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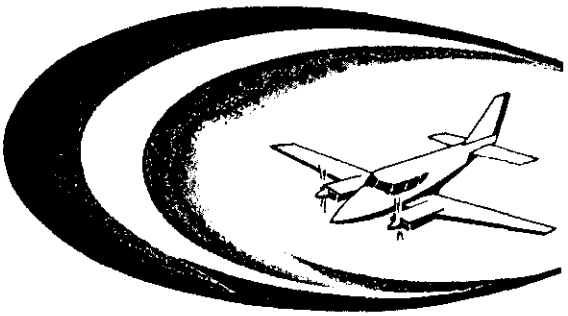
AC 61.117-1D

FLIGHT TEST GUIDE



COMMERCIAL PILOT Airplane . . .

Revised 1972

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

PREFACE

This flight test guide has been prepared by the Flight Standards Service of the Federal Aviation Administration to assist the applicant for the commercial pilot certificate in preparing for his certification flight test.

It contains information and guidance concerning the procedures and maneuvers relevant to the flight test required of applicants for a commercial pilot certificate by Part 61 of Federal Aviation Regulations. The guide should be helpful to all pilots preparing for a certification flight test, to flight instructors, to pilot examiners, and FAA inspectors. The suggested flight test checklist, page v, is included for the convenience of those who may find such a checklist useful.

This revised edition supersedes the *FLIGHT TEST GUIDE—COMMERCIAL PILOT, AIRPLANE . . . AC 61.117–1C,* dated 1969, and all other instructions pertinent to Commercial pilot tests in airplanes. Persons using this guide to prepare for the Commercial Pilot Flight Test should also refer to the latest revisions of Part 61 of the Federal Aviation Regulations and AC 61–21 *FLIGHT TRAINING HANDBOOK,* for required maneuvers and recommended procedures.

Comments regarding this publication may be directed to Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

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(Suggested)

APPOINTMENT WITH INSPECTOR OR EXAMINER: name _____

time/date _____

ACCEPTABLE AIRPLANE WITH DUAL CONTROLS

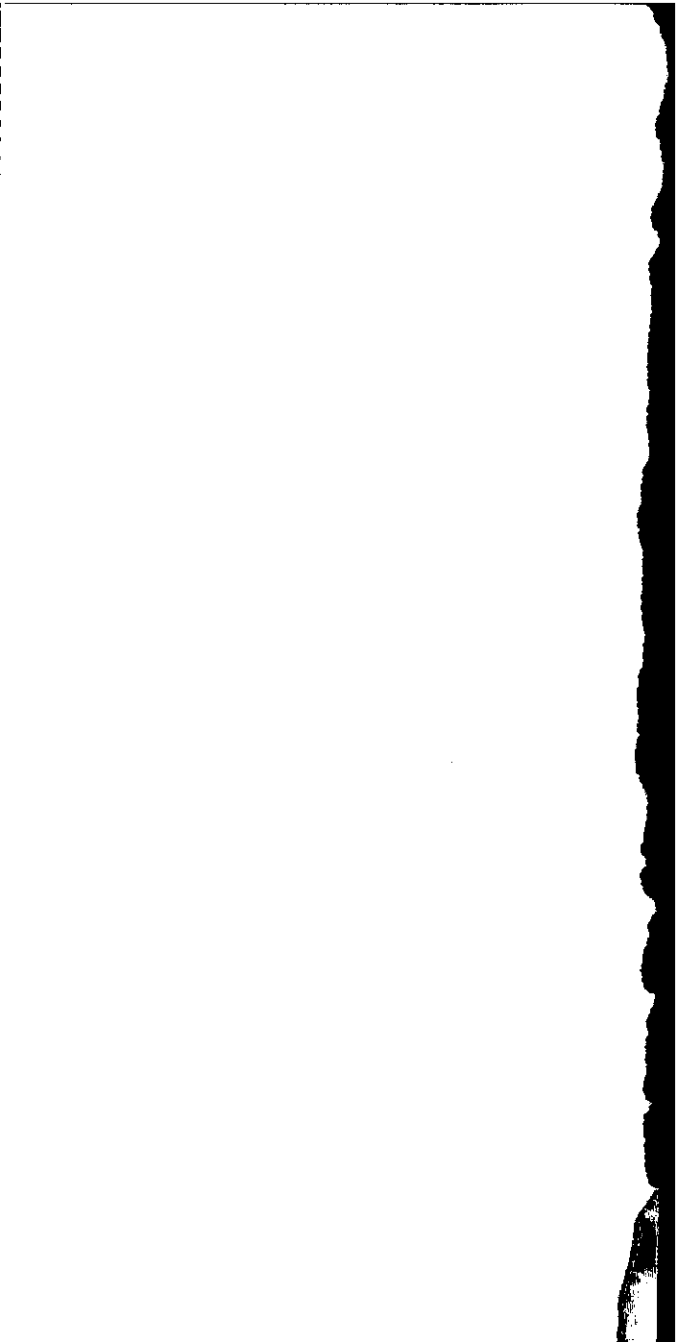
- View limiting device ☐
- Aircraft Documents:
  - Airworthiness Cert. ☐
  - Registration Cert. ☐
  - Operating Limitations ☐
- Aircraft Maintenance Records:
  - Airworthiness Inspections ☐
- FCC Station License ☐

PERSONAL EQUIPMENT

- Current Charts ☐
- Computer and Plotter ☐
- Flight Plan form ☐
- Flight Logs, etc. ☐
- Current AIM ☐

PERSONAL RECORDS

- Pilot Cert. ☐
- Medical Cert. ☐
- Signed Recommendation ☐
- Written Test Results ☐
- Logbook ☐
- Notice of Disapproval (if applicable) ☐
- Approved School Graduation Certificate (if applicable) ☐
- FCC Radiotelephone Operator Permit ☐
- Examiner's Fee (if applicable) ☐



GENERAL INFORMATION

An applicant for a commercial pilot flight test is required by Section 61.21 of the Federal Aviation Regulations to: (1) have passed the commercial pilot written test within 24 months before the date he takes the flight test, (2) have the aeronautical experience required for a commercial pilot certificate, (3) hold a first or second class medical certificate issued within the past 12 months, and (4) have the written recommendation, made not more than 60 days before applying for the flight test, of an appropriately rated flight instructor. Application for the test should be made to an Federal Aviation Administration Operations Inspector, or to a designated pilot examiner.

The applicant is required by FAR 61.25 to provide an airworthy airplane for the flight test. This airplane must be capable of, and its operating limitations must not prohibit, the flight maneuvers required in the test. The following equipment will be necessary for the completion of the procedures and maneuvers required by FAR 61.117 for the commercial pilot flight test:

1. Two-way radio suitable for voice communications with aeronautical ground stations.
2. A radio receiver suitable for the use of available radio navigation facilities (may

altitude, and heading tolerances are not hard-and-fast, but represent the performance expected in good flying conditions with a typical, personal-type airplane. The practice of exceeding these tolerances before corrective action is initiated, however, is indicative of an unsatisfactory performance. Any procedure or action, or the lack thereof, when necessary, which requires the intervention of the inspector or examiner to maintain safe flight, will be disqualifying.

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

Emphasis will be placed on the maneuvers and procedures which are most critical to a safe performance as a pilot. The demonstration of prompt stall recognition and adequate control of stalls and recovery techniques will receive special attention from examiners conducting flight tests.

During the entire flight test, attention will be given to the applicant's vigilance for other air traffic, and his adequate clearance of the area before performing any flight maneuver which might result in the hazard of colliding with another aircraft. Failure to exercise proper vigilance or to take such positive action as may be appropriate to insure that the flight area has been adequately cleared for conflicting traffic will be disqualifying.

If a commercial pilot flight test is taken in a multiengine airplane, the description and acceptable performance in the current FAA *Multiengine Airplane Class or Type Rating Flight Test Guide*, will be used for each required maneuver which is performed differently in multiengine airplanes, rather than those in this guide.

PHASE I. ORAL OPERATIONAL TEST

1. Airplane Registration, Airworthiness and Equipment Documents

a. Objective.—To determine that the applicant can name, find, and establish the validity of documents, placards, or approved manual material required by Regulation to be available in a certificated airplane.

b. Description.—The applicant will be requested to present or point out in the airplane the required aircraft registration, airworthiness records, operating limitations, *Airplane Flight Manual* (if required), equipment list, and weight and balance documents.

c. Acceptable performance guidelines.—The applicant should be able to find and establish the identity and validity as well as explain the purpose and significance of each required item.

2. Airplane Maintenance Records and Airworthiness Inspection Reports

a. Objective.—To determine that the applican knows what airworthiness inspections are required for a certificated airplane, and what evidence of these inspections is acceptable for flight operations.

b. Description.—The applicant will be required to present and explain the aircraft and engine records or logbooks, or other required airworthiness inspection reports.

c. Acceptable performance guidelines.—The applicant should be able to find and explain the significance of the required inspection reports to a pilot.

3. Airplane Performance, Range, and Operation.

a. Objective.—To determine that the applicant knows what performance data and operating information is important to the pilot, and can obtain them for the airplane to be used for the test.

b. Description.—The applicant will be required to demonstrate a practical knowledge of the performance capabilities and limitations, and approved normal and emergency operating procedures for the airplane furnished. This includes power settings, placarded speeds, range, fuel and oil requirements, the operation of aircraft systems and special equipment, and critical performance speeds.

As appropriate, he will be required to use manuals or materials to determine the effects of temperature, density, altitude, wind, surface conditions, and gross weight on flight performance. He is expected to be familiar with the general effects of power settings and altitude on the cruising range, and to know the airspeeds for the best performance in the airplane used.

A practical knowledge will be expected of the control system; the fuel, lubrication, hydraulic, and electrical systems; and where applicable, the operation of the supercharger(s), landing gear and flaps, radio, pressurization, heating, oxygen, and special emergency equipment.

c. Acceptable performance guidelines.—The applicant should be able to obtain from documents, placards, approved manuals or approved manual material required in the airplane, the operating data and procedures essential to its proper operation. Inability to do so or faulty knowledge thereof will be disqualifying.

4. Airplane Weight and Balance

a. Objective.—To determine that the applicant can make practical and accurate computations concerning permissible loads and their distribution in the flight categories applicable to the airplane used.

b. Description.—The applicant will be required to make practical computations based on the approved weight and balance data for the airplane used in the test. It is preferred that a loading graph or computer supplied with the airplane be used for this purpose, if available.

c. Acceptable performance guidelines.—The applicant should be able to make accurate determinations of permissible loads and load distribution in relation to allowable gross weight and center of gravity limits.

5. Airplane Line Check

a. Objective.—To determine that the applicant can make a practical determination of whether or not an airplane is ready for flight.

b. Description.—The applicant will be expected to use an orderly procedure in conducting a preflight check of the airplane, preferably in accordance with a checklist provided by the manufacturer or owner. This check covers the airplane's readiness for

flight, including fuel and oil supply, the presence of all required equipment and documents, and its airworthiness so far as can be determined by external inspection.

c. Acceptable performance guidelines.—The applicant should know the significance of each item checked, and not overlook any obvious unairworthy condition. He should know the appropriate action a pilot should initiate to correct each unsatisfactory item detected.

6. Use of Radio For Voice Communication (includes item 4 of phase IV, page 33)

a. Objective.—To determine that the applicant can use two-way radio effectively for ground and flight communications.

b. Description.—During his flight test, the applicant will be expected to use two-way radio for obtaining information, clearances, and making requests pertinent to the flight.

c. Acceptable performance guidelines.—Regulations require that the applicant must show competence in the use of radio for voice communications. Performance will be evaluated on the basis of the applicant's ability to determine and tune to the correct radio frequencies and use appropriate radio procedures and phraseology.

PHASE II. BASIC PILOTING TECHNIQUE TEST

1. Preflight Operations

a. Objective.—To determine that the applicant knows how to start and warm up the engine, and that he can determine the airplane's immediate readiness for flight.

b. Description.—The applicant will be expected to use proper procedures in engine starting, warmup, runup, in adjusting aircraft systems and equipment, and in checking flight controls and instruments.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of the accuracy of the procedures used, and the thoroughness of the engine, systems, and airplane checks. The use of a checklist is recommended, preferably one supplied by the airplane manufacturer.

2. Taxiing

a. Objective.—To determine that the applicant can maneuver the airplane expeditiously and safely on the surface.

b. Description.—The demonstration of taxiing will include the operation of the airplane on the surface, the initial and continuing determination that the taxi path is clear of obstructions, and compliance with local taxi rules and tower instructions.

Seaplane applicants will be required to demonstrate taxiing at slow speeds and on the step, sailing, docking, a simulated or actual approach to a buoy, and turns to downwind headings.

c. Acceptable performance.—Performance will be evaluated on the basis of the accuracy of taxi operations; safety; consideration for other aircraft and personnel on ramps and taxi-way; the use of the flight controls and brakes for steering; and the use of the water rudder, if the seaplane used is so equipped. Consideration will be given to the use of appropriate taxiing speeds, considering safety and the expeditious movement of airport traffic.

3. Takeoffs and Landings

a. Objective.—To determine that the applicant can consistently make accurate, smooth, safe takeoffs and landings under all normally anticipated conditions.

b. Description.—Regulations require that the applicant demonstrate competency in takeoffs and landings, including:

(1) A slip to a landing, if a three-control airplane is used;
(2) A crosswind takeoff and landing;
(3) A short field takeoff, and power approach to a short field landing;
(4) A soft field takeoff and landing;
(5) A wheel landing if a tailwheel type airplane is used, or a stall landing if a nosewheel type airplane is used; and
(6) Three accuracy landings within 200 feet beyond a designated mark.

These landing operations may be performed separately; or may be combined at the discretion of the inspector or examiner. A sideslip used in the performance of a crosswind landing may be used to demonstrate (1) and (2), for example, or if crosswind techniques must be used on all landings because of the direction of the wind, no separate demonstration need be required.

All takeoff and landing demonstrations are expected to be made in compliance with the established traffic pattern for the airport used, and in accordance with control tower instructions. Crosswind landings must be performed with full consideration for other air traffic and for either the designed capability of the aircraft (FAR 23.233) or for the limitations specified by the manufacturer in the owner's manual.

A slip to a landing may be demonstrated from a moderate forward or sideslip, as appropriate to the circumstances. Slips may be performed with or without flaps, if not prohibited by the operating limitations of the airplane used.

At least one crosswind takeoff and landing, subject to sufficient crosswind component to require the use of crosswind techniques, will be required. The use of the sideslip, crabbing, or combined technique for drift correction will be acceptable.

The short field takeoff procedure assumes a firm, smooth, short surface with surrounding obstructions. The pilot should initiate rotation just as the best angle of climb airspeed is attained and that speed should be maintained until the altitude of the assumed obstruction (usually 50 ft.) is reached. The

flap setting and airspeed, if prescribed by the manufacturer for the existing conditions, are required.

The short field power approach and landing procedure is that appropriate to landing over obstructions on a short field. Short field landings should be made from a stabilized final approach in landing configuration, with a moderately low power setting, at below normal approach speed, and with a constant rate of descent. Power should not be maintained beyond the point where it is needed to insure an appropriate landing, and should be accomplished with little or no floating. Upon touchdown, proper application of brakes is expected in order to minimize the after-landing roll. Full flaps are used for the last segment of the approach, and moderate slips may be used in airplanes with or without flaps. If the airplane is so equipped, reverse thrust should accompany use of brakes.

The soft field takeoff and landing demonstrates the procedure appropriate to very soft or very rough surfaces. The takeoff run is made with the wing at a relatively high angle of attack to lighten the load on the wheels as much as possible. Liftoff is made at the minimum possible airspeed, and the wheels are held just clear of the surface until the best angle of climb airspeed is attained and climb initiated at that speed. The flap setting shall be in accordance with the manufacturer's recommendations.

The soft field landing should be made at an airspeed compatible with the softest possible touchdown. The nosewheel is held clear of the surface during rollout. In tailwheel type

airplanes, the tailwheel is held solidly on the surface from the instant of touchdown.

Stall landings in nosewheel-type airplanes are made from normal approaches flared just above the surface, touching down on the main wheels with the nosewheel held well clear of the runway, at or very near the power-off stalling speed.

Wheel landings in tailwheel-type airplanes are made from normal approaches flared to an attitude which will permit contact on the main gear only. As airspeed is lost and the airplane settles, the wheels are held in contact with the surface with a slight forward force on the controls, and the tailwheel is allowed to settle to the runway as flying speed is lost.

The three accuracy landings are demonstrated from approaches at a relatively constant airspeed from an altitude of not more than 1,000 feet above the surface through a 180° change in direction. They terminate with a touchdown in normal landing attitude beyond and within 200 feet of line or mark assigned by the examiner. Flaps and moderate slips may be used in a normal manner. It is desired that one or more of these accuracy landings be made power off.

c. Acceptable performance guidelines.— The applicant's performance of all takeoff and landing demonstrations will be evaluated on the basis of the correctness of his procedures, planning, judgment, observance of traffic patterns, and control tower instructions, his use of prescribed speeds, correction for wind drift, airspeed control, coordination, smoothness, and accuracy of landings. Faulty operation of the airplane or its systems, use of

improper airspeeds or airplane configurations, excessive maneuvering, or attempting to land with excessive drift will be disqualifying.

4. Airport Traffic Patterns

a. Objective.—To determine that the applicant can safely expedite airport departures and arrivals with full consideration for other air traffic and in compliance with established traffic patterns.

b. Description.—It is expected that the applicant will observe and correctly interpret any traffic flow indicators and conform with the established traffic pattern for the airport used during all maneuvers involved on the flight test. In the event control tower instructions or special traffic procedures prevent the demonstration of a normal rectangular traffic pattern, the examiner may request the applicant to fly a rectangular pattern about an area elsewhere, making the usual entries and departures.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, maintenance of altitude, airspeed control, correction for wind drift, the observance of safe clearance from other aircraft, acknowledgment of and compliance with control tower instructions and local taxi and air traffic patterns. Applicant should be able to maintain an altitude within 100 feet of the prescribed traffic pattern altitude.

5. Forced Landings (single-engine only) and Simulated Emergencies

a. Objective.—To determine that the applicant can act correctly, effectively, and

promptly cope with foreseeable emergency situations in flight.

b. Description.—The examiner will close the throttle at unannounced times during the flight test, and request the applicant to proceed as he would in the event of an actual power failure. His procedure is expected to include a check of the instruments, engine controls, and fuel selectors that he will use to identify the reason for an actual failure. No simulated forced landing will be given where an actual landing could not normally be completed, if one should become necessary, or where a simulated approach might constitute a violation of the Federal Aviation Regulations

Without notice and prior to touchdown, the Operations Inspector, or designated examiner, will direct the applicant to execute a go-around from a landing approach. The applicant is expected to react promptly, and safely execute all procedures appropriate under the circumstances which prevail.

c. Acceptable performance guidelines.—The applicant's performance on the simulated forced landing will be evaluated on the basis of the safety and effectiveness of his operations. Consideration will also be given to his planning, technique, accuracy, and the thoroughness of his cockpit check to identify the failure.

Performance on the go-around will be evaluated on the basis of the applicant's ability to maintain positive airplane control

and appropriate speeds, to use correct power and trim settings, and to properly operate the gear and flaps. Attempting to climb at less than the best angle of climb speed or failure to maintain directional control will be disqualifying.

6. Emergency Operation of Airplane Equipment

a. Objective.—To determine that the applicant has a thorough knowledge of, and can accurately and promptly simulate or perform the emergency operation of all systems and equipment for the airplane used on the flight test.

b. Description.—The demonstrations required will necessarily vary with each type of airplane used, and with the special equipment installed. The applicant will be required to demonstrate, or have a practical operating knowledge of all aircraft systems and special equipment installed.

Emergency operations such as the emergency extension of the landing gear and flaps, replacing fuses or re-setting circuit breakers, emergency fuel system management, manual operation of pressurization, and use of standby hydraulic and electrical systems will be actually performed when practicable. Emergency operations, such as the discharge of pressure fire extinguisher or use of oxygen systems, may be simulated.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of the applicant's knowledge of procedures and his accuracy in their application.

7. Engine-out Emergencies, If Multiengine Airplane Is Used

A commercial pilot flight test conducted in a multiengine airplane will include the engine-out emergency procedures described in Phase III of the current *Multiengine Airplane Class or Type Rating Flight Test Guide.*

PHASE III. PRECISION MANEUVERS

1. Gliding Spirals About a Point On the Ground

a. Objective.—To determine that an applicant can control his gliding speed, maintain his orientation, and correct for wind drift during steep gliding spirals, as might be appropriate in making a forced landing after a power failure at a relatively high altitude.

b. Description.—Gliding spirals through three full turns, both right and left, will be expected, with a bank of at least 50° at the steepest point in each turn being preferred. A uniform radius should be maintained about a reference point on the ground.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of drift correction, airspeed control, coordination, orientation, and vigilance for other air traffic. Observance of the following limits will be accepted as a competent performance:

(1) Airspeed within 8 knots of recommended.

(2) Bank between 50° to 55° at steepest point.

(3) Heading on recovery within 10° of entry heading.

(4) Uniform radius about the point.

2. Three Consecutive Shallow On-Pylon Eights

a. Objective.—To determine that the applicant can maneuver an airplane accurately and with correct coordination, while his attention is diverted to points outside the airplane.

b. Description.—Three on-pylon eights will be performed with banks which do not exceed 30° at the steepest sector of each turn. The applicant may elect to use one turn about a pylon to establish his pivotal altitude and the appropriate starting bank before performing the three required on-pylon eights. The pylons selected should be at equal elevations, crosswind, and sufficiently close that very little straight flight between the turns will be involved.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, altitude control, coordination, smoothness, and the ability to hold the projection of the reference line on the pylons. The line-of-sight reference from the airplane parallel to its lateral axis should be held within 1 foot of the pylon. The consistent use of slips or skids to hold the reference line on the pylon will be disqualifying.

3. Three Consecutive Steep On-Pylon Eights

a. Objective.—To determine that the applicant can maneuver an airplane accurately, and with correct coordination under flight situations requiring high control forces and very precise coordination while his attention is diverted to points outside the airplane.

b. Description.—Three on-pylon eights will be performed with banks of at least 50° at the steepest sector of each turn. These may be performed either before or after the aforementioned shallow pylon-eights. If they are performed first, the applicant may use one turn about a pylon to establish his pivotal altitude, or if they are performed after the shallow eights he will be expected to proceed directly from one to the other. Pylon selection should be as described for shallow on-pylon eights, except they should be closer together.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, altitude control, coordination, smoothness, and the ability to hold the projection of the reference line on the pylons. The line-of-sight reference line from the airplane parallel to its lateral axis is expected to remain within 1 foot of the pylon. Corrections for variations in groundspeed about each pylon may be accomplished by very slight variations in altitude, or the reference line may be allowed to move back and forth within the acceptable limits described previously. The use of slips or skids to hold the reference line on the pylons will be disqualifying.

4. One Right and One Left 720° Steep Power Turn

a. Objective.—To demonstrate the ability to maneuver an airplane with safety and precision when near the performance limits imposed by high load factors.

b. Description.—Right and left 720° power turns with a bank of at least 50° will be

expected. Turn entries and recoveries should be accomplished promptly and smoothly, with appropriate power adjustments.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, coordination, smoothness, prompt stabilization of the turns, maintenance of constant bank and altitude, and orientation. The ability to roll from one turn directly into a turn in the opposite direction will demonstrate the advanced coordination skills desired in this maneuver. Any of the following will be disqualifying:

(1) Variations of more than 100 feet from the entering altitude.

(2) Variations of more than 5° from the desired bank.

(3) Recovery headings more than 10° from the entering headings.

(4) Slips or skids which are not immediately corrected.

5. Lazy Eights

a. Objective.—Lazy eights are used to demonstrate a high degree of coordination, timing, planning, airspeed, and altitude control.

b. Description.—Lazy eights should be performed with slow and constant variations in pitch, bank, altitude, and airspeed. The maximum bank will be approximately 30° and attained at the 90° point during the 180° change in direction. The airspeed will vary in high and low values to the maximum extent consistent with the requirement that the loops of the lazy eight are to be symetrical, and that the portions above and below the

horizon are to be equal. At no time during the maneuver will airplane attitude, control positions, or control forces remain constant.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, orientation, coordination, smoothness, altitude control, airspeed control, and pattern symmetry. A persistent gain or loss of altitude with the completion of each lazy eight, or repeated slipping or skidding will be disqualifying.

6. Chandelles

a. Objective.—The chandelle is used to demonstrate planning, coordination, and accuracy of control during a maximum performance maneuver.

b. Description.—The chandelle is a maximum performance climbing turn with a 180° change in direction. Entry should be from level flight at the manufacturer's recommended airspeed. When entry speed is not recommended by the manufacturer, normal cruise speed or maneuvering speed, whichever is slower, will be used. The maneuver should be accomplished with the use of fixed power setting or the coordinated use of power. It is started by assuming the optimum bank for the maximum of performance, then assuming the pitch attitude which will produce the maximum climb. A coordinated recovery should begin at 90° of the turn and the maneuver should be completed at 180° of turn in laterally level straight flight at just above stalling airspeed. Other recognized procedures are acceptable when competently performed.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of planning, timing, airspeed control, coordination, smoothness, and orientation. The quality of the applicant's performance is not judged solely by the amount of altitude gained, but by his overall proficiency as it pertains to climb performance for the power/bank combination used, to the elements of piloting skill and technique mentioned in the preceding sentence, and to the existing conditions of flight. The applicant is to complete chandelles consistently within 10° of the desired heading, and recover with the airspeed not more than 5 knots above stalling speed.

7. Maneuvering at Minimum Controllable Airspeed

a. Objective.—To determine that the applicant can recognize critically slow airspeeds in various flight situations, and understands the changes in flight control response which are characteristic of such speeds.

b. Description.—The applicant will be asked to demonstrate straight flight and medium banked turns in level flight, climbs, and descents, at such airspeeds that any reduction in speed would result in a stall. In airplanes for which stall warners are required equipment, the speed should be such that the stall warner is continuously activated. Demonstrations will be conducted with various flap settings and in both cruising and landing configurations if the airplane is equipped with flaps and/or retractable landing gear. The maneuver described here should not be confused with flight test demonstrations in multi-

engine airplanes pertaining to minimum control speed (V_{mc}).

c. Acceptable performance guidelines.—The applicant will be expected to coordinate power and flight controls so that altitude changes in excess of 100 feet will not occur in level flight at a given altitude. Airspeed within 5 knots of the desired speed will be maintained. Any unintentional stall will be disqualifying. Performance will be evaluated on the basis of airspeed control, appropriate flight control usage, coordination, and smoothness.

8. Stalls, Imminent Stalls, and Recoveries

a. Objective.—To determine that an applicant can recognize imminent stalls and complete stalls, and make prompt, effective recoveries from both, as may be encountered in all normally anticipated flight situations.

b. Description.—The applicant will be required to perform recoveries for imminent and complete stalls entered from straight and turning flight, power on and power off. Recoveries from approach to stalls will be initiated *just prior* to the onset of buffeting and/or loss of control effectiveness usually associated with the complete stall. The applicant should maintain control of the airplane throughout the stall performance, and recover with normal use of controls. The flight test will include the recovery from stalls entered from the three most critical flight situations:

(1) Takeoff and departure.
(2) Approaches to landings.
(3) During accelerated maneuvers.

Takeoff and departure stalls are simulated from straight flight, and from approximately 15° to 20° constant banked turns in takeoff configuration with recommended takeoff power. To prevent an abnormally high pitch attitude before the stall, it is important to initiate the climb at normal liftoff speed, and increase the angle of attack gradually until a stall occurs. After the climb is initiated at liftoff airspeed, speed should decrease until recovery is effected. The altitude should be noted at the time of assumed liftoff and compared with the altitude at which recovery is effected.

Landing approach stalls are performed from straight glides and 20° to 30° banked gliding turns with or without flaps, with gear extended, and trim set. The demonstration is entered at landing approach speed, and the angle of attack is increased smoothly until a stall occurs or full up elevator produces no further stall development. Turns should continue at a constant angle of bank until stall recovery is initiated. Recovery will be complete when full control effectiveness is regained and a positive rate of climb is established.

Accelerated stalls are performed from a sustained bank of 45° or more by increasing the angle of attack at a constant altitude or moderate rate of climb until a stall occurs. Power may be reduced below cruising to assist in increasing the angle of attack, but any decrease in the rate of climb or loss of altitude will defeat the purpose of the maneuver by relieving the load factor. The accelerated stall is one which occurs sooner than expected (by a novice pilot) because the higher

load factor induced by a steep turn or other accelerated maneuver causes the stall angle of attack airspeed to be reached at an airspeed which is higher than that normally experienced when no bank is involved. An airplane with a wings level stalling speed of 50 knots, for example, will stall at approximately 60 knots in a sustained 45° bank, yet the angle of attack would be the same in both instances.

Accelerated stalls should not be performed in other than acrobatic airplanes at speeds more than 1.25 times the unaccelerated stalling speed, or with flaps extended, because of the extremely high structural loads which may result. Abrupt pitch changes in all flight maneuvers should be avoided in airplanes with extensions between the engine and propeller, because of the high gyroscopic loads involved.

The applicant will be asked to recover from all types of stalls in high-performance airplanes as soon as evidence of a stall is recognized. Such evidence may be uncontrollable pitching, buffeting, rapid decay of control effectiveness, or when full up elevator produces no further stall development. In light, trainer-type airplanes, the examiner may ask the applicant to delay the initiation of stall recoveries until the nose has pitched down through the horizon. The applicant should control the attitude of the airplane to the maximum extent possible throughout the stall and recovery with the normal use of the flight controls. To assure maximum control and to preclude uncoordinated flight, turns appropriate to the bank and airspeed should be continued until recovery from the stall is initiated.

Recovery is complete when the airplane regains straight and laterally level flight. All appropriate flight and power controls should be used during stall recoveries. Recoveries without the use of power will be expected when specifically directed by the inspector or examiner. The angle of attack is relieved by relaxation of the back force on the elevator control, or the application of forward force if necessary, and full control effectiveness should be regained with the least loss of altitude. Special consideration will be directed to the altitude necessary to recover from the high rate of descent associated with full up elevator.

c. Acceptable performance guidelines.— Throughout his stall recovery demonstrations, the applicant will be expected to use prompt and correct control application to achieve the desired attitudes and maintain the desired heading. Consideration will be given to the applicant's positive action and smoothness. Failure to initiate corrective action on imminent stalls before the stall occurs, indications of a secondary stall during recoveries, or diving which results in unnecessary loss of altitude during recoveries will be disqualifying, as will any loss of control which makes it necessary for the inspector or examiner to take over to avoid a spin or exceeding the airspeed limitations of the airplane.

PHASE IV CROSS-COUNTRY FLIGHT

1. Cross-County Flight Planning

a. Objective.—To determine that the applicant can adequately prepare for a cross-country flight in a reasonable period of time.

b. Description.—Prior to takeoff for the flight test, the applicant will be required to plan a cross-country flight in the airplane to be used for the flight test. This flight will be to a point not less than 3 hours at normal cruise speed from the point of departure. At least one intermediate stop will be included.

Planning should include the obtaining of pertinent and available weather information. The applicant should demonstrate that he knows what a weather briefing should include and how it is best obtained. He should clearly indicate that he understand both the importance and limitations of weather briefings in planning a VFR cross-country flight, and to his decisions concerning safe operations. Planning will also include the determination of course(s) on sectional aeronautical chart(s), establishing check points, and estimating flying times, headings, and fuel requirements. The drawing of course lines on the chart is not required, though the applicant may do so if he desires. The *Airman's Information Manual*, if available, will be used as a reference for airport information,

NOTAMS, and such other appropriate guidance as may be extracted from its contents.

The use of plotter and computer is not mandatory, but the applicant will be required to make computations, by whatever means, for headings, speeds, and speed conversions, en-route and arrival times, fuel consumption, etc. In addition, the applicant will demonstrate his ability to select, as they relate to his flight, the radio frequencies commonly used for communication and navigation.

This flight planning, which will be accomplished at the direction of the examiner and subject to his evaluation, will be a practical demonstration of the applicant's ability to use all the aeronautical knowledge requisite to his task.

If the applicant brings a completed flight plan to the test, it will not be accepted.

c. Acceptable performance guidelines.—It is expected that all flight planning operations will be meaningful, applicable to the trip proposed, and accurate. The use of more than 30 minutes to prepare a 3-hour trip is indicative of an inadequate performance, unless unavoidable delays are experienced in obtaining weather information.

2. Cross-Country Flying

a. Objective.—To determine that the applicant can conduct safe, expeditious VFR cross-country flights, using normally available aids and facilities.

b. Description.—When requested by the examiner, the applicant will set out on the cross-country flight which he has planned before takeoff. The planned course will be

followed at least until the applicant establishes the compass heading necessary to stay on course, and can give a reasonable estimate of his groundspeed and time of arrival at his first point of intended landing. At this time, he may be requested to divert to 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 evaluate the applicant's ability to navigate by pilotage, and may also include the use of radio aids to VFR navigation required under Item 4, of this phase. The cross-country demonstration will include an approach and landing at an unfamiliar airport, when practicable.

c. Acceptable performance guidelines.— The cross-country flight will be evaluated on the basis of the applicant's ability to follow the intended course, correctly identify checkpoints, maintain heading and altitude, and provide reasonable estimates to times over checkpoints, and plan alternate courses during flight.

Failure to establish within 10 minutes the compass heading necessary to maintain the course planned and to hold this track within 1 mile, or to hold altitude within 200 feet of the planned cruising altitude will be disqualifying. Using his observed time over checkpoints, he is expected to compute an estimated time of arrival at the first point of intended landing with an apparent error of not more than 5 minutes for each hour of cruising flight involved.

When requested to divert to an alternate airport, he will be expected to promptly turn

to his new *course*, and within 10 minutes establish the appropriate *heading* for this course. His approach to the unfamiliar airport will be evaluated on the basis of compliance with any known or available information (*Airman's Information Manual*, traffic direction/ airport and runway markings, tower instructions and applicable Federal Aviation Regulations) relative to that airport.

3. Cross-Country Flying Emergencies

a. Objective.—To determine that the applicant can recognize and cope promptly and correctly with emergencies which occur during cross-country flights.

b. Description.—During the cross-country flight demonstration, the examiner will simulate, or ask the applicant to assume typical emergencies involving aircraft or equipment malfunctions and encounters with critical flight situations.

Simulated malfunctions may include such emergencies as partial or imminent power failures, failure of electrical or hydraulic systems, fires in flight, or loss of pressurization, etc. Critical flight situations may include being lost, encountering unanticipated adverse weather, icing, loss of visual references, etc.

The applicant will be expected to proceed as he would in the event he encounters the emergency simulated, including the evaluation of the emergency, attempting to make inflight corrections for malfunctions, and the execution of appropriate emergency actions.

c. Acceptable performance guidelines.—Performance will be evaluated on the basis of the applicant's prompt analysis of the situation and possible choices of action, his re-

sourcefulness and planning, and the appropriateness of the actions taken. Emphasis will be directed to the consideration and application of normal remedies before drastic emergency action is initiated. Any action which invokes additional unnecessary hazards will be disqualifying.

4. Use of Radio Aids to VFR Navigation

a. Objective.—To determine that the applicant can effectively use the common aeronautical radio facilities for assistance in VFR navigation.

b. Description.—During his flight test, perferably on the cross-country portion, the applicant will be required to demonstrate the use of radio navigation facilities for VFR navigation. He may elect, as may be appropriate with respect to the radio equipment in the airplane, to use all VHF/UHF or LF/MF equipment and facilities available.

He will be expected to intercept and track toward the station on assigned VOR radial or ADF bearing. No prescribed orientation procedure will be required.

c. Acceptable performance guidelines.—Performance will be avaluated on the basis of the applicant's ability to tune in and identify the desired radio facility, to intercept a desired radial or ADF bearing, and to track it toward or away from the station. Consideration will also be given to his practical knowledge of the procedures for obtaining radar guidance, DF steers, and emergency approach assistance by radio.

5. Instrument Flight

a. Objective.—To determine that the applicant is able to control and maneuver an airplane solely by reference to flight instruments.

b. Description.—The applicant will be requested to demonstrate his ability to control and maneuver an airplane solely by reference to flight instruments. The following maneuvers and operations are specifically required by FAR 61.117(c):

(1) Recovery from a well-developed power-on moderate turn spiral in a medium banked attitude.

(2) Recovery from a high-angle climb in a turn.

(3) Standard rate turns of 180° and 360° duration to within 10° and 20°, respectively, of proper heading and 150 feet of altitude.

(4) Maximum safe performance climbing turns of 180° duration, followed by continued straight climb to predetermined altitude, requiring not less than 1 minute of straight climb performed within 10 knots of the proper airspeed and 10° of proper heading.

(5) Two consecutive descending 90° turns, using normal approach power for reducing altitude, performed within 10° of the proper heading, and at the completion of the first 90° turn continued straight descent for 1 minute, and then a second 90° descending turn and continued straight descent for 1½ minutes (simulating a landing approach).

(6) Straight and level flight performed within 10° of the proper heading, 100 feet of the assigned altitude, and 10 knots of the specified airspeed.

c. Acceptable performance guidelines.— Performance will be evaluated on the basis of coordination, smoothness, and accuracy. Any loss of control which makes it necessary for the examiner to take over to avoid a stall or to avoid exceeding the operating limitations of the airplane used will be disqualifying.