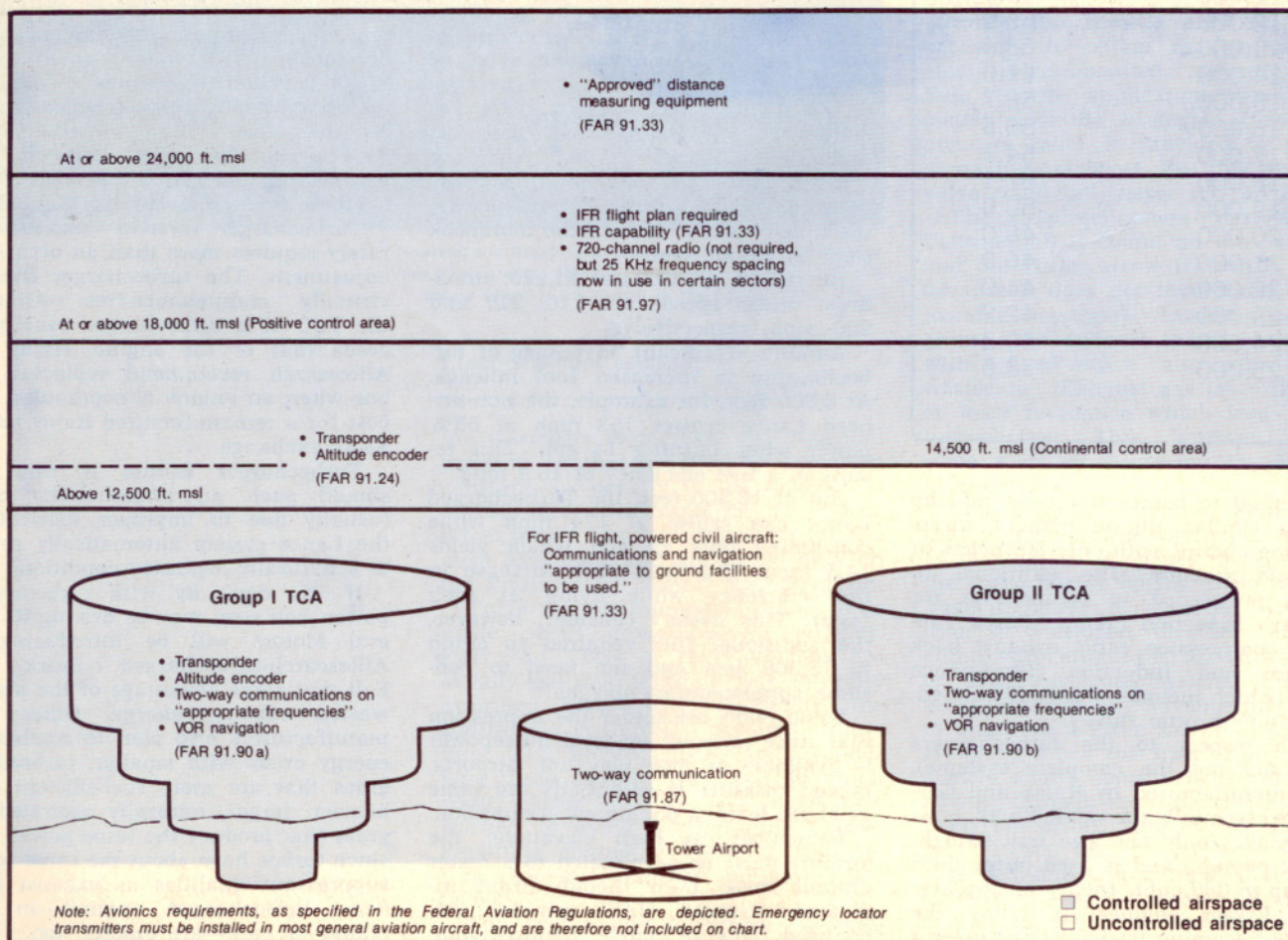
Tuning In to Radio Buying

Installing the right avionics
in the right place
at the right time — for the
right price — shouldn't
be a simple undertaking

■ The combination of unlimited funds, current IFR flying experience, and the proposed purchase of a new airplane makes for easy buying decisions when it comes to avionics.

It's simple—look at the features the radios have, look at their style, maybe go for a brand you know, and then find the optional avionics package and have installed as much as will fit in the panel.

Few of us, though, have it so easy. In obtaining our radios we face space limitations, electrical and wiring considerations and, certainly of primary



concern, dollar constraints. Moreover, sometimes we feel we're not ready for, or don't need, all that fancy equipment. And sometimes we may fail to look far enough into the future to see that we may soon be forced into installing an FAA-approved somethingorother.

What avionics do you need? In what order? At what price? For what kind of flying?

"We don't want to touch that one with a 10-foot pole," said a technical man at the General Aviation Manufacturers Assn.

Selection of avionics is "like everybody's favorite meatloaf recipe," suggested a spokesman at Bendix Avionics, when confronted with the same series of questions.

Yet with an intelligent view of the flying world, of your personal flying habits and needs, and of the airplane that the radios are to go into, a selection of avionics can be approached quite logically.

Assuming you're buying a plane for your own use, some key questions can be asked:

Are you instrument-rated now, or do you plan to train in the future for an instrument rating?

Will your flying be concentrated in heavily populated areas, or will your craft be based in the wide open spaces out west?

Will you be flying above 12,500 feet? Above 18,000 feet? Above 24,000 feet?

Will you most often be flying alone, or will there be another pilot aboard?

What kind of navigation aids are at the airport you frequent most commonly?

Let's begin with a basic assumption. You're going to start with an airplane that includes a minimum of equipment for comfortable VFR flying. The realities of today's airspace mean you'll want communications capability for talking to control towers; navigation equipment that can pick up VORs; and in most areas a transponder for radar identification of your craft—yes, even for VFR flying.

It must be stressed that you can,

legally, cruise over most of this country with no radios of any sort in your airplane. But for practical use, a nav/com and transponder will be invaluable.

If all your flying will be VFR, and you fly off the beaten track a bit (away from the big cities where the terminal control areas are housed) you don't need, and may not want, any more equipment. And it's unlikely that you'll need anything else in the next several years. If the VHF radio in your aircraft has only 90 communication channels, you may want to upgrade that to handle 360 channels, for many approach and departure controllers are on frequencies such as 126.55 or 119.35.

If you ever have in mind installation of more avionics in your airplane, you should—with the initial order of a nav/com and transponder—think about the airplane's future.

A spokesman for Collins Radio suggested that looking at, and planning for, ultimate requirements will, in the long run, save money and weight, and add reliability. He suggests sticking with one brand of radios, to assure the best possible "interface" between them. And he further proposed that an initial investment in wiring for the future may make adding radios later a simpler task.

"A good avionics shop is your best friend," he added. "Provide for wiring necessary for installations later, and make sure that shop gives you a wiring diagram that is absolutely current."

Assuming now that you're going to begin adding equipment to make your airplane one suitable for IFR use, you might take a look at Federal Aviation Regulation 91.33 (d). Within that paragraph, the rules call for "two-way radio communications system and navigational equipment appropriate to the ground facilities to be used."

There's a lot of latitude in that rule, but for today's IFR system, minimum avionics will be a 360-com and VOR nav, a backup nav/com, and a transponder. With two sets of radios, you'll need some kind of audio selection panel at this point.

The next piece of equipment depends

on your personal recipe for IFR flying. Ed King, Jr., (AOPA 93665) president of King Radio, says he'd add a marker beacon receiver and indicator, to get you down to reasonably low minimums in gruff weather.

Others might opt for a basic wing leveler, to ease a single pilot's workload . . . to give a guy time to review charts and handle other cockpit duties without winding up in an unintentional, tight spiral inside a cloud. The wing leveler, particularly one with course-tracking capability, also makes a long cross-country trip for the single pilot less of a strain, leaving him more ready to cope with the most critical phase of the trip, the final landing at a destination.

In thinking about autopilots, a spokesman at Sperry Flight Systems suggested that "heading-hold capability is only as good as the compass it's connected to." A slaved compass system, one that automatically keeps the heading gyro aligned with a magnetic compass, can reduce both workload and error possibilities for pilots flying hard IFR, he said. The cost, though, will be several thousand dollars, and there are a few things that might be sought first.

Charles B. Husick (AOPA 434178), president of Narco, says he'd add an altitude-reporting encoder next, assuming there's to be a lot of flying in the northeastern United States. And, a transponder/encoder combo is required for flights above 12,500 feet in controlled airspace, even if the flight is under VFR.

Almost everybody seriously involved with avionics or instrument flying places the next piece of gear high on his personal priority list. It's the HSI, or horizontal situation indicator. This single unit, which fits in a standard instrument panel cutout, overlays a VOR navigation display on top of a directional gyro. Advanced models also include glideslope display and other features. This one instrument will offer almost everything you need for instrument weather navigation.

"An HSI does more to reduce cockpit

workload, both en route and on approach, than anything else," says Husick. Since it combines two indicators into one, it also reduces space requirements in the instrument panel.

While on the subject of workload, a lot of the pros will tell you that heavy IFR flying demands use of a headset with boom mike. Your mike will be at the ready all the time and, as an added bonus, you get a free right hand that can be used for all kinds of things you never dreamed of.

At this point in your radio layout, if your great uncle were to bequeath to you another \$1,500 or so, you would probably want to connect an old standby to the airplane. The automatic direction finder, long past its prime as the heart of the instrument navigation system, still has a solid seat in today's IFR sky.

"If someone had told me 25 years ago that an ADF would be mentioned today in a 'What's New in IFR' discussion, I would have indicated disbelief," said Edward B. Moore (AOPA 366683), president of Edo-Aire, a New Jersey-based avionics manufacturer. The ADF's wide application as an approach aid—Non-Directional Beacon approaches, as well as its use for locating the outer marker on an ILS—was unpredicted, he added. There are now over 900 of these low and medium frequency facilities around the country.

Some pilots might rank the ADF even higher, for it's a navigation instrument that can get them "unlost" more simply than any other. If he can tune a station, a pilot can fly there without a heading gyro, compass, or other radio. He simply turns the airplane until the ADF needle is pointed straight ahead, then follows the needle. Eventually, albeit by a curving path perhaps, he'll arrive at that station.

Now, for another several hundred dollars you can have a glideslope receiver as an adjunct to your radios. It will get you a couple of hundred feet closer to the ILS runway in the ugliest of weather—the kind of weather that doesn't happen too often, and usually doesn't stick around for a long time. That's why the glideslope is lower on the priority list. It's not the cheapest thing, but it may have been included when you bought a marker beacon receiver for the plane.

Distance measuring equipment (DME) is likely the next item on the shopping list. Any IFR flight can be completed successfully without DME, but every IFR flight will seem about ten times easier with this wizard aboard. DME's

aren't what they used to be: a needle pointing roughly to distances from the VORTAC. Now you get digital readings in tenths of a mile, speeds down to the knot, and time estimates to or from the station down to the minute. Some DME's will provide two or three of these bits of information simultaneously on 2-inch-wide displays intended for placement directly in front of the pilot.

Three more pieces of avionics can create the most complete instrument panel you might ever want—a radar altimeter, area navigation (RNAV) unit, and a full autopilot (or combined autopilot/flight director).

RNAV, still the relative newcomer to the panel, will get you to almost any location, using signals from existing VORTAC ground stations. It's slowly being adopted into the IFR system, and gives the night VFR pilot a good way to keep pinpointing the nearest airport. Pilotage in VFR weather, and off-airway routings if IFR, can give you some of the same benefits of RNAV, however, at a lot less cost. But keep your eye on the future of RNAV.

(Of course, you may have wanted to drop five or ten grand on weather radar. But that's another story).

With the accoutrements you've affixed in your instrument panel, and with some anti-icing equipment, you'll be ready to challenge the schedules of the airliner.

Hold on. All this stuff's only useful for the pilot who knows how to use what he's got, and assures that it's all operating properly.

"There's nothing that can do more to enhance safety," said an avionics shop owner, "than good avionics that are well maintained, and used by someone who knows how to use them." Russ Hammer (AOPA 110314), president of Radio Ranch, Inc., in Polo, Ill., says he finds some airplanes that are operated by "gadget-buyers." He deals with some pilots who put in electronics "more as a hobby than a necessity." Certain items, he noted, like tape decks and complex digital clocks, can create added congestion behind the instrument panel and may run up costs of installation and maintenance of really useful radios.

And Narco's Husick added, "An airplane that's over-equipped is actually one that's not being utilized properly."

According to Hammer, a pilot should always be making practical checks of his equipment—cross-checking one VOR against the other, and checking degrees of VOR indicator error when over a VOR by tuning a nearby VOR that is connected with a published airway. He also suggested frequently calculating ground speed and distances as checks of the DME.

Put forth here has been a lot of fine advice about how to equip an airplane. Where we fail, though, is that we can't tell you how to do it cheaply. Yes, there are places that offer radios at big discounts. What you may get, though, is a nav/com mailed to you in a box. You've still got to face installation costs and potential problems, among them invalidation of the unit's warranty.

In the long run, you might best deal with one shop that may give you a good price for purchase and installation of a radio package, and has a reputation for fairness and quality. When you're talking about putting radios in a new airplane, you're talking about men pulling wires from, and drilling holes in, a machine for which you might have just paid \$50,000 or \$100,000. You'd probably prefer it be done right, rather than cheap.

Of course the airplane manufacturers offer radio packages that can be ordered along with the new craft. But often their prices on radio equipment are substantially above list. Some shops, on the other hand, will not charge for installation of radios purchased at list price. So ask a reputable shop and compare with the manufacturer's prices. You could find a big bargain, although you may have to place your brand new craft in a hanger for two weeks.

Cessna recommends its way of doing things. Cessna owns an avionics subsidiary, and offers standardized Cessna avionics packages for almost all its models. If bought in the groupings recommended by Cessna, radios will cost about 10% less than for the same equipment purchased separately.

In making your avionics buys, look for combinations of features in one piece of equipment—and maybe save some money. Some audio selector panels will include marker beacon receiver and lights for not much extra money. Narco is putting a glideslope receiver into one of its VOR indicator/receiver units. Edo-Aire offers a count-up digital timer as part of its ADF. Collins adds frequency storage capability in one of its communications radios.

In short, approach avionics buying with a willingness to spend time entrenched in comparisons. Be skeptical of claims of outrageously cheap radios. Be a wise shopper in looking at the manufacturer-installed avionics packages; take a description of the package to a shop and get a quote.

Look at your needs today, and don't overbuy or make your panel overly complex. Yet, plan ahead for the future so you don't create unnecessary migraine headaches later—and a wallet-full of extra costs. □