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CIVIL AERONAUTICS MANUAL 20

U. S. Department of Commerce — Civil Aeronautics Administration

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Supplement No. 1 — November 30, 1954

SUBJECT: Revisions to Civil Aeronautics Manual 20 dated June 1954

This supplement affects those applicants for private and commercial pilot certificates who have completed flight or written tests, and applicants for flight instructor and instrument ratings who have completed written tests, but have not yet qualified for the certificate or rating sought. It provides (1) a 24-month period of grace for those who have passed examinations and tests prior to the effective date of this CAM (6/54), and (2) prescribes a 24-month limitation on the acceptability of forms issued as evidence of completion of the private and commercial flight tests, and of the flight instructor and instrument written examinations.

Prior to the issuance of CAM 20, the CAA accepted certificates issued as evidence of passing written examinations and flight tests for an indefinite period. However, recent rapid advances in aviation have required frequent changes in the coverage of examinations and tests to insure that all applicants meet the aeronautical knowledge and skill requirements of the Civil Air Regulations.

Accordingly, the effect of this supplement is to institute a uniform policy of a two-year limitation for the acceptance of any examination or test taken for the issuance of a private or commercial pilot certificate, or for a flight instructor or instrument rating. Forms issued as evidence of the successful completion of examinations and tests subsequent to June 1, 1954, bear expiration dates 24 months from the date of the examination reported. A period of grace until May 31, 1956, is allowed for the acceptance of such forms valid before June 1, 1954, and which do not bear expiration dates, even though they may be more than 24 months old. See also added sections 20.36-2 and 20.42-2.

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"(2) After the applicant's first solo flight, at least 5 hours of dual instruction time shall be given in cross-country flying, of which not less than 3 hours shall be given before his first solo cross-country flight.

"(3) Dual instruction time shall include instruction in the prevention of and recovery from power-on and power-off stalls entered from all normally anticipated flight attitudes.

"(b) *Glider.* Each applicant for a glider rating shall have made at least 100 glider flights or have acquired 10 hours of glider flight time including at least 50 glider flights. The total number of required flights shall include at least (1) 25 glider flights during each of which 360° turn is made; (2) 1 hour of flight instruction in the recovery from stalls entered from all normally anticipated flight attitudes; (3) 2 hours in the aggregate during which the applicant is the sole occupant of the glider; and (4) at least 3 hours in a glider suitable for cross-country flight."

20.25–1 *Evidence of flight experience (CAA policies which apply to sec. 20.25).* Flight experience required by this paragraph should be substantiated by a logbook maintained in accordance with the requirements of section 43.43.

20.25–2 *Qualifying dual instruction (CAA interpretations which apply to sec. 20.25 (a)).* The words dual instruction as used in section 20.25 (a) are defined in section 20.74. In the case of foreign or military pilots, such instruction must be given by a pilot authorized by the licensing authority of his country or the appropriate branch of his military service.

"20.26 *Aeronautical Skill.* The applicant shall exercise reasonable judgment, coordination, and smoothness in the execution of all flight maneuvers, any of which, however, may be modified or eliminated if not consistent with the characteristics of the aircraft used in the flight test and if appropriate operation limitations are entered on the rating record. If an applicant's medical certificate shows a structural defect or limitation such additional maneuvers and tests shall be required as may be necessary to demonstrate the competence of the applicant to pilot aircraft safely, and appropriate operation limitations shall be entered on the rating record. Except as thus provided, each applicant shall satisfactorily accomplish a practical examination with respect to the following procedures and maneuvers:

"(a) *Airplane.*

"(1) Preflight inspection, starting, taxiing, and run-up check of aircraft before takeoff;

"(2) Planning of a cross-country flight to a specified destination, reckoning with weather conditions, fuel requirements, check points, estimated time of arrival, and available alternate airports, and accomplishing such portion of the planned flight, including change of course to an alternate airport, as is necessary to demonstrate proficiency in cross-country flying;

"(3) Straight and level flight, left and right medium banked turns, left and right climbing and gliding turns at normal and at minimum controllable speeds, and recovery from power-on and power-off stalls entered from all normally anticipated flight attitudes;

"(4) Turns while maintaining a constant radius, or track, around a point, or area, including a 720° turn in each direction in a banked attitude of more than 45°;

"(5) Normal and cross-wind takeoffs and landings following appropriate traffic control procedures of the airport involved, using power, flaps, and slips at the applicant's discretion for assistance in landing;

"(6) Simulated emergencies, including one short or soft-field takeoff, and one landing, if in single-engine aircraft, with engine throttled and using flaps, slips, or both, for assistance; or, if in multiengine aircraft, in accordance with proper engine-out procedure.

"(b) *Glider.*

"(1) At least 2 flights, one of which shall include a 360° approach to the right and one to the left, landing each time within 200 feet beyond a designated line or point;

"(2) Recovery from stalls entered from all normally anticipated flight attitudes. (Stall maneuvers may be demonstrated in airplanes.)

"(c) *Rotorcraft.* As prescribed by the Administrator appropriate to the type of rotorcraft used."

20.26–1 *Demonstration of skill—general (CAA interpretations which apply to sec. 20.26).*

(a) *Quality of performance.* The applicant will be required to demonstrate his ability to exercise reasonable judgment, coordination, and smoothness in all required flight maneuvers in the following manner:

(1) *Judgment.* Exercise of reasonable judgment will be demonstrated when the conduct of the flight maneuver results in (i) compliance with part 60, (ii) flight within each operating limitation of the aircraft being used, (iii) avoidance of critical situations which require corrective action by the agent or examiner to maintain continued safe operation, and (iv) the observance of accepted good operating practices for flight conditions encountered.

(2) *Coordination.* Exercise of reasonable coordination will be demonstrated when there are no unnecessary conspicuous slips or skids in the conduct of the flight maneuver.

(3) *Smoothness.* Exercise of reasonable smoothness will be demonstrated when the conduct of the flight maneuver in gust-free air results in a positive and definite change of aircraft attitude without any unintentional abrupt or sudden aircraft motions.

(b) *Modification and elimination of required maneuvers.* Required maneuvers will be modified or eliminated only when their performance is prohibited by the aircraft's flight manual or the operating limitations of the aircraft's airworthiness certificate. When this is the case, the pilot certificate issued will be limited to aircraft of that type.

(c) *Applicants with physical limitations.*[3] The additional manuevers and tests required for applicants who have certain structural physical limitations will be those which will demonstrate that the limitation does not adversely affect the ability to perform the necessary cockpit procedures and motions to effect safe flight in one or more types of aircraft.

The operating limitations entered on the applicant's rating record of his certificate, upon successful completion of all other tests and maneuvers, will be only those found necessary by the applicant's inability to cope with one or more operating conditions.

[(d) *Flight test before written is passed.* The private pilot flight test may be taken before or after the written examination. An applicant who takes the flight test before passing the written examination will be issued a written report of the result of the test.]

20.26–2 *Flight test—airplanes (CAA policies which apply to sec. 20.26 (a)).* The private pilot practical examination in airplanes will be given in two phases. The failure of any maneuver or procedure will constitute the failure of the phase of which that maneuver is a part, and of the flight test. In the event of such failure, the applicant for reexamination will be required to repeat the phase, or phases, failed.

The phases of the private pilot practical examination and flight test maneuvers required in airplanes are:[4]

PHASE I—*Piloting technique*

Preflight check and oral equipment examination.
Starting, warm-up, and stopping.
Taxiing, or sailing and docking.
Run-up.
Flight at normal speeds—straight and level, medium turns, climbing and gliding turns.
Flight at minimum controllable speeds—straight and level, medium turns, climbing and gliding turns.
Stalls, with and without power.
Turns about a point.
Normal takeoffs and landings.
Crosswind takeoffs and landings.
Emergencies: (a) Short field and soft field takeoff, and power-off landings in single-engine airplanes; (b) engine-out procedure in multiengine airplanes.

PHASE II—*Cross-country*

Cross-country flight planning.
Cross-country flying.

20.26–3 *Flight test—gliders (CAA policies which apply to sec. 20.26 (b)).* The agent or examiner will accompany the applicant in a glider or an airplane during his demonstration of stalls and slow flight. All other items on the flight test may be observed from the ground.

[3] See section 29.5 for Waiver of Physical Standards.

[4] See appendix A for details of flight test requirements.

The private glider pilot flight test will be divided in two phases. The failure of any maneuver or procedure constitutes the failure of the phase of which it is a part, and of the flight test. Upon reexamination, the applicant must repeat the phase failed.[4]

PHASE I—*Basic techniques*

Preflight check and oral equipment examination.

Auto, auto pulley, or winch tow; or airplane tow.

360° approaches, right and left.

Accuracy landings.

PHASE II—*Special and critical maneuvers*

Stalls and slow flight (may be demonstrated in an airplane).

20.26–4 *Flight test—Rotorcraft (CAA policies which apply to sec. 20.26 (c)).* The private pilot flight test in rotorcraft will be given in two phases. The failure of any maneuver or procedure will constitute the failure of the phase of which it is a part, and of the flight test. In the event of such failure, the phase failed will be repeated on reexamination.

The phases of the private pilot flight test on rotorcraft, and the required maneuvers are as follows:[4]

PHASE I—*Basic techniques*

Preflight inspection.

Engine and rotor starting and stopping, cockpit procedures.

Taxiing.

Normal takeoffs and landings.

High altitude takeoffs and roll-on landings.

Crosswind takeoffs and landings.

Climbs and descents.

Emergencies.

PHASE II—*Precision maneuvers*

Hovering—upwind, downwind, and crosswind.

Hovering turns.

Turns with medium banks.

S-turns.

Pattern flying.

Commercial Pilot Rating

"20.30 ***Age.*** **18 years."**

"20.31 *Citizenship.* An applicant for a pilot certificate with a commercial pilot rating may be a citizen of any country or a person without nationality."

"20.32 *Education.* Applicant shall be able to read, write, speak, and understand the English language."

"20.33 *Physical Standards.*

"(a) *Powered Aircraft.* Applicant for a powered aircraft rating shall meet the physical standards of the second class prescribed in part 29 of this subchapter: *Provided,* That an applicant who is unable to distinguish aviation signal red, aviation signal green, and white shall be issued an airman certificate appropriately endorsed to prohibit the holder thereof from exercising the privileges of such certificate except under such conditions, or with the use of such equipment which would not require the ability to distinguish such aviation signal colors.

"(b) *Glider.* Applicant shall have no known physical defect which renders him incompetent to pilot a glider, and shall so certify."

20.33–1 *Evidence of meeting physical standards (CAA policies which apply to sec. 20.33 (a)).* The Administrator, or his representative, will accept a first- or second-class medical certificate issued within 12 months preceding the date of the application as evidence of the applicant's meeting the physical standards.

20.33–2 *Color deficiency limitation (CAA policies which apply to sec. 20.33 (a)).* When the applicant holds a medical certificate bearing the notation DEFECTIVE COLOR VISION, the commercial pilot certificate will bear the limitation NOT VALID FOR NIGHT FLIGHT OR BY COLOR SIGNAL CONTROL.

This limitation may be removed by the successful completion of a special medical flight test authorized by the CAA Medical Division, W–265, Washington 25, D. C.

20.33–3 *Glider pilot certification of physical condition (CAA policies which apply to sec. 20.33 (b)).* An applicant for a commercial glider pilot certificate should either present a third-class or better medical certificate issued within the preceding 24 months or certify on his application that he has no known physical defect which renders him incompetent to pilot a glider.

[4] See appendix A for details of flight test requirements.

"20.34 *Aeronautical Knowledge.*

"(a) *Powered Aircraft.* Applicant shall pass a written examination covering such of the provisions of parts 43 and 60 of this subchapter as are pertinent; meteorology as applied to the recognition of weather conditions while flying, the analyzing of weather maps and sequence reports furnished by the United States Weather Bureau; practical air navigation problems including the use of maps, navigation by terrain and dead reckoning, and the use of navigational instruments and aids; the theory and practice of flight; the maintenance of aircraft and the maintenance and use of aircraft powerplants in common use.

"(b) *Glider.* Applicant shall pass a written examination on such of the provisions of parts 43 and 60 of this subchapter as are pertinent or hold a powered aircraft rating."

[20.34–1 *Demonstration of aeronautical knowledge—powered aircraft (CAA policies which apply to sec. 20.34 (a)).* The applicant for a commercial pilot certificate with a rating on powered aircraft will be required to pass within 5 hours a written examination provided by the Administrator. A passing grade of 70 percent is required. Applicants who pass the written examination will be given a report of grade achieved.]

20.34–2 *Demonstration of aeronautical knowledge—gliders (CAA interpretations which apply to sec. 20.34 (b)).* Applicants for commercial glider pilot ratings need pass only that portion of the commercial pilot written examination relating to Civil Air Regulations. [A passing grade of 70 percent is required. Applicants who pass the written examination will be given a report of the grade achieved.]

"20.35 *Aeronautical experience.*

"(a) *Powered aircraft.* An applicant for a commercial pilot rating shall comply with the following flight experience requirements:

"(1) 200 hours of flight time credited in accordance with part 43 of this subchapter, of which at least 100 hours shall be as pilot in command;

"(2) 20 hours of cross-country flight time as pilot in command, which shall include at least one flight of not less than 350 miles in the course of which three full-stop landings are made at different points, one of which shall be not less than 150 miles from the initial point of departure;

"(3) 5 hours of night flight time which shall include not less than 10 takeoffs and 10 landings as pilot in command and as sole manipulator of the controls; and

"(4) 10 hours of instrument flight experience, of which not less than 5 hours shall be instrument flight instruction given by a rated instrument pilot and not more than 5 hours under simulated instrument flight conditions accompanied by a safety pilot, or in a mechanical trainer acceptable to the Administrator.

"(5) The requirements for night flight time and instrument flight experience apply only to applicants for airplane category ratings provided for in this part.

"(6) An applicant who does not meet the night flight time or instrument flight experience requirements of subparagraphs (3) and (4) but does meet the other requirements of this paragraph may be issued a pilot certificate with a commercial rating, and in that event the Administrator shall appropriately endorse such certificate to show that the holder thereof does not meet the night flight time or instrument flight experience requirements.[1] At such time as the holder of a certificate so endorsed submits reliable documentary evidence to the Administrator that he has met such night flight time or instrument flight experience requirements, he shall be reissued a certificate without such endorsement or with the endorsements appropriately modified.

"(b) Glider. An applicant for a glider rating shall have had at least 250 glider

[1] Paragraph 2.4.1.3 (c) and (d) of Annex 1 (Personnel Licensing Standards) to the Convention on International Civil Aviation provides that an applicant for a commercial pilot certificate shall have 5 hours of night flight time and 10 hours of instrument flight instruction. An individual holding a pilot certificate with a commercial rating issued after October 1, 1951, who does not meet such requirements may not participate in international flight as a commercial pilot unless he receives permission from the State or States whose territory is entered. Further, pursuant to the provisions of article 32 of the Convention on International Civil Aviation he shall have endorsed on his certificate the particulars in which he does not meet the International Standards. However, such endorsement on a commercial certificate issued by the Administrator does not prohibit the holder thereof from exercising all the privileges of a commercial pilot rating while flying within the United States and its possessions.

flights, or 25 hours of glider flight time including at least 125 glider flights. At least 25 of the required total number of flights shall have included 360° turns. As a part of his aeronautical experience an applicant shall have had at least 1 hour of flight instruction in the recovery from stalls entered from all normally anticipated flight attitudes."

20.35–1 *Evidence of flight experience (CAA policies which apply to sec. 20.35).* Flight experience required by section 20.35 should be substantiated by a logbook maintained in accordance with sec. 43.43.

20.35–2 *International operating limitations (CAA policies which apply to sec. 20.35 (a) (6)).* A commercial pilot who does not meet the experience requirements of section 20.35 (a) (3) and/or section 20.35 (a) (4) will, if otherwise qualified, receive a certificate with one of the following endorsements, as appropriate:

HOLDER DOES NOT MEET THE NIGHT FLIGHT REQUIREMENTS OF ICAO

or

HOLDER DOES NOT MEET THE INSTRUMENT FLIGHT REQUIREMENTS OF ICAO

or

HOLDER DOES NOT MEET THE NIGHT AND INSTRUMENT FLIGHT REQUIREMENTS OF ICAO

A new certificate without these endorsements will be issued at any time by an Aviation Safety Agent to the holder of a commercial pilot certificate who presents documentary evidence (see section 43.43) that he has met the appropriate requirement.

The above endorsements do not restrict nor affect in any way the privileges of the certificate for flight in the United States or its possessions. However, they do restrict the holder of the certificate from piloting airplanes commercially in foreign countries (members of ICAO) without specific consent.

"20.36 *Aeronautical skill.* Applicant shall competently perform the following maneuvers:

"(a) *Powered aircraft.*

"(1) A series of 3 landings from an altitude not to exceed 1,000 feet with engine throttled and a 180° change in direction, the aircraft touching the ground in normal landing attitude beyond and within 200 feet of a designated line or point. At least one landing shall be accomplished from a forward slip;

"(2) A spiral in each direction of not less than 3 full turns in a banked attitude of not less than 60°, with engine throttled;

"(3) 3 shallow on-pylon figure eights, 3 steep on-pylon figure eights, and one 720° power turn in each direction in a banked attitude of at least 60°. During each of these maneuvers the total variation in altitude shall not exceed 100 feet;

"(4) (Revoked.)

"(5) Straight climbs, climbing turns, slips, maneuvers at minimum controllable speeds, and emergency maneuvers such as simulated forced landings and recovery from power-on and power-off stalls entered from all normally anticipated flight attitudes.

"Any of the maneuvers required by this section may be modified or eliminated if such action is appropriate to the characteristics of the aircraft used in the test and appropriate operation limitations are entered on the rating record.

"(b) *Glider.*

"(1) At least 2 flights, one of which shall include a 360° approach to the right and one to the left, landing each time within 100 feet beyond a designated line or point;

"(2) a spiral in each direction of not less than 3 full turns in a banked attitude of not less than 45°;

"(3) a demonstration of satisfactory technique in the performance of glider flight when towed by an automobile or a winch;

"(4) a demonstration of satisfactory technique in the performance of glider flight when towed by an airplane during climb, and when above, below, and to one side of the towing airplane slipstream while in level flight; and

"(5) recovery from stalls entered from all normally anticipated flight attitudes. (Stall maneuvers may be demonstrated in airplanes.)"

20.36–1 *Demonstration of skill—general (CAA policies which apply to sec. 20.36).*

[The commercial pilot flight test may be taken either before or after the written examination. An applicant who takes the flight test before the written examination is passed will be given a written report of the result of the test.]

20.36–2 *Flight test—airplanes (CAA policies which apply to sec. 20.36 (a)).* The commercial pilot flight test in airplanes will be given in two phases. The failure of any maneuver or procedure constitutes the failure of the phase of which that maneuver is a part, and of the flight test. After such failure, the applicant for reexamination will be required to repeat the phase, or phases, failed.

The phases of the commercial pilot flight test in airplanes and the required maneuvers and procedures are as follows:[4]

PHASE I—*Basic techniques*

Preflight check and oral equipment examination.
Starting, taxiing, and run-up.
Normal takeoffs and accuracy landings.
Crosswind takeoffs and landings.
Airport traffic pattern.
Climbs and glides.
Slips.
Emergencies.

[Cross-country—Applicants who have not passed the private pilot flight test since August 1, 1951, will be required to demonstrate the competence in cross-country flight planning and flying required for a private pilot certificate by passing Phase II of the private pilot flight test, entitled *Cross-country.*]

PHASE II—*Precision maneuvers*

Spirals.
Pylon eights.
720° power turns.
Flight at minimum controllable speed.
Stalls.
Engine-out procedure (if test taken in multiengine airplane).

20.36–3 *Flight test—helicopters (CAA policies which apply to sec. 20.36 (a)).* The commercial pilot flight test in helicopters will be given in two phases. The failure of any maneuver or procedure will constitute the failure of the phase of which that maneuver is a part, and of the flight test. After such failure, the applicant for reexamination will be required to repeat the phase, or phases, failed.

The phases of the commercial pilot flight test in helicopters, and the required maneuvers and procedures are as follows:[4]

PHASE I—*Basic techniques*

Preflight check and oral equipment examination.
Engine and rotor starting and stopping, and cockpit procedures.
Taxiing.
Normal takeoffs and landings.
Crosswind takeoffs and landings.
Running takeoff and roll-on landing.
Climbs and descents.
Airport traffic pattern.
Emergencies.

PHASE II—*Precision maneuvers*

Hovering—upwind, downwind, and crosswind.
Hovering turns.
Pattern flying with constant heading.
S-turns.
Turns with medium banks.
Rapid decelerations (quick stops).

20.36–4 *Flight test—gliders (CAA policies which apply to sec. 20.36 (b)).* The agent or examiner conducting the test will accompany the applicant for a commercial glider pilot flight test in a glider or an airplane during his demonstration of stalls and slow flight. Other items on the test may be observed from the ground, or from within the glider.

The commercial glider flight test will be given in two phases. The failure of any maneuver constitutes the failure of the phase of which that maneuver is a part, and of the flight test. After such failure, the applicant for reexamination will be required to repeat the phase, or phases, failed.

The phases of the commercial pilot glider flight test, and the required maneuvers and procedures are as follows:[4]

[4] See appendix A for descriptions of and standards for required flight maneuvers and procedures.

(a) *Knowledge of effective instruction methods.* To demonstrate his knowledge of effective instruction, the applicant will be required to orally describe and illustrate the principles of good instruction involving (1) advance instructor preparation, (2) student preparation, (3) instructor demonstration, (4) student participation, and (5) instructor followup inspections.

(b) *Knowledge of safe flying habits and principles.* To demonstrate his knowledge of safe flight habits and principles to follow by a pilot in extricating himself from a critical situation, the applicant will be required to describe orally basic habits and principles that are applicable to getting lost, running low on fuel, encountering turbulent air, getting caught above clouds or in adverse atmospheric conditions, unexpected radio aid shutdown, motor trouble, and operations in high temperatures/altitudes and in mountainous terrain.

(c) *Correctness and clarity of explanations.* To demonstrate his ability to explain clearly and correctly, the applicant will answer orally questions such as those a student might ask, and will simulate instruction—using the agent as a student—in the performance of maneuvers and procedures, both on the ground and in flight. The applicant will be required to instruct the agent as he would a beginning student, and the agent will attempt to fly various maneuvers just as the applicant directs. Explanations and directions should be clear, concise, and correct.

(d) *Recognition and correction of student errors.* To demonstrate his ability to recognize and correct errors in flight performance, the applicant will be required to analyze the performance of the agent when he simulates the performance of a typical student, and make appropriate corrections for any errors committed. The applicant should recognize not only the apparent error, but the basic fault which caused it, and should require a correction which a student can readily understand. For example, repetition of hazardous errors—such as stalling in turns, should be dealt with in a different manner from minor errors—such as gaining or losing altitude.

20.41–6 *Practical examination—gliders (CAA policies which apply to sec. 20.41 (d)).*

PHASE I—*Performance of flight training maneuvers*

The applicant will be required to demonstrate the correct and complete performance of standard flight training maneuvers and procedures used in glider flight training. Tolerances for the flight test maneuvers will be those allowed a commercial pilot applicant. (See sec. 20.36–4.) These maneuvers and procedures include, but are not limited to:[6]

Preflight check and oral equipment examination.
Auto, auto pulley, or winch tow.
Airplane tow.
360° approaches.
Accuracy landings.
Spirals.
Stalls and slow flight.
Spins.

PHASE II—*Flight instruction methods*

The applicant will be required to complete satisfactorily the same demonstration of ability, using a glider, as is required for applicants with airplanes under section 20.41–5, Phase II.

20.41–7 *Practical examination—helicopters (CAA policies which apply to sec. 20.41 (d)).*

PHASE I—*Performance of flight training maneuvers*

The applicant will demonstrate the correct and competent performance of standard flight training maneuvers and procedures used in helicopter flight training. Tolerances for the flight test maneuvers will be those allowed a commercial pilot applicant (sec. 20.36–3). These maneuvers and procedures include, but are not limited to:[6]

Preflight check and oral equipment examination.
Starting, stopping, and cockpit procedures.
Taxiing (with helicopters appropriately equipped).
Normal takeoffs and landings.
Crosswind takeoffs and landings.
Running takeoff and roll-on landing.

[6] See appendix A for descriptions and standards for required flight maneuvers and procedures.

Autorotative approaches; straight, 180°, and 360°.
Autorotative landing.
Hovering; upwind, crosswind, and downwind.
Hovering turns.
Turns with medium banks.
S-turns.
Pattern flying with constant heading.
Pattern flying with changing heading.
Rapid decelerations.
Climbs and descents.
Emergencies.

PHASE II, *Flight instructor methods*

The applicant will be required to complete satisfactorily the same demonstration of ability using a helicopter, as that required for applicants with airplanes under section 20.41–5, Phase II.

"20.42 *Instrument rating.*

"(a) *Knowledge.* Applicant shall pass a written examination demonstrating his familiarity with the use of such instruments and other navigational aids, both in the aircraft and on the ground, as are necessary for the navigation of aircraft by instruments, with instrument flight rules, and with flight planning in relation to air traffic control services and aircraft performance. An applicant who is a private pilot shall, in addition, meet the knowledge requirements of section 20.34 (a), except those pertinent to the maintenance of aircraft and aircraft engines.

"(b) *Experience.* An applicant shall hold a private or commercial pilot rating and shall have at least:

"(1) 150 hours of flight time as pilot in command, of which not less than 50 hours shall be cross-country flight time, and

"(2) 40 hours of instrument time under actual or simulated instrument flight conditions, of which not less than 20 hours shall have been in actual flight.

"(c) *Aeronautical skill.* Applicant shall competently perform the following maneuvers solely by reference to instruments:

"(1) Straight and level flight,

"(2) Moderately banked 180° and 360° turns in both directions,

"(3) Straight and level flight at minimum safe speeds, minimum glides, maximum climbs, and approaches to stalled attitudes of flight,

"(4) Climbing turns,

"(5) Stalls, skids, slips, spirals, banks in excess of 45°, and recovery from unusual positions,

"(6) A demonstration of estimating arrival time, taking into account speed, wind, and drift.

"(d) *Radio skill.* Applicant shall demonstrate his competence while flying solely by reference to instruments with respect to the following items:

"(1) Tuning radio,

"(2) Orientation,

"(3) Operation along a radio range leg,

"(4) Locating cone of silence,

"(5) Let-down using approved instrument approach procedure for the particular airport.

"(e) *Modified tests.* Any of the maneuvers or procedures required in paragraphs (c) and (d) of this section may be modified or eliminated if such action is appropriate to the characteristics of the aircraft or equipment used in the test and appropriate operation limitations are noted."

[20.42–1 *Demonstration of aeronautical knowledge (CAA policies which apply to sec. 20.42 (a)).* The applicant must pass, within five hours at one sitting, the written examination furnished by the Administrator, which consists of three sections: Civil Air Regulations, Meteorology, and Radio Navigation. To pass, a grade of 70 percent must be achieved in each section. A written report of the grades achieved will be issued for each examination taken.

[An applicant for an instrument rating who is the holder of a private pilot certificate will not be required to take an additional examination to demonstrate compliance with section 20.34 (a). The portions of 43 and 60 pertaining to instrument flight rules, as well as the navigation and meteorology requirements of section 20.34 (a) are included in the instrument rating written examination.]

20.42–2 *Prerequisites for taking the instrument written examination (CAA policies which apply to sec. 20.42 (a)).* The applicant for the instrument rating written examination will be required to show that he meets the experience requirements of section 20.42 (b) (1); and in addition either has (a) at least 30 hours of instrument flight time under actual or simulated flight conditions or (b) if enrolled in an instrument flight course in a certificated instrument flying school, the written recommendation of the chief flight inspector of that school.

20.42–3 *Qualifying instrument flight experience (CAA interpretations which apply to sec. 20.42 (b) (2)).* Instrument time under simulated instrument flight conditions means instrument flight practice or instruction (a) in an aircraft while under a hood or other device which limits the pilot's range of vision to the cockpit, or (b) in a synthetic trainer.

Instrument time in actual flight means the time spent controlling an aircraft in flight by reference to instruments only, either in actual instrument weather or under a hood or similar device.

20.42–4 *Demonstration of skill—general (CAA policies which apply to sec. 20.42 (c) and (d)).* No instrument flight test will be given until the applicant has passed the required written examination.

The flight test will be conducted in two phases: (a) Instrument Flying, and (b) Navigation and Approach Procedures. The failure of any item in either phase constitutes the failure of that phase, and of the flight test. In the event of failure, the applicant will be required to repeat the phase, or phases, failed upon reexamination.

The applicant will be required to demonstrate his ability to perform all items of Phase I by the use of the minimum aircraft equipment and instrumentation required for instrument flight by section 43.30 (c) (primary panel). He may use all available equipment and instrumentation for Phase II.

The phases and required maneuvers and procedures for the instrument rating flight test are as follows:[6]

PHASE I—*Basic instrument flying technique.*
- Straight and level flight at normal, approach, and minimum safe speeds.
- Turns, climbs, and descents at normal, approach, and minimum control speeds.
- Stalls.
- Steep turns.
- Recovery from unusual attitudes.
- Engine-out procedure on tests taken in multiengine aircraft.

PHASE II—*Radio navigation and approach procedures.*
- Estimating arrival times.
- Use of radio equipment.
- Orientation.
- Beam bracketing.
- Locating range station.
- Instrument letdown and approach procedures.
- Airway traffic control procedures.
- Missed approach procedures.

20.42–5 *Instrument flight tests for helicopter and glider pilots (CAA policies which apply to sec. 20.42 (e)).* Instrument flight tests will be given in airplanes only, but instrument rating privileges are not restricted to any aircraft category.

Certificate Rules

"20.50 *Application.* Application for a student pilot certificate, pilot certificate, or any rating shall be made on a form furnished by the Administrator."

20.50–1 *Where to obtain applications (CAA policies which apply to sec. 20.50).* Application forms are obtainable from a representative of the Administration or one of its regional, district, or field offices.

Applications for a student pilot certificate may be mailed to an Aviation Safety District Office. All other applications are presented in person to an Aviation Safety Agent or a designated pilot examiner.

Applicants qualifying on the basis of military competency (sec. 20.55), or for a flight instructor rating (sec. 20.41), will apply to an Aviation Safety Agent.

"20.51 *Duration.*

"(a) A student pilot certificate issued to a United States citizen shall remain in effect

[6] See appendix A for descriptions and standards for required flight maneuvers and procedures.

for a period no longer than 24 months after the date of issuance.

"(b) A pilot certificate with a private or commercial rating issued to a United States citizen shall remain in effect until surrendered, suspended, revoked, or otherwise terminated by order of the Board.

"(c) A student pilot certificate or a pilot certificate with a private or commercial rating issued to an applicant other than a United States citizen shall remain in effect for a period no longer than 12 months after the date of issuance, but it may be reissued without further demonstration of technical competence.

"(d) A limited pilot certificate shall remain in effect for a period no longer than 12 months after date of issuance, but it may be reissued without further demonstration of technical competence.

"(e) After revocation, and upon request after suspension, the certificate shall be returned to the Administrator.

"(f) Nothing in this section shall be construed to deny or defeat the jurisdiction of the Federal courts, the Administrator, or the Board to impose any authorized sanction, including revocation of the certificate, for a violation of the Act or of the Civil Air Regulations occurring during the effective period of the certificate."

20.51–1 *Reissuance of certificates held by aliens (CAA policies which apply to sec. 20.51 (c)).* Pilot certificates held by individuals other than United States citizens, which are about to expire, or have expired, will be reissued by Aviation Safety Agents upon receipt of application for renewal in accordance with current citizenship qualifications.

"20.52 *Temporary certificates.* The Administrator or his authorized representative may issue a temporary student pilot certificate or a temporary pilot certificate with a private or commercial rating for a period of not to exceed 90 days, subject to the terms and conditions specified therein by the Administrator."

20.52–1 *Issuance of temporary pilot certificates (CAA policies which apply to sec. 20.52).* Temporary pilot certificates are issued to qualified applicants by Aviation Safety Agents and designated pilot examiners pending the examination of the applicants' records and the issuance of certificates of greater duration by the Administrator.

"20.54 *Exchange of certificates.*

"(a) A private or commercial pilot certificate which was effective on or after January 1, 1942, and which was issued prior to July 1, 1945, will expire on July 1, 1947. Such certificate may be exchanged at any time prior to July 1, 1947, for a pilot certificate and the appropriate ratings provided for in this part.

"(b) *Reissuance.* Any person who on June 30, 1947, held a valid private or commercial certificate, and who failed to exchange such certificate in accordance with paragraph (a) of this section, may, notwithstanding such failure and without other showing, obtain a pilot certificate with appropriate ratings upon application to the Administrator."

20.54–1 *Validity dates of expired certificates (CAA interpretations which apply to sec. 20.54 (b)).* A private pilot certificate issued or last endorsed on or after January 1, 1941, or a commercial pilot certificate issued or last endorsed on or after July 1, 1941, was valid June 30, 1947, unless revoked, suspended, or otherwise terminated.

20.54–2 *Reissuance of certificates (CAA policies which apply to sec. 20.54 (b)).* Certificates which have expired in accordance with section 20.54 (a) will be reissued upon application to an Aviation Safety Agent or an ASDO. Such reissuance constitutes a certificate issuance, and current required ICAO qualification notations will be made a part thereof.

The holder of a valid pilot certificate who so desires may voluntarily exchange it for a photographically issued type of wallet size by presenting it with an application to an Aviation Safety Agent.

"20.55 *Military competence.* Pilot certificates and appropriate ratings granted on the basis of military competence shall be issued in accordance with the provisions of paragraphs (a), (b), (c), and (d) of this section.

(7) National Guard.

(8) Civil Air Patrol.

20.58–3 *Application (CAA rules which apply to sec. 20.58).* An applicant for an airman identification card shall comply with the following procedure:

(a) *Application.* The applicant shall apply in person to an Aviation Safety Agent, or an Aviation Safety District Office.

(b) *Form.* Application for Airman Identification Card, Form ACA–2134, shall be completed in single copy, typed or printed in ink, and contain precise information on each item.

(c) *Proof of identity.* The applicant shall furnish proof of his identity. The agent may exercise his discretion in the method by which he identifies the applicant. Identification of the applicant may be established by one or more of the following means:

(1) Airman Identification Card, Form ACA–935, issued by the CAA to the applicant during World War II.

(2) The agent's knowledge of the applicant's identity.

(3) The applicant's identification by a person known to the agent.

(4) Combinations of identification cards and licenses held by the applicant.

(5) Comparison of the applicant's signature with that on other cards and licenses held by him.

(d) *Proof of place and date of birth.* The following documentary evidence is satisfactory evidence of place and date of birth.

(1) Airman Identification Card, Form ACA–935, issued by CAA during World War II. (If he held this card and lost it, he may write to CAA, Airman Records Branch, Washington 25, D. C., and obtain confirmation that it was issued to him and the information it contained.)

(2) Birth certificate. (When the applicant's birth certificate does not contain the exact name now used by him, he shall explain the difference on the application form.)

(3) Baptismal record, if it contains the full name and place and date of birth.

(4) Naturalization papers, if place and date of birth are shown.

(5) Passport, expired or current.

(6) Aircrewman Identification Card, or Crew Member Certificate, Form ACA–2116.1.

(7) Statement from any State or Federal Government agency which has the applicant's birth certification on file.

(8) Statement from any military, State, municipal, local, or Federal Government agency which has established, by investigation or otherwise, the applicant's place and date of birth.

Applicants who cannot furnish any of the documents listed in (1) through (8) may present affidavits from attending physician, either parent, brother, sister, relative, or acquaintances who have personal knowledge of the applicant's place and date of birth.

Military identification cards, service records, discharge papers, drivers' licenses, and the like are not acceptable documentary evidence of place and date of birth.

(e) *Evidence of citizenship.* The following documentary evidence is satisfactory evidence of citizenship.

(1) Any document listed in paragraph (d) if citizenship is claimed in the country of birth.

(2) Naturalization papers.

(3) Currently valid passport.

(4) Statement from an appropriate official of a foreign government that the applicant is a citizen of that country.

(5) Civil Aeronautics Board waiver of citizenship requirements for the issuance of an airman certificate to stateless or other persons.

(6) Certified statements from persons, courts, or agencies in authority on cases of derivative citizenship, uncompleted naturalization, or other complex citizenship status. Such statements must contain information on the current status of the applicant's citizenship.

(f) *Photographs.* The applicant shall furnish two photographs which are:

(1) Taken from the same negative.

(2) One-inch square, full face, head only.

(3) Taken within the past 12 months, and

(4) Readily recognizable as photographs of applicant.

(g) *Fingerprints.* The applicant shall be fingerprinted only by an Aviation Safety Agent or other CAA employee authorized by the agent.

(h) *Reissuance of lost card.* An applicant

who has lost his Airman Identification Card, Form ACA–2135, may obtain another by making application exactly as required for his original card, or by:

(1) Writing to the CAA Airman Records Branch, W–253, Washington 25, D. C., and explaining the circumstances of the loss, and requesting a letter verifying that such card had been issued, and

(2) Presenting the letter and two photographs, as required for original issuance, to an Aviation Safety Agent who will issue a duplicate card.

20.58–4 *Scheduled air carrier airmen (CAA interpretations which apply to sec. 20.58).* An airman certificated under section 20.58 is not required to hold an identification card when he is exercising the privileges of his certificate in operations conducted by a scheduled air carrier. This includes any operation in which the airman is carrying out his duties as an employee of a scheduled air carrier.

20.58–5 *Other airman certificate (CAA interpretations which apply to sec. 20.58).* An identification card which meets the requirements of section 20.58 for pilots will also meet the identification card requirements for any other airman certificates which he may hold.

Examinations and Tests

"20.60 *General.* The prescribed examinations and tests shall be given by a person designated by the Administrator."

20.60–1 *Who conducts examinations and tests (CAA policies which apply to sec. 20.60).* The examinations and tests required by this part for a certificate or rating will be conducted by the persons indicated below:

Type of Examination	*Conducted by*
Written Examinations (for all certificates).	Aviation Safety Agents.
Practical Examinations: Private Pilot.	Aviation Safety Agents, Private and Commercial Pilot Examiners.
Commercial Pilot	Aviation Safety Agents, and Commercial Pilot Examiners.
Additional Aircraft Ratings.	Aviation Safety Agents, and Private or Commercial Pilot Examiners according to certificate held. Also, ATR examiners for holders of commercial pilot certificates.
Instrument Rating	Aviation Safety Agents, Instrument Rating and ATR Examiners.
Instructor Rating	Aviation Safety Agents.
Physical Examination:	
First Class	Designated ATR Medical Examiners.
Second Class	Designated ATR and 2d Class Medical Examiners.[7]
Third Class	Medical Examiners, or a competent licensed physician.

20.60–2 *Who accompanies applicant on flight test (CAA policies which apply to sec. 20.60).* An Aviation Safety Agent or a CAA designated pilot examiner will accompany the applicant for a flight test (except certain glider tests) in the aircraft during the performance of all required maneuvers. In addition, the agent or examiner may, at his discretion, require the performance of solo takeoffs and landings, unless the Aircraft Flight Manual prohibits solo operation of the aircraft used.

[20.60–3 *Period of acceptance for reports of successful completion of examinations and tests (CAA policies which apply to sec. 20.60).* Reports of the results of oral or written examinations, or of flight tests, issued applicants for pilot certificates and ratings subsequent to June 1, 1954, will be accepted by the Administrator for a period of 24 months from the date of the examination or test reported thereon. Reports issued to an applicant on or before May 31, 1954, and acceptable under policies existing on that date, will continue to be accepted until May 31, 1956.]

"20.61 *Physical examination.* Prior to taking a flight test for a rating, an applicant shall have met the appropriate physical re-

[7] See Regulations of the Administrator, section 406.12a, as amended December 30, 1950, for physical examination procedures for military pilots.

quirements within the time limitations hereinafter prescribed:

"(a) *Private rating.* Within the preceding 24 months.

"(b) *Commercial rating.* Within the preceding 12 months."

20.61–1 *Physical prerequisites for flight tests (CAA policies which apply to sec. 20.61).*

(a) *Original private and commercial flight tests—powered aircraft.* A CAA first or second class medical certificate will be acceptable for flight tests for a commercial pilot certificate if issued within the preceding 12 months. A first, second, or third class medical certificate will be acceptable for a private pilot certificate, if issued within the preceding 24 months.

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the use of a definite technique to overcome drift is acceptable for this demonstration.

NOTE: If the demonstrations of normal takeoffs and landings involve an appreciable crosswind component requiring drift correction, this demonstration will not be required.

Standard. The applicant must maintain a straight departure and landing path over the airport, land without side load on the gear, and use the flaps in accordance with the Airplane Flight Manual. (Any accepted technique may be used for overcoming drift.)

(5) AIRPORT TRAFFIC PATTERN

Procedure. During his performance of takeoffs and landings and during operations in the airport vicinity, the applicant will be expected to conform to the established traffic pattern for the airport used on the flight test.

Standard. The prescribed altitude shall be maintained within 100 feet, recovery from turns must be made on the correct flight path headings, and correction for drift must be made on the crosswind legs of the pattern.

Preparative guide. The applicant should display preplanning, accurate selection of headings and altitudes, and observance of safe operating distances from other traffic.

(6) CLIMBS AND GLIDES

Procedure. During the flight test, the applicant will be expected to demonstrate normal uniform climbs and glides, in straight flight and in turns in both directions.

Standard. Climbs are to be made at the recommended best rate of climb and airspeed with the recommended climb power setting, and glides made at the normal gliding speed for the airplane used. Airspeeds should be maintained within 5 m. p. h. and the bank of a steady turn within 5°.

(7) SLIPS

Procedure. The applicant will be expected to demonstrate slips in both directions while following a straight or curved flight track.

NOTE: This demonstration is in addition to that required for accuracy landings.

Standard. Entry to and recovery from slips are to be executed without abrupt control or airplane movements. The airspeed must be maintained constant within 5 m. p. h. and the track made good to effect a landing at a predesignated location.

Preparative guide. The applicant should be capable of making a smooth transition from and to slips, maintain a stabilized slip condition to the right or left, follow a desired ground track to a landing with the low wing in the slip always on the inside of a turn or upwind for a cross-wind landing.

(8) EMERGENCIES

Procedure. Forced landing procedures will be required in single-engine airplanes. The examiner will close the throttle at unannounced times during the flight, and request the applicant to proceed as he would in the event of a genuine engine failure. Handling the throttle and the carburetor heat throughout the simulated forced landing will be the responsibility of the examiner. No simulated forced landing will be continued below 200 feet above the ground unless an immediate landing is practicable.

Engine-out procedure will be required on flight tests in multiengine airplanes. An engine may be throttled or cut off, depending on conditions. Propeller feathering will be demonstrated on airplanes equipped with propellers which can be feathered and unfeathered in flight without damage to the engine. The examiner will not require the feathering of a propeller on takeoff or in any other critical situation in which the failure of another engine would endanger safety.

Other emergencies, such as encountering severe storms, the failure of the landing gear extension mechanism, etc., may be presented orally, and the applicant required to demonstrate or explain a suitable course of action.

Standard. On simulated forced landings the applicant must decide on a course of action, establish a normal glide, avoid violent maneuvering, and pursue the course of action without change unless a modification is considered to offer a better probability of effecting the least injury or damage.

In executing engine-out procedures, with an engine throttled, or set to zero thrust to simulate a feathered propeller, the applicant will

be expected to execute straight flight and 10° to 20° banked turns in either direction while maintaining the recommended engine-out airspeed within 5 m. p. h., the altitude within the airplane's limitations, and the straight flight heading within 5°.]

The applicant is expected to present correct solutions to other emergency problems, and to demonstrate a knowledge of the correct emergency operation of airplane accessories.

Preparative guide. The applicant should be conversant with recommended procedures and principles to follow in all types of critical situations such as: engine failure, severe turbulence, unexpectedly strong headwinds, mountainous terrain effects on vertical air currents, being lost, instrument or equipment failures, etc.

Phase II—Precision Maneuvers

(1) SPIRALS

Procedure. The applicant will demonstrate a gliding spiral of three full turns in either direction with a bank of at least 60°. No spiral is to be practiced or demonstrated above or in the traffic pattern of an airport except by prearrangement with the airport authorities or the control tower.

Standard. The applicant must be able to maintain a constant airspeed within 10 m. p. h., a bank within 5°, and to recover on a heading within 10° of that on which the spiral was started.

(2) PYLON EIGHTS

Procedure. Shallow and steep pylon eights will be required. These will be demonstrated over unpopulated areas where no hazard or annoyance to persons or livestock might result.

Standard. The turn and bank around each pylon are to be so planned and executed that the pylon remains within one wing chord length of the reference point (near the wing tip) which is used by the pilot. This reference point should be established on a line from the pilot's eye that is parallel to the lateral axis of the airplane.

Preparative guide. CAA Technical Manual 100, Flight Instruction Manual has some useful guide material.

(3) 720° POWER TURNS

Procedure. The applicant will be required to make 720° power turns in each direction at a bank of at least 60°.

Standard. During 720° power turns, the bank must be held between 55° and 65°, the altitude within 100 feet of the starting altitude, and recovery accomplished on a heading within 15° of that on which entry was made. No slips or skids will be allowed.

(4) FLIGHT AT MINIMUM CONTROLLABLE AIRSPEED

Procedure. Flight at a minimum controllable speed is to be demonstrated in the below specified flight maneuvers at an airspeed from which a reduction of 5 m. p. h. or less would result in immediate indications of a stall. The demonstration will include: (a) a 10°–30° banked climb with normal climb power and gear/flaps up if retractable; and (b) a 10°–30° banked glide with normal low gliding power and gear/flaps down—if retractable type.

At least once during his demonstration of slow flight the applicant will be required to close the throttle and allow the airplane to stall. Indication of a stall should appear immediately if the proper slow flight speed has been maintained.

Standard. The applicant will be required to demonstrate his ability to maintain control of the airplane in sustained flight at an airspeed within 5 m. p. h. of the stalling speed without allowing any unintentional stalls to occur.

Preparative guide. The applicant should be capable of smooth and positive control usage at extremely slow flight speeds to avoid unintentional stalls and possess the ability to recognize critically slow airspeeds.

(5) STALLS

Procedure. Stalls and stall recoveries will be demonstrated from three flight conditions which simulate normal situations from which stalls have been found to be most critical. These three occur during a takeoff and departure, an approach to a landing, and when engaging in accelerated maneuvering at reduced speeds.

Takeoff and departure stalls will be simulated with the airplane in a 10° to 30° banked