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CIVIL AERONAUTICS MANUAL 20

U. S. Department of Commerce — Civil Aeronautics Administration

Civil Aeronautics Manuals and supplements thereto are issued by the Office of Aviation Safety, Civil Aeronautics Administration, for the guidance of the public and are published in the Federal Register and Code of Federal Regulations.

Supplement No. 2 — CAA Library — March 15, 1956

SUBJECT: Revisions to Civil Aeronautics Manual 20 dated June 1954.

This supplement is issued to provide subscribers of CAM 20 with new and revised material. Civil Aeronautics Manual 20 was amended in 20 F. R. 888—890 on February 9, 1956, to include CAA policies pertaining to the following:

(1) The issuance of and the procedures for obtaining a waiver of physical standards for a private or commercial pilot certificate (20.23–4 and 20.33–4).

(2) The retention of existing ratings upon the issuance of a pilot certificate of a higher rating; and the obtaining of additional flight instructor category ratings (20.40–2 and 20.41–8).

(3) The issuance of and the procedures for obtaining a new pilot certificate in the case of change of name or request for lower grade pilot certificate; and for a duplicate pilot or medical certificate in the case of loss or destruction (20.50–2 through 20.50–4).

(4) The reissuance of cancelled or voluntarily surrendered pilot certificates or ratings (20.51–2 and 20.51–3).

(5) The procedure for obtaining a replacement for a lost Report of Written Examination, Form ACA–578A (20.60–4).

The following revisions were made to existing material:

(1) Section 20.42–2 was amended to read that the applicant for the instrument written examination show (a) that he meets the experience requirements and has at least 30 hours of instrument time; or (b) if enrolled in an instrument flight course, the written recommendation of the chief flight instructor of that school.

(2) Section 20.60–3 was changed to specify the applicants from whom reports of oral or written examinations will be acceptable until May 31, 1956, as evidence of successful completion of examinations and tests; and

(3) Section 20.61–1(c) was amended to correct an erroneous reference.

This new and revised material shall become effective March 15, 1956.

NOTE: New and revised material is indicated by brackets [ ].

Remove and destroy the following pages:	*Insert in lieu thereof the following pages:*
V through VII	V through VIII
3 and 4	3 through 4–1
7 and 8	7 through 8–1
11 through 16	11 through 16–3
19 through 48	19 through 47

John F. Warlick

FOR WILLIAM B. DAVIS
Director,
Office of Aviation Safety.

Attachments.

Table of Contents

Student Pilot Certification

	Paragraph	Page
Issuance	**20.1**	1
Where to obtain student pilot certificates (*CAA policies which apply to sec. 20.1*)	20.1–1	1
Age	**20.2**	1
Minors in the armed forces (*CAA policies which apply to sec. 20.2*)	20.2–1	1
Other minors (*CAA interpretations which apply to sec. 20.2*)	20.2–2	1
Citizenship	**20.3**	1
Education	**20.4**	1
Language limitation (*CAA policies which apply to sec. 20.4*)	20.4–1	1
Removal of limitation (*CAA policies which apply to sec. 20.4*)	20.4–2	1
Physical standards	**20.5**	1
Evidence of meeting physical standards (*CAA policies which apply to sec. 20.5 (a)*)	20.5–1	1
Color deficiency limitation (*CAA interpretations which apply to sec. 20.5 (a)*)	20.5–2	2
Glider pilot certification of physical condition (*CAA policies which apply to sec. 20.5 (b)*)	20.5–3	2
Aeronautical knowledge	**20.6**	2

Pilot Certificates and Ratings

Issuance	**20.10**	2
Types of certificates and by whom issued (*CAA policies which apply to sec. 20.10*)	20.10–1	2
Graduates of certified flying schools	**20.11**	2
Limited pilot certificate	**20.12**	2
Demonstration of aeronautical knowledge (*CAA policies which apply to sec. 20.12*)	20.12–1	3
Evidence of meeting physical standards (*CAA policies which apply to sec. 20.12*)	20.12–2	3
Eligibility for a limited private pilot certificate (*CAA policies which apply to sec. 20.12*)	20.12–3	3
Eligibility for a limited commercial pilot certificate (*CAA policies which apply to sec. 20.12*)	20.12–4	3
Aircraft and instrument ratings on limited pilot certificates (*CAA policies which apply to sec. 20.12*)	20.12–5	3
Language limitation (*CAA policies which apply to sec. 20.12*)	20.12–6	3
Computation of flight time	**20.13**	3

Private Pilot Rating

Age	**20.20**	3
Citizenship	**20.21**	3
Education	**20.22**	3
Language limitation (*CAA policies which apply to sec. 20.22*)	20.22–1	3
Removal of limitation (*CAA policies which apply to sec. 20.22*)	20.22–2	4
Physical standards	**20.23**	4
Evidence of meeting physical standards (*CAA policies which apply to sec. 20.23 (a)*)	20.23–1	4

	Paragraph	Page
Physical standards—Continued		
Color deficiency limitation (*CAA policies which apply to sec. 20.23 (a)*)	20.23–2	4
Glider pilot certification of physical condition (*CAA policies which apply to sec. 20.23 (b)*)	20.23–3	4
Waivers for private pilot applicants who fail to meet physical standards (*CAA policies which apply to sec. 20.23*)	20.23–4	4
Aeronautical knowledge	**20.24**	4
Demonstration of aeronautical knowledge (*CAA policies which apply to sec. 20.24*)	20.24–1	4–1
Aeronautical experience	**20.25**	4–1
Evidence of flight experience (*CAA policies which apply to sec. 20.25*)	20.25–1	5
Qualifying dual instruction (*CAA interpretations which apply to sec. 20.25 (a)*)	20.25–2	5
Aeronautical skill	**20.26**	5
Demonstration of skill—general (*CAA interpretations which apply to sec. 20.26*)	20.26–1	6
Flight test—airplanes (*CAA policies which apply to sec. 20.26 (a)*)	20.26–2	6
Flight test—gliders (*CAA policies which apply to sec. 20.26 (b)*)	20.26–3	6
Flight test—rotorcraft (*CAA policies which apply to sec. 20.26 (c)*)	20.26–4	7

Commercial Pilot Rating

Age	**20.30**	7
Citizenship	**20.31**	7
Education	**20.32**	7
Physical standards	**20.33**	7
Evidence of meeting physical standards (*CAA policies which apply to sec. 20.33 (a)*)	20.33–1	7
Color deficiency limitation (*CAA policies which apply to sec. 20.33 (a)*)	20.33–2	7
Glider pilot certification of physical condition (*CAA policies which apply to sec. 20.33 (b)*)	20.33–3	8
Waivers for commercial pilot applicants who fail to meet physical standards (*CAA policies which apply to sec. 20.33 (a)*)	20.33–4	8
Aeronautical knowledge	**20.34**	8
Demonstration of aeronautical knowledge—powered aircraft (*CAA policies which apply to sec. 20.34 (a)*)	20.34–1	8
Demonstration of aeronautical knowledge—gliders (*CAA interpretations which apply to sec. 20.34 (b)*)	20.34–2	8
Aeronautical experience	**20.35**	8
Evidence of flight experience (*CAA policies which apply to sec. 20.35*)	20.35–1	9
International operating limitations (*CAA policies which apply to sec. 20.35 (a) (6)*)	20.35–2	9
Aeronautical skill	**20.36**	9
Demonstration of skill—general (*CAA policies which apply to sec. 20.36*)	20.36–1	10
Flight test—airplanes (*CAA policies which apply to sec. 20.36 (a)*)	20.36–2	10
Flight test—helicopters (*CAA policies which apply to sec. 20.36 (a)*)	20.36–3	10
Flight test—gliders (*CAA policies which apply to sec. 20.36 (b)*)	20.36–4	10

Aircraft, Flight Instructor, and Instrument Rating

Aircraft rating competence	**20.40**	11
Demonstration of competency for additional aircraft ratings (*CAA interpretations which apply to sec. 20.40 (a)*)	20.40–1	11
Retention of existing ratings upon the issuance of a pilot certificate of a higher rating (*CAA policies which apply to sec. 20.40*)	20.40–2	11
Aircraft category rating	**20.40a**	11
Airplane class ratings	**20.40b**	11
Aircraft type ratings	**20.40c**	11
Aircraft types (*CAA policies which apply to sec. 20.40c*)	20.40c–1	11

	Paragraph	Page
Flight instructor rating	**20.41**	12
Demonstration of knowledge (*CAA policies which apply to sec. 20.41 (b)*)	20.41–1	12
Prerequisites for taking the written examination (*CAA policies which apply to sec. 20.41 (b)*)	20.41–2	12
Demonstration of skill—aircraft categories (*CAA policies which apply to sec. 20.41 (d)*)	20.41–3	12
Demonstration of skill—general (*CAA policies which apply to sec. 20.41 (d)*)	20.41–4	12
Practical examination—airplanes (CAA *policies which apply to sec. 20.41 (d)*)	29.41–5	13
Practical examination—gliders (*CAA policies which apply to sec. 20.41 (d)*)	20.41–6	13
Practical examination—helicopters (*CAA policies which apply to sec. 20.41 (d)*)	20.41–7	14
Additional flight instructor privileges (*CAA policies which apply to sec. 20.41*)	20.41–8	14
Instrument rating	**20.42**	14
Demonstration of aeronautical knowledge (*CAA policies which apply to sec. 20.42 (a)*)	20.42–1	15
Prerequisites for taking the instrument written examination (*CAA policies which apply to sec. 20.42 (a)*)	20.42–2	15
Qualifying instrument flight experience (*CAA interpretations which apply to sec. 20.42 (b) (2)*)	20.42–3	15
Demonstration of skill—general (*CAA policies which apply to sec. 20.42 (c) and (d)*)	20.42–4	15
Instrument flight tests for helicopter and glider pilots (*CAA policies which apply to sec. 20.42 (e)*)	20.42–5	16

CERTIFICATE RULES

Application	**20.50**	16
Where to obtain applications (*CAA policies which apply to sec. 20.50*)	20.50–1	16
Application to change a name on a pilot certificate (*CAA policies which apply to sec. 20.50*)	20.50–2	16
Application to replace a lost or destroyed pilot or medical certificate (*CAA policies which apply to sec. 20.50*)	20.50–3	16
Application for a pilot certificate with lower rating (*CAA policies which apply to sec. 20.50*)	20.50–4	16–1
Duration	**20.51**	16–1
Reissuance of certificates held by aliens (*CAA policies which apply to sec. 20.51 (c)*)	20.51–1	16–2
Cancellation of pilot certificates (*CAA policies which apply to sec. 20.51 (b)*)	20.51–2	16–2
Voluntary surrender of certificate or rating (*CAA policies which apply to sec. 20.51 (b)*)	20.51–3	16–2
Temporary certificates	**20.52**	16–2
Issuance of temporary pilot certificates (*CAA policies which apply to sec. 20.52*)	20.52–1	16–2
Exchange of certificates	**20.54**	16–2
Validity dates of expired certificates (*CAA interpretations which apply to sec. 20.54 (b)*)	20.54–1	16–2
Reissuance of certificates (*CAA policies which apply to sec. 20.54 (b)*)	20.54–2	16–2
Military competence	**20.55**	16–3
Demonstration of aeronautical knowledge—private or commercial pilot (*CAA policies which apply to sec. 20.55*)	20.55–1	17
Evidence of membership or civilian employment and of flight status—private or commercial pilot (*CAA policies which apply to sec. 20.55*)	20.55–2	17
Evidence of discharge or release—private pilot or commercial (*CAA policies which apply to sec. 20.55*)	20.55–3	18
Requirements for aircraft category, class, and type ratings (*CAA policies which apply to sec. 20.55 (c)*)	20.55–4	18
Requirements for instrument rating (*CAA policies which apply to sec. 20.55 (d)*)	20.55–5	18
Change of address	**20.56**	18

	Paragraph	Page
Termination of certificates	**20.57**	18
Identification	**20.58**	18
Airman identification card (*CAA rules which apply to sec. 20.58*)	20.58–1	18
Other identification cards acceptable to the Administrator (*CAA rules which apply to sec. 20.58*)	20.58–2	18
Application (*CAA rules which apply to sec. 20.58*)	20.58–3	19
Scheduled air carrier airmen (*CAA interpretations which apply to sec. 20.58*)	20.58–4	20
Other chairman certificate (*CAA interpretations which apply to sec 20.58*)	20.58–5	20

Examinations and Tests

General	**20.60**	20
Who conducts examinations and tests (*CAA policies which apply to sec. 20.60*)	20.60–1	20
Who accompanies applicant on flight test (*CAA policies which apply to sec. 20.60*)	20.60–2	20
Period of acceptance for reports of successful completion of examinations and tests (*CAA policies which apply to sec. 20.60*)	20.60–3	20
Replacement of written examination report (*CAA policies which apply to sec. 20.60*)	20.60–4	21
Physical examination	**20.61**	21
Physical prerequisites for flight tests (*CAA policies which apply to sec. 20.61*)	20.61–1	21
Aircraft used in flight tests	**20.62**	21
Certificated aircraft usable for flight tests (*CAA interpretations which apply to sec. 20.62* (a))	20.62–1	21
Airplanes usable for instrument rating flight tests (*CAA interpretations which apply to sec. 20.62* (a))	20.62–2	21
Time and place	**20.63**	22
Time and place of examinations (*CAA policies which apply to sec. 20.63*)	20.63–1	22
Reapplication after failure	**20.64**	22
Individuals authorized to give instruction for reexamination (*CAA policies which apply to sec. 20.64* (a) *and* (c))	20.64–1	22

Appendices

Appendix A. Pilot flight tests	23
Appendix B. Aircraft type ratings	47

20.12–1 *Demonstration of aeronautical knowledge (CAA policies which apply to sec. 20.12).* The applicant for a limited pilot certificate will be given a short examination on the United States air traffic rules. This examination may be written or oral, at the discretion of the agent accepting the application.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

20.12–2 *Evidence of meeting physical standards (CAA policies which apply to sec. 20.12).* The applicant for a limited pilot certificate should present evidence of currently meeting the physical requirements of his own country, or may present a current CAA medical certificate of a grade appropriate to the certificate applied for.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

20.12–3 *Eligibility for a limited private pilot certificate (CAA policies which apply to sec. 20.12).* An applicant who holds a pilot certificate or license issued by his own government which conveys noncommercial pilot privileges, and who meets the pilot experience requirements of section 20.25 may be issued a limited private pilot certificate.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

20.12–4 *Eligibility for a limited commercial pilot certificate (CAA policies which apply to sec. 20.12).* An applicant who holds a pilot certificate or license issued by his own government which conveys commercial pilot privileges, and who meets the pilot experience requirements of section 20.35 may be issued a limited commercial pilot certificate.

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20.12–5 *Aircraft and instrument ratings on limited pilot certificates (CAA policies which apply to sec. 20.12).* A limited pilot certificate will bear those aircraft ratings shown on the pilot certificate issued by the holders own government. In the event the foreign pilot certificate does not list aircraft ratings equivalent to those issued by the United States, the applicant may be issued ratings for those aircraft in which he has flown at least 10 hours as pilot-in-command during the preceding 12 months.

The holder of a limited pilot certificate may obtain an instrument rating by meeting the appropriate experience requirements and passing the prescribed examinations and tests.[1]

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20.12–6 *Language limitation (CAA policies which apply to sec. 20.12).* A limited pilot certificate issued to an applicant who is unable to speak and understand the English language will contain the following limitation, or the equivalent: NOT VALID FOR FLIGHTS REQUIRING THE USE OF ENGLISH FOR TRAFFIC INSTRUCTIONS.

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"20.13 *Computation of Flight Time.* Flight time shall be computed as follows:

"(a) *Powered Aircraft.* Flight time in powered aircraft shall be computed in hours and minutes.

"(b) *Glider.* Flight time had in a glider may be computed either in hours and minutes, or by number of flights. Ten short-patterned and released glider flights may be counted as 1 hour of flight time."

Private Pilot Rating

"20.20 *Age.*

"(a) *Powered Aircraft:* 17 years.

"(b) *Glider:* 16 years."

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

"20.22 *Education.* Applicant shall be able to read, write, speak, and understand the English language, or an appropriate operation limitation will be placed on the pilot certificate."

20.22–1 *Language limitation (CAA policies which apply to sec. 20.22).* A private pilot

[1] A Radio Operator's License is required by the Federal Communications Commission for the operation of a radio transmitter in an aircraft, as elsewhere. The possession of an FCC radio license is not a prerequisite for a CAA instrument rating, however, because the FCC allows radio transmission by an unlicensed person if a licensed operator is in the airplane. Foreign nationals are not eligible for FCC radio operator licenses.

certificate issued to a person who cannot read, write, speak, and understand the English language will bear the limitation NOT VALID FOR FLIGHTS REQUIRING THE USE OF ENGLISH FOR TRAFFIC INSTRUCTIONS.

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20.22–2 *Removal of limitation (CAA policies which apply to sec. 20.22).* The language limitation will be removed by an Aviation Safety Agent when the holder demonstrates that he can read, write, speak, and understand English.

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"20.23 *Physical Standards.*

"(a) *Powered Aircraft.* Applicant shall meet the physical standards of the third 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."

20.23–1 *Evidence of meeting physical standards (CAA policies which apply to sec. 20.23 (a)).* The Administrator or his representative will accept a first-, second-, or third-class medical certificate issued within 24 months preceding the date of application as evidence of the applicant's meeting the physical standards.

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20.23–2 *Color deficiency limitation (CAA policies which apply to sec. 20.23 (a)).* When an applicant holds a medical certificate bearing the notation DEFECTIVE COLOR VISION, the private 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 test authorized by the CAA Medical Division, W–265, Washington 25, D. C.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

20.23–3 *Glider pilot certification of physical condition (CAA policies which apply to sec. 20.23 (b)).* An applicant for a private glider pilot certificate should either present a medical certificate or certify on his application that he has no known physical defect which renders him incompetent to pilot a glider.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

[20.23–4 *Waivers for private pilot applicants who fail to meet physical standards (CAA policies which apply to sec. 20.23).* Applicants who do not meet the physical standards of Part 29 of this subchapter should apply to the Chief, Medical Division, Civil Aeronautics Administration, Washington 25, D. C., for a waiver of these standards as authorized under section 29.5 of the Civil Air Regulations. Waivers of physical standards are issued by the CAA on the basis of a study of the applicant's flight operation record, ability, judgment, and/or the results of a special medical flight test authorized under section 20.26 of this part.[1a] In order to take a medical flight test, the applicant must meet all experience requirements for a private pilot certificate and present written authorization from the CAA Medical Division for such a test.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.

"20.24 *Aeronautical knowledge.*

"(a) *Powered aircraft.* An applicant for a powered aircraft rating shall have passed within the preceding 24 months a written examination based on Parts 43, 60, and 62 of the Civil Air Regulations and on practical aspects of cross-country flight planning, weather recognition, pilotage, dead reckoning, and general safety practices in the operation of aircraft.

[1a A pilot certificate issued on the basis of a special medical flight test will bear special aircraft, equipment, or operating limitations appropriate to the deficiency involved; or the notation ISSUED ON THE BASIS OF SPECIAL MEDICAL TEST to indicate that no limitation was found necessary.]

"(b) *Glider.* An applicant for a glider rating shall demonstrate a knowledge of such portions of Parts 43, 60, and 62 as are pertinent to glider operations and of aeronautical charts, meteorology in relation to glider flights, navigation and other instruments used in the operation of gliders, theory of flight, and glider operating limitations."

20.24–1 *Demonstration of aeronautical knowledge (CAA policies which apply to sec. 20.24).* Applicants will be required to answer correctly, within 1 hour, 45 of the 50 questions on the examination provided by the Administrator appropriate to the category of aircraft for which rating is sought.[2]

The applicant's student pilot certificate will be endorsed by an Aviation Safety Agent to show the results obtained on the examination.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

[2] Complete information on the coverage of the private pilot written examination is found in the CAA booklet *Questions and Answers for Private Pilots*, for sale at most airports, and at the U. S. Government Printing Office, Washington, D. C. (25c).

"20.25 *Aeronautical experience.*

"(a) *Powered aircraft.* Each applicant for a powered aircraft rating, whether he has obtained his flight experience in spinnable, nonspinnable, two-control, or three-control aircraft, shall have not less than 25 hours of solo flight time and 15 hours of dual instruction time given by a rated flight instructor: *Provided,* That if the applicant holds a private or commercial pilot certificate with a glider rating, he may receive credit for not more than 10 hours of the required solo flight time for equal flight time obtained in gliders. Each applicant shall in addition meet the requirements of subparagraphs (1) through (3).

"(1) At least 10 hours of the required solo flight time shall be cross-country flight time. Each solo cross-country flight shall include a landing at a point more than 25 miles from the point of departure, and at least one flight shall include a landing at a point more than 100 miles from the point of departure.

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).

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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

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.

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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.

(Published in 19 F. R. April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. April 23, 1954, effective June 1, 1954.)

[20.33–4 *Waivers for commercial pilot applicants who fail to meet physical standards (CAA policies which apply to sec. 20.33(a)).* Applicants who do not meet the physical standards of Part 29 of this subchapter should apply to the Chief, Medical Division, Civil Aeronautics Administration, Washington 25, D. C., for a waiver of these standards as authorized under section 29.5 of the Civil Air Regulations. Waivers of physical standards are issued by the CAA on the basis of a study of the applicant's flight operation record, ability, judgment, and/or the results of a special medical flight test authorized under section 20.26 of this part.[4a] In order to take a medical flight test, the applicant must meet all experience requirements for a commercial pilot certificate and present written authorization from the CAA Medical Division for such a test.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"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.

[4a A pilot certificate issued on the basis of a special medical flight test will bear special aircraft, equipment, or operating limitations appropriate to the deficiency involved; or the notation ISSUED ON THE BASIS OF SPECIAL MEDICAL TEST to indicate that no limitation was found necessary.]

"(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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 19 F. R. 7719, November 30, 1954, effective November 30, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 19 F. R. 7719, November 30, 1954, effective November 30, 1954.)

"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.

PHASE I—*Basic techniques*
Preflight check and oral equipment examination.
Auto, auto pulley, or winch tow.
Airplane tow.
360° approaches, right and left.
Accuracy landings.
PHASE II—*Special and critical maneuvers*
Spirals.
Stalls and slow flight (may be demonstrated in an airplane).

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Aircraft, Flight Instructor, and Instrument Rating

"20.40 *Aircraft rating competence.*

"(a) An applicant for any additional aircraft rating subsequent to the original issuance of a pilot certificate shall demonstrate competency in aircraft of the category and class and, if the aircraft has a maximum certificated takeoff weight of over 12,500 pounds, of the type for which the rating is sought.

"(b) A private pilot limited by his rating to nonspinnable airplanes may have this limitation removed by making application to the Administrator and by showing that he meets the experience requirements of section 20.25. In this case the dual cross-country instruction required need not have been received before any solo cross-country flight.

"(c) A pilot limited by his rating to gliders, when applying for a pilot rating in powered aircraft, shall meet the aeronautical knowledge, experience, and skill requirements appropriate to the pilot rating sought."

20.40–1 *Demonstration of competency for additional aircraft ratings (CAA interpretations which apply to sec. 20.40 (a)).* The applicant for an additional aircraft rating will be required to establish his competency by demonstrating enough of the maneuvers and procedures appropriate to his basic pilot certificate to prove his proficiency in all operations not covered by ratings he already holds. These maneuvers and procedures must be performed with the degree of competency specified for the issuance of the basic certificate he holds.

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[20.40–2 *Retention of existing ratings upon the issuance of a pilot certificate of a higher rating (CAA policies which apply to sec. 20.40).*

[(a) *Private pilot.* The holder of a private pilot certificate may retain without further flight test all of his valid airplane class ratings, and his flight instructor, or instrument rating on a commercial pilot certificate for which he qualifies, regardless of the airplane used for the commercial flight test. He may retain aircraft category and type ratings without a flight test with only private pilot privileges.

[(b) *Commercial pilot.* The holder of a commercial pilot certificate who qualifies for an airline transport pilot certificate may retain all of the aircraft, flight instructor, and instrument ratings entered upon his commercial pilot certificate without further tests. However, when such ratings are endorsed upon his airline transport pilot certificate, he may exercise only the privileges of a commercial pilot in respect to these ratings.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"20.40a *Aircraft category rating.*The following aircraft category ratings are issued:

"(a) Airplane.
"(b) Glider.
"(c) Autogiro.
"(d) Helicopter."

"20.40b *Airplane class ratings.* The following airplane class ratings are issued:

"(a) Single-engine land.
"(b) Single-engine sea.
"(c) Multiengine land.
"(d) Multiengine sea."

"20.40c *Aircraft type ratings.* An aircraft type rating shall be issued for each type of aircraft having a maximum certificated takeoff weight of over 12,500 lbs."

20.40c–1 *Aircraft types (CAA policies which apply to sec. 20.40c).* Aircraft type ratings will be issued for only those aircraft of which

at least one has been certificated for civil use.[5] Ratings may be issued on prototype and experimental aircraft bearing United States civil registration and experimental or restricted category airworthiness certificates.

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"20.41 *Flight instructor rating.* A flight instructor rating may be issued to an applicant who meets the following requirements:

"(a) *Age.* 18 years.

"(b) *Knowledge.* An applicant shall pass a theoretical and practical examination on his competency to instruct students in flight.

"(c) *Experience.* An applicant shall be a commercial pilot or a private pilot who has met the experience requirements for the issuance of a pilot certificate with a commercial pilot rating.

"(d) *Skill.* An applicant shall demonstrate in each category of aircraft in which he desires to give flight instruction his ability to perform with precision and to teach such flight maneuvers as are necessary and appropriate for instruction in the safe piloting of that category of aircraft."

20.41–1 *Demonstration of knowledge (CAA policies which apply to sec. 20.41 (b).* The applicant for a flight instructor rating will be required to pass, before any practical examination is given, a written examination furnished by the Administrator which consists of two sections relating to (a) the fundamentals of flight instruction, and (b) the performance and analysis of flight maneuvers appropriate to the category of aircraft for which he desires a flight instructor rating. The examination must be completed within 4 hours at one sitting. To pass, the applicant must obtain a grade of 70 percent on each section.

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20.41–2 *Prerequisites for taking the written examination (CAA policies which apply to sec. 20.41 (b).* The flight instructor written examtion will be given to any person who meets the experience requirements of section 20.41 (c).

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20.41–3 *Demonstration of skill—aircraft categories (CAA policies which apply to sec. 20.41 (d)).* Each certificate issued with a flight instructor rating will bear a notation showing the category of aircraft in which the holder has demonstrated his competence to give flight instruction. The flight instructor caregories issued are:

Flight Instructor—Airplane.
Flight Instructor—Glider.
Flight Instructor—Helicopter.

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20.41–4 *Demonstration of skill—general (CAA policies which apply to sec. 20.41 (d)).* The applicant for a flight instructor rating will be required to pass a practical examination which includes a flight demonstration of all common flight training maneuvers, and a demonstration of the ability to give clear, accurate, and effective flight instruction. The practical examination will be conducted by Aviation Safety Agents only.

The practical examination will be conducted in two phases, Performance of Flight Training Maneuvers and Flight Instruction Methods. The failure of any portion of a phase will constitute the failure of that phase and of the practical examination. An applicant who has failed the practical examination for a flight instructor rating will be required to repeat the complete test upon reexamination. However, if the reexamination is given by the agent who previously tested and disapproved the applicant, he may, at his own discretion, require only the phase of the test which was previously found unsatisfactory.

The CAA Flight Instruction Manual—Technical Manual No. 100—will be used as the basis for evaluating the applicant's knowledge of flight maneuvers and the instruction methods used. The manual may also be used for an open book test in which the applicant will locate and discuss for the agent the material on any principle or maneuver.

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[5] A current list of such large aircraft is found in appendix B of this manual.

20.41–5 *Practical examination—airplanes (CAA policies which apply to sec. 20.41 (d)).*

PHASE I—*Performance of flight training maneuvers*

The applicant will be required to demonstrate his ability to perform correctly the standard flight training maneuvers and procedures as they would be shown to primary flight students.

On flight tests in airplanes, these maneuvers and procedures include, but are not limited to: [6]

Preflight check and oral equipment examination.
Taxiing or sailing and docking.
Runup.
Normal takeoffs and accuracy landings.
Crosswind takeoffs and landings.
Flight at normal speeds—straight and level, turns, climbs, and glides.
Flight at minimum controllable speed—straight and level, turns, climbs, and glides.
Stalls, with and without power.
Spins (two turns each way).
Spirals (three turns each way).
720° power turns.
Pylon eights.
Airport traffic pattern.
Traffic control procedures.
Simulated emergencies—short and soft field takeoffs; slips; landing to a spot using power, flaps, and slips as desired; and simulated forced landings.
Cross-country flight planning.

PHASE II—*Flight instruction methods*

The applicant will be required to demonstrate his knowledge of and skill in applying effective instruction methods. This demonstration will include the following:

(a) *Knowledge of effective instruction methods.* To demonstrate his knowledge of effective in-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 principals 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.

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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.)

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

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.

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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.
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.

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[20.41–8 *Additional flight instructor privileges (CAA policies which apply to sec. 20.41).* The holder of a flight instructor rating who wishes to qualify under section 43.64 (d) of this subchapter to give dual instruction in a category of aircraft in which he has not demonstrated his instructional competence, will be required to pass Section Two of the flight instructor written examination (see sec. 20.41–1 (b) of this part) and the practical test pertinent to the category of aircraft in which he wishes to instruct.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"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 condi-

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

tions, 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 Parts 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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 19 F. R. 7719, November 30, 1954, effective November 30, 1954.)

[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 (a) that he meets the experience requirements of section 20.42 (b) (1) of this part, and in addition has at least 30 hours of instrument time under actual or simulated instrument flight conditions; or (b) if enrolled in an instrument flight course in a certificated instrument flying school, the written recommendation of the chief flight instructor of that school.]

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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.

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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 fail-

ure 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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

[20.50–2 *Application to change a name on a pilot certificate (CAA policies which apply to Sec. 20.50).* Application to change a name on a pilot certificate should be made on Form ACA–342, and submitted to an Aviation Safety Agent. The application should be accompanied by the applicant's current pilot certificate and the marriage license, court order, or other document verifying the name change. These documents will be returned to the applicant after examination by the agent.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

[20.50–3 *Application to replace a lost or destroyed pilot or medical certificate (CAA policies which apply to Sec. 20.50).*

[(a) *Pilot certificate.* Application to replace a lost or destroyed pilot certificate should be made in a letter addressed to the Chief, Airman Records Branch, W–253, Civil Aeronautics Administration, Washington 25, D. C. The letter should contain the following: (1) a brief statement of the circumstances surrounding the loss or destruction of the certificate; (2) all available information regarding the certificate, such as grade, number, exact name in which it was issued, ratings, and date of issuance; and (3) be accompanied by a check or money order for $2.00, payable to the Civil Aeronautics Administration, Department of Commerce.

[(b) *Medical certificate.* Application to re-

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

place a lost or destroyed medical certificate should be made in the form of a letter addressed to the Chief, Medical Division, W–265, Civil Aeronautics Administration, Washington 25, D. C., and accompanied by a check or money order for $2.00, payable to the Civil Aeronautics Administration, Department of Commerce.

[(c) *Telegraphic evidence of lost pilot or medical certificate.* The person to whom a pilot or medical certificate was issued may, upon loss of that certificate, obtain from the CAA an official telegram confirming its issuance. This telegram may be carried in pilot's personal possession as a pilot certificate, medical certificate, or both pending the receipt of duplicate certificates issued in accordance with paragraphs (a) and (b) of this section, *Provided*, That he has not been notified of the suspension or revocation of the certificate concerned.

[The request for such a telegram may be made by prepaid telegram stating the date on which a duplicate certificate or certificates were requested, or including the request for such duplicate(s) and a money order for the necessary fee or fees.

[A request for a telegram for temporary use in lieu of a lost pilot or medical certificate should be addressed to the appropriate division shown in paragraph (a) or (b) of this section. A request for a telegram for temporary use in lieu of both pilot and medical certificates should be addressed to the Chief, Airman Records Branch, W–253, Civil Aeronautics Administration, Washington 25, D. C.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

[20.50–4 *Application for a pilot certificate with lower rating (CAA policies which apply to sec. 20.50).*

[(a) *Permanent surrender.* A pilot may make application for a pilot certificate with a lower rating. The application should be made on Form ACA–355 and include the following statement or its equivalent: THIS REQUEST FOR A LOWER RATING IS MADE FOR MY OWN REASONS, WITH FULL KNOWLEDGE THAT SUCH RATING MAY NOT BE REISSUED TO ME UNLESS I AGAIN PASS THE EXAMINATIONS AND TESTS PRESCRIBED FOR ORIGINAL ISSUANCE. Form ACA–355 and the applicant's current certificate should be forwarded to the CAA regional office.

[(b) *Temporary surrender.* A pilot may make application for a pilot certificate with a lower rating with the privilege of having his current higher rating reinstated within 2 years if he, within this 2-year period, passes the appropriate medical examination for such higher rating. This application should be made on Form ACA–355 and include the following statement or its equivalent: THIS REQUEST FOR LOWER RATING IS MADE FOR MY OWN REASONS. I REQUEST THE PRIVILEGE OF HAVING MY HIGHER RATING REINSTATED WITHIN 2 YEARS WITHOUT BEING REQUIRED TO PASS THE EXAMINATIONS AND TESTS PRESCRIBED FOR ORIGINAL ISSUANCE, PROVIDING THAT, BEFORE THE EXPIRATION OF 2 YEARS, I PASS THE APPROPRIATE MEDICAL EXAMINATION PRESCRIBED FOR SUCH HIGHER RATING. The applicant should forward Form ACA–355 and his current pilot certificate to the CAA Aviation Safety District Office. The applicant should request from the agent a form which he can present as evidence of his having held the higher rating.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"20.51 *Duration.*

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

(Published in 19 F. R. 2385, April 23, 1945, effective June 1, 1954.)

[20.51-2 *Cancellation of pilot certificates (CAA policies which apply to sec. 20.51 (b)).* A pilot certificate revoked by the Civil Aeronautics Board will not be reissued or reinstated. To obtain another certificate, the pilot must requalify and complete all applicable examinations and tests.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

[20.51-3 *Voluntary surrender of certificate or rating (CAA policies which apply to sec. 20.51 (b)).* The holder of a pilot certificate who wishes to surrender the certificate or ratings thereon should forward the certificate with the request that it be accepted by the Administrator for surrender. The request should be addressed to the Chief, Airman Records Branch, W-253, Washington 25, D. C. Voluntary surrender of a certificate will not be accepted by the CAA for the purpose of avoiding civil penalty, revocation, suspension, or other sanction. When a certificate has been accepted for surrender, the pilot must requalify and pass all applicable examinations and tests if he wishes to obtain another pilot certificate.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"20.52 *Temporary certificates.* The Administrator or his authorized representative may issue a temporary student pilot certificate or a temporaty 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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

"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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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 Aviation

Safety District Office. 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.

(Published in 19 F. R. 2385, April 23, 1954, effective March 15, 1954.)

"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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 19 F. R. 2763, May 13, 1945).

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 19 F. R. 2763, May 13, 1954.)

20.60-4 *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 Fight Manual prohibits solo operation of the aircraft used.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

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 for commercial pilot

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

certificates or for any additional ratings] on or before May 31, 1954, and acceptable under policies existing on that date, will continue to be accepted until May 31, 1956.

(Published in 19 F. R. 7719, November 30, 1954, effective November 30, 1954; amended in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

[20.60–4 *Replacement of written examination report (CAA policies which apply to sec. 20.60).* Duplicates of lost Forms ACA–578A, Report of Written Examination, may be obtained from the Airman Records Branch, W–253, Civil Aeronautics Administration, Washington 25, D. C., for a fee of $1.00 each. Such requests should be accompanied by a check or money order made payable to the Civil Aeronautics Administration.]

(Published in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

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

(b) *Original private and commercial flight tests, and flight instructor tests—gliders.* The applicant should certify that he has no known physical defect which would render him incompetent to pilot gliders, or present a CAA medical certificate of any class.

(c) *Instrument, flight instructor, and additional aircraft ratings—powered aircraft.* The holder of a private or commercial pilot certificate who applies for an additional rating will be required to hold a medical certificate appropriate to his basic certificate and which has been issued within the time limits specified in section 43.41 of this subchapter.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954; amended in 20 F. R. 888, February 9, 1956, effective March 15, 1956.)

"20.62 *Aircraft used in flight tests.*

"(a) *Powered aircraft.* Applicant shall furnish a certificated aircraft which must be equipped with complete dual controls and accommodate the applicant and examiner and parachutes for both. In addition, aircraft used for instrument flight tests shall be equipped as specified in section 43.30 (c).

"(b) *Glider.* Applicant shall furnish a certificated glider."

20.62–1 *Certificated aircraft usable for flight tests (CAA interpretations which apply to sec. 20.62 (a)).* An aircraft which contains a current United States airworthiness certificate may be used for a flight test, provided it is in airworthy condition; the certificate contains no limitations excluding pilot flight tests; its operating limitations permit the carriage of the applicant, the examiner, and all necessary equipment and fuel; and its equipment and instruments are all in good working condition.

A foreign registered aircraft having a valid airworthiness certificate issued by the proper authorities of the country in which the aircraft is registered may be used for pilot flight tests at the discretion of the agent or examiner. When required, the applicant for the flight test shall obtain an appropriate certificate or other authorization from the foreign government involved authorizing the agent or examiner to act in such capacity aboard the foreign aircraft.

Military aircraft on operational status may also be used at the discretion of the agent or examiner, provided permission from the appropriate military authority is obtained.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

20.62–2 *Airplanes usable for instrument rating flight tests (CAA interpretations which apply to sec. 20.62 (a)).* An airplane used for an instrument flight test must be equipped, in addition to the equipment required for instrument flight by section 43.30 (c), with a hood, or other device which limits the pilot's range of vision to the cockpit for simulating

instrument flight conditions. This installation must exclude all outside visual reference for the pilot, yet not restrict the vision of the safety pilot, agent, or examiner. Sufficient visibility for the safety pilot is required to permit clearance for turns in either direction. When incomplete visibility to the left is afforded, in side-by-side seating airplanes, a safety observer must be provided to maintain a watch to the left. This observer must be in uninterrupted contact with the safety pilot.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

"20.63 *Time and place.* All examinations and tests will be held at such times and places as the Administrator may designate."

20.63–1 *Time and place of examinations (CAA policies which apply to sec. 20.63).* Each CAA region publishes an itinerary schedule monthly or quarterly showing when and where its Aviation Safety Agents will be available for written and practical examinations. These itinerary schedules are posted at all active airports and at Aviation Safety District Offices.

Appointments for examinations by designated examiners should be arranged directly with the examiners concerned.

(Published in 19 F. R. 2385, April 23, 1954, effective June 1, 1954.)

"20.64 *Reapplication after failure.* Applicants who have failed in any examination will be subject to the following rules in making application for reexamination:

"(a) An applicant for a pilot certificate with a powered aircraft rating or for an additional rating who fails to pass any prescribed theoretical examination may reapply after the expiration of 30 days from the date of such failure or after he has received not less than 5 hours of instruction from a certificated ground instructor in each subject failed.

"(b) An applicant who has failed to pass any prescribed practical examination or test on powered aircraft may reapply only after an appropriately rated flight instructor has checked his competency and certified in the applicant's logbook that he considers such applicant qualified for the certificate or rating sought, or after the expiration of 30 days from the date of such failure.

"(c) An applicant for a glider rating who has failed to pass any prescribed theoretical examination may reapply at any time after the expiration of 30 days or after he has received not less than 5 hours of instruction on each subject failed from a certificated ground instructor.

"(d) An applicant for a glider rating who has failed to pass any prescribed practical examination or test may reapply only after he has made at least 20 additional gliding flights."

20.64–1 *Individuals authorized to give instruction for reexamination (CAA policies which apply to sec. 20.64 (a) and (c)).* An applicant who has failed a subject of the prescribed theoretical examination may be reexamined after 5 hours of instruction on such subject from an individual holding a ground instructor certificate or a flight instructor rating with a rating for the particular subject.

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Appendix A

Pilot Flight Test Procedures and Standards

This appendix contains the maneuvers, procedures, standards, and preparative guide helps with which an applicant is concerned when seeking a private or commercial pilot certificate. It includes similar material relating to an instrument rating and to additional aircraft ratings. Relative portions of the private and commercial pilot material are also applicable to the Phase I maneuvers required of an applicant for a flight instructor rating. The composition of the information herein is as follows:

Procedure	The way the maneuver or item will be carried out on the test.
Standard	The degree of skill or accuracy required for a passing performance.
Preparative guide	Factors and helps to the applicant in preparing himself for the flight test.

Private Pilot Flight Tests

General

Overall Test Requirement. The flight test standards and tolerances set forth herein are those that are expected in smooth air, and which can be attained on a repeated basis. Allowance will be made by the examiner for gusty air and other extenuating circumstances encountered during the actual flight test.

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:

JUDGMENT. Exercise of reasonable judgment will be demonstrated when the conduct of the flight maneuver results in (1) compliance with CAR 60, (2) flight within each operating limitation of the aircraft being used, (3) avoidance of critical situations which require corrective action by the agent or examiner to maintain continued safe operation, and (4) the observance of accepted good operating practices for flight conditions encountered.

COORDINATION. Exercise of reasonable coordination will be demonstrated when there are no unnecessary conspicuous slips or skids in the conduct of the flight maneuver.

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.

Modification and elimination of required maneuvers. Required maneuvers will be modified or eliminated only when their performance is prohibited by the Aircraft 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.

Waivers of physical standards. An applicant who holds a medical certificate which lists a specific structural defect or the limitation VALID FOR STUDENT PILOT PRIVILEGES ONLY, or both, may be issued a private pilot certificate only after he obtains a waiver of physical standards. Certificates issued on the basis of such waivers will bear appropriate operating limitations.

Waivers of physical standards will be issued on the basis of a study of the applicant's operation record, ability, and judgment; or on the results of a special medical flight test. Authorization for special medical flight tests will be issued to applicants who meet all experience requirements for a private pilot certificate upon written request made to the CAA Medical Division, W-265, Washington 25, D. C.

Private Pilot Flight Test—Airplanes

The private pilot flight test on airplanes will be given in two phases. The failure of any maneuver or procedure in either phase will constitute the failure of that phase, and of the whole test. In the event of such failure, the applicant for reexamination will be required to repeat the phase failed.

The phases of the private pilot flight test are: Phase I—Piloting Technique, and Phase II—Cross Country.

The maneuvers and procedures required of applicants in airplanes, under each phase, are as follows:

PHASE I—PILOTING TECHNIQUE

(1) Preflight check and oral equipment examination.
(2) Starting, warmup, and stopping.
(3) Taxiing, or sailing and docking.
(4) Runup.
(5) Flight at normal speeds: straight and level, medium turns, climbing and gliding turns.
(6) Flight at minimum controllable speeds; straight and level, medium turns, climbing and gliding turns.
(7) Stalls, with and without power.
(8) Turns about a point.
(9) Normal takeoffs and landings.
(10) Crosswind takeoffs and landings.
(11) Emergencies, Single engine airplanes—Short and soft field takeoffs, and power-off landings in single-engine airplanes.
(12) Emergencies, Multiengine airplanes—Engine out procedure in multiengine airplanes.

PHASE II—CROSS-COUNTRY

(1) Cross-country flight planning
(2) Cross-country flying.

The following paragraphs set forth the procedures for performing the required tests, standards and the tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Piloting Technique

(1) PREFLIGHT CHECK AND ORAL EQUIPMENT EXAMINATION

Procedure. This check is the physical inspection of the airplane to see that there is no visible evidence of unairworthiness, and that it is properly certificated and serviced for the flight proposed.

Standard. The applicant will be required to demonstrate his ability to make a complete check and to display an accurate knowledge of [preflight inspection procedure. He should know the significance of the airworthiness category and operating limitations of the airplane used.]

Preparative guide. Check the outside and inside of the airplane. Check for presence of all required equipment and documents. Check the fuel and oil supply by accepted methods. Use the prescribed (by the manufacturer or CAA TM-100) preflight inspection procedure.

(2) STARTING, WARMUP, AND STOPPING

Procedure. The applicant will use the starting, warmup, and stopping procedures recommended in the Airplane Flight Manual or by [the airplane manufacturer.]

Standard. The applicant will be expected to take precautions to prevent fire, propeller blast damage, and hazards to personnel; and will demonstrate precautions to be taken for starting when no competent assistance is available.

(3) TAXIING, OR SAILING AND DOCKING

Procedure. The applicant will be required to demonstrate the operation of his airplane on the surface between the loading ramp and the takeoff position. Seaplane applicants will also demonstrate taxiing at slow speeds and on the step, sailing, and turns to downwind headings.

Standard. The applicant must maintain control, maintain visual contact with his taxi path, avoid obstructions, and comply with local taxi rules and control tower instructions.

Preparative guide. The applicant should use safe taxi speeds, care in watching for obstructions and other traffic, and make efficient use of flight and engine controls and brakes.

Seaplane applicants should be able to demonstrate considerations necessary in taxiing under typical conditions of wind, current, and rough water experienced in normal seaplane operations. The use of the water rudder is important.

(4) RUNUP

Procedure. The applicant will be required

to conduct a runup check in accordance with the recommended procedure. It will include the runup of the engine(s), the check of ignition, engine accessories, propeller operation, engine smoothness and power output; the check of the flight controls for freedom of movement; and the use of the checklist when provided.

Standard. The runup must be complete and conducted so as to avoid hazard to persons and property, and detrimental effect to the engine.

Preparative guide. The applicant should use a planned procedure in executing his runup, preferably that recommended by the Airplane Flight Manual or [airplane manufacturer.]

(5) FLIGHT AT NORMAL SPEEDS

Procedure. Normal basic flight maneuvers will be demonstrated at the airspeeds appropriate to the airplane used. These maneuvers include: straight and level flight, 10°–30° bank climbing turns, 10°–30° bank gliding turns, and 10°30° bank turns in level flight. These may be combined with the other required maneuvers.

Standard. The standards for these maneuvers are as follows:

Straight and level flight (2 minutes):

[Altitude—±200 feet.]

[Heading—±10°.]

Airplane must not be held in slipping flight.

Turns in level flight (through 360°):

Airspeed—within 10 m. p. h.

Bank—within 10°

Power setting—cruising power or slightly above.

[(6) FLIGHT AT APPROACH AND CLIMB-OUT SPEEDS

[*Procedure.* The applicant will perform the maneuvers required by (5) at speeds appropriate to landing approaches and climb-out after takeoff.

[*Standard.*

Straight and level flight:

Altitude—±100 feet.

Airspeed—±5 m. p. h.

Power setting—as required to maintain level flight.

Configuration—initial approach.

Climbing turns:

Airspeed—±5 m. p. h.

Bank—±10°.

Power setting—as recommended for climb.

Configuration—takeoff and climb.

Gliding turns:

Airspeed—±5 m. p. h.

Bank—±10°.

Power setting—idling.

Configuration—landing approach.

[*Preparative guide.* The applicant's performance should show an appreciation of the difference in relative effectiveness of the flight controls as compared with normal flight speeds.

[Coordination, airspeed, and positive flight and power control usage are important factors. Violent control usage which tends to slow the airspeed unnecessarily should be avoided.]

[(7) STALLS, WITH AND WITHOUT POWER

[*Procedure.* Stalls and stall recoveries will be required from straight climbing and gliding flight, and from the three conditions of flight from which stalls have been found most critical. These conditions are: takeoff and departure, landing approach, and accelerated maneuvering at reduced speeds.

Takeoff and departure stalls will be simulated from 10° to 30° banked climbing turns in takeoff configuration. The climb will be entered at approximately takeoff speed with full climb power, and gradually steepened with the bank constant until a stall occurs.

Approach to landing stalls will be simulated from 10° to 30° banked gliding turns entered at normal approach speeds with the engine throttled and the airplane in landing configuration. As the turn continues, the gliding attitude should be flattened until a stall occurs.

Accelerated maneuver stalls will be performed from 30° to 45° banked gliding turns in approach and in cruise configurations, and from at least 45° banked turns in level flight. Accelerated stalls from glides will be performed with the engine throttled, except in airplanes without sufficient up elevator effect to produce a stall in a gliding turn, in which only sufficient power to produce the necessary elevator effectiveness may be used. In level flight turns, only sufficient power to hold altitude will be used. In both of these flight

conditions, the angle of attack will be increased smoothly and rapidly until a stall occurs at slightly (5 to 10 m. p. h.) above the normal unaccelerated stalling speed.]

[NOTE: *Accelerated stalls shall not be performed at speeds more than 15 m. p. h. above the unaccelerated stalling speed because of the extremely high structural loads imposed on the wing and tail surfaces, particularly in gusty air.*

Recovery from all stalls will be completed to straight flight with the wings level, and with the least loss of altitude consistent with the prompt recovery of full control effectiveness.

[*Standard.*

Stall recognition:

Prompt and accurate, without use of stall warning device.

Recovery:

To straight flight, using coordinated control action as necessary, (1) immediately upon stall recognition and (2) after a full stall develops and the nose falls below the horizon.

Airspeed:

Not to exceed cruising speed at any time.

[*Preparative guide.* The applicant's performance should show that he appreciates the fact that the angle of attack (of the airflow with the chord of the wing), and not the airspeed, is the prime factor in stalls. This is demonstrated in accelerated stalls. The prompt correct use of the elevators is of primary importance in reducing the angle of attack. In accelerated stalls from turns, the immediate relaxation of, or complete recovery from the turn is the most effective and rapid means of decreasing the angle of attack. The prompt smooth application of power hastens the recovery from stalls, and reduces the loss of altitude which results. The ability to recover from stalls without power is also important for use in emergencies, and to sharpen the realization that stalls are not the result of reduced power alone. The use of the flight controls in stall recoveries should be prompt, positive, coordinated, and smooth. The appearance of too much airspeed on recovery is evidence that too much altitude has been sacrificed, and that the applicant has not properly identified the stall and his recovery therefrom.]

(8) TURNS AROUND A POINT OR AREA

Procedure. Turns around a point or area will include at least two full turns in each direction about a point or small area selected by the examiner. The banked attitude at the steepest point of the turns should be at least 45° and the flight path should approximate a circle or oval about the point or area selected. Bank and power setting may be varied as necessary. The airplane should have its gear and flaps up, if retractable.

The point chosen may be any prominent point or area not within a congested area. The turns should be flown at an altitude of approximately 500 feet above the ground, building, or highest terrain feature. The examiner may ask questions about the area surrounding the point to divert the applicant's attention from the operation of the airplane.

Standard.

Altitude—5–700 feet above terrain or structure.

Flight control—No loss of airspeed or control which results in an indication of an impending stall.

Preparative guide. The applicant should be able to maintain his track and altitude without slipping or skidding while his attention is diverted to objects on the ground. It is intended that the turns are to be made to enable the pilot to closely observe the designated point as they would have to be made if one were taking a close look at a house or other ground object of special interest.

(9) NORMAL TAKEOFFS AND LANDINGS

Procedure. The applicant will be required to make at least two normal takeoffs and landings, using the established traffic procedures for the airport involved.

Approaches may be performed with a gradual reduction of power from the beginning of the approach to the point where the pilot feels sure of reaching the runway.

Landings will be appropriate to the airplane used. Landings with and without the use of flaps will be required in airplanes so equipped [unless prohibited by the Airplane Operating Limitations]. In airplanes equipped with tailwheels, the applicant will demonstrate at least

one wheel landing of a type suitable for gusty air. In airplanes equipped with nose wheels, the applicant will demonstrate at least one full stall landing of a type suitable for rough fields.]

Standard. The applicant will be required to comply with the established traffic pattern, fly a straight path over the airport when taking off and landing, maintain traffic pattern altitudes within 100 feet, and maintain the best angle of climb and recommended glide speeds within 5 m. p. h. Touchdown must be made within the designated portion of the runway (usually the first third) and in a normal landing attitude. [Slips, if used, must be entered and stopped smoothly, and controlled throughout.]

Preparative guide. Important factors are the applicant's takeoff preparations, his maintenance of ample clearance distances with other traffic, and compliance with tower instructions and traffic patterns. When there is no formal traffic control at the airport used the examiner will question the applicant on radio and light gun procedures used at controlled airports. Takeoffs and landings should be smooth, well within the performance capabilities of the airplane used, and give evidence of the applicant's mastery of the airplane being used.

(10) CROSSWIND TAKEOFFS AND LANDINGS

Procedure. At least one takeoff and landing subject to a crosswind component [of at least 10 m. p. h.]

NOTE: No additional demonstration will be required if the demonstrations of normal takeoffs and landings involve a crosswind which necessitates corrections for drift prior to landing and after takeoff.

Standard. The applicant must correct for drift on climb-outs and approaches, make landings and takeoffs without side loads on the landing gear and maintain directional control during takeoff and landing roll.

Preparative guide. The method used to correct for drift and to avoid landing gear side loads should show the application of a definite and planned technique.

(11) EMERGENCIES, SINGLE-ENGINE AIRPLANES

POWER-OFF APPROACHES AND LANDINGS

[*Procedure.* The applicant will be required to make at least one power-off approach and landing at an airport. The approach shall extend through at least 180° change of direction with the engine at a fast idle. In addition he will make at least one approach and landing at an airport if circumstances permit, or simulated landing approach elsewhere, from an altitude of at least 2,000 feet with the engine at a fast idle.]

Standard. A normal landing is required on a designated portion of the runway or landing area with sufficient margin to permit a controlled roll to a stop.

SHORT FIELD TAKEOFFS

Procedure. Short field takeoff procedures will be demonstrated (a firm surface is assumed) [by utilizing a start from extreme end of available takeoff area and attaining and maintaining the recommended best angle of climb airspeed and attitude as promptly as possible.

[*Standard.*

Airspeed—±5 m. p. h. of recommended best angle of climb speed.

Takeoff run—No loss of control and maximum [use] of available area.

[SOFT FIELD TAKEOFFS

[*Procedure.* Procedures for taking off from soft surfaces, such as deep grass or snow, will be required. The manufacturer's recommended flap setting for soft fields will be used, and a "running turn" into the takeoff run will be made if practicable. A high angle of attack will be maintained to lighten the load on the wheels to ease ground drag, and the airplane will be flown off the ground at minimum controllable speed, and held just off the ground until the best rate of climb speed is attained.

[*Standard.* Liftoff will be made at not in excess of the power-off stalling speed. Climb-out speed will be ±5 m. p. h., the recommended best rate of climb speed.

[HIGH TEMPERATURE/ALTITUDE TAKEOFFS

[*Procedure.* The applicant will be required to discuss the principles, procedures, and performance effects that are applicable to operations at altitudes of not less than 5,000 feet and in temperatures of not less than 90°.

[*Standard.* The applicant will be expected to determine correctly the effect of high altitude/

376345—56——3

temperature conditions through use of the Koch chart (on the back of sectional charts) or from other sources, such as the Airplane Flight Manual.]

(12) EMERGENCIES, MULTIENGINE AIRPLANES

[*Procedure.* All applicants for flight tests in multiengine airplanes will be required to demonstrate the operation of the airplane with one engine inoperative. Propeller feathering shall be demonstrated in all airplanes equipped with propellers which can be feathered and unfeathered in flight.

[To emphasize the effect of engine-out operation on the flight characteristics of the airplane, the following specific items will be required on all multiengine flight tests:

[1. Full stalls with engines throttled in airplanes weighing 12,500 pounds or less, and partial stalls in large airplanes.

[2. Engine-out minimum control speed. The applicant will be required to reduce the airspeed slowly with one engine at full takeoff power until the airplane stalls or flight control is definitely lost, whichever occurs first, and recover to level flight promptly with the minimum altitude loss.

[3. The application of the engine-out best rate of climb speed to produce the best climb or the slowest altitude loss.

[4. The effect on engine-out performance of carburetor heat, failure to feather a propeller, extension of gear or flaps, and various combinations of these.

[5. An approach and landing with one engine throttled to zero thrust. If feathering propellers are not installed, one engine should be idling.

[6. Emergency operation of retractable landing gear, flaps, fuel system, and essential accessories.

[*Standard.* The applicant will be required to determine and apply correctly the engine-out minimum control and best rate of climb airspeeds. He must apply the appropriate checklist accurately and promptly, trim the airplane accurately, and make the proper power settings when an engine failure is simulated. Airspeed variations shall be held to within 5 m. p. h. of the desired airspeeds, and headings to within 10° after engine-out flight is established. If level flight is possible, altitude shall be maintained within 100 feet of the desired altitude.

[*Preparative guide.* The applicant should know and respect the effectiveness of the engine-out minimum control and best rate of climb airspeeds. He should realize that the engine-out minimum control speed increases as engine power output increases and *vice versa:* reducing power in an emergency may effect a resumption of flight control, but a loss of altitude. He should note that full takeoff power is available from most engines only at sea level, so minimum control speed determinations and practice should be conducted as low as is safe to provide as near takeoff power as possible. He should know at which configurations of gear, flap, and propeller settings his airplane is capable of level flight with an engine out.]

Phase II—Cross-Country

(1) CROSS-COUNTRY FLIGHT PLANNING

Procedure. Before takeoff, the applicant will be required to plan a flight to a point designated by the examiner. The point chosen will be at a distance equivalent to at least two hours of flying in the airplane used.

Planning will consist of obtaining available weather information; plotting the course and establishing check points and distances; and estimating the time required, heading, and fuel requirements.

Standard. The flight plan will be correctly computed and course plotted on an aeronautical chart. The applicant must show familiarity with weather report facilities, with elementary navigation procedures, and with the cruising speed and fuel consumption of the airplane to be used.

Preparative guide. The applicant should be able to evaluate the weather data obtained and determine whether the proposed flight can be completed safely; he should be able to plot and measure his course; and be able to make

accurate estimates of the time and fuel required, based on the available information.

(2) CROSS-COUNTRY FLYING

Procedure. The applicant will be required to start the cross-country flight he has planned and to follow his planned course until he has established the compass heading necessary to stay on the track. He will identify at least three planned check points and compute his actual ground speed.

At an unannounced point on his course, the examiner will ask him to proceed to an alternate airport. (The examiner may ask the applicant to select a suitable alternate.) If practicable, the applicant will approach and land at an unfamiliar airport.

Standard. On his planned course, the applicant is to establish within 10 minutes his compass heading to hold within 10°, maintain a track within one mile of his plotted course, and fly within 200 feet of the selected cruising altitude. [A check on ETA for the planned destination on the basis of observed time over check points should be accurate within 10 minutes.]

On his flight toward an alternate, the applicant is to select a suitable alternate airport and establish a heading toward it, within 10 minutes, with a heading accuracy within 15°.

His approach to an unfamiliar airport is to be made in accordance with either the known traffic pattern, a standard left pattern, by reference to traffic directional markers, or control tower instructions when available.

Preparative guide. The applicant should have a familiarity with the elements of flying a compass course, and with the use of pilotage. He should be sufficiently at ease over strange terrain to observe landmarks and keep a watch for other aircraft. The use of a written flight log is recommended to note the time over check points and to compute ground speeds. The correlating of the aeronautical chart with the terrain traversed and the noting of compass headings only when in straight and stabilized flight are important considerations.

When requested to plot a course to a suitable alternate, the applicant should be able to use his chart and plotter with reasonable accuracy while maintaining straight and level flight. If he is required to select his own alternate, he should make his selection on the basis of all known factors, such as weather, size and facilities of the airport, distance, and terrain which must be traversed to reach it.

The approach to and landing on an unfamiliar airport should demonstrate observance of all considerations and safety practices which apply to flight where local procedures and traffic may not be known.

Private Pilot Flight Test—Gliders

The agent or examiner will accompany the applicant in a glider or an airplane during his demonstration of stalls and slow flight. Other items on the flight test may be observed from the ground, or from within a glider.

The flight test maneuver tolerances set forth below for determination of the competency of an applicant are those that are expected in smooth air and which can be attained on a repeated basis. Allowance will be made by the agent or examiner for gusty air or for other extenuating circumstances encountered during the actual flight test demonstration.

The private glider pilot flight test will be divided into 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.

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).

The following paragraphs set forth procedures for performing the tests, the standards and tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Techniques

(1) PREFLIGHT CHECK AND ORAL EQUIPMENT EXAMINATION

Procedure. The applicant will be required to perform a preflight check of the glider to be used, with special attention to the control system and the tow cable release. He will be ex-

pected to identify and present, if requested, the airworthiness and registration certificates and operation limitations placards.

Standard. The applicant must not overlook any apparent unairworthy condition.

Preparative guide. The preflight check should include a thorough check of the exterior and interior of the glider, noting all critical items. The operation of the controls and of the tow cable release should be checked by manual operation.

(2) AUTO, AUTO PULLEY, OR WINCH TOW; OR AIRPLANE TOW

Procedure. The applicant will be required to demonstrate his ability to make correct takeoffs when launched by auto, auto pulley, or winch tow; or by airplane tow.

Standard. The applicant will be expected to make a controlled takeoff, select an efficient angle of climb, and to release the tow line when the optimum altitude has been reached (in auto or winch tows). If an airplane tow is demonstrated, the applicant will be expected to stay clear of the airplane's slip stream, avoid any unnecessary maneuvering which would slow the airplane's takeoff, and at no time allow the tow line to slacken during flight.

Preparative guide. Takeoffs should be smooth, controlled, and give evidence of a knowledge of the flight characteristics of the glider used. The applicant should be familiar with and use appropriate hand signals.

(3) 360° APPROACHES, RIGHT AND LEFT

Procedure. 360° approaches, right and left, are to be demonstrated from a prescribed glider flight pattern around the landing area, or from a position directly over the landing spot.

Standard. The applicant should be able to follow the prescribed pattern at an airspeed within 10 m. p. h. of the stall speed (without spoilers). Spoilers and slips may be used in the normal manner on final approach only.

Preparative guide. The applicant should plan his approach so that the excessive use of slips or spoilers is unnecessary, should compensate for wind drift in the pattern, and should use no rough and abrupt control movements.

(4) ACCURACY LANDINGS

Procedure. Accuracy landings will be made in which normal landings are made within 200 feet beyond a designated line. Spoilers or slips may be used.

Standard. On accuracy landings the glider must touch down in a normal landing attitude. Spoilers or slips may be used. The applicant must comply with the prescribed glider flight pattern.

Preparative guide. The normal glider traffic pattern should be observed all through the performance of accuracy landings. Abnormal variations in speed, excessively steep turns, and violent slips should be avoided.

Phase II—Special and Critical Maneuvers

(1) STALLS AND SLOW FLIGHT

Procedure. Stalls and slow flight may be demonstrated in a glider or an airplane. Stalls will be demonstrated from both straight and turning flight attitudes. At least one stall should be an accelerated (high speed) stall, entered from a 30°–45° banked turn.

Standard. Recovery is to be completed within 100 feet and without exceeding approach operating speeds and load factors. Recovery will not be completed until straight gliding flight has been obtained.

Preparative guide. The applicant should recognize stalls promptly and take immediate coordinated corrective action. He should have an appreciation of the difference in glider control response and structural loads experienced at critically slow speeds in comparison to high speeds.

Private Pilot Flight Test—Rotorcraft

A private pilot practical examination on helicopters will be given by an Aviation Safety Agent or by a designated private or commercial pilot examiner. The examination will be given in two phases. The failure of any maneuver or procedure in either phase will constitute the failure of that phase and of the practical examination. In the event of such failure, the phase failed will be repeated on reexamination.

The flight test maneuver standards set forth below for determination of the competency of

an applicant are those that are expected in smooth air and which can be attained on a repeated basis. Allowance will be made by the agent or examiner for gusty air or for other extenuating circumstances encountered during the actual flight test demonstration.

PHASE I—BASIC TECHNIQUES

(1) Preflight inspection.
(2) Engine and rotor starting and stopping, and cockpit procedures.
(3) Taxiing.
(4) Normal takeoffs and landings.
(5) High altitude takeoffs and roll-on landings.
(6) Crosswind takeoffs and landings.
(7) Climbs and descents.
(8) Emergencies.

PHASE II—PRECISION MANEUVERS

(1) Hovering; upwind, downwind, and crosswind.
(2) Hovering turns.
(3) Pattern flying.
(4) Turns with medium banks.
(5) S-turns.

The following paragraphs set forth procedures for performing the required tests, the standards and tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Techniques

(1) PREFLIGHT INSPECTION.

Procedure. The applicant will be required to conduct a preflight check of the aircraft in accordance with the recommendation of the Aircraft Flight Manual, or the manufacturer's maintenance manual.

Standard. The applicant will be expected not to overlook any apparent unairworthy item or condition, and to display an accurate knowledge of the recommended preflight inspection procedure.

(2) ENGINE AND ROTOR STARTING AND STOPPING, AND COCKPIT PROCEDURE.

Procedure. The applicant will be required to start the engine, engage the rotor, and bring it up to operating speed. Rotor stopping and engine shutoff will also be accomplished.

Standard. The applicant will be required to demonstrate his ability to carry out the procedures correctly and completely, and to exercise safety precautions.

(3) TAXIING

Procedure. The applicant will be required to taxi over assigned courses if the rotorcraft used is equipped with wheels for that purpose.

Standard. The applicant will be expected to maintain control, avoid obstructions, and comply with local taxi rules and control tower instructions.

Preparative guide. The applicant should use safe efficient taxi speeds, care in watching for obstructions and other traffic, and make efficient use of the flight and engine controls.

(4) NORMAL TAKEOFFS AND LANDINGS

Procedure. For a normal takeoff demonstration, the rotocraft is to be lifted off, and forward speed increased to the recommended autorotational speed before any significant amount of altitude is gained. For demonstration of normal, hover-type landings, the rotorcraft is to be allowed to settle to the ground without excessive forward or lateral movement from a hovering position just clear of the ground.

Standard. The applicant will be required to make normal landings consistently within 20 feet of a mark, from a correctly flared approach following a 180° and a 360° change in direction, and to maintain correct approach speeds.

(5) HIGH ALTITUDE TAKEOFFS AND ROLL-ON LANDINGS

Procedure. The procedure used will simulate that necessary for making rolling takeoffs in high altitude (low air density) conditions. Under normal circumstances, these conditions will be simulated by allowing the applicant to use insufficient power to lift the aircraft until translational lift is obtained.

The applicant will also be expected to demonstrate roll-on landings, such as those which are necessary under conditions of low air density or reduced power output. These landings will be accomplished from shallow descents, with at least minimum autorotational speed, and descent slowed for touch down at 5 to 10 m. p. h., with a roll to a stop.

When an applicant furnishes a rotorcraft with skids or floats, these maneuvers may be deleted at the discretion of the examiner.

Standard. The applicant will be expected to hold a constant airspeed within 10 m. p. h., but in no case less than the minimum autorotative speed, and a heading within 10°; to flare in advance so as not to endanger the tail rotor; and to correct for drift on approach.

(6) CROSSWIND TAKEOFFS AND LANDINGS

Procedure. Crosswind takeoffs and landings from a hovering position are to be demonstrated with the wind from both right and left.

NOTE: This maneuver may be critical in some rotorcraft, so the Aircraft Flight Manual should be consulted in case of doubt about the amount of crosswind which can be safely controlled.

Standard. On takeoff, the applicant will be expected to hold his heading within 10° and his lateral movement within 10 feet. On landings, touchdown is to be made without drift.

Preparative guide. Liftoffs and touchdowns should be smooth, and should impose no abnormal or excessive loads on the landing gear.

(7) CLIMBS AND DESCENTS

Procedure. Climbs and descents of uniform rates with constant airspeeds are to be demonstrated both in straight flight and turns.

Standard. Power must be coordinated with the application of collective pitch so as to prevent noticeable variations in r. p. m., and the airspeeds in stabilized climbs or descents should be maintained within 10 m. p. h. The airspeed must in no case be allowed to become less than the minimum autorotative speed.

Preparative guide. Coordination of power with pitch should be smoothly applied. Transition to and from climbs and descents should be flared smoothly into level flight.

(8) EMERGENCIES

Power Plant Failures and Autorotative Approaches

Procedure. The examiner will throttle the engine at a speed near cruising and at the minimum autorotational speed. Autorotational approaches will be completed by the applicant, with the engine throttled, to predesignated areas through straight, 180°, and 360° patterns.

Standard. Recovery from autorotational approaches are to be initiated at sufficient altitude to insure that the tail boom does not strike the ground. A safe normal landing must be possible within the predesignated area.

Loss of Lift at Altitude

Procedure. The applicant will *either* demonstrate at a safe altitude *or* verbally describe, the procedures relating to the flight condition in which excessive vertical descent is encountered due to the rotor operating in the rotor vortices. If a demonstration is made, the rapid vertical descent condition is to be established at sufficient altitude to allow a minimum of 500 feet for recovery to level flight.

Standard. The applicant will be expected *either* to demonstrate his ability to cope with and overcome such a flight condition *or* to display a knowledge of the correct procedures to follow under such circumstances.

Preparative guide. For power plant failures, immediate action should be taken to enter autorotation, obtain and maintain recommended autorotational speed within 10 m. p. h., and execute a planned approach to the selected area.

In effecting a recovery from rapid descent due to rotor vortex effects, preference should be given to obtaining forward speed, rather than by the application of additional power. The latter sometimes aggravates the condition. A constant heading should be held throughout the maneuver.

Phase II—Precision Maneuvers

(1) HOVERING; UPWIND, DOWNWIND, CROSSWIND

Procedure. The applicant will be required to demonstrate hovering at an altitude of his own selection on headings specified by the examiner. The headings specified will include upwind, crosswind, and downwind.

The hovering altitude is to be selected by the applicant after his first takeoff and landing. Different altitudes may be selected for different maneuvers, but all hovering altitudes should be within the ground effect. Care should be taken to see that the limits of cyclic pitch control are not approached on crosswind and downwind headings, and that the rearward airspeed limit is not exceeded.

Standard. The applicant must maintain hovering altitude within 5 feet, and his posi-

tion within a 20-foot circle, and maintain a steady rotor speed.

(2) HOVERING TURNS

Procedure. At the discretion of the examiner, the applicant will be required to make 180° and 360° turns while hovering.

Standard. The applicant must maintain his position within a 20-foot circle, and his altitude within 5 feet.

(3) PATTERN FLYING

Procedure. Pattern flying will be accomplished at hovering altitude about a square or rectangle with sides approximately 25 yards in length. The heading is to be held constant, preferably directly into the wind.

Standard. The applicant must demonstrate his ability to follow the prescribed pattern within 20 feet, maintain a constant altitude within 5 feet, and a heading within 10°.

(4) TURNS WITH MEDIUM BANKS

Procedure. Turns are to be executed in cruising forward flight at an altitude in excess of 500 feet above the ground. The resulting bank is to be between 30° and 45°, and turns are to be made both to the right and left.

Standard. The applicant is to perform turns without yaw, recover on and hold predetermined headings, and hold a constant altitude and rotor r. p. m.

(5) S-TURNS

Procedure. The applicant will be expected, at an altitude, of 500 feet, to fly S-turns back and forth across any straight ground reference line, which is, as nearly as possible, 90° to the wind.

Standard. The applicant must hold altitude within 50 feet, airspeed within 10 m. p. h., correct for drift, maintain a constant rotor r. p. m., and make a symmetrical ground track pattern.

Commercial Pilot Flight Tests

General

Overall Test Requirements. The commercial pilot flight test may be taken before or after the written examination.

The flight test tolerances and standards set forth herein are those that are expected in smooth air, and which should be attained on a repeated basis. Allowance will be made by the examiner for gusty air and other extenuating circumstances encountered during the actual flight test.

Modification or elimination of required maneuvers. Required maneuvers will be modified or eliminated only if their performance is prohibited by the Aircraft Flight Manual or operating limitations. When this is the case, the commercial pilot certificate issued will be limited to that type of aircraft.

Special medical flight tests. Special medical flight tests authorized by the CAA Medical Division for applicants who do not meet the second-class medical requirements of PART 29 will include all of the commercial pilot required maneuvers, and, in addition, special maneuvers prescribed by the Medical Division to determine that the applicant can fly safely, notwithstanding his physical deficiency.

Certificates issued on the basis of such tests will bear appropriate operating limitations, or a notation showing that such a test has been satisfactorily accomplished.

Commercial Pilot Flight Test—Airplanes

The Commercial pilot flight test on airplanes will be given in two phases. The failure of any maneuver or procedure will constitute the failure of the phase of which the 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 commercial pilot flight test in airplanes are: Phase I—Basic Techniques, and Phase II—Precision Maneuvers.

The maneuvers and procedures under each phase are as follows:

PHASE I—BASIC TECHNIQUES

(1) Preflight check and oral equipment examination.
(2) Starting, taxiing, and runup.
(3) Normal takeoffs and accuracy landings.
(4) Crosswind takeoffs and landings.
(5) Airport traffic pattern.
(6) Climbs and glides.
(7) Slips.
(8) Emergencies.
[(9) Cross-country (if required).]

PHASE II—PRECISION MANEUVERS

(1) Spirals.
(2) Pylon eights.
(3) 720° power turns.
(4) Flight at minimum controllable speed.
(5) Stalls.

The following paragraphs set forth the procedures for performing the required tests, the standards and tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Techniques

(1) PREFLIGHT CHECK AND ORAL EQUIPMENT EXAMINATION

Procedure. The applicant will be required to conduct a preflight check of the airplane to determine that it is in airworthy condition, properly serviced, and ready for the flight proposed.

The preflight check will be accompanied or preceded by an oral examination on the equipment used, in order to demonstrate a knowledge of the airplane, engine, and equipment to be used, and their operation.

Standard. The applicant will be expected to recognize any apparent unairworthy item, make a complete check, and display a precise knowledge of the airplane and equipment to be used.

Preparative guide. All procedures and information should be based on the practical operation of the airplane, on the contents of the Airplane Flight Manual, or the manufacturer's recommended procedures.

(2) STARTING, TAXIING, AND RUNUP

Procedure. The applicant will be required to demonstrate starting procedures and techniques, taxiing techniques appropriate to the airplane, the runup of the engine(s) to check power output and smooth operation. A radio check, when applicable, and a flight control check for freedom of movement are to be included.

If a seaplane test is being taken, the demonstration will include sailing, taxiing slowly and on the step, and turns to downwind headings.

Procedures for starting the engine when no competent assistance is available will be required of applicants in single-engine airplanes.

Standard. Starting and runup procedures are to be conducted in accordance with the Airplane Flight Manual or the engine manufacturer's recommendations. Taxiing is to be accomplished with the correct use of power, flight controls, brakes, tail wheel lock, and in accordance with established taxi patterns or control-tower instructions.

Preparative guide. Use a checklist whenever available.

(3) NORMAL TAKEOFFS AND ACCURACY LANDINGS

Procedure. A series of three takeoffs will be required, in which the applicant attains the recommended best rate of climb speed before starting climb, and corrects for drift during takeoff and initial climb.

Three accuracy landings will be required which involve a 180° change in direction of approach. Power may be used only momentarily for clearing the engine. At least one of these accuracy landings is to be made in which a forward slip is used.

Standard. On the accuracy landings, touchdown must be made in a normal landing attitude within 200 feet beyond a point or line designated by the examiner. Violent slips or airspeeds below minimum controllable speeds will not be acceptable.

(4) CROSSWIND TAKEOFFS AND LANDINGS

[*Procedure.* At least one takeoff and landing subject to a crosswind component of at least 10 m. p. h. will be required.]

NOTE: No additional demonstration will be required if the demonstrations of normal takeoffs and landings involve a crosswind which necessitates corrections for drift prior to landing and after takeoff.

Standard. The applicant must correct for drift on climb-outs and approaches, make landings and takeoffs without side loads on the landing gear and maintain directional control during takeoff and landing roll.

Preparative guide. The method used to correct for drift and to avoid landing gear side loads should show the application of a definite and planned technique.

(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 ±5 m. p. h. and the bank of a steady turn ±10°.]

(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 ±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 crosswind landing.

(8) EMERGENCIES, SINGLE-ENGINE AIRPLANES

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 accomplished by the examiner. No simulated forced landing will be continued below 200 feet above the ground unless an immediate landing is practicable.]

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.

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.

[(9) EMERGENCIES, MULTIENGINE AIRPLANES

[*Procedure.* All applicants for flight tests in multiengine airplanes will be required to demonstrate the operation of the airplane with one engine inoperative. Propeller feathering shall be demonstrated in all airplanes equipped with propellers which can be feathered and unfeathered in flight.

[To emphasize the effect of engine-out operation on the flight characteristics of the airplane, the following specific items will be required on all multiengine flight tests:

[1. Full stalls with engines throttled in airplanes weighing 12,500 pounds or less, and partial stalls in large airplanes.

[2. Engine-out minimum control speed. The applicant will be required to reduce the airspeed slowly with one engine at full takeoff power until the airplane stalls or flight control is definitely lost, whichever occurs first, and recover to level flight promptly with the minimum altitude loss.

[3. The application of the engine-out best rate of climb speed to produce the best climb or the slowest altitude loss.

[4. The effect on engine-out performance of carburetor heat, failure to feather a propeller, extension of gear or flaps, and various combinations of these.

[5. An approach and landing with one engine throttled to zero thrust. If feathering propellers are not installed, one engine should be idling.

[6. Emergency operation of retractable landing gear, flaps, fuel system, and essential accessories.

[*Standard.* The applicant will be required to determine and apply correctly the engine-out minimum control and best rate of climb airspeeds. He must apply the appropriate checklist accurately and promptly, trim the airplane accurately, and make the proper power settings when an engine failure is simulated. Airspeed variations shall be held to within 5 m. p. h. of the desired airspeeds, and headings to within 10° after engine-out flight is established. If level flight is possible, altitude shall be maintained within 100 feet of the desired altitude.

[*Preparative guide.* The applicant should know and respect the effectiveness of the engine-out minimum control and best rate of climb airspeeds. He should realize that the engine-out minimum control speed increases as engine power output increases and *vice versa:* reducing power in an emergency may effect a resumption of flight control, but a loss of altitude. He should note that full takeoff power is available from most engines only at sea level, so minimum control speed determinations and practice should be conducted as low as is safe to provide as near takeoff power as possible. He should know at which configurations of gear, flap and propeller settings his airplane is capable of level flight with an engine out.]

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 APPROACH AND CLIMB-OUT SPEEDS

[*Procedure.* The applicant will be required to perform straight and level flight, climbing turns, gliding turns, and 10°—30° banked turns in level flight at speeds appropriate to landing approaches and climb-out after takeoff.

[*Standard*

Straight and level flight:

Altitude—±100 feet

Airspeed—±5 m. p. h.

Power setting—as required to maintain level flight.

Configuration—initial approach.

Climbing turns:

Airspeed—±5 m. p. h.

Bank—±10°

Power setting—as recommended for climb.

Configuration—takeoff and climb.

Gliding turns:

Airspeed—±5 m. p. h.

Bank—±10°

Power setting—idling.

Configuration—landing approach.

[*Preparative guide.* The applicant's performance should show an appreciation of the difference in relative effectiveness of the flight controls as compared with normal flight speeds.

[Coordination, airspeed, and positive flight and engine control usage are important factors. Violent control usage which tends to slow the airspeed unnecessarily is to be avoided.

[(5) STALLS

[*Procedure.* Stalls and stall recoveries will be required from straight climbing and gliding flight, and from the three conditions in which stalls have been found to be most critical. These conditions are: takeoff and departure, landing approach, and accelerated maneuvering at reduced speeds.

Takeoff and departure stalls will be simulated from 10° to 30° banked climbing turns in takeoff configuration. The climb will be entered at approximately takeoff speed with full climb power, and gradually steepened with the bank constant until a stall occurs.

Approach to landing stalls will be simulated from 10° to 30° banked gliding turns, entered at approach speed with the engine throttled and the airplane in landing configuration. As the turn continues, the gliding attitude should be flattened until a stall occurs.

Accelerated maneuver stalls will be performed from 30° to 45° banked gliding turns in approach and in cruise configurations, and from at least 45° banked turns in level flight. Accelerated stalls from glides will be performed with the engine throttled, except in airplanes without sufficient up elevator effect to produce a stall in a gliding turn, in which only sufficient power to produce the necessary elevator effectiveness may be used. In level flight turns, only sufficient power to hold altitude will be used. In both of these flight conditions, the angle of attack will be increased smoothly and rapidly until a stall occurs at slightly (5 to 10 m. p. h.) above the unaccelerated stalling speed.]

NOTE: Accelerated stalls will not be performed at airspeeds more than 15 m. p. h. above the unaccelerated stalling speed because of the extremely high structural loads that are imposed on the wings and tail surfaces, particularly in gusty air.

[Recovery from all stalls will be completed to straight flight with the wings level, and with the least loss of altitude consistent with the prompt recovery of control effectiveness.]

[*Standard.*

Stall recognition:

Prompt and accurate, without use of stall warning device.

Recovery:

To straight flight, using coordinated control action as necessary,

(1) immediately upon stall recognition, and

(2) after a full stall develops and the nose falls below the horizon.

Airspeed:

Not to exceed cruising speed at any time.

[*Preparative guide.* The applicant's performance should show that he appreciates the fact that the angle of attack (of the airflow with the chord of the wing), and not the airspeed, is the prime factor in stalls. This is demonstrated in accelerated stalls. The prompt correct use of the elevators is of first importance in reducing the angle of attack. In accelerated stalls from turns, the immediate relaxation of, or complete recovery from the turn is the most effective and rapid means of reducing the angle of attack.

[The prompt smooth application of power hastens the recovery from stalls and reduces the loss of altitude which results. The ability to recover from stalls without power is important for use in emergencies, and also to sharpen the realization that stalls are not the result of reduced power alone.

[The use of the flight controls in stall recoveries should be prompt, positive, coordinated, and smooth. The appearance of too much airspeed on recovery is evidence that too much altitude has been sacrificed, and that the applicant has not properly identified the stall and his recovery therefrom.]

Commercial Pilot Flight Test—Rotorcraft

The commercial pilot flight test on rotorcraft will be given in two phases. The failure of any maneuver or procedure will constitute the failure of the phase of which the 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 flight test maneuver tolerances set forth below for determination of the competency of an applicant are those that are expected in smooth air and which can be attained on a repeated basis. Allowance will be made by the agent or examiner for gusty air or for other extenuating circumstances encountered during the actual flight test demonstration.

The phases of the commercial pilot test in rotorcraft are: Phase I—Basic Techniques, and Phase II—Precision Maneuvers. The maneuvers and procedures under each phase are as follows:

PHASE I—BASIC TECHNIQUES

(1) Preflight inspection and oral equipment examination.
(2) Engine and rotor starting and stopping; cockpit procedures.
(3) Taxiing.
(4) Normal takeoffs and landings.
(5) Crosswind takeoffs and landings.
(6) High altitude takeoffs and roll-on landings.
(7) Climbs and descents.
(8) Airport traffic pattern.
(9) Emergencies.

PHASE II—PRECISION MANEUVERS

(1) Hovering—upwind, crosswind, and downwind.
(2) Hovering turns.
(3) Pattern flying with constant heading.
(4) S turns.
(5) Turns with medium banks.
(6) Rapid decelerations (quick stops).

The following paragraphs set forth procedures for performing the required tests, the standards and tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Techniques

(1) PREFLIGHT INSPECTION AND ORAL EQUIPMENT EXAMINATION

Procedure. The applicant will be required to conduct a preflight inspection of the aircraft used in accordance with the Aircraft Flight Manual or the manufacturer's maintenance manual. This preflight check will cover the items necessary to determine that the aircraft is in a generally satisfactory state of airworthiness, and is properly certificated and serviced for the flight proposed.

As a part of the preflight check, the applicant will be given a brief oral examination to determine his knowledge of the rotorcraft, engine, accessories, operating limitations, and any special equipment installed.

Standard. The applicant will be expected not to overlook any apparent unairworthy item, or condition, and to display an accurate knowledge of the recommended preflight inspection procedure. He will be expected to identify, and present if requested, all required certificates, documents, and placards which pertain to the aircraft.

On his oral examination he will be expected to display a precise knowledge of the operational procedures and limitations of the rotorcraft used.

(2) ENGINE AND ROTOR STARTING AND STOPPING; AND COCKPIT PROCEDURES

Procedure. The applicant will be expected to start the engine, engage the rotor, bring the rotor up to operating speed, and stop the rotor and the engine. He will be expected to display a knowledge of the cockpit procedures and to take all applicable safety precautions.

Standard. The applicant must not use any procedure which might create a hazard to persons or be detrimental to the airworthiness of the aircraft or engine. He will be required to carry out the procedures correctly and completely.

(3) TAXIING

Procedure. The applicant will demonstrate correct taxiing procedures in rotorcraft equipped with wheels for that purpose.

Standard. The applicant will be expected to maintain control, avoid obstructions, and comply with local taxi rules and control tower instructions.

Preparative guide. The applicant should use safe taxi speeds, follow the desired taxi path, observe other traffic and obstructions, and

make efficient use of flight and engine controls.

(4) NORMAL TAKEOFFS AND LANDINGS

Procedure. For a normal takeoff demonstration, the rotorcraft is to be lifted off, and accelerated to a safe autorotational speed before a significant amount of altitude is gained. For demonstration of normal, hover-type landings, the rotorcraft is to be allowed to settle to the ground without forward motion or lateral movement from a hovering position just clear of the ground.

Standard. The applicant will be required to make normal landings consistently within 10 feet of a mark, from a correctly flared approach following a 180° and a 360° change in direction, and to maintain correct approach speeds.

Preparative guide. The applicant should be able to control power correctly, to maintain correct rotor speeds, and to flare his approaches to landings without endangering the tail rotor. Takeoffs and landings should be smooth, and executed without side loads on the landing gear.

(5) CROSSWIND TAKEOFFS AND LANDINGS

Procedure. Crosswind takeoffs and landings are to be demonstrated with a crosswind component allowable for the rotorcraft used and in accordance with its Helicopter Flight Manual.

Standard. Lift offs must be precise, on a constant heading, and with minimum possible sideward movement. Crosswind landings are to be made from a hovering position without drift.

(6) HIGH ALTITUDE TAKEOFFS AND ROLL-ON LANDINGS

Procedure. The procedure used will simulate that necessary to make a running takeoff as used in high altitude (low air density) conditions. Under normal circumstances, these conditions will be simulated by allowing the applicant to use insufficient power to lift the aircraft until translational lift is obtained.

The applicant will also be expected to demonstrate roll-on landings, such as those which are necessary under conditions of low air density or reduced power output. These landings will be accomplished from shallow descents with at least minimum autorotational speed, and descent slowed for touch down at a low ground speed and a roll to a stop.

When the applicant furnishes a rotorcraft with skids or floats these maneuvers may be deleted at the discretion of the examiner.

Standard. The applicant must be able to hold a constant air speed within 10 m. p. h., but in no case less than the minimum autorotative speed, a heading within 5°, and to flare correctly without drifting or without endangering the tail rotor.

(7) CLIMBS AND DESCENTS

Procedure. Climbs and descents of uniform rates with constant airspeeds are to be demonstrated both in straight flight and in turns.

Standard. Power must be coordinated with the application of collective pitch so as to prevent noticeable variations in r. p. m., and the airspeeds in stabilized climbs or descents should be maintained within 10 m. p. h. The airspeed must in no case be allowed to become less than the minimum autorotative speed. The climbs and descents must be maintained within 50 feet per minute of the uniform rate.

Preparative guide. Coordination of power with pitch should be smoothly applied. Transition to and from climbs and descents should be flared smoothly into level flight.

(8) AIRPORT TRAFFIC PATTERN

Procedure. During takeoff and landing demonstrations, as well as on other maneuvers on the flight test, the applicant is to conform to the established traffic pattern for the landing area used for the test.

Standard. The applicant should be able to maintain the prescribed traffic pattern altitude within 50 feet, to recover from turns on the designated headings, and to correct for drift on the crosswind legs of the pattern.

(9) EMERGENCIES

POWER PLANT FAILURES AND AUTOROTATIVE APPROACHES

Procedure. The examiner will throttle the engine at a speed near cruising and at the minimum autorotational speed. Autorotational approaches will be completed by the applicant. with the engine throttled, to predesignated areas through straight, 180°, and 360° patterns.

Standard. Recovery from autorotational

approaches are to be initiated at sufficient altitude to insure that the tail boom does not strike the ground. A safe normal landing must be possible within the predesignated area.

LOSS OF LIFT AT ALTITUDE

Procedure. The applicant will *either*, demonstrate at a safe altitude, *or* verbally describe the procedures relating to the flight condition in which excessive vertical descent is encountered due to the rotor operating in the rotor vortices. If a demonstration is made, the rapid vertical descent condition is to be established at sufficient altitude to allow a minimum of 500 feet for recovery to level flight.

Standard. The applicant will be expected *either* to demonstrate his ability to cope with and overcome such a flight condition, *or* to display a knowledge of the correct procedures to follow under such circumstances.

Preparative guide. For power plant failures, immediate action should be taken to enter autorotation, obtain and maintain recommended autorotational speed within 10 m. p. h., and execute a planned approach to the selected area.

In effecting a recovery from a rapid descent due to rotor vortex effect, preference should be given to obtaining forward speed, rather than by the application of additional power. The latter sometimes aggravates the condition. A constant heading should be held throughout the maneuver.

Phase II—Precision Maneuvers

(1) HOVERING—UPWIND, CROSSWIND, AND DOWNWIND

Procedure. The applicant will be required to demonstrate hovering at an altitude of his own selection on headings specified by the examiner. The headings specified will include upwind, crosswind, and downwind.

The hovering altitude should be selected by the applicant after his first takeoff and landing. Different altitudes may be selected for different maneuvers, but all hovering altitudes should be within the ground effect. Care should be taken to see that the limits of cyclic pitch control are not approached on crosswind and downwind headings, and that the rearward airspeed limit is not exceeded.

Standard. The applicant must maintain hovering altitude within 5 feet, his position within a 10-foot circle, and a constant rotor speed.

(2) HOVERING TURNS

Procedure. The applicant will be required to make 180° and 360° turns in both directions while hovering.

Standard. The applicant must hold his position within a 10-foot circle, his altitude within 5 feet, maintain a constant rate of heading change, and a constant rotor r. p. m.

(3) PATTERN FLYING

Procedure. Pattern flying will be accomplished at hovering altitude about a square or rectangle with sides approximately 25 yards in length. The heading used is to be that of the side most nearly alined with the wind.

Standard. The applicant should be able to follow the sides of the pattern within 10 feet, maintain a constant heading without yaw, and maintain the hovering altitude within 5 feet.

(4) TURNS WITH MEDIUM BANKS

Procedure. Turns are to be executed in cruising forward flight at an altitude in excess of 500 feet above the ground. The resulting bank should be between 30° and 45°, and turns are to be made both to the right and the left.

Standard. The applicant must recover within 15° of the desired heading, maintain altitude within 50 feet, and maintain a constant rotor r. p. m.

(5) S-TURNS

Procedure. The applicant will be expected, at an altitude of 500 feet, to fly S-turns back and forth across any straight reference line, which is, as nearly as possible, 90° to the wind on the ground.

Standard. The applicant must hold altitude within 25 feet, airspeed within 5 m. p. h., correct for drift, maintain a constant rotor r. p. m., and make a symmetrical ground track pattern.

(6) RAPID DECELERATIONS (QUICK STOPS)

Procedure. Rapid deceleration from cruising flight to hovering is to be demonstrated at an altitude chosen by the applicant. This altitude is to be sufficiently high to insure that there is no danger to the tail rotor, and must not be

within the altitude limits placarded against hovering.

Standard. The applicant must be able to use correct power control, maintain altitude within 15 feet, and heading within 10° during the deceleration maneuver.

Commercial Pilot Flight Test—Gliders

The commercial pilot flight test in gliders 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 must repeat the phase failed.

The examiner will accompany the applicant in the glider or airplane during his performance of stalls and slow flight. Other items on the flight test may be observed from the ground, or from within the aircraft, at the discretion of the examiner.

The phases of the commercial pilot flight test in gliders, and the required maneuvers and procedures, are as follows:

PHASE I—BASIC TECHNIQUES

(1) Preflight check and oral equipment examination.
(2) Auto, auto pulley, or winch tow.
(3) Airplane tow.
(4) 360° approaches, right and left.
(5) Accuracy landings.

PHASE II—SPECIAL AND CRITICAL MANEUVERS

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

The following paragraphs set forth procedures for performing the required tests, the standards and tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Techniques

(1) PREFLIGHT CHECK AND ORAL EQUIPMENT EXAMINATION

Procedure. The applicant will be required to perform a preflight check of the glider used, with special attention to the control system and the tow cable release. He will be expected to identify and present, if requested, the airworthiness and registration certificates and operation limitations placards.

As a part of the preflight inspection, the applicant will be given a brief oral examination to determine that he has a practical knowledge of the operating procedures for the glider to be used.

Standard. The applicant must not overlook any apparent unairworthy condition, and is to display a correct knowledge of the operation of the glider to be used.

Preparative guide. The preflight check should include a thorough check of the exterior and interior of the glider, noting all critical items. The operation of the controls and of the tow cable release should be checked by manual operation. The applicant should be familiar with the details of such glider operating procedures as: safe climbing principles to be observed in all types of tows, holding a correct relative position in airplane tows, landing downwind safely, etc.

(2) AUTO, AUTO PULLEY, OR WINCH TOW

Procedure. The applicant will be required to demonstrate glider flight when launched by auto, auto pulley, or winch tow.

Standard. The applicant will be expected to make a controlled takeoff, select an efficient angle of climb, maintain a uniform tension on the tow cable, and to release the tow line when the optimum altitude has been reached.

(3) AIRPLANE TOW

Procedure. The applicant will be required to demonstrate glider flight when towed by an airplane. This will include: steady flight above, below, and to one side of the airplane's slipstream; a change of the glider's towing position to above, below, and to one side without encountering the slipstream; and a pass through the slipstream.

Standard. For a period of three minutes in each relative position, the applicant must maintain steady flight with a uniform tension on the tow line, must not impose excessive side or vertical loads on the tail of the tow plane, and must get and stay clear of the airplane's slipstream immediately upon getting off the ground on takeoff.

(4) 360° APPROACHES, RIGHT AND LEFT

Procedure. 360° approaches, right and left, are to be demonstrated from a prescribed glider

flight pattern around the landing area, or from a position directly over the landing spot.

Standard. The applicant must conform to the approach pattern, and maintain the recommended approach speed within 10 m. p. h. Spoilers or slips may be used in a normal manner on final approach and landing only.

(5) ACCURACY LANDINGS

Procedure. Accuracy landings are to be demonstrated from the 360° approaches with the glider touching down in a roll-landing attitude within 100 feet beyond a designated line or point. Accuracy landings are to be made both upwind and crosswind. Spoilers and slips may be used in a normal manner on the final approach and landing.

Standard. The glider must touch down in a normal landing attitude within 100 feet beyond the designated line or point, and thereafter roll to a stop without bouncing or ballooning. Landings should be smooth, and final approach speeds normal to the glider used.

Preparative guide. The applicant should be capable of landing consistently close to a designated spot, to demonstrate good advance planning, coordination, and airspeed control.

Phase II—Special and Critical Maneuvers

(1) SPIRALS

Procedure. A spiral of three full turns in each direction will be demonstrated in which the bank is at least 45°.

Standard. The applicant must maintain a constant bank within 5°, an airspeed within 5 m. p. h., and recover within 10° of the heading from which the spiral was started.

(2) STALLS AND SLOW FLIGHT

Procedure. Stalls and slow flight may be demonstrated in a glider or an airplane. Stalls and recoveries will be demonstrated from straight flight from a 30°–45° banked turn, and at least one accelerated (high speed) stall (entered from a steep turn).

Sustained slow flight is to be demonstrated in straight flight and in 30°–45° banked turns.

Standard. The applicant is expected to recognize stalls promptly and to take immediate corrective action. Recovery is to be made to normal gliding flight with the wings level and without exceeding approved operating speeds, load factors, or a 50 foot loss of altitude. Slow flight is to be made at an airspeed not over 5 m. p. h., above the stalling speed and is to be made for a period of at least one minute without losing control.

Preparative guide. The applicant should have the ability to keep a glider under complete flight control at a speed just above stalling, for sustained periods, and while maneuvering between level flight and steeply banked turns. He should have full knowledge of the interrelationship of airspeed, maneuvering loads, aerodynamic forces, and structural loads.

Instrument Rating Flight Tests

General

Overall Test Requirement. The instrument flight test will be given to an applicant who meets the experience requirements for an instrument rating, and who has passed the instrument written examination.

The flight test maneuver standards and tolerances set forth below are those which are expected in smooth air and which should be attained on a repeated basis. Allowance will be made by the examiner for gusty air or other extenuating circumstances encountered during the actual flight test.

The CAA *Flight Information Manual* and the U. S. Coast and Geodetic Survey *Radio Facility Charts* and *Instrument Approach Charts* prescribe the procedures and standards applicable to the radio navigation and instrument approach portions of the instrument flight test.

Airplanes used for instrument flight tests must be equipped with at least the minimum instrumentation and equipment prescribed by section 43.30 (c) for instrument flight, a suitable hood or other device for limiting the pilot's vision to the cockpit, and full dual controls.

Modified Tests

The instrument flight test will be modified only when the characteristics of an airplane, or its operating limitations prevent the performance of any required maneuver. When this is the case, the instrument rating issued will be limited to that type of airplane.

Instrument Flight Tests for Helicopter and Glider Pilots

Instrument flight tests are given in airplanes only, but the instrument rating privileges are not restricted to any aircraft category.

Instrument Flight Test Phases and Required Maneuvers

The instrument flight test will be given in two phases: *Instrument Flying* and *Radio Navigation and Approach Procedures*. The failure of any maneuver or procedure in either phase constitutes 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 failed.

The applicant will be required to complete Phase I with the use of the minimum aircraft equipment and instrumentation required by section 43.30 (c) (primary panel). He may use all available equipment and instrumentation for Phase II.

The phases of the instrument flight test and the required maneuvers and procedures are as follows:

PHASE I—BASIC INSTRUMENT FLYING TECHNIQUE

(1) Straight and level flight.
(2) Turns, climbs, and descents.
(3) Stalls.
(4) Steep turns.
(5) Recovery from unusual attitudes.
(6) Engine out procedure on tests in multiengine airplanes.

PHASE II—RADIO NAVIGATION AND APPROACH PROCEDURES

(1) Estimating arrival times.
(2) Use of radio equipment.
(3) Orientation.
(4) Beam bracketing.
(5) Locating range station.
(6) Instrument letdown and approach procedure.
(7) Missed approach procedures.
(8) Airway traffic control procedures.

The following paragraphs set forth the procedures for performing the required maneuvers and procedures, the required tests, standards, and the tolerances of error allowed for a passing performance, and guide factors to aid the applicant in preparing for the flight test.

Phase I—Basic Instrument Flying Technique

(1) STRAIGHT AND LEVEL FLIGHT

Procedure. The applicant will be required to demonstrate straight and level flight at normal cruising speed, at the recommended instrument approach speed, and at minimum safe airspeeds.

Flight at instrument approach speed is to be demonstrated with the retractable gear extended and flaps in approach position.

Flight at minimum safe speed is to be demonstrated at the lowest airspeed recommended for turbulent air for the airplane used, and with the recommended airplane gear/flap positions and engine r. p. m. settings.

Standard. The applicant will be required to hold a heading within 10°, altitude within 100 feet, and airspeed within 10 m. p. h.

Preparative guide. The applicant should be familiar with procedures; be capable of maintaining full flight control and attitudes—in both smooth and rough air, and while making a smooth transition to and from different flight speeds. The applicant should be capable of maintaining positive control throughout the normal speed range of the airplane.

(2) TURNS, CLIMBS, AND DESCENTS

Procedure. The applicant will be required to demonstrate turns, climbs, and descents at normal flight speeds, at the recommended instrument approach speed, and at the recommended minimum safe speed.

Standard. The applicant must; reach an assigned altitude, from another altitude, within 10 seconds of an estimated time, maintain a standard rate of turn (3° per second or 90° for each 30 seconds of turn), without exceeding an error of ±20° for a 360° turn, and maintain the recommended climb and descent airspeed within 10 m. p. h.

Preparative guide. The applicant should be able to make uniform rates of climb, uniform rates of turn, and to recover from timed turns within 5° of the desired heading for each 90° of turn. Transition from climbs and descents to level flight should be smooth, and power settings appropriate to the performance desired.

(3) STALLS

Procedure. Partial stalls will be required in

single and multiengine airplanes, and full stalls will be required in single-engine airplanes.

A partial stall is attained when the instruments reflect a noticeable decrease in the rate of climb or a noticeable increase in the rate of descent as the airplane approaches the maximum angle of attack. A full stall is attained when the nose pitches after the maximum angle of attack is passed.

Standard. The applicant must recognize and identify the partial and the full stall, take corrective action without exceeding cruising airspeed, and recover on a heading within 20° of the original heading.

Preparative guide. The applicant should develop a keen recognition of an impending stall, be prompt in initiating recovery, and effect a smooth and safe recovery.

(4) STEEP TURNS

Procedure. The applicant is to demonstrate 45°–60° bank turns in both directions through approximately 720°.

Standard. The applicant must maintain [altitude within 100 feet.]

(5) RECOVERY FROM UNUSUAL ATTITUDES

Procedure. The attitudes used will include approaches to stalls in turns, steep climbing and diving spirals, slips, skids, and straight climbs and dives. The applicant is to bring the airplane promptly to straight and level flight from the attitudes, unusual to normal flight, in which the examiner places it.

Standard. The applicant must promptly return the airplane to level flight without exceeding the airplane's approved operating limitations and load factors.

Preparative guide. The applicant should acquire the ability to recover promptly, safely, and smoothly from unusual flight attitudes without any great airspeed fluctuations or abrupt loads being imposed on the structure.

(6) ENGINE OUT PROCEDURES

Procedure. When the applicant for an instrument rating furnishes a multiengine airplane, he will be required to demonstrate flight with one engine shut off or throttled. [Propeller feathering will be required on airplanes equipped with propellers which can be feathered and unfeathered in flight. In other airplanes, one engine will be throttled to simulate a feathered propeller.] In no event will an engine be feathered in such a position that the failure of another engine would endanger safety.

Standard. The applicant must maintain the recommended engine out airspeed within 10 m. p. h., a heading within 10°, make the correct power settings, and follow the appropriate checklist.

Phase II—Radio and Navigation and Approach Procedures

(1) ESTIMATING ARRIVAL TIMES

Procedure. The applicant will be required to demonstrate in the required written examination his ability to estimate correctly arrival times.

Standard. A passing grade on the instrument rating written examination will be accepted as evidence of the ability to estimate time of arrival.

(2) USE OF RADIO EQUIPMENT

Procedure. The applicant is to find the frequencies for available CAA radio aids, and to tune correctly to all radio aids he elects to use on his flight test. He will be required to demonstrate the correct selection of frequency, the use of the volume control, voice and range filter, and of dual radio equipment, if installed.

Standard. [The applicant must demonstrate: a correctly tuned signal; and the correct use of the automatic and manual volume controls, and the voice and range filter. He must know and use the proper frequencies for ground and air communication.]

Preparative guide. The applicant should have an intimate knowledge of radio aids, the ability to find quickly the desired frequencies in available publications, a ready and comprehensive working familiarity with the procedures and phraseology in radio communication.

(3) ORIENTATION

Procedure. Orientation is to be demonstrated by the selection and execution of a method suited to the radio facility used and the conditions experienced.

[The applicant may use the low frequency or VOR range system for his orientation.]

Standard. The applicant must decide upon and follow a planned course of action, maintain his altitude within 100 feet, and identify his position correctly. (The use of any planned action in flight, which results in the correct establishment of the aircraft's position, is acceptable.)

Preparative guide. The applicant should be able to select the orientation system that is most applicable to the existing situation, carry out the system without hesitation, and make a correct report when his position is established.

(4) BEAM BRACKETING

Procedure. The applicant is to follow an assigned radio range leg or radial after intersecting it at an angle of 30°–60°.

Standard. The applicant must align the airplane with the assigned leg or radial, using bracketing heading changes of progressively lesser magnitude. He should maintain altitude during this procedure within 100 feet.

Preparative guide. The applicant should be capable of promptly and correctly interpreting range signals, computing successively lesser bracketing headings, and maintain altitude control in a smooth and effective manner.

(5) LOCATING RANGE STATION

Procedure. The applicant is to complete the procedure of beam bracketing and follow the range leg or radial to the range station, and to identify his arrival over the station.

Standard. [Altitude must be maintained within 100 feet while approaching the station, and the arrival over the station must be correctly identified.]

Preparative guide. The applicant should be able to follow a leg or radial with a minimum number and magnitude of heading corrections, to identify the station accurately and promptly, and to maintain altitude. [The applicant should obtain a definite indication of his presence above the station, such as a distinct cone of silence, reversal of the to-from indicator, or oscillation of the course needle. The passing of the station should be confirmed by accepted methods.]

(6) INSTRUMENT LETDOWN AND APPROACH PROCEDURE

Procedure. [The applicant is to demonstrate a standard instrument approach for an airport of the examiner's choice, using either low frequency range signals, ADF, or the VOR and/or ILS system, at the applicant's option.]

Standard. In an airplane equipped with only one receiver and with primary instruments only, the applicant must arrive within 100 feet above the minimum authorized altitude and be within sight of the airport (distance within the authorized minimum visibility of the airport used).

[In an airplane equipped with additional navigational equipment, including a directional gyro, the applicant will be required to arrive within 100 feet above the minimum authorized altitude, in a position to land on or to fly directly across the airport. If ILS is used, a correct approach must be continued to the middle marker.]

When the airport used has standard approach minimums above 500 feet and 1 mile due to local conditions, the applicant will also be required to demonstrate his ability to conduct an approach to these minimums.

(7) MISSED APPROACH PROCEDURES

Procedure. The applicant will be required to execute correctly the missed approach procedure specified for the airport used. The applicant is to make all appropriate radio reports upon being instructed to execute his missed approach procedure.

Standard. Any error in altitude on the dangerous side will be disqualifying.

Preparative guide. The applicant should be able to effect smoothly the transition from approach procedure to the missed approach procedure, including the necessary airplane configuration and power changes, and to make correct advisory reports to the airport controller.

8) AIRWAY TRAFFIC CONTROL

Procedure. The applicant is to contact airways traffic control and obtain an airway traffic clearance. He is to make all mandatory contacts and position reports, the same as would be done on an actual instrument flight.

[ATC clearances will be simulated if actual clearances are impracticable, and simulated holding procedures will be required.]

Standard. The applicant must use correct radio procedures, copy clearances correctly, and comply with ATC instructions.

Preparative guide. The applicant should be familiar with radio and flight planning procedures, should adhere strictly to his clearance and should make correct and complete position reports and estimates.

Aircraft Rating Flight Tests

Aircraft Category, Class, and Type Rating Tests—General

No mandatory set of maneuvers and procedures will be required on flight tests for applicants seeking the addition of aircraft category, class, and type ratings to a private or a commercial pilot certificate.

The maneuvers given will be selected from the list of maneuvers required for the issuance of the applicant's present grade of certificate (private or commercial). The maneuvers selected will depend on the applicant's background as a pilot, and on the other ratings he already holds. The maneuvers required will be those necessary to show proficiency in the safe and competent operation of aircraft not previously demonstrated for the ratings already held.

The standards and tolerances of performance will be those which apply to the applicant's basic pilot certificate.

To be prepared for the flight test, the applicant should be sure that he is thoroughly familiar with correct operation of the aircraft to be used, its operational limitations, flight characteristics and performance, and emergency procedures. He should also have run through all the maneuvers and items required for his basic grade of pilot certificate and be certain that he can meet the standards.

Appendix B

Aircraft Type Ratings

This appendix contains the type ratings which the holder of a pilot certificate may be issued upon meeting the flight test standards applicable thereto.

Aircraft Type Ratings Issued

I. Civil Aircraft*

Manufacturer	Model designations	Certificate type ratings
[Boeing	247A, 247D, or C73	Boeing 247.
	314	Boeing 314.
	307 or SA307B1	Boeing 307.
	377 or C–97	Boeing 377.
[Consolidated Vultee	28–4, 28–5, PBY2, PBY5, OA10.	Consolidated Vultee PBY.
	Convair 240, 340, or 440	Convair 240—340—440.
[Curtiss-Wright	C46 or Commando	Curtiss-Wright C–46.
[Douglas	DC3, C47, C48, C49, C50, C51, C52, C53, C68, R4D.	Douglas DC3.
	Super DC3, DC3S	Douglas DC3S.
	DC4, C54, A, B, C, etc., R5D, 1, 2, 3, 4, etc.	Douglas DC4.
	DC6, DC6A, DC6B, DC7 or C118.	Douglas DC6—DC7.
	DC2, C32, C33, C34, C39, C42, R2D.	Douglas DC2.
	B18	Douglas B18.
	B23 or UC67	Douglas B23.
[Ford	5ATB, 5ATC, or 5AT	Ford 5.
[Grumman	G73 or Mallard	Grumman G–73.
[Lockheed	18, C57, C59, C60, R50	Lockheed 18.
	Constellation, 049, 149, 649, 749, 1049, C–69, C121.	Lockheed Constellation.
[Martin	202 or 404	Martin 202—404.
[Sikorsky	S43, S43B, or S43W	Sikorsky S43.
[Vickers	744 or 745	Vickers Viscount.]

*Including civil counterpart of military aircraft.

II. Military Aircraft

Military aircraft which have been certificated but which have no civilian counterpart will be shown on the certificate by manufacturer and by basic military identification; e. g., Boeing B–17.

III. Amphibious Aircraft

For Amphibian types, such as Consolidated PBY, the certificate will bear a restriction of "Land" or "Sea" unless proficiency has been demonstrated on both land and water, for example: CONSOLIDATED PBY LAND. If proficiency is demonstrated on both land and water the type rating will read "CONSOLIDATED PBY LAND AND SEA."

IV. Other Aircraft

Applicants for type ratings on aircraft not listed above, or for those aircraft listed in Safety Regulation Release 277 as certificated in the limited category, will be required to present evidence that at least one aircraft of the type concerned has been issued a certificate by the CAA for civilian use.

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