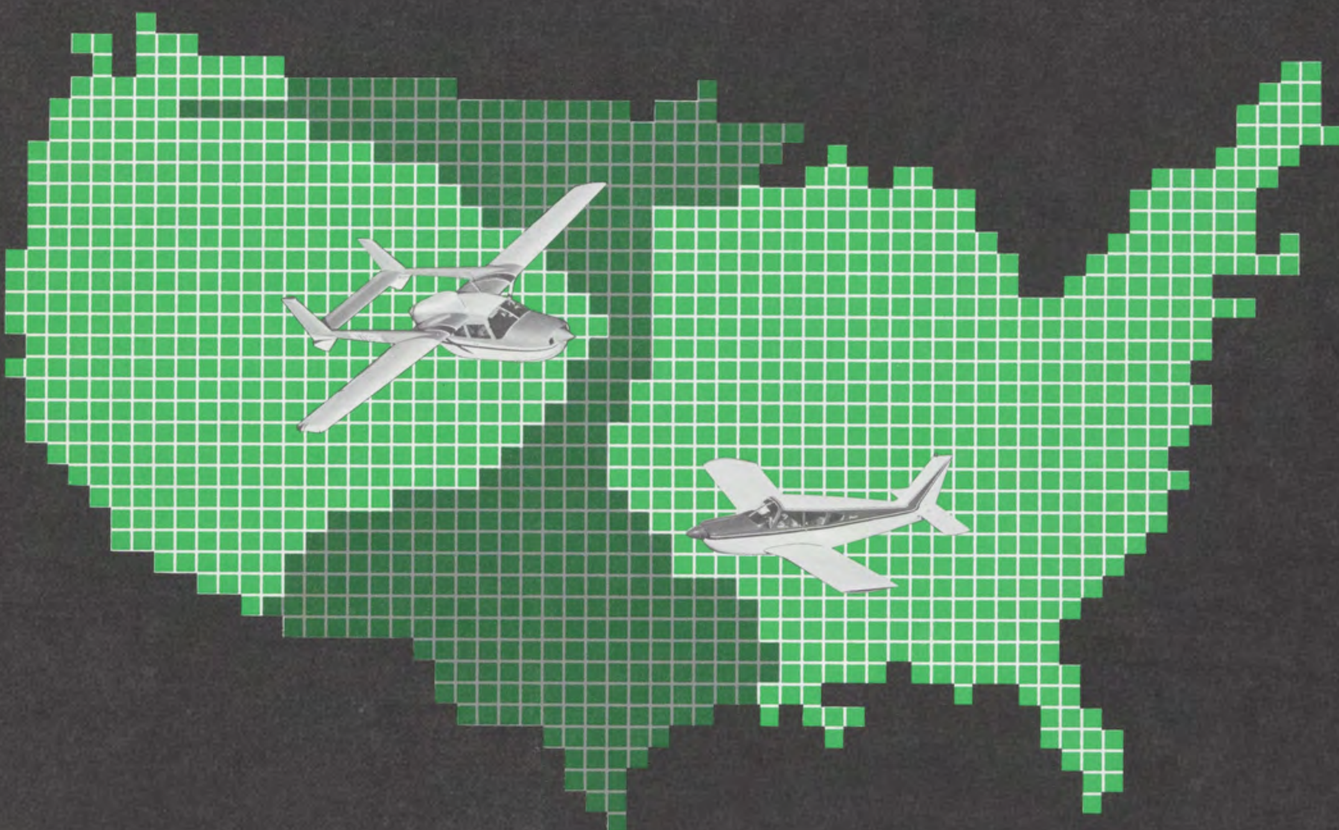
March—April 1988

FAA Aviation NEWS

A DOT/FAA FLIGHT STANDARDS SAFETY PUBLICATION

Closing the LORAN Gap, p. 7



Also in this issue:

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BRIEFS

LIGHT UP THE BIRDS. Pilots flying near migratory bird flyways are advised to check the NOTAMS at flight service stations for reports of local bird migrations. Bird collisions with aircraft often have serious and sometimes fatal consequences. The use of landing lights and/or strobe lights is recommended to give better warning to the feathered flyers. Migrations continue into April along the northern flyways.

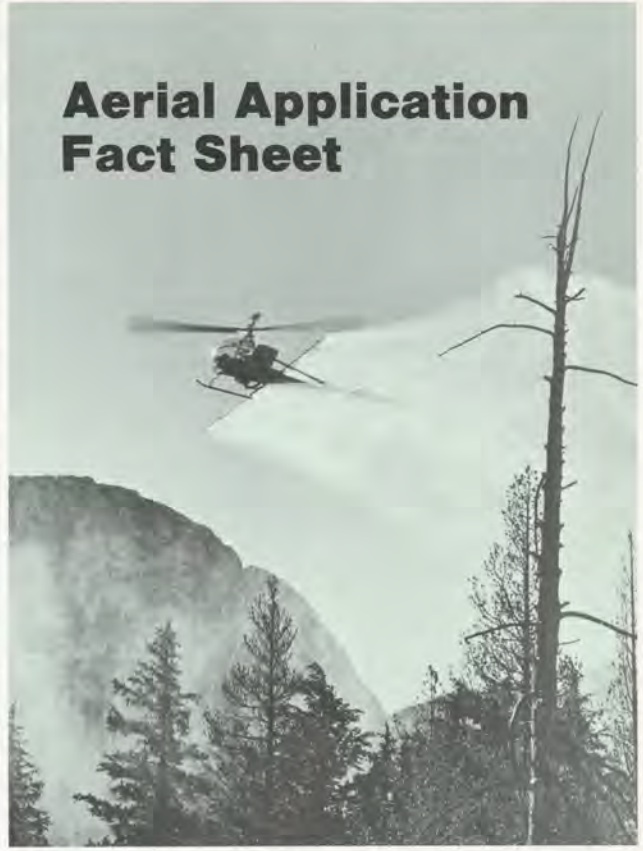
NEW HELICOPTER ROUTE CHARTS. Following the recommendation of FAA's Cartographic Standards Branch, the National Ocean Service (NOS) has begun issuing a new standardized series of charts for helicopter use in busy terminal areas. The chart is in three colors, with blue used for helicopter routes and other aeronautical data. A large number of prominent landmarks are shown pictorially in black. The scale is 1:125,000. The first of these charts are New York (12-17-87), Washington, D.C. (2-11-88) and Chicago (5-5-88).

The price of the new charts is $2.25. They may be ordered from any chart dealer or from NOS, Riverdale, MD 20737 (Tel. 301/436-6990).

SUSPECT CAPS. Certain valve caps for aircraft tires and struts, bearing the trademark "DILL" MS20813-1, may cause inadvertent deflation because of a defective gasket. This is a black rubber gasket which sometimes twists when the cap is screwed down, and may depress the pin. Although no related mishaps have been reported, suspect caps should not be installed, and should be removed when identified. Acceptable DILL caps have a brass ring gasket. Suspect caps can be returned to your supplier for free replacement.

DO-IT-YOURSELF ALL THE WAY. Amateur aircraft builders who wish to perform the required annual inspection on their aircraft must first be issued a Repairman's certificate from the local Flight Standards district office. Advisory Circular 65-23A, "Certification of Repairmen (Experimental Aircraft Builders)", explains in detail how an amateur builder can be issued a repairman's certificate for his aircraft. The advisory circular is free from DOT M-443.2, Washington, D.C. 20590.

Aerial Application Fact Sheet



Aerial application of seeds, fertilizers and pesticides is a key component of modern agriculture and an important livelihood resourse for many pilots. Traditionally it has been one of the most accident-prone kinds of flying, but that accident record has improved appreciably within the last decade, thanks to better equipment, better technique and a broad concern for safety. The ag pilot, perhaps more than any other pilot in general aviation, is subject to pressure in his or her work, given the unpredictability of growing conditions and the brevity of the season—opens the door to accidents because it leads to fatigue, taking chances, contamination and neglect of the aircraft as well as the individual.

During the months of June and July 1986—perhaps the busiest season of the year—there were 82 accidents reported by the National Transportation Safety Board in aerial ag operations. The great majority of these, about 75 percent, were in the pilot error category where fatigue obviously plays its part. However, some of these accidents also appear to have been caused by ignorance of approved procedures or the unnoticed development of risky habits.

The "Application Fact Sheet" which follows is a helpful reminder of safe practices in the aerial application business, provided by the FMC (Food, Machinery, and Chemical) Corporation of Philadelphia.

Attention to proper and safe handling procedures is important with any pesticide application. The range of people involved is wide: pilots, loaders, agricultural workers and the general public. The area which can be affected by just a single aircraft is large, which means that those involved in aerial application must take special care.

The following safety guidelines will aid in safe and effective operation.

GENERAL OPERATIONS

Always read the label before applying any agricultural chemical. The label contains a wealth of information on how the product should be used and what special precautions, if any, must be observed for safe use. *Follow the label directions carefully.*

Brief all workers involved in the operation about both general safety precautions such as washing before eating, not carrying cigarettes which can become contaminated, etc., and any specific precautions which relate to the pesticide in use. Do not take it for granted that the ground crew will realize that the relatively nontoxic fungicide in use yesterday has been replaced by a very toxic insecticide today.

Have someone *in charge* at the airstrip. Make this person responsible for adherence to proper handling procedures. Make sure the rules are enforced for both the protection of the workers and your own business.

Make sure the person in charge (and other people as well) knows the first aid procedure for exposure to the chemical being applied and knows where and how to obtain professional medical assistance.

Be sure to protect others as well as your own crew. Keep all pesticides secure to prevent accidental exposure to people and livestock and dispose of pesticide containers promptly so they are not re-used. Notify people working in or around the area to be sprayed about the intended spraying and any re-entry restrictions.

PROTECTING THE ENVIRONMENT

Protect the environment by ensuring that unintentional release of materials does not enter streams, ponds, or other bodies of water or non-target areas.

1. Do not spray over lakes, ponds or rivers unless applying pesticides specifically to those areas. Do not allow drift to contaminate these areas.
2. Check the area surrounding the target area carefully for any crops or livestock susceptible to drift.
3. Do not spray over houses, buildings or livestock.
4. Use proper application techniques and equipment set-up to avoid drift. Remember, drift is no accident; it occurs because

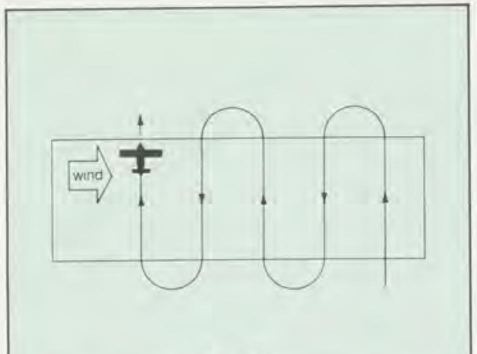


Figure 1.
Proper pattern to avoid flying through spray from previous area.

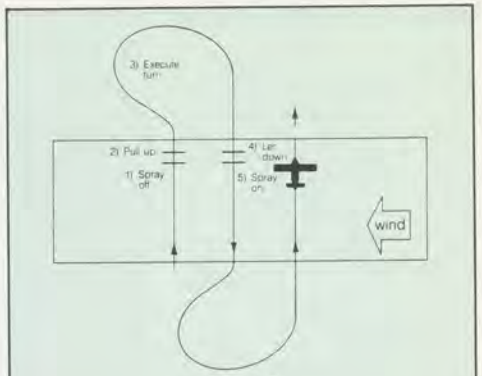


Figure 2.
The safe turn-around

proper application techniques go unheeded.
5. When cleaning equipment or containers, do not allow run-off water to contaminate lakes, ponds, rivers or ground water. The safest way to dispose of wash water is to collect it in a holding tank and dispose of it in an approved area. Always follow local regulations.
6. If an accident occurs and there is any risk of contamination of water supplies, notify local authorities immediately and attempt to contain the spill with earthen dikes.

FLYING GUIDELINES

This fact sheet is not intended to be a flight training manual. However, several flight procedures in which the greatest incidence of accidents occur, and which are worthy of constant review and attention are covered below:

1. *Carefully check the target area for flying hazards before application.* This applies especially to new areas which you are unfamiliar with, but applies to familiar areas as well. Remember, the power line that you flew under last month may have another line strung below it today.

Be especially wary of any breaks in the pattern of the cultivated area; these often signal poles or power lines.

Transformers on poles usually signal a line running off to a building or well. Guy wires are normally placed on the opposite side of the pole from a branch line or where a power line ends or makes a sharp turn.

2. *Have a plan for clearing obstructions and stick to it.* For obstructions at the end of a field, shut off the spray equipment before starting the pull-up. This will help avoid drift and carry a uniform spray pattern to the edge of the field. When starting a spray run over an obstruction, first drop the aircraft down to the proper application height and start spraying after the aircraft is in straight and level flight at a point even with the shutoff point of the previous run. After the main part of the field has been sprayed, fly one or two passes across the flight pattern, parallel and close to the obstruction.

For obstructions within a field, clear these the same way as obstructions at the end of a field: stop spraying one or two swath widths before the obstruction, climb over it and make a complete 360° turn to drop in on the other side. Dealing with obstructions in this way, rather than popping up over the obstruction and immediately dropping down on the other side, allows the pilot to retain better control of both the aircraft and the spray pattern.

3. *Plan application runs so as not to fly through material sprayed on preceding passes.* To do this requires flying crosswind with each successive pass moving upwind (figure 1).

4. *Execute the turn-around carefully.* The turn-around is a critical maneuver which is executed repeatedly during aerial application. The combination of pulling up with loss of airspeed and increased drag, a tight turn, and turning downwind, often puts the aircraft very close to stall conditions and needs to be executed carefully.

Whenever possible, pull up and level off *before* starting a turn. The normal procedure is to: 1) make a 45° turn *away* from the next intended pass; 2) fly in this direction for several seconds. How long you fly away from the next pass depends on the distance the next swath is to be from the one just flown and the rate of turn which may be safely executed—the closer the next swath or the shallower the turn, the longer the time should be; 3) turn back toward the next intended swath path leaving enough room before the let-down to orient yourself and align the aircraft (figure 2).

Having everything set up before letting down will make it easier to turn the spray equipment on at the proper time to cover the edge of the field and not spray non-target areas. Avoid turn-arounds over people, buildings or bodies of water.

Be alert to ensure that the spraying system is shut off before pulling up for the turn-around.

PROTECTING THE PILOT

Special care must be taken to prevent exposure of pilots to chemicals. When at all possible, pilots should not handle or load pesticides, as continuous exposure can cause illness, making it unsafe to operate the aircraft. Pilots should observe the following:

1. Wear the appropriate protective clothing and equipment.
- A crash helmet must fit well to do its job. Always wear one—they save lives. Eye protection is also essential against chemicals.
- Wear clean clothing each day and change clothing immediately if it becomes contaminated. Many chemicals are highly toxic when absorbed through the skin. Wash contaminated clothing separately in hot water with plenty of soap.
- When use of a respirator is specified on the product label, use one and be sure that it is fitted with the appropriate canister.
- When using rubber gloves, be sure the insides are kept clean. Do not put soiled hands into the gloves as just a slight amount of chemical will render any protection from the gloves useless by keeping it in contact with the hands.

2. When using organophosphates, have blood cholinesterase levels checked at regular intervals.
3. Bathe thoroughly after each day's work.

4. Be familiar with each pesticide used. Know the special precautions which must be taken with each one, the symptoms of exposure and the antidotes required in case of over-exposure.
5. Fatigue is a real enemy. It can cause errors in judgment, inattention, and slow reaction times: all of which can be fatal to a pilot.

Hot humid conditions, vibration, wind, dust and chemical odor are all factors which contribute to fatigue and which are common to most aerial spraying operations.

Once the spray season starts, it is often difficult to schedule flying time to provide the proper rest intervals for pilots which further increases the problem. Pilots should be aware that they are usually the last to recognize their own delayed reactions caused by fatigue.

While there is no substitute for proper rest, here are some tips on fighting fatigue:
- Eat properly. You may be busy but no schedule is so important that proper meals should be forfeited. Be sure to wash hands and face thoroughly before eating.
- Drink plenty of fluids.
- Take frequent breaks outside of the aircraft. When possible, take breaks away from the airstrip.
- Wear earplugs or other devices to minimize noise which is a factor in causing fatigue.

GROUND CREW

All people who refuel, reload or maintain the aircraft should allow the first four rules of protection given under "Protecting the Pilot." In addition, observe the following precautions:

1. Handle liquids with care to avoid splashing and/or spilling chemicals.
2. Clean up spills promptly using sawdust or absorbent clay to absorb the spill. Dispose of the contaminated material in a secure place. Do not allow it to be used for any other purpose.
3. Be sure to close all aircraft tanks securely.
4. Clean aircraft, especially the cockpit, frequently.
5. Do not allow runoff water to splash on the body. Do not stand in runoff water without waterproof boots.
6. Be able to immediately locate and operate fire extinguishers.
7. Know what to do in case of an accident or fire.
8. Do not breath fumes when pouring concentrated chemicals into mixing equipment or aircraft.
9. Do not eat, drink or smoke or store such items around mixing equipment or chemicals or carry food or cigarettes in your clothes while loading aircraft. They will absorb fumes and become contaminated.
10. Wash hands and face thoroughly before eating.
11. Bathe thoroughly at the end of the day and change clothing. Change clothing immediately if it becomes contaminated. Wash clothing separately from normal laundry. If at all possible, do not take clothing used in mixing and loading home.
12. Keep all unauthorized people away from the area.
13. Dispose of containers properly. Rinse each container thoroughly immediately after using. If possible, crush all metal cans after rinsing, to prevent use for other purposes.

FLAGMEN

1. Make sure all people and livestock are out of the treatment area before treatment. Inform people of re-entry restrictions.
2. Wear proper protective clothing.
3. Always start flagging on the downwind side and move into the wind—move away from drift.
4. When the aircraft is lined up for the pass, move to the next position.
5. Watch the airplane at all times. Never turn your back on an approaching aircraft.
6. Stay at the field until the pilot has completed spraying so assistance can be given in case of an accident.

EQUIPMENT MAINTENANCE AND CLEANING

All parts of the aircraft spray system should be inspected frequently. Damaged or loose fitting hoses will permit the chemical to leak onto non-target areas. And leaks which are confined inside the aircraft can cause corrosion and/or harm the pilot.

The windscreen should be cleaned at every loading. Ground crews and pilots should be reminded that the aircraft is most often covered with a pesticide film and should not be pushed without wearing chemical resistant gloves. Wash the exterior of the aircraft as frequently as practical. This not only reduces the risk of contamination from the aircraft, but helps preserve the aircraft itself.

Water soluble pesticide solutions are easily cleaned from the aircraft or spray system with clean water. Oil-based formulations should be flushed from the system with diesel oil or another suitable solvent. Be careful not to flush systems used with oil-based pesticides with water, or systems used with water-based pesticides with oil, as this will form an insoluble paste-like material which will clog the system. When using vegetable oil carriers, both the spray system and the aircraft can be easily cleaned with a solution of water and a common household detergent.

Pesticide tanks should not be steam-cleaned as the heated pesticide will give off toxic fumes.

Whenever a different pesticide is used, it is important to thoroughly flush the system to remove all of the previous pesticide. After herbicides have been used, the system should be neutralized by thorough flushing of the system with a commercial tank cleaner or by adding one liter of household ammonia to 50 gallons of water.

In all cases, be sure that the runoff water from these cleaning operations is collected and does not contaminate any water source or be left on the ground where people or livestock can come in contact with it.

AIRFIELD OPERATIONS

A well organized loading area not only contributes to safe operations but minimizes the amount of time the aircraft is on the ground, thus further increasing productivity. When temporary airstrips are used, many of the features outlined here will not be possible to maintain. However, provisions should be made to incorporate as many of them as possible into any aircraft loading area.

1. Keep fuel and pesticide storage areas well separated so that in the event of a fire at the fuel site, the pesticide will not become involved.
2. Provide secure storage which can be locked for all pesticides. Adequate ventilation should be provided to minimize the temperature in these buildings. Extremely high temperatures, which occur in unventilated buildings, may cause loss of pesticide effectiveness and lack of ventilation also means unnecessary exposure to chemical fumes to workers who enter the building.
3. Be sure all pesticides are labeled correctly and that, where used, bulk tanks are clearly marked as to the chemical they contain. Whenever possible, bulk tanks should be diked to prevent chemical runoff in case of a tank failure.
4. Dispose of empty containers in accordance with local regulations. Always rinse and drain each container thoroughly. Crush, if possible. Remember that pesticide containers are attractive containers for many other uses, and, if left lying around, will be taken and very possibly cause harm to unsuspecting people.
5. Whenever possible, a hard-stand should be provided for the loading and wash-down area. This will permit removal of spilled chemicals or wash water from the area.
6. If at all possible, the loading/storage area should be formed to prevent children and livestock from entering.

Aircraft operations are particularly attractive to young children and special care should be taken to keep them well away from the area.

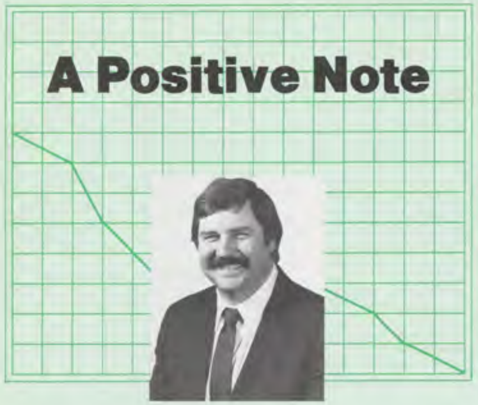
7. A shower should be provided for ground personnel and pilots. If this is not possible, running water and soap are the minimum which must be easily accessible to all who come in contact with chemicals.
8. Keep an adequate number of fire extinguishers handy.

FIRST AID

Speed is essential in minimizing the effect of contact with or ingestion of any

(continued on p. 16)

A Positive Note



by John K. Lauber
Member, National Transportation Safety Board

"... General aviation continued to improve its accident rates in 1987. For the fifth year in a row, the total accident rate and fatal accident rate dropped, to 8.25 and 1.45 per 100,000 aircraft hours respectively. Both are record lows for that segment of the industry. Fatalities declined from 955 to 788, also a record low since the NTSB began keeping statistics in 1967." (From a NTSB release dated 1/12/88.)

This is good news indeed for a year in which aviation safety was the topic of headlines and the lead story on network news on an almost daily basis—as well as a frequent subject of editorial comment and Capitol Hill discussions. Good news too for a year of generally dismal and gloomy production and delivery figures from general aviation manufacturers. It's downright *nice* to be able to report some very positive news about general aviation. You may notice from the accompanying Table that there has been an overall drop in annual general aviation accidents of about 40% since 1977, although activity has remained at a similar level.

Although it will take considerable time before detailed analyses can be done to determine specific reasons for the declining general aviation accident rates, there are clearly several factors at work, each of which is making a contribution to the overall safety picture. I'd like to briefly mention two areas which I believe are especially important and which I am confident will lead to even further improvements in general aviation safety.

Previous studies by university researchers, and by aviation safety specialists from the FAA, NTSB, and NASA have demonstrated many times over that human error is by far the largest single cause of aviation incidents and accidents—historically, flight crew error is found to be causal in as many as 90% of these accidents. Furthermore, it is well-known that a very large proportion of these pilot error accidents are directly the result of inadequate knowledge of the fundamentals of flight, or represent flaws in judgment and decision-making on the part of the pilot.

Thanks to the efforts of many individuals and organizations, both of these problem areas—inadequate knowledge and poor judgment—are being directly, and successfully, attacked. I believe we're seeing fewer accidents as a result.

In a unique cooperative effort involving the AOPA Air Safety Foundation, the General Aviation Manufacturers Association, the Ohio State University, Transport Canada, and the FAA, a series of training manuals on Aeronautical Decision Making has been developed and published. These manuals, directed at different segments of the aviation community, present practical, useful information on the decision-making process, plus discussion of factors and situations which can adversely affect pilot's judgments. Also included are training exercises which illustrate the principles involved. Preliminary experimental evaluations of the effectiveness of this training material show reductions of from 10% to 50% in the pilot error rates.

Concurrently we have seen, over the past two years, an FAA supported nationwide Back-to-Basics program, with pilot seminars and literature dealing with successive segments of basic pilot skills. As a participant in some of these seminars, I can vouch for the fact that they are very worthwhile—they help us to acknowledge the fact that we, like the professionals, need periodic, recurrent training to keep up our skills and understanding of the complex system we fly in. These programs provide much-needed "booster shots" to prevent ignorance-induced skill degradation and accidents. I urge all pilots to participate in these on-going programs.

How much of the reduction in general aviation accident rates can be attributed to these two programs is still a matter of conjecture. But as a general aviation pilot, and as someone with a professional interest in transportation safety, my intuition tells me that both are significant forces for good. I believe we all owe a large debt of gratitude to those people who had the insight and inspiration to make them happen. ■

Dr. John K. Lauber was appointed to the National Transportation Safety Board by President Reagan in November 1985. Previously, Dr. Lauber was Chief of the Aeronautical Human Factors Research Office of NASA's Research Center at Moffett Field, CA.

Dr. Lauber holds a Ph.D in psychology from the Ohio State University. He has worked with the Navy Human Factors' Laboratory at Orlando in addition to conducting and managing aviation human factors research for NASA. He is the author of numerous scientific and technical papers on human factors and aviation safety. In 1985, he received NASA's outstanding leadership award, and has served on numerous national and international committees and commissions.

Dr. Lauber has a commercial pilot's license, with airplane single- and multi-engine land, instrument—airplane, and rotorcraft-helicopter ratings. He is type-rated in the B-727.

AIRCRAFT ACCIDENTS, FATALITIES, AND ACCIDENT RATES
U.S. GENERAL AVIATION FLYING
1977–1987
(ALL OPERATIONS OTHER THAN THOSE OPERATING UNDER 14 CFR 121 OR 14 CFR 135)

Year	Accidents		Total Fatalities	Aircraft Hours FLown (000)#	Accident Rate 100,000 Aircraft Hours	
	Total	Fatal			Total	Fatal
1977	4,079	661	1,276	31,578	12.9	2.09
1978	4,216	719	1,556	34,887	12.1	2.06
1979	3,818	631	1,221	38,641	9.9	1.63
1980	3,590	618	1,239	36,402	9.9	1.69 (R)
1981	3,500	654	1,282	36,803	9.5	1.78 (R)
1982	3,233 (R)	591 (R)	1,187 (R)	32,095	10.1	1.84
1983	3,075 (R)	555 (R)	1,064 (R)	31,048	9.9	1.79 (R)
1984	3,010 (R)	543 (R)	1,039 (R)	31,510	9.5 (R)	1.72 (R)
1985	2,741	498	952	30,590	9.0	1.62
1986	2,581	469	955	29,313	8.8	1.60
1987p	2,420	426	788	29,320	8.25	1.45

(P) Preliminary (R) Revised — Source: National Transportation Safety Board

Closing the Gap for LORAN

An estimated 60,000 pilots in this country now fly in airplanes equipped with a LORAN-C receiver. *Do they know something the rest of us do not know?* Or is LORAN just another piece of gadgetry to clutter up the cockpit?

Pilots who fly with LORAN claim that it gives them increased safety, accuracy, convenience, greater reception range at all altitudes, shorter distance to fly—and therefore fuel savings—greater flexibility in flight planning, and navigational access to destinations formerly reachable only by dead reckoning. Everything you need is displayed at the push of a button. No more struggling to unfold a chart with one hand in a wind buffeted cockpit, or peering in semi-darkness at jumbled symbols or inscrutable print. *All this for as little as $500, less manufacturer's rebate?*

Not quite. For $500, you can buy a new, no-frills, marine-use LORAN-C, providing essentially longitude and latitude and perhaps course deviation. An aviation-approved LORAN for VFR use starts at about $750 plus installation, with IFR sets starting at $3,000. For maximum sophistication with automatic chain switching and signal outage recognition you might pay from $7,000 to $8,000. But even the basic set could be a life-saver if you happen to get lost at an altitude below VHF reception. (LORAN is receivable from the ground up).

How is it done—with satellites? Laser beams? Not at all.

LORAN is an acronym for LONG RANGE NAVIGATION, which is an electronic means of establishing your position relative to three or more stations transmitting a low frequency radio signal from a point as far as 1,000 miles distant. LORAN is a standard navigation system of ships, yachts and fishing boats.

Developed for marine use during World War II, almost half a century ago, the LORAN system consisted of groups of three or more transmitting stations located adjacent to coastal waters and the Great Lakes. The original LORAN "A" transmitted in the 1800 to 2100 kHz range. Shipboard equipment consisted of an appropriate antenna and receiver. Also required were charts pre-plotted with "lines of position" relative to the various groups, or "chains", of transmitters.

The original LORAN-"A" receiver could perform essentially one function: it could record (in microseconds) the time of arrival of a radio signal from a master station, and the time of signal arrival from other identifiable secondary stations in the chain. The ship's navigator, with complex geometry, could use this data to calculate a hyperbolic curve, called a line of position, for each time difference. Using a preplotted chart containing numerous lines of position, it was possible to establish the ship's position as the intersection of two appropriate lines of position.

When performed accurately the calculation could result in a position error of no greater than 1/4 mile at a distance of more than 1,000 miles from the transmitters.

The complex operation called for the

services of a skillful navigator, required considerable plotting and sometimes took as long as an hour or more to complete. The lapse of time was of little significance for ships moving at from six to ten knots, but it ruled out the widespread use of LORAN-"A" for fast moving aircraft overland. (It was used by some air carrier jets over the ocean. The bulk and weight of the receiver equipment, which might weigh over 50 lbs., was another deterrent factor.)

However, the commercial development of the microchip for computer function in the 1960's opened the door to a vastly improved form of LORAN. A mini-computer coupled to the receiver was not only capable of calculating your position but could also be programmed to give you the relative location and distance to any other point on land or sea—plus your ground speed, course, deviation, etc.

Within a few years, multi-purpose LORAN-"C" receivers started coming on the market in lightweight packages (as light as six lbs.). The initial LORAN-"A" was discontinued and the more effective "C" signal was transmitted on 100 kHz.

As airmen began experimenting with the new equipment and FAA considered its applications for aviation, avionics manufacturers jumped on the bandwagon in a race to provide LORAN-C receivers that could be approved for IFR as well as VFR operations. The manufacturing race was stimulated when FAA, in 1977, recognized LORAN-C as appropriate for navigating on certain routes over the north Atlantic. In 1981 a technical standard was issued for LORAN-C as a long range over-water navigation system.

In 1984 the agency issued an Advisory Circular, AC 20–121, on LORAN. The circular discussed acceptable means of obtaining airworthiness approval of airborne LORAN-C navigation systems for use under both VFR and IFR conditions within the United States and surrounding waters. This circular is available free from DOT M–443.2, Washington, D.C. 20590. (An updated version, AC 20–121A, is now under preparation and will probably be available in the fall of 1988.)

As indicated in the circular, operators wishing to use LORAN-C under VFR may obtain approval of the installation by type certificate, supplemental type certificate, or from an FAA Flight Standards field office. Following certification the aircraft must be approved for return to service by a repair station, manufacturer, or inspection authorization holder. Requirements for VFR approval include the following provisions:

- LORAN-C equipment must not interfere with the normal operation of other equipment installed in the aircraft. This is accomplished by a ground test and flight test, to check for objectionable electromagnetic interference, proper and safe function of the LORAN-C, and operation in accordance with the manufacturer's specifications.
- The structural mounting of the equipment must be sufficient to assure appropriate restraint when subjected to emergency landing loads anticipated for the aircraft.
- A navigation source annunciator must be provided adjacent to the display, if the LORAN-C supplies any information to displays such as a horizontal situation indicator, course deviation indicator, or any equipment which is normally used to operate the aircraft.

LORAN-C controls and displays must be placarded to read, "LORAN-C not approved for IFR" (unless such approval has been obtained).

LORAN may be coupled to the "radio nav" function of an autopilot, provided the LORAN has a course deviation indicator (CDI) output that is compatible with the autopilot, and the same installation procedures normally used for the VOR coupling are in use.

IFR OPERATIONS

Aircraft employing LORAN-"C" for IFR navigation must be equipped with an approved alternate means of IFR navigation. For IFR use the LORAN equipment must be certificated under the same standards that apply to area navigation. The initial installation requires an engineering evaluation, not only to assure accuracy but also to check on failure indications and environmental effects. Subsequent installation of a given LORAN in other aircraft of the same model may require additional engineering evaluations, depending upon how closely the LORAN system is integrated with the aircraft controls and display.

LORAN is *not* approved for instrument approach at the present time. The only exception is for operators participating in FAA's Limited Implementation Program. With the assistance of the National Association of State Aviation Organizations this program was designed to establish requirements for LORAN-C guidance in non-precision approaches.

The program was initiated in 1985 at eight airports, using a selected runway where a VOR or ILS approach could be overplayed. Participating operators had to obtain FAA approval of their LORAN equipment, provide a graphic description of the approach procedure, and obtain a special "Certificate of Authorization" from the controlling FAA facility. A second qualified pilot was required on board to compare the progress of the LORAN approach with a underlying VOR, ADF, RNAV or ILS signals.

Additionally, a LORAN-C signal monitor was installed in the airport control tower to serve two purposes: (1) to advise a controller as to signal outages or other problems affecting the approach clearance; and (2) to provide calibration values, which compensate for seasonal or local changes in the rate of signal propagation. These values correct navigational errors which could render the accuracy unacceptable for an instrument approach. They had to be available to the pilot with the approach chart and manually inserted into the receiver.

The Limited Implementation Program is now being expanded, with site evaluation and preparation being carried out for many other airports. The next candidates are Atlantic City; Cincinnati; Kalamazoo, MI; Manassas, VA; and Norwich, CT. FAA has contracted for 186 more operational monitors, which are to be installed around the nation at the rate of 15 per month.

In the expanded phase of this program the monitors need not be located at the air-

Two new chains, centered at Liberty and Boise City, will provide coast-to-coast coverage in the 48 states and a continuous overland navigation source to Alaska.

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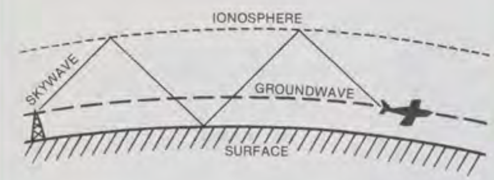
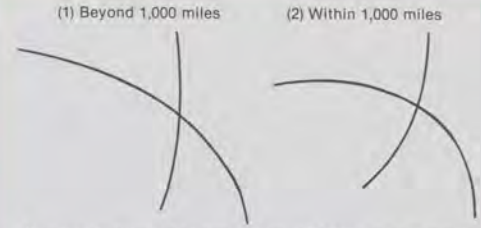


LORAN skywave signal (—) is reflected earthward from ionosphere, requiring longer time to reach aircraft than groundwave (---).



Geometric dilution occurs when LORAN transmission is "stretched" or extended beyond norm, resulting in acute angle where lines of position intersect to establish position (1). Ideal intersection for accuracy is close to 90° (2).

port but may be sited within a 90 NM radius. Non-precision LORAN approaches are expected to become operational nationwide by the end of this decade.

LORAN is installed and maintained by the U.S. Coast Guard, not the FAA; and therefore the adoption of this system for reliable use in the airspace requires the working out of many complex problems.

For example, it has been essential to work out a means of alerting pilots via NOTAMs when a LORAN transmitting station is scheduled to be shut down by the Coast Guard for maintenance, or when a signal is not available in a given "dead" area because of frequency contamination. The agency is now working out an effective means of conveying this information to pilots before they begin a flight with the intention of using LORAN-C for instrument navigation.

A second concern is with environmental changes that affect signal accuracy. Most of our experience with LORAN has been in marine use, where the signals travel over a level surface with relatively stable temperatures and electrical properties. The variation in the rate of signal propagation is so slight that any errors are easily within the range of acceptability for seagoing vessels. That is not the case when LORAN is used for aircraft navigation overland.

Overland, the LORAN signal is affected locally by changes in temperature, mineral content, vegetation, weather, etc., which could be of concern for NP instrument approaches. Even the day/night temperature change in some areas can result in a perceptible difference in LORAN accuracy. The taks of establishing calibrations for all sections of the country is very time-consuming. High energy transmitters may damp out LORAN in certain areas.

THE MID-CONTINENT GAP

Because of the original orientation of the LORAN system toward large, navigable bodies of water, the present installation leaves uncovered a large area of the central plains from the Dakotas to Texas, with some adjacent portions of New Mexico, Oklahoma, Iowa and Minnesota. There is a distance of some 1,600 miles between the master station of the west coast chain, at Fallon, NV, and the nearest master station in the eastern section of the country, at Dana, IN.

Congress has appropriated funds for the installation of four new transmitters in this central area to be located at Havre, MT; Gillette, WY; Boise City, OK; and Santa Teresa, NM. A coast-to-coast LORAN navigation system is expected to be in use within three years. The northern coverage will link up with Canadian LORAN, affording continuous LORAN navigation overland to Alaska as well.

Some of the newly manufactured LORAN receivers are advertised as capable of bridging the mid-continent gap now, using "skywaves". Under some conditions this technology may work out, but it is not dependable enough for IFR operations and could lead VFR pilots into trouble as well.

LORAN is designed to use a "ground wave," a signal that travels parallel to the surface and is available at virtually any altitude flown by an aircraft. A "skywave" is the portion of the LORAN signal that goes upward and bounces back and forth between the ionosphere and the earth. This signal arrives at a receiver significantly later than the groundwave, so that the receiver is able to disregard it.

Nevertheless, some receivers have been programmed so that they will accept skywaves and measure their time difference at distances that are not possible with ground waves. The problem here is that skywaves will "skip" over some areas, resulting in interrupted or erroneous coverage. Skywave LORAN is not acceptable for IFR air navigation.

Similar unreliability may be experienced with receivers that claim to stretch signal coverage beyond the norm. Here you may run into a type of error called "geometric dilution of position." The farther a LORAN receiver moves from the chain of transmitters, the more acute the angle formed by the intersection of lines of position, which provide a fix on the receiver. (The ideal crossing angle is 90 degrees.) Acute crossing angles cause sizable position errors.

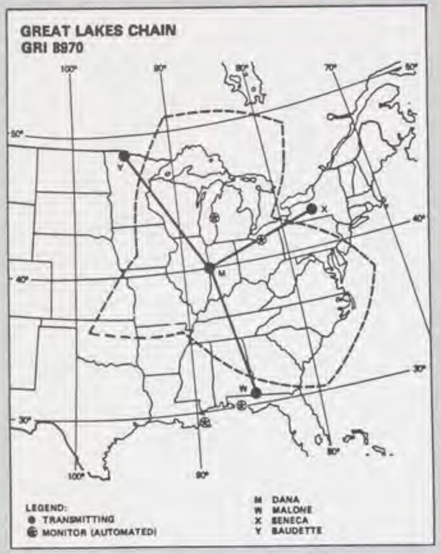
Another problem is known as "master dependency." Many receivers cannot navigate unless they receive a signal from the master station of a chain. Some receivers will automatically switch to another secondary transmitter in place of the master when the master is not available. Other receivers do not have this feature and will lose their signal. Software is available for some receivers which enable them to maintain navigation by dead reckoning for short periods when a station is lost, but the accuracy of this system is uncertain.

Some pilots attempting to cross over the midcontinent on LORAN have found that when they attempted to switch from one chain to another, they could neither pick up the new signal or return to the previously used transmission. Others have reported inability to re-acquire a LORAN signal after landing in the midsection of the country. This is understandable in view of the fact that LORAN needs better receptivity to acquire a signal than to continue tracking one.

Any of these problems could place the pilot in serious circumstances if the weather goes bad or an emergency landing is required. The best advice is to wait until the anticipated midcontinent chains are installed before depending upon LORAN alone to fly across the gap. With the present transmitters, only one model of LORAN has been approved for IFR operation in the "gap."

FAA is fully committed to LORAN-C for air navigation as soon as a supplementary aid and it will soon be adapted to the present navigation systems. In the meantime it is important for pilots who purchase receivers to respect their current limitations, and to refrain from unlawful and unsafe use.

Existing LORAN chains over U.S.



Dashed line (---) includes area of normal coverage, which is affected by environmental factors and position of master transmitting station. Monitors shown here are part of the Coast Guard surveillance system; they are not components of nonprecision aircraft approaches.

Typical RNAV LORAN receiver display.

Frequently Asked Questions About The Use of LORAN Navigation

Q. *Can I borrow a LORAN receiver that operates from a battery or plugs into the cigarette lighter, and just use it under VFR conditions, without getting any official approval?*

A. No. Any avionics equipment, including LORAN, is considered "installed" if it is functioning in the aircraft. The installation must be approved by an authorized repair station, manufacturer, or inspection authorization holder. A primary concern here is to make sure that the LORAN does not interfere with other equipment in the aircraft. This also applies to the installation of a LORAN antenna.

Q. *Are there special charts to be used with LORAN-C?*

A. LORAN operates in relation to geographical coordinates (i.e., latitude and longitude figures), which means that you will need to have a source of this information for programming your LORAN-C computer. Readily available sources are sectional charts (including terminal area charts) and FAA's Airport/Facility Directory. Some newer receivers have an extensive database, so that the pilot need only know the three or four character identifiers of an airport or VOR.

Q. *Are there any special preflight arrangements you have to make?*

A. As with area navigation, you should prepare a list of checkpoints or waypoints. Even if you are flying nonstop these are important to confirm the accuracy of your navigation. You will need to have the coordinates for these points handy, unless your receiver already has it in memory.

Q. *How can I tell how accurate my LORAN equipment is?*

A. You can use the known coordinates at your airport of departure to check on LORAN data before you start. For complete accuracy you should position your aircraft at the Airport Reference Point, which is the precise intersection of the given coordinates.

Q. *When I lose a signal, how can I tell if the station is down or the problem is in my equipment?*

A. Airborne LORAN for approaches are required to display a warning flag within ten seconds of a LORAN unacceptable error or signal failure at any station in use. Enroute IFR LORAN must flag a failure within 60 seconds. You may also check with the nearest FSS for LORAN NOTAMs.

Q. *Since LORAN is a low frequency signal, isn't there likely to be static interference on the ground or near clouds?*

A. This should not be a problem if the antenna is properly installed and rigged for static dissipation. Also metal-to-metal bonding must be intact. Sometimes there is interference from large metallic masses in a heavily industrialized city, or from a large power generating plant, or substation, or transmission line. Some sets will display the current signal-to-noise ratio, which will alert you to signal attenuation.

Q. *What about the need to adjust the set en route for change of season, snow cover, magnetic variation, grid errors, etc. How important is it to calibrate for these?*

A. That depends on the kind of flying you do. If you usually fly within the same general area of no more than a couple of hundred miles, and operate VFR in a fairly simple aircraft, you should not be bothered by lack of calibration—the accuracy should be on a par with the VOR system. Full calibration can result in an error minimization to less than 50 feet, but not everyone needs that kind of accuracy.

On the other hand if you do a lot of long range and over water flying, usually IFR and alone in complex aircraft, then you would be concerned about eliminating sources of signal errors.

Q. *A similar question—is the sophistication and/or the price of the box I need related to the kind of flying I do?*

A. It is. The more demanding your flight tasks, and the more you depend upon electronic navigation, the more important it is that the equipment provide maximum assistance. For any IFR use of LORAN, you must have an approved IFR installation. At any event no matter how good your equipment it will not entirely rule out human error. LORAN cannot read your mind, or your clipboard; it will only steer you according to the numbers you feed in. A *Navajo* survey plane recently crashed into a mountainside in Canada while on an IFR survey mission using LORAN-C. Consequences were fatal to the crew of three. The investigation indicated that latitude of the route programmed was less than one degree in error from the intended route. Pilot error, not system error.

Q. *So it would be safer to use VORs or instrument fixes on checkpoints when you are flying LORAN IFR so you can crosscheck?*

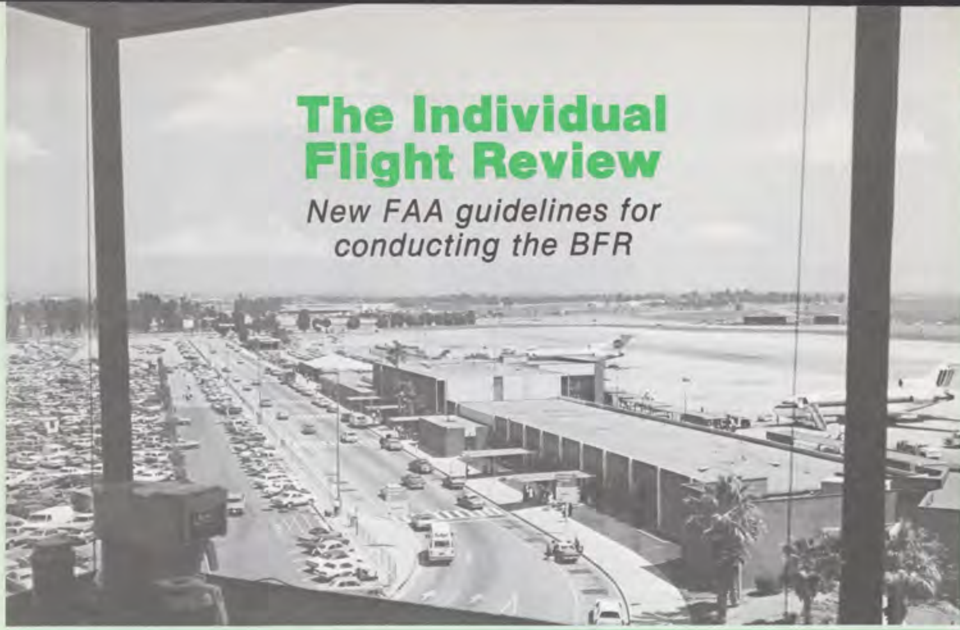
A. To some extent, yes. At the same time you should be aware that you can reduce the collision hazard by using LORAN to stay away from busy airways, VOR fixes and terminal control areas, as much as is practical.

Q. *For landing, just how far into a terminal area can you go with LORAN?*

A. Insofar as you can identify the coordinates and the various fixes and check points, you can proceed to the initial approach point, or to the point where ATC issues you vectors for the approach. At present you cannot use LORAN for any type of instrument approach unless you are in the Limited Implementation Program (for LORAN non-precision approach).

Q. *If all LORAN signals are on the same frequency, 100 kHz, how do I know which chain to select for my purposes, and how do I convey this to my receiver?*

A. Charts showing chain coverage in the U.S. and Canada are found in the Coast Guard LORAN-C User Handbook, in FAA Advisory Circular 20–121, and in various commercial publications on LORAN-C navigation. Each chain repeats its signal at carefully timed intervals. This "Group Repetition Interval" (GRI), given in microseconds, must be punched or dialed into your receiver so that it is capable of identifying the master station and the necessary secondary stations. With some receivers, chain selection is automatic once the initial position is given. ■



The Individual Flight Review

New FAA guidelines for conducting the BFR

Since November 1, 1974, Part 61 of the Federal Aviation Regulations has required a biennial flight review (BFR) for persons intending to act as pilot-in-command of any aircraft. This currency program was intended to be industry managed and FAA monitored, with no specific guidelines set on what the review should entail. An ad hoc industry task force was formed to recommend guidelines on conducting and determining the successful completion of a BFR.

In 1976 these ideas were put in pamphlet form and made available to the public. However, the content of the BFR was still left to the discretion of the reviewer (i.e., the certificated flight instructor).

Now, because of the growing complexity of the aviation environment, FAA has issued an advisory circular to supplement existing guidelines on the conduct of a review. AC 61-98, "Scope and Content of Biennial Flight Reviews," gives specific guidance to the flight instructor on how to structure a BFR to meet the needs of individual pilots. The circular takes into consideration the fact that each pilot has a different flying background, therefore needs individual attention. The review is separated into four sections as follows.

1. PRELIMINARY INTERVIEW

A personal interview between pilot and CFI is recommended before the BFR is initiated. This allows the CFI to become familiar with the pilot's flight experience and the customary scope of his or her flight activity. This will lead to the following considerations:

a. *Type of Equipment Flown.* The maneuvers and procedures reviewed will vary, depending on the make and model of aircraft used. For example, a review in a light twin-engine aircraft should be different from one conducted in a small two-seat tailwheel aircraft without radio or extra instrumentation. The instructor may wish to recommend that the pilot take the review in the aircraft usually flown, or in the most complex make and model if several aircraft are flown regularly.

Instructors should also consider their own experience and qualifications in a given make and model aircraft prior to giving a review in that model. For aircraft in which the CFI is not current or is not familiar, recent flight experience or sufficient knowledge of aircraft limitations, characteristics, and performance should be obtained prior to giving the review.

b. *Nature of Flight Operations.* The CFI should consider the type of flying generally performed by the pilot prior to establishing a plan for conducting his/her review. For example, a pilot conducting long-distance flights between busy terminal areas may need a different review than a pilot who generally flies in the local area from the same airport.

Nevertheless, the CFI should also consider the need for an indepth review of certain other subjects or procedures if the type of flight operations is likely to change, or if other circumstances exist. For example, a pilot who normally conducts only local flight operations may be planning to begin flying to a location with a Terminal Control Area (TCA). Another pilot may operate only a two-seat aircraft without radio but in close proximity to a TCA. In both cases, the CFI should include TCA requirements and operating procedures as part of the biennial flight review.

c. *Amount and Recency of Flight Experience.* The CFI should review the pilot's logbook to determine total flight experience, plus type and recency of experience, in order to evaluate the need for particular maneuvers and procedures on the review.

For example, a pilot who has not flown in several years may require an extensive review of basic maneuvers from the practical test standards appropriate to that pilot's grade of certificate. This same pilot may also require a more extensive review of FAR Part 91, including recent changes in airspace and other requirements.

Another pilot who is upgrading to a newer or faster airplane should receive more emphasis on knowledge of aircraft systems and performance or in cross-country procedures appropriate to a faster airplane. Regardless of flight experience, the CFI should ensure that the plan includes all areas in which the pilot should receive a review in order to operate safely. In some cases the CFI may wish to recommend that the pilot undertake a complete refresher program, such as those described in the current issue of Advisory Circular 61-10, "Private and Commercial Pilots Refresher Courses."

d. *Scope of Review.* After completing the analysis above, the CFI should discuss it with the pilot and reach a mutually agreeable understanding regarding how the biennial review will be conducted. The CFI may wish to provide the pilot with reading or study materials or recommend such publications for study prior to actually undertaking the flight review. The CFI should also explain to the pilot the standards under which satisfactory completion of the review will be measured.

2. REVIEW OF FAR PART 91 OPERATING AND FLIGHT RULES

The CFI should tailor the review of general operating and flight rules to the needs of the pilot being reviewed. The objective is to ensure that the pilot can comply with regulatory requirements and operate safely in various types of airspace and under various weather conditions.

As a result, the instructor should conduct a review that is broad enough to meet this objective, yet provide a more comprehensive and indepth review in those areas where the pilot's knowledge is not as extensive. In the later instance, the instructor may wish to employ a variety of reference sources, such as the *Airman's Information Manual*, to ensure that the pilot's knowledge is current.

The review of FAR Part 91 rules is critical due to the increasing complexity of airspace and the need to ensure that all pilots are familiar with TCA's, Airport Radar Service Areas (ARSA's), and other types of airspace. The biennial flight review may be the only regular proficiency and updating experience on those subjects that some pilots are exposed to. Accordingly, instructors should place appropriate emphasis on this part of the review.

The advisory circular will provide the instructor with a useful format for organizing the FAR Part 91 review and ensuring that essential areas are covered. The review should be expanded in those areas where the pilot's knowledge is less extensive.

3. REVIEW OF MANEUVERS AND PROCEDURES

The maneuvers and procedures covered during the review are those which, in the discretion of the CFI, are necessary for the pilot to demonstrate that he or she can safely exercise the privileges of their pilot certificate. Accordingly, the instructor should evaluate the pilot's skills and knowledge to the extent necessary to ensure the he/she can safely operate under a wide range of conditions and within regulatory requirements.

The instructor may wish to prepare a preliminary plan for the flight review based on a sequence of maneuvers which should be outlined in advance to the pilot take the review. For example, this may include a flight to the practice area or to another airport, with maneuvers accomplished while en route.

It could also include a period of simulated instrument flight time. The instructor should request the pilot to conduct whatever preflight preparation is necessary to conduct the planned flight. Examples of such activities may include checking weather, computing required runway lengths, calculating weight and balance, completing a flight log, filing a flight plan, and/or conducting the preflight inspection.

Prior to commencing the flight portion of the review, the instructor should discuss various operational subjects with the pilot. This oral review could include, but not necessarily be limited to, areas such as aircraft systems, speeds and performance; meteorological and other hazards, wind shear and wake turbulence; and operations in controlled airspace, such as TCA's and collision avoidance procedure. The emphasis during this discussion should be on practical knowledge of recommended procedures and regulatory requirements.

Regardless of the pilot's experience, the instructor may wish to review at least those maneuvers considered critical to safe flight, such as stalls, flight at minimum controllable airspeed, and takeoffs and landings. Based on his/her in-flight assessment of the pilot's skills, the instructor may wish to add other maneuvers from the practical test standards or flight test guide appropriate to the grade of pilot certificate.

The in-flight review need not be limited to evaluation purposes. The instructor may desire to provide additional instruction in weak areas or, based on mutual agreement with the pilot, defer this instruction for a follow-up flight.

4. POST-REVIEW

Upon completion of the review, the instructor should debrief the pilot and explain whether the review was satisfactory or unsatisfactory. Regardless of this determination, the instructor should provide the pilot with a comprehensive analysis of his/her performance, including any weak areas. The instructor should not endorse the pilot's logbook to reflect an unsatisfactory review, but should sign the logbook to record the instruction given.

A satisfactory BFR should be endorsed as follows: "*Ref: Far 61.57(a), Mr. /Ms. R. Jones, holder of Pilot Certificate* (give number) *has satisfactorily completed a Biennial Flight Review on* (date)."

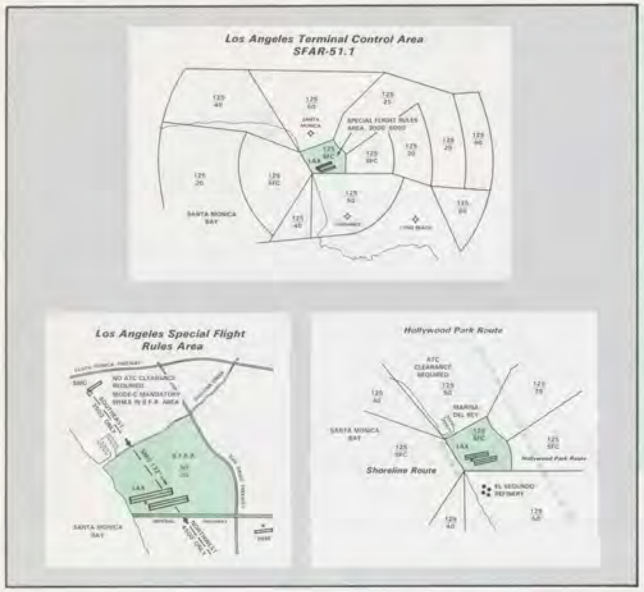
This should be followed by the instructor's name, signature, CFI number, and expiration date.

NOTE: Following an unsuccessful review a pilot may continue to act as P.I.C. if a period of 24 months has not lapsed since the last successful BFR, or any of these other flight checks:

- Pilot certification or added rating.
- Any proficiency flight check required by the FAR.
- Pilot examiner flight check.
- Proficiency flight check given by a U.S. Armed Forces check pilot.

The AC is free from the DOT, M-443.2, Washington, DC 20590. ■

Each pilot has a different flying background, and therefore needs individual attention



SPECIAL FLIGHT RULES FOR LOS ANGELES TCA

As of March 10, 1988, FAA is establishing a special Flight Rules Area over Los Angeles International Airport which will enable VFR traffic to transition the Los Angeles TCA without obtaining a clearance from air traffic control.

The new rule, SFAR–51–1, applies to that portion of the Los Angeles TCA, from 3,500 feet MSL up to 4,500 feet MSL inclusive, which is bounded on the north by Ballona Creek, on the east by the San Diego Freeway, on the south by the Imperial Highway and on the west by the Pacific Ocean shoreline Area. In addition, this SFAR establishes specific rules for operation in the Special Flight Rules Area. In summary, the special rules will:

1. Limit operations Operations in the Special Flight Rules Area are on a see-and-avoid basis and require VFR weather conditions.
2. Require aircraft to have the equipment as specified in FAR 91.24(b), which includes a transponder with Mode C.
3. Require that pilots have the current LAX TCA aeronautical chart.
4. Require operation on the Santa Monica VOR 132° radial, in level flight, at 3,500 feet MSL for southeastbound traffic and 4,500 feet MSL for northwestbound traffic.
5. Limit airspeed to 140 knots IAS or lower.
6. Require use of anticollision and position/navigation lights and recommend use of landing light.
7. Prohibits VFR turbojet operation in the Special Flight Rules Area, on the basis that turbojet aircraft could not operate safely within the 140 knot airspeed limitation.

VFR transition routes have been established elsewhere for use by other aircraft, including turbojets, at higher altitudes and airspeeds than permitted in the Special Flight Rules Area.

On August 19, 1987, the Los Angeles TCA ceiling was raised to 12,500 feet MSL, and that configuration remains unchanged. However, FAA is establishing two additional VFR transition routes: the Hollywood Park Route, and the Shoreline Route. These will be shown on the Los Angeles Sectional and Terminal Area Charts dated March 10, 1988.

For further information contact Joe Gill, Airspace Branch (ATO–240), FAA, 800 Independence Avenue, S.W., Washington, D.C. 20591. Telephone, (202) 267-9252. For a copy of SFAR 51–1, write to the Office of Public Affairs, Public Inquiry Center, APA–230, FAA address as above. Telephone, (202) 267-3484.

VFR ROUTES OUTSIDE OF SPECIAL FLIGHT RULES AREA

Hollywood Park

Enter TCA N/S bound and follow the Van Nuys 140 radial until exiting TCA. Maintain altitude assigned by ATC. If VOR out of service navigate visually along a line between Van Nuys Airport, Hollywood Park and the Queen Mary/Spruce Goose Dome, or request radar vectors.

Shoreline Route

(1) Northbound enter TCA abeam El Segundo refinery. Initiate and remain at ½ to 1 mile offshore. Exit TCA abeam Marina Del Rey. Maintain altitude assigned by ATC (available altitudes are 7,500' to 12,500' MSL)

(2) Southbound enter TCA abeam Marina Del Rey. Initiate and remain at ½ to 1 mile offshore. Exit TCA abeam El Segundo refinery. Maintain altitude as assigned by ATC. (Available altitudes are 2,500' to 4,000' MSL.)

NOTE: All requirements of FAR 91.24 and 91.30 must be met when using these routes. Pilots shall remain clear of TCA until receiving specific ATC approval to enter. Graphics shown are informational only; for navigation obtain current terminal area chart.

LIGHT PLANE SPEED RECORD

A Swearingen Sx-300 kit-sold single engine aircraft recently set a new speed record of 313.882 mph for airplanes in the National Aeronautic Association's C-lb class (500 to 1,000 Kg.). Using a 300 hp 10-540 Lycoming engine, the SX-300 broke a record of ten years standing held by an 800 hp-powered airplane. The flight took place at San Antonio, TX with designer/pilots Ed Swearingen and Forrest Molberg at the controls.

LATEST FAA PUBLICATIONS

Weight Advisory

A new advisory circular called "Substantiation for an Increase in Maximum Weight, Maximum Landing Weight, or Zero Fuel Weight" is now available. AC 23–7 provides information and guidance concerning acceptable means, but not the only means, of complying with FAR Part 23, "Airworthiness Standards." The AC is free from the DOT, M–443.2, Washington, DC 20590.

Pilot Schools

Advisory circular 140–2S has been issued updating the current "List of Certificated Pilot Schools." The AC lists the schools by state, including mailing address, certificate number, and ratings or courses offered. The AC is available from the U.S. Government Printing Office, Washington, DC 20402 at a cost of $1.75. The stock number must be included with your order (SN 050–007–00763–9).

• Mrs McFarland's Parachute

Looking back on 1987 we can think of no story more hair-raising than the news article about the free falling sky-diver who intercepted his free falling companion in midair, and succeeded in opening her parachute when they were both, literally, seconds from oblivion.

This incredible accomplishment gave us the incentive to search through the annals of aviation rescues for any comparable exploit. We discovered what we already knew before our search—that this was a feat of unparalleled skill, daring, and split second timing.

However, we did come across an event that happened sixty-three years ago and had some uncannily similar circumstances. On June 28, 1925 over Grissard Field in Cincinnati a young woman, Mrs. Irene McFarland, jumped from her plane with the purpose of testing the prototype of a new parachuting device. It was packed into a container which was fastened to the plane, and theoretically, the weight of her jump would cause the container to break and allow the parachute to slide and blow out.

Unfortunately, when she jumped the parachute jammed so that the container cords held fast to the plane. Thus she was suspended under the fuselage where she swung like a pendulum. She could not release the parachute, and her pilot, Lieutenant Watson, without causing her death, could not land.

Fortunately, the authorities had required Mrs. McFarland to carry an extra army parachute. At this juncture, Lieutenant Watson motioned her to release the army parachute. Fortunately, the opening of this chute provided enough force to break the cords that held her to the fuselage. She made a safe landing, and in retrospect, her 1925 jump made its own infinitely small contribution to aviation safety.

M. Sherman
West New York NJ

• SVFR for Practicing?

I recently flew a large multi-engine, turbine-powered airplane into the Salem (OR) airport during daylight hours. The airport lies within a 24 hour a day control zone. The current weather observation was ceiling 1,100 broken, visibility seven miles. Upon completion of a practice IFR approach I wanted to remain in the traffic pattern and conduct several VFR practice landings. However there was a problem. The pattern altitude for my large aircraft was 1,500 AGL, which would have put me in the clouds. To fly VFR in the zone I would have had to be 500 feet below the clouds, which would have put me at 600 feet AGL or less.

In order to fly at a safer, higher, and quieter altitude I requested a Special VFR clearance. The tower advised me that SVFR could not be granted because the field was above VFR minimums. I was told that if I was requesting a take-off clearance that was okay.

Were they correct in denying me SVFR, and if so, why? It seems to me that if ATC can deny SVFR because the weather is above VFR, then they could also refuse to give out an IFR clearance on the same grounds.

Corey J. Ferguson
Mission Viejo, CA

The authority for the controller's decision is vested in FAA Order 7110.65. This order only authorizes granting a SVFR clearance when the controlling airport has IFR weather conditions.

• Two Stall Speeds

In the Nov/Dec 1987 Forum, you defined "V"-speeds. V_{so} was defined as stalling speed. In my training as a student pilot, I was taught two different stall speeds. V_{so} (stuff out), was stall speed with landing gear down and full flap extension. This was located at the bottom of the white arc on the airspeed indicator. The other stall speed, V_s, was at the bottom of the green arc. This speed was considered stall speed for the airplane in a "clean" configuration, flaps and landing gear retracted. Is this correct?

Gregory Wheeler
Kansas City, MO

Our reply was overly condensed.

"Stalling Speed" or V_s refers to the "Minimum steady flight speed at which the airplane is controllable.

V_{so} is the stalling speed, or the minimum steady flight speed, in the landing configuration.

V_{s1} is the stalling speed, or minimum steady flight speed, obtained in a specific configuration. These configurations are defined in the airplane flight manual. They are not confined to the "clean" configuration.

• Hand Held Receivers

With the increasing availability and use of emergency hand held transceivers, I would suggest that FAA introduce an equipment code for inclusion in IFR flight plans which would indicate that such equipment is aboard the aircraft. Reception distance may be considerable, even in excess of 60 miles, but transmission distance may be very short, possibly not exceeding 5 miles. Therefore ATC efforts to contact an aircraft in trouble may be terminated prematurely, unless an appropriate code is worked out to indicate reception—only capability.

Dr. Cyril Toker
Potomac, MD

If during an IFR flight radio contact is lost, you are expected to follow the procedures for two-way radio failure, as detailed in the Airman's Information Manual, Section 4. This includes turning up the volume on your NAV radio, as ATC will attempt to contact you over any voiced NAVAIDs you may be using, as well as over the COM frequency.

In the event of aircraft electrical failure a self-powered, hand-held transceiver might enable you to receive, but perhaps not transmit successfully, over the COM frequency. However the ATC instructions are received, you should comply, and acknowledge by means of a change in transponder code and/or aircraft heading, as appropriate.

This should ensure continued transmission from ATC. Thus it appears unlikely that any advantage would be derived from encoding information about the backup transceiver in your flight plan.

FAA AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• High/Low Airports

Another pilot and I were talking about the highest and lowest airports in the country (Leadville, CO and Death Valley, CA) when we started to wonder about the highest and lowest airports in the world. Where are they and at what altitudes?

John Gordon
Astoria, OR

In the free world the highest airport with commercial traffic is at La Paz, Bolivia, at 13,313 feet. The longest runway is 13,124 feet. Air carrier jets use this airport, but usually the engine and brake power have to be boosted in order to handle the very high takeoff and landing speeds.

The lowest commercial airport is Schipo Airport at Amsterdam, Holland, at minus 13 feet.

It is difficult to be sure about the highest non-commercial airport, but Peru's Darlot Betoldi field at 16,990 feet is a good candidate. The 6,100 feet runway will not handle any sizable aircraft. Israel's Sedom Airport on the west bank of the Jordan river, at minus 1,279 feet is probably as low as you can go with any aircraft.

INSTRUMENT CORNER

• Below DH or MDA

I would like a better understanding of FAR 91.116(c)(3)(i) as regards the sighting of approach lights when descending below the Descent Height or Minimum Descent Altitude during an instrument approach. Some pilots I know interpret it to mean that during any category of approach you can descend to 100 feet above the touchdown zone elevation if any approach lights are visible, but you cannot go below 100 feet above the TDZE unless you can see the red terminating or siderow bars of lights.

Sidney Fleishman
Panama City, FL

That is essentially correct, unless you are making a category II or III approach where the visual references specified by the Administrator do not include the approach lights.

Bear in mind that the pilot must also be in compliance with the requirements of paragraphs (1) and (2) of FAR §91.116(c)

(1) requires that the aircraft be continuously in a position from which a descent to a landing on the intended runway can be made, using normal maneuvers. For Part 121 and 135 operations the aircraft must touchdown within the TDZ of the runway of landing.

(2) requires that you maintain the minimum flight visibility for the instrument approach procedures being used.

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Factsheet
(continued from p. 5)

> Symptoms of Contamination
>
> These vary according to specific chemicals, but may include headache, nausea, blurred vision, cramps, fever, fatigue, exhaustion and unconsciousness. Any indication of illness in the vicinity of toxic chemicals should be suspected as contamination, requiring medical help at once.

pesticide. Timeliness of these first actions can often spell the difference between a minor mishap, which can be treated at the site, or a serious problem.

In all cases where a person has ingested a pesticide or loses consciousness, a doctor should be called immediately and a copy of the pesticide label should be taken with the victim to the treatment facility. The procedures outlined here are for *first aid only*, and, except in the most minor cases (for instance, where a non-caustic pesticide has been splashed on the skin and is immediately washed off), should be followed up by professional medical personnel. Consult the pesticide label for any special first aid or medical instructions.

Pesticide poisoning can occur in four ways:

On the Skin (dermally): This is the most common type of accidental exposure by chemical workers.

If a chemical is splashed on clothing, the affected clothing should be removed *immediately*. Do not re-use until it has been thoroughly laundered with soap and hot water.

Wash pesticides from skin with soap and water. If soap is not immediately available, flush with plenty of water.

Some pesticides are absorbed through the skin very rapidly and dermal exposure can produce the same symptoms as swallowing the pesticide. If a large area of skin has been exposed, the washing delayed, or symptoms of intoxication appear, the victim must be given professional medical attention immediately.

In the Eye: Wash the eye immediately with clean, cool water for at least ten minutes.

Consult professional medical attention immediately.

Through the Mouth (orally): This is the least likely route of exposure to workers and the most likely to children. It is also the most serious.

Medical attention must be obtained without delay. Be sure to provide a copy of the label from which the pesticide came.

Keep the victim quiet and administer first aid as specified on the label.

Inhalation: If poisoning is suspected, immediately remove the person from the area of exposure. Have the patient rest in fresh air; keep warm and comfortable.

Observe the patient for symptoms. If they occur, seek professional medical help. ■

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