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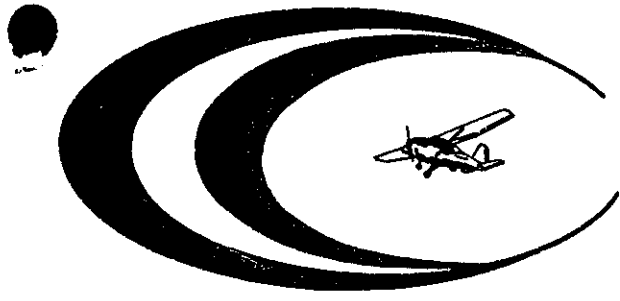
FLIGHT TEST GUIDE



PRIVATE PILOT
Airplane . . .
Single-Engine

ADVISORY CIRCULAR

FEDERAL AVIATION AGENCY

FLIGHT TEST GUIDE

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FEDERAL AVIATION AGENCY
N. E. Halaby, Administrator
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CONTENTS

GENERAL INFORMATION

An applicant for a private pilot flight test in an airplane must meet the pertinent flight test and private pilot certification requirements of Part 61 of the Federal Aviation Regulations.

This means that he must hold valid student pilot and medical certificates, have passed the required written examination, meet the age and flight experience requirements for a private pilot certificate, and provide an acceptable certificated airplane for the flight test.

The airplane provided must be currently certificated, and appropriate for the performance of the prescribed flight test procedures and maneuvers which follow. At least the following equipment will be necessary for the completion of the required procedures and maneuvers:

1. Two-way radio suitable for voice communications with aeronautical ground stations.

2. Radio receiver suitable for use of radio navigation facilities (may be the same radio used for item 1, above).

3. Functioning turn-and-bank indicator and a sensitive altimeter.

4. Fully functioning dual controls.

5. Suitable view limiting device for simulating instrument flight conditions. This device must be readily removable and installable in flight. It must be effective in preventing the observation of outside references by the applicant, but it must not

unduly restrict the examiner's outside visibility.

6. The approved *Airplane Flight Manual* for the airplane, if provided by the airplane owner; otherwise the applicant should have at least an appropriate checklist.

The private pilot flight test is conducted in three phases: the oral operational examination, basic piloting techniques, and a cross-country flight. The failure of any part of a phase constitutes the failure of that phase and of the whole test. All phases not satisfactorily completed on the original test must be satisfactorily completed upon reapplication before a private pilot certificate will be issued to the applicant.

The flight test may be discontinued at any time by the applicant or the examiner * when the failure of a required test item makes the successful completion of the test impossible. In such cases, credit will be allowed only for whole phases successfully completed.

An applicant's performance will be evaluated by the examiner on the basis of the applicant's judgment, knowledge, smoothness, and accuracy displayed on the test. A competent performance of a flight maneuver is one in which the pilot is obviously the master of the airplane and the successful outcome of the maneuver never seriously in doubt.

* The word "examiner" is used in this guide to denote either an FAA Inspector or a designated Pilot Examiner who conducts an official flight test.

PHASE I. ORAL OPERATIONAL EXAMINATION

1. Airplane documents

The applicant will be requested to present and explain the airplane registration, airworthiness, and equipment documents required to be carried in the airplane.

2. Airworthiness records

The applicant should also present and explain the airplane logbooks, the powerplant logbooks, and the required airworthiness inspection records.

3. Airplane performance and operations

The applicant will be expected to display a practical knowledge of the performance capabilities of and approved operating procedures for the airplane furnished. This should include the operation of the fuel, electrical, and hydraulic systems; and reference to the *Airplane Flight Manual* for performance data.

He should have a thorough knowledge of the adverse effect on aircraft performance caused by high temperature, high density altitude, and operations at full gross weight, and how these and other factors such as runway gradient, sand, mud, and tall grass increase the required takeoff distance. The cumulative effect of a combination of these factors should be discussed in a manner that demonstrates

proper understanding of their significance and of the appropriate precautions to be taken.

The applicant should be thoroughly familiar with the cruising range of the airplane at various altitudes and power settings. He should demonstrate familiarity with proper airspeeds for best performance in the airplane used. The importance of proper airspeed control will be emphasized by the examiner.

4. Airplane loading, including fuel, oil and baggage capacities

The applicant should demonstrate knowledge of the approved weight and balance data for the airplane furnished, and be able to determine permissible fuel and payload distribution.

5. Airplane line check

The applicant should use an orderly procedure in conducting a preflight check of the airplane to be used, preferably using a checklist provided by the manufacturer. This check should cover the airplane's readiness for flight, including the fuel and oil supply, the presence of all required equipment and documents, and its airworthiness so far as can be determined by an external inspection.

He should know the significance of each item checked, and must not overlook any obvious unairworthy condition. He should know the appropriate remedial action for a pilot to initiate to correct any unsatisfactory item detected.

PHASE II. BASIC PILOTING TECHNIQUES

1. Preflight operations

The applicant will be required to perform engine starting, warmup, runup, and airplane control and equipment checks. Procedures must be thorough and accurate, and a checklist should be used. Runups should be made into the wind if practicable, and in a manner that will avoid hazards to persons and property and not cause any detrimental effect on the engine or propeller.

2. Taxiing

The applicant will be expected to maintain full control of his airplane on the surface, keep visual contact with his taxi path to avoid possible obstructions, and comply with the local taxi rules and control tower instructions. He should taxi at a reasonable speed, considering safety and the expeditious movement of traffic.

3. Normal and crosswind takeoffs and landings

The applicant will be required to make at least three takeoffs and landings using the established traffic pattern for the airport involved. Approaches should be executed in the normal pattern at approach speeds appropriate to the airplane configuration, and the descent from the traffic pattern altitude controlled by a gradual reduction in power. The engine should

not be completely throttled until arrival at a point on final approach where the pilot feels sure of reaching the point of intended touchdown.

At least one landing without flaps will be required in an airplane equipped with flaps, unless prohibited by operating limitations; and one go-around from touchdown attitude at not more than 3 fee above the runway with full flaps will b required.

The demonstration of at least one crosswind takeoff and landing using recognized crosswind techniques will be required. No additional crosswind demonstration will be required if the normal landings on the test are to be performed in a crosswind condition which requires the application of crosswind techniques.

The applicant will be expected to comply with the established traffic pattern, fly a straight flight path on initial climb and final approach, maintain traffic pattern altitudes within 100 feet, and climb and approach speeds within 5 m.p.h. Touchdown should be made within the portion of the runway designated by the examiner in normal landing attitude at normal touchdown speed.

Performance will be evaluated on the basis of planning, smoothness, airspeed control, and the ability to hold the proper headings and altitudes.

4. Flight at normal and minimum controllable airspeeds

Climbing, descending, and level flight o straight courses and in medium banked

(20° to 30°) turns will be required at the best rate-of-climb speed, landing approach airspeed, or cruise speed, as appropriate. These may be demonstrated in conjunction with other maneuvers on the flight test or separately.

The same flight maneuvers will also be required at minimum controllable airspeeds with appropriate power settings. The speeds used should be sufficiently slow so that any further reduction in speed or increase in load factor would result in immediate indications of an imminent stall.

Flight at minimum controllable speeds should be conducted in both cruising and landing configurations. Stall warning indicators should be rendered inoperative for this maneuver, unless such an indicator is required equipment in the airplane used for the test.

The applicant will be expected to maintain altitude within 100 feet of the assigned altitude when level flight is requested, and headings within 10° in straight flight. During flight at minimum controllable speeds, he will be expected to maintain an airspeed within 5 m.p.h. above the desired speed. Any unrecognized unintentional stall will be disqualifying.

5. Stalls and stall recoveries

Stalls and stall recoveries will be required from straight and turning flight, with and without power. The flight test will emphasize stall entries from the three flight situations in which stalls have been

found to be the most critical; takeoff and departure, approach to landing, and during accelerated maneuvers. The term "accelerated" applied to stalls has nothing to do with the rapidity with which a stall is induced; it denotes a stall which occurs at higher than the normal airspeed because the angle of attack is increased by the additional load factor resulting from a steep turn or abrupt pullup.

Takeoff and departure stalls should be simulated from straight flight and moderately (10° to 30°) banked climbing turns in takeoff configuration with recommended climb power. A climb should be initiated at lift-off speed, and the angle of attack slowly increased at a constant bank until a stall occurs.

Approach to landing stalls should be demonstrated from straight glides and moderately banked gliding turns in landing configuration. The turn should be entered at landing approach speed and continued at a constant bank as the angle of attack is increased with the elevators until a stall occurs.

Accelerated maneuver stalls will be performed from 45° banked turns with reduced power in cruising and approach configurations. The angle of attack should be increased smoothly in a level or slightly climbing turn until a stall occurs at slightly (3 to 5 m.p.h.) above the unaccelerated stalling speed. Accelerated

stalls should never be attempted in non-acrobatic airplanes at speeds more than 10 m.p.h. above the unaccelerated stalling speed because of the extremely high structural loads which may be imposed.

Recovery from stalls should be completed to straight and laterally level flight by the coordinated use of all flight and power controls. The angle of attack should be relieved smoothly by the relaxation of pressure on the elevator control, and full control effectiveness regained with the least loss of altitude consistent with safety. Recoveries should be executed with and without the use of power, as directed; (1) upon the applicant's first recognition of physical indications of a stall; and (2) after a stall has developed and the nose has pitched down through level-flight attitude.

The applicant's performance will be evaluated on the basis of the following:

Stall recognition—He should recognize the first physical symptoms of a stall promptly, without reference to stall warning devices. Such devices will not be deacitvated in airplanes for which the are required equipment.

Airspeed control—He should not exceed normal cruising airspeed at any time during stall entry and recovery.

Altitude loss—He should allow the least loss of altitude consistent with the prompt recovery of control effectiveness. Altitude loss in power-on stall recoveries should not exceed 200 feet.

Loss of control—Any loss of control that makes it necessary for the examiner to take over to avoid a spin or the exceeding of the airspeed limitations of the airplane will be disqualifying.

6. Turns about a point

The applicant will be required to perform right and left turns of at least 720° duration about a point on the ground. A uniform radius about the point should be maintained by varying the bank to compensate for drift, with a bank of approximately 45° at the steepest point. The altitude maintained should provide an unobstructed view of the point circled, but should not be lower than 500 feet above the highest obstruction.

The examiner may ask the applicant questions about objects on the ground to determine whether the applicant can operate the airplane properly while his attention is diverted.

Performance will be evaluated on the basis of coordination and smoothness, drift correction, and altitude control. Significant changes in airspeed and altitude should result in prompt corrective action. Any prolonged cross-control condition or the use of a dangerously slow airspeed will be disqualifying.

The following tolerances should be observed:

Altitude variation—± 100 feet.

Airspeed—Within 10 m.p.h. of speed appropriate to power setting and bank maintained.

Recovery heading—Within 20° of assigned heading.

7. Stall landings or wheel landings

At least one stall-type landing at minimum airspeed will be required if a nosewheel-type airplane is used, or one wheel-type landing if a tailwheel-type airplane is used. These may either be combined with other landings required, or demonstrated separately.

Stall landings in nosewheel-type airplanes should be made from normal approaches flared just above the runway, touching down on the main wheels with the nosewheel well clear of the runway at, or very near to power-off stalling speed. The procedure is similar to that for a three-point landing in a tailwheel-type airplane.

Wheel landings in tailwheel-type airplanes should be performed from an approach with a normal glide flared just above the runway, touching down on the main wheels by smoothly increasing the angle of attack until, just before contact with the ground, the longitudinal axis of the airplane parallels the runway and the rate of descent is nearly zero. The wheels should be held in contact with the runway by slight forward pressure on the elevator control after touchdown, with the tailwheel allowed to settle to the runway as speed is lost.

Performance will be evaluated on the basis of planning, airspeed control, smoothness of touchdown, and directional control during rollout.

8. Short-field takeoff, power approach and landing

The desired short-field technique assumes a short field with a firm, smooth surface and surrounding obstructions. Take-

off procedure requires the prompt, smooth application of full takeoff power with rotation for lift-off initiated just as the best angle-of-climb airspeed is reached. Initial climb (to 50 feet) should be performed at the best angle-of-climb airspeed shown in the *Airplane Flight Manual.*

Short-field landings should be made from the normal traffic pattern, using the elevators primarily to control the airspeed during final approach and the throttle to control the descent. The airspeed used should be approximately 1.3 times the power-off stalling speed in landing configuration. Full flaps should be used for the last segment of the approach, and moderate slips may be used for minor corrections.

Performance will be evaluated on the basis of planning, smoothness and accuracy. Lift-off and initial climb should be performed within 5 m.p.h. of the best angle-of-climb speed, and the prescribed final approach speed should be maintained within 5 m.p.h. on the last segment of the final approach (from 100 feet above the runway).

9. Soft-field takeoff and landing

The accepted soft-field technique assumes a field of adequate length with the surface made unsuitable for airplane operation by the presence of snow, mud, high grass, or loose rocks. The takeoff run should be made with the wing at a relatively high angle of attack to lighten the load on the wheels as much as possible. The nosewheel or tailwheel should be

lifted as soon as possible and held clear of the surface.

The airplane should be allowed to lift off at the minimum possible airspeed, and before climbing more than a few feet from the surface, the angle of attack should be carefully reduced to achieve the best rate-of-climb airspeed. The flap setting recommended by the *Airplane Flight Manual* should be used.

The soft-field landing should be completed from a normal approach with touchdown at the slowest possible airspeed and a short landing roll. The nosewheel should be held clear of the surface as long as possible during the rollout, but in tailwheel-type airplanes the tailwheel should be held solidly on the surface from the instant of touchdown.

Performance will be evaluated on the basis of planning, airspeed control, smoothness, and the accuracy of operations. Lift-off should be accomplished at not higher than the power-off stalling speed, and normal climbout and approach speeds should be observed.

10. Slips and a slip to a landing (three-control airplanes only)

The applicant will be required to demonstrate right and left slips at altitude, and at least one landing from a moderate slip. The slips performed at altitude should vary from gentle to the steepest in which the airplane will maintain its heading and airspeed without buffeting. Slips should be performed with and without flaps, unless prohibited by the airplane's operating limitations.

The required slip to a landing may be made in conjunction with other landings conducted on the test, or separately.

Performance will be evaluated on the basis of smoothness, airspeed control, maintenance of desired heading and track, and recovery at the appropriate altitude. Slips to landings should always be made into the wind.

11. Emergency operation of aircraft equipment

The demonstration required under this item will necessarily vary with each type of airplane used for a flight test, and with the special equipment installed. The applicant will be required to demonstrate, or have a practical knowledge of, the emergency operation of all aircraft systems and special equipment installed.

Emergency operations will be actually performed when practicable, but may be simulated for such items as the discharge of pressure fire extinguisher systems.

Performance will be evaluated on the applicant's knowledge of procedures and his accuracy in their application.

12. Engine-out emergencies (multiengine airplanes only)

A flight test for a private pilot certificate conducted in a multiengine airplane will include the emergency procedures contained in Phase III of the flight test prescribed by the *Multiengine Airplane Class or Type Rating Flight Test Guide.*

PHASE III. CROSS-COUNTRY FLIGHT

1. Cross-country flight planning

Before takeoff for the flight test, the applicant will be requested to plan a cross-country flight to a point at least two hours' cruising range distance in the airplane to be used for the test. At least one intermediate stop should be included.

Planning should include the obtaining of all pertinent available weather information, plotting the course on an aeronautical chart, establishing checkpoints and distances, and estimating flying time, headings, and fuel requirements. The *Airman's Guide* should be used as a reference for airport information and for NOTAMS. The use of a computer or wind vector diagrams for computing headings and groundspeeds is desirable, but not required.

The flight planning required on the flight test should be a practical demonstration of the preparation for an actual cross-country flight, and not merely a classroom exercise. It should be completed within 15 minutes.

2. Cross-country flying

When requested by the examiner, the applicant should set out on the planned cross-country flight. The planned course should be followed until the applicant establishes the compass heading required to

stay on the track and can give a reasonable estimate of his groundspeed. At this point, the examiner may request him to head for an alternate airport of the examiner's choice (or the examiner may ask the applicant to select a suitable alternate). The cross-country demonstration will be of sufficient duration to allow the examiner to determine the applicant's ability in th[illegible] phase. The use of radio aids to navigation required by item 4 (below) may be effectively combined with this requirement.

The cross-country flight will be evaluated on the basis of the applicant's ability to follow the designated track, correctly identify checkpoints, maintain heading and altitude, and provide reasonable estimates of time over checkpoints. It is recommended that the cross-country flight include a landing at a strange airport, when practicable.

The applicant should establish the compass heading necessary to hold his planned course within 10°, and thereafter maintain his plotted track within one mile. He should maintain an altitude within 200 feet of that planned. Using his observed time over checkpoints, he should be able to compute an ETA (estimated time of arrival) for the point of first planned landing with an error of not more than 10 minutes. His approach to an unfamiliar airport should be in accordance with either the known traffic pattern, reference to traffic directional markers, or contr[illegible] tower instructions when available.

3. Cross-country flight emergencies

During the cross-country portion of the flight test, the examiner will simulate or ask the applicant to stimulate various emergencies such as imminent or partial engine failure, being lost, encountering adverse or marginal weather, loss of visual reference to the ground, icing, or imminent fuel exhaustion.

Performance will be evaluated on the applicant's ability to promptly analyze the situation and possible choices of action, his resourcefulness and planning, and the appropriateness of the action initiated. Emergency action should not be initiated until all normal remedies for the assumed difficulty have been considered.

4. Use of radio aids to VFR navigation

During the cross-country portion of his flight test, the applicant will be required to demonstrate the use of radio navigation facilities for VFR navigation. He may elect to use a VOR or low frequency range system, or ADF equipment in the airplane.

The applicant will be expected to tune in and identify a radio range station (VOR or LF) and follow an assigned radial or range leg. He should be able to determine whether he is flying to or from the station by the appropriate omni indicator, or by checking for a fade or build on an LF range. No IFR-type radio orientation procedures will be required.

In the event an applicant electing to use LF radio ranges takes a test at a location remote from a range leg, he may demon-

strate his ability to establish his position by the signals received from two or more range stations.

The use of ADF for tracking to and from radio stations will be acceptable evidence of the ability to use radio aids for navigation.

Performance will be evaluated on the basis of the applicant's ability to determine the proper frequency, to tune in and identify the desired station, and to follow a radial or range leg, or to track on an assigned ADF bearing. A working knowledge of the procedures for obtaining radar guidance, DF steers, and emergency approach assistance is desirable, and may be demonstrated by the applicant during the flight test.

5. Control by reference to flight instruments

During the cross-country phase of his flight test, or in conjunction with his performance of the flight maneuvers involved, the applicant will be required to demonstrate his ability to perform normal flight maneuvers and to recover from critical flight attitudes solely by reference to flight instruments. This may be demonstrated with the use of a gyroscopic turn indicator and a sensitive altimeter only (in addition to the usual VFR instrumentation), but it is preferred that full flight instrumentation be used, including a gyro-horizon and a directional gyro.

The following flight maneuvers by reference to instruments are specifically required by the regulations:

a. Recovery from the start of a power on spiral.

b. Recovery from the approach to a climbing stall.

c. Normal turns of at least 180° left and right to within 20° of a preselected heading.

d. Shallow climbing turns to a predetermined altitude.

e. Shallow descending turns at reduced power to a predetermined altitude.

f. Straight and level flight.

Performance will be evaluated on the basis of coordination, smoothness, and accuracy. Any loss of control that makes it necessary for the examiner to take over to avoid a stall or to avoid exceeding the acrobatic or airspeed limitations of the airplane used will be disqualifying.

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