Civil Aeronautics Manual 22

Lighter-Than-Air Pilot Certificates

FEDERAL AVIATION AGENCY

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Introductory Note

This manual contains in a consolidated form (1) Civil Air Regulations Part 22, Lighter-Than-Air Pilot Certificates, dated November 1, 1949, Amendments 22–1 through 22–12, and the editorial changes required by Special Regulations SR–430, effective December 31, 1958; and (2) the rules, policies, and interpretations issued by the Administrator of the Federal Aviation Agency in application to the various sections of the regulations.

FAA *rules* are supplementary regulations issued pursuant to authority expressly conferred on the Administrator in the Civil Air Regulations. Such rules are mandatory and must be complied with.

FAA *policies* provide detailed technical information on recommended methods of complying with the Civil Air Regulations. Such policies are for the guidance of the public and are not mandatory in nature.

FAA *interpretations* define or explain words and phrases of the Civil Air Regulations. Such interpretations are for the guidance of the public and will be followed by the Agency in determining compliance with the regulations.

This manual is arranged to give the number, title, and text of each section of the regulations followed by any rules, policies, or interpretations applicable to that section. These rules, policies, or interpretations of the Administrator are identified by consecutive dash numbers appended to the regulation section number.

This manual supersedes Civil Aeronautics Manual 22, dated October 15, 1956, and all supplements thereto. As amendments and other pertinent materials pertaining to Part 22 are issued, they will be included in this manual.

Contents

Classification of Lighter-Than-Air Pilot Certificates

	Section	Page
Grades	**22. 1**	1

Lighter-Than-Air Pilot Certificate Requirements

Student lighter-than-air pilot certificate	**22. 10**	
Where to obtain student lighter-than-air pilot certificates (*FAA policies which apply to sec. 22.10*)	22. 10–1	
Minor applicants (*FAA interpretations which apply to sec. 22.10(a)*)	22. 10–2	
Evidence of meeting physical standards (*FAA policies which apply to sec. 22.10(e)*)	22. 10–3	
Color deficiency limitation (*FAA policies which apply to sec. 22.10(e)*)	22. 10–4	
Private lighter-than-air pilot certificates	**22. 11**	
Evidence of meeting physical standards (*FAA policies which apply to sec. 22.11(e)*)	22. 11–1	
Color deficiency limitation (*FAA policies which apply to sec. 22.11(e)*)	22. 11–2	
Demonstration of aeronautical knowledge (*FAA policies which apply to sec. 22.11(f)*)	22. 11–3	
Prerequisite for taking written examination (*FAA policies which apply to sec. 22.11(f)*)	22. 11–4	
Evidence of flight experience (*FAA policies which apply to sec. 22.11(g)*)	22. 11–5	
Flight test (*FAA policies which apply to sec. 22.11 (h)*)	22. 11–6	
Quality of performance (*FAA policies which apply to sec. 22.11(h)*)	22. 11–7	
Conduct of flight test (*FAA policies which apply to sec. 22.11(h)*)	22. 11–8	
Military competence requirements—written examination—private lighter-than-air pilot (*FAA policies which apply to sec. 22.11(i)*)	22. 11–9	
Documentary evidence acceptable for issuance of certificate based on military competence (*FAA policies which apply to sec. 22.11(i)*)	22. 11–10	
Evidence of military discharge or release—private lighter-than-air pilot (*FAA policies which apply to sec. 22.11(i)*)	22. 11–11	
Commercial lighter-than-air pilot certificate	**22. 12**	
Evidence of meeting physical standards (*FAA policies which apply to sec. 22.12(e)*)	22. 12–1	
Color deficiency limitation (*FAA policies which apply to sec. 22.12(e)*)	22. 12–2	
Demonstration of aeronautical knowledge—commercial lighter-than-air pilot (*FAA policies which apply to sec. 22.12(f)*)	22. 12–3	
Written examination (*FAA policies which apply to sec. 22.12(f)*)	22. 12–4	
Prerequisite for taking written examination (*FAA policies which apply to sec. 22.12(f)*)	22. 12–5	
Evidence of flight experience (*FAA policies which apply to sec. 22.12(g)*)	22. 12–6	
Flight test (*FAA policies which apply to sec. 22.12(h)*)	22. 12–7	
Quality of performance (*FAA policies which apply to sec. 22.12(h)*)	22. 12–8	
Conduct of flight test (*FAA policies which apply to sec. 22.12(h)*)	22. 12–9	
Radio skill (*FAA policies which apply to sec. 22.12(i)*)	22. 12–10	7
Military competence requirement—written examination—commercial lighter-than-air pilot (*FAA policies which apply to sec. 22.12(j)*)	22. 12–11	7
Documentary evidence acceptable for issuance of certificate based on military competence (*FAA policies which apply to sec. 22.12(j)*)	22. 12–12	7
Evidence of military discharge or release—commercial lighter-than-air pilot (*FAA policies which apply to sec. 22.12(j)*)	22. 12–13	7

	Section	Page
Free balloon pilot certificate	**22. 13**	7
Written examination (*FAA policies which apply to sec. 22.13(f)*)	22. 13–1	8
Prerequisite for taking written examination (*FAA policies which apply to sec. 22.13(f)*)	22. 13–2	8
Evidence of flight experience (*FAA policies which apply to sec. 22.13(g)*)	22. 13–3	8
Flight test (*FAA policies which apply to sec. 22.13(h)*)	22. 13–4	8
Quality of performance (*FAA policies which apply to sec. 22.13(h)*)	22. 13–5	8
Conduct of flight test (*FAA policies which apply to sec. 22.13(h)*)	22. 13–6	8

Lighter-Than-Air Pilot Certificates

Application	**22. 20**	9
Where to obtain forms and make application (*FAA policies which apply to sec. 22.20*)	22. 20–1	9
Duration	**22. 21**	9
Reissuance of certificates held by aliens (*FAA policies which apply to sec. 22.21(c)*)	22. 21–1	9
Issuance of temporary lighter-than-air pilot certificates (*FAA policies which apply to sec. 22.21(d)*)	22. 21–2	9
Recent experience requirements	**22. 22**	9
Reinstatement	**22. 23**	10
Examinations and tests	**22. 24**	10
Examinations and tests (*FAA policies which apply to sec. 22.24*)	22. 24–1	10
Change of address	**22. 25**	10
Termination of certificates	**22. 26**	10

Pilot Regulations

Flight limitations and privileges	**22. 31**	10
Miscellaneous	**22. 32**	11

Definitions

Lighter-than-air aircraft	**22. 40**	12
Solo flight time	**22. 41**	12
Dual instruction	**22. 42**	13
Pilot in command	**22. 43**	13
Flight time	**22. 44**	13
Authorized representative of the Administrator	**22. 45**	13
APPENDIX A		15

Lighter-Than-Air Pilot Certificates

Classification of Lighter-Than-Air Pilot Certificates

22.1 *Grades.* Lighter-than-air pilot certificates are classified in the following grades:

(a) Student lighter-than-air pilot certificate.

(b) Private lighter-than-air pilot certificate.

(c) Commercial lighter-than-air pilot certificate.

(d) Free balloon pilot certificate.

Lighter-Than-Air Pilot Certificate Requirements

22.10 *Student lighter-than-air pilot certificate.* To be eligible for a student lighter-than-air pilot certificate an applicant shall comply with the following requirements:

(a) *Age.* 16 years is the minimum age for the issuance of a student lighter-than-air pilot certificate. If applicant be less than 21 years of age at the time of making application, he shall submit with his application the written consent of either parent, or legal or natural guardian to the issuance of the pilot certificate sought.

(b) *Character.* Applicant shall not be temperamentally unsuited for flying.

(c) *Citizenship.* An applicant for a student lighter-than-air pilot certificate may be a citizen of any country or a person without nationality.

(d) *Education.* If an applicant is unable to read, speak, and understand the English language, appropriate operation limitations may be entered upon his student lighter-than-air pilot certificate.

(e) *Physical condition.* 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.

(f) *Aeronautical knowledge.* No requirement is prescribed.

(g) *Aeronautical experience.* No requirement is prescribed.

(h) *Aeronautical skill.* No requirement is prescribed.

22.10–1 *Where to obtain student lighter-than-air pilot certificates (FAA policies which apply to sec. 22.10).* Student lighter-than-air pilot certificates may be obtained by qualified applicants from Aviation Safety Agents in Aviation Safety District Offices.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.10–2 *Minor applicants (FAA interpretations which apply to sec. 22.10 (a)).* Unmarried applicants under 21 years of age must furnish the written consent of either parent, or legal or natural guardian, in the space provided on the application, or on a separate sheet. No consent is required for married male applicants under 21, but a married female applicant under 21 years of age must furnish the consent of her husband, who may be under 21.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.10–3 *Evidence of meeting physical standards (FAA policies which apply to sec. 22.10 (e)).* The Administrator, or his representative (Aviation Safety Agent or lighter-than-air pilot examiner) 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.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.10–4 *Color deficiency limitation (FAA policies which apply to sec. 22.10 (e)).* When an applicant holds a medical certificate bearing the notation DEFECTIVE COLOR VISION, the student 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 FAA Civil Air Surgeon, AS–1, Washington 25, D. C.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11 *Private lighter-than-air pilot certificate.* To be eligible for a private lighter-than-air pilot certificate an applicant shall comply with the following requirements:

(a) *Age.* 18 years is the minimum age for the issuance of a private lighter-than-air pilot certificate. If applicant be less than 21 years of age at the time of making application, he shall submit with his application the written consent of either parent, or legal or natural guardian to the issuance of the pilot certificate sought.

(b) *Character.* Same as in section 22.10 (b).

(c) *Citizenship.* An applicant for a lighter-than-air pilot certificate with a private pilot rating may be a citizen of any country or a person without nationality.

(d) *Education.* Applicant shall be able to read, speak, and understand the English language.

(e) *Physical condition.* 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.

(f) *Aeronautical knowledge.* Applicant shall pass a written examination covering so much of the provisions of this part and Parts 1 and 60 of this subchapter as are pertinent to his certificate, prevailing weather conditions in the United States as encountered in flying, and the forecasting thereof, the analyzing of weather maps and sequence reports as furnished by the United States Weather Bureau, practical air navigation problems and the use of maps, navigation by terrain (pilotage) and by dead reckoning, including the use of instruments and other aids to navigation in visual-contact flying, and the general servicing and operation of airships.

(g) *Aeronautical experience.* Applicant shall have logged at least 50 flight hours actually at the controls of airships, including not less than 5 hours of solo flight and not less than 5 hours of cross-country flight. At least 5 hours of such time shall have been logged within the 60 days immediately preceding the date of filing the application.

(h) *Aeronautical skill.* Applicant shall satisfactorily demonstrate his ability to pilot airships in solo flight and in addition to normal takeoffs and landings to perform satisfactorily the following maneuvers:

(1) A series of right and left turns and figure eights;

(2) Ascents and descents at rates up to 600 feet per minute not permitting gas pressure to exceed 1½ inches of water during ascents or to fall below 1 inch of water during descents;

(3) Land the airship 200 pounds heavy and 200 pounds light;

(4) Such other maneuvers as the Administrator deems necessary.

(i) *Military competence.* An applicant for a private lighter-than-air pilot certificate shall be deemed to have met the aeronautical knowledge, experience, and skill requirements for the issuance of such certificate, if he passes a written examination on Parts 43 and 60 and presents reliable documentary evidence showing:

(1) That he is a member of the armed forces of the United States or a civilian employee of the ferry or transport services thereof, and either is on solo flying status as a rated lighter-than-air pilot or the equivalent or has, within 12 months preceding the

date of application, been graduated from and rated as a lighter-than-air pilot by a military flying school; or

(2) That he has been honorably discharged or released from such forces and was, at the time of such discharge or release, on solo flying status as a rated lighter-than-air pilot or the equivalent or had been graduated from and rated as a lighter-than-air pilot by a military flying school: *Provided*, That if he has been honorably discharged or released from such forces for a period longer than 12 months preceding the date of application, he shall pass the flight test prescribed by section 22.11 (h), unless he can show that he has had, within 12 months preceding the date of application, at least 10 hours of flight time as pilot in command in lighter-than-air military aircraft.

22.11–1 *Evidence of meeting physical standards (FAA policies which apply to sec. 22.11 (e)).* The Administrator, or his representative (Aviation Safety Agent or lighter-than-air pilot examiner) 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.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–2 *Color deficiency limitation (FAA policies which apply to sec. 22.11 (e)).* 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 FAA Civil Air Surgeon, AS–1, Washington 25, D. C.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–3 *Demonstration of aeronautical knowledge (FAA policies which apply to sec. 22.11 (f)).* Applicants for a private lighter-than-air pilot certificate will be required to pass the appropriate written examination furnished by the Administrator within 24 months prior to the date of issuance of the certificate. To pass the examination the applicant is required to answer correctly, within one hour, 45 of the 50 questions on the examination.[1] The applicant will be required to pass the written examination before the practical examination can be taken.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–4 *Prerequisite for taking written examination (FAA policies which apply to sec. 22.11 (f)).* Applicant will be required to hold a valid student lighter-than-air pilot certificate.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–5 *Evidence of flight experience (FAA policies which apply to sec. 22.11 (g)).* Flight experience required by section 22.11 (g) of this part should be substantiated by a logbook maintained in accordance with the requirements of section 22.32 (f) of this part.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–6 *Flight test (FAA policies which apply to sec. 22.11 (h)).*

(a) Applicant will be required to successfully accomplish the following maneuvers:[2]

(1) Ground handling and mooring.
(2) Preflight checks.
(3) Runups.
(4) Takeoffs.
(5) Ascents.
(6) Turns (right and left) and figure 8's.
(7) Straight and level flight.
(8) Descents.
(9) Landings (positive static balance).
(10) Landings (negative static balance).

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–7 *Quality of performance (FAA policies which apply to sec. 22.11 (h)).* The applicant will be required to demonstrate his ability to exercise reasonable judgment and smoothness in all required flight maneuvers. Exercise of reasonable judgment will be demonstrated when the conduct of the flight maneuver results in compliance with Part 60 of this subchapter, avoidance of critical situations

[1] 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. (25 cents).

[2] See app. A for Guide to Satisfactory Performance of Required Maneuvers.

which require corrective action by the agent or examiner to maintain continued safe operation, and the observance of accepted good operating practices for flight conditions encountered.

(20 F. R. 7326, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–8 *Conduct of flight test (FAA policies which apply to sec. 22.11 (h)).* The flight test will be conducted by an Aviation Safety Agent or a private or commercial lighter-than-air pilot examiner. The flight test, including all maneuvers, will be discussed thoroughly with the applicant so as to insure complete understanding of what is expected.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–9 *Military competence requirements—written examination—private lighter-than-air pilot (FAA policies which apply to sec. 22.11 (i)).* An applicant for a private lighter-than-air pilot certificate based on military competence will be required to accomplish satisfactorily within one hour an examination on Parts 43 and 60 of the Civil Air Regulations with a passing grade of not less than 70 percent.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–10 *Documentary evidence acceptable for issuance of certificate based on military competence (FAA policies which apply to sec. 22.11 (i)).*

(a) An official identification card indicating that the applicant is a member of the armed forces of the United States or a civilian employee of the ferry or transport services thereof is acceptable documentary evidence. Documentary evidence of flight status will consist of (1) official orders to solo flight status, or (2) a copy of USAF Form 5 or a copy of a USN flight log properly endorsed to show solo flight status, or (3) official orders showing graduation from and rating as a lighter-than-air pilot by a military flying school, or (4) a copy of orders showing duty involving flying as a rated lighter-than-air pilot, or (5) a properly executed Certificate of Pilot Status, Form ACA–356, signed by the appropriate commanding officer.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.11–11 *Evidence of military discharge or release—private lighter-than-air pilot (FAA policies which apply to sec. 22.11 (i)).* Documentary evidence of honorable discharge or release from the armed forces should consist of an original or photostatic copy of such discharge or release. Persons discharged from the service or removed from flight status for reasons of flight deficiency, for the good of the service, or as a result of disciplinary action will not be issued a lighter-than-air pilot certificate on the basis of military competency.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12 *Commercial lighter-than-air pilot Certificate.* To be eligible for a commercial lighter-than-air pilot certificate an applicant shall comply with the following requirements:

(a) *Age.* 18 years is the minimum age for the issuance of a commercial lighter-than-air pilot certificate. If applicant be less than 21 years of age at the time of making application, he shall submit with his application the written consent of either parent, or legal or natural guardian to the issuance of the pilot certificate sought.

(b) *Character.* Applicant shall not be temperamentally unsuited for flying.

(c) *Citizenship.* An applicant for a lighter-than-air pilot certificate with commercial rating may be a citizen of any country or a person without nationality.

(d) *Education.* Applicant shall be able to read, speak, write, and understand the English language.

(e) *Physical condition.* Applicant 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.

(f) *Aeronautical knowledge.* The same as in section 22.11 (f) and, in addition, the applicant shall pass a written examination on the theory and practice of flight, the main-

tenance of nonrigid airships and the maintenance and proper use of airship power units, the use of such instruments and other navigational aids, both in airships and on the ground, necessary for the navigation of airships by instrument, and meteorology as applied to weather analysis and forecast.

(g) *Aeronautical experience.* Applicant shall show a total of at least 200 hours of flight time actually at the controls of airships of which at least 5 hours shall have been logged within the 60 days immediately preceding the date of the filing of the application and including:

(1) Not less than 50 hours in solo flight;

(2) Not less than 10 hours in cross-country flight;

(3) Not less than 10 hours in flight during the hours of darkness;

(4) Not less than 20 hours of instrument instruction and practice in flight: *Provided,* That not more than 10 hours of this requirement may be instruction and practice under simulated conditions not in flight when approved by the Administrator; and

(5) In lieu of not to exceed 50 hours of the 200-hour total flight time requirement, applicant may show an equal or greater amount of flight time while participating as a crew member when acceptable to the Administrator.

(h) *Aeronautical skill.* Same as in section 22.11 (h) except that:

(1) In the maneuvers required by section 22.11 (h) (1) the altitude of the ship shall not vary up or down in excess of 100 feet of the assigned flight altitude.

(2) In the maneuvers required by section 22.11 (h) (2) ascents and descents at rates up to 1,200 feet per minute shall be made under the same pressure limitations.

(3) Applicant shall also demonstrate satisfactorily his ability to perform, solely by instrument, the following:

(i) Straight, level flight for given period of time;

(ii) Moderate 180- and 360-degree precision turns in both directions;

(iii) Ascents and descents at rates up to 1,000 feet per minute;

(iv) Climbing and diving turns and recovery therefrom;

(v) Estimating arrival time taking into account wind, air speed, and drift while in flight or under simulated conditons;

(vi) Such other maneuvers as the Administrator deems necessary.

(i) *Radio skill.* Applicant shall demonstrate satisfactorily his ability to perform while in flight the following:

(1) Tuning radio;

(2) Orientation;

(3) Following radio range;

(4) Locating cone of silence;

(5) Letting-down-through on the range by a satisfactory airship instrument approach procedure for the particular airport used in connection with the test; and

(6) Such other maneuvers as the Administrator deems necessary.

(j) *Military competence.* An applicant for a commercial lighter-than-air pilot certificate shall be deemed to have met the aeronautical knowledge, experience, and skill requirements for the issuance of such certificate, if he passes a written examination on Parts 43 and 60 and presents reliable documentary evidence showing:

(1) That he is a member of the armed forces of the United States or a civilan employee of the ferry or transport services thereof, and has been on active duty on solo flying status as a rated lighter-than-air pilot or the equivalent for a period of at least 6 consecutive months prior to the date of application or has, within 12 months preceding the date of application, been graduated from and rated as a lighter-than-air pilot by a military flying school; or

(2) That he has been honorably discharged or released from such forces, and had been on active duty on solo flying status as a rated lighter-than-air pilot or the equivalent for a period of 6 consecutive months preceding such discharge or release or had been graduated from and rated as a lighter-than-air pilot by a military flying school: *Provided,* That if he has been honorably discharged or released from such forces for a period longer than 12 months preceding

the date of application, he shall pass the flight test prescribed by section 22.12 (h).

22.12–1 *Evidence of meeting physical standards (FAA policies which apply to sec. 22.12 (e)).* The Administrator, or his representative, will accept a first- or second-class medical certificate issued within 12 months preceding the date of the application as evidence of the applicant's meeting the physical standards.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–2 *Color deficiency limitation (FAA policies which apply to sec. 22.12 (e)).* 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 test authorized by the FAA Civil Air Surgeon, AS–1, Washington 25, D.C.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–3 *Demonstration of aeronautical knowledge—commercial lighter-than-air pilot (FAA policies which apply to sec. 22.12 (f)).* The applicant for a commercial lighter-than-air pilot certificate will be required to pass a written examination provided by the Administrator. A passing grade of at least 70 percent is required. Applicants who pass the written examination will be given a report of grade achieved. This report, and reports previously issued, will be accepted within a maximum period of 24 months from date of issuance as evidence of having met this certificate requirement.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–4 *Written examination (FAA policies which apply to sec 22.12 (f)).*

(a) The written examination for commercial lighter-than-air applicants will consist of the commercial pilot and instrument rating examinations. Subjects covered are as follows:

(1) Civil Air Regulations, including both visual and instrument flight rules.

(2) Navigation by dead reckoning, pilotage, and by radio.

(3) Meteorology.

(4) General servicing and operation of airships.

(b) The applicant will be required to pass the written examination before the practical examination can be taken. Written examinations will be valid for the issuance of a commercial lighter-than-air certificate for a period of 24 months.

(c) An applicant who holds a valid heavier-than-air commercial pilot certificate will be required to pass only the general servicing and operation of airship and the instrument examination.

(d) An applicant who holds a valid heavier-than-air commercial pilot certificate with an instrument rating will be required to pass only the general servicing and operation of airships.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–5 *Prerequisite for taking written examination (FAA policies which apply to sec. 22.12 (f)).* To be eligible to take the commercial lighter-than-air written examination, an applicant will be required to hold either a private lighter-than-air pilot certificate or a valid student lighter-than-air certificate which has been endorsed for solo and cross country.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–6 *Evidence of flight experience (FAA policies which apply to sec. 22.12 (g)).* Flight experience required by section 22.12 (g) of this part should be substantiated by a logbook maintained in accordance with section 22.32 (f) of this part.

(20 F. R. 7327, Oct. 1. 1955, effective Nov. 15, 1955.)

22.12–7 *Flight test (FAA policies which apply to sec. 22.12 (h)).*

(a) Applicant will be required to successfully accomplish the following maneuvers:[3]

(1) Ground handling and mooring.
(2) Preflight check.
(3) Runups.
(4) Takeoffs.
(5) Ascents.
(6) Turns (right and left) and figure 8's.
(7) Straight and level flight.
(8) Precision turns (180° and 360°).

[3] See app. A for Guide to Satisfactory Performance of Required Maneuvers.

(9) Climbing turns.
(10) Diving turns.
(11) Descents.
(12) In flight ETA computations.
(13) Radio operation and tuning.
(14) Radio orientation.
(15) Beam bracketing and tracking.
(16) Locating cone of silence.
(17) Traffic control and approach procedure.
(18) Landings (positive static balance).
(19) Landings (negative static balance).

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–8 *Quality of performance (FAA policies which apply to sec. 22.12 (h)).* The applicant will be required to demonstrate his ability to exercise reasonable judgment and smoothness in all required flight maneuvers. Exercise of reasonable judgment will be demonstrated when the conduct of the flight maneuver results in compliance with Part 60 of this subchapter, avoidance of critical situations which require corrective action by the agent or examiner to maintain continued safe operation, and the observance of accepted good operating practices for flight conditions encountered.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–9 *Conduct of flight test (FAA policies which apply to sec. 22.12 (h)).* The flight test will be conducted by an Aviation Safety Agent or a commercial lighter-than-air pilot examiner. The test, including all maneuvers, will be discussed thoroughly with the applicant so as to insure complete understanding of what is expected.[4]

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–10 *Radio skill (FAA policies which apply to sec. 22.12 (i)).* Final approach procedures for airplanes need not necessarily be followed by lighter-than-air applicants. An applicant may elect to consider his initial approach as a final approach and go direct to the airport, if such procedure does not require more than 90° of turn over the station. Orientation and approach procedures will be discussed prior to the flight test. Orientation and approach may be made utilizing either LF or VHF range facilities.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–11 *Military competence requirement—written examination—commercial lighter-than-air pilot (FAA policies which apply to sec. 22.12 (j)).* An applicant for a commercial lighter-than-air pilot certificate based on military competence will be required to accomplish satisfactorily within one hour an examination on Parts 43 and 60 of the Civil Air Regulations, with a passing grade of not less than 70 percent.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–12 *Documentary evidence acceptable for issuance of certificate based on military competence (FAA policies which apply to sec. 22.12 (j)).*

(a) An official identification card indicating that the applicant is a member of the armed forces of the United States or a civilian employee of the ferry or transport services thereof is acceptable documentary evidence. Documentary evidence of flight status will consist of (1) official orders to solo flight status, or (2) a copy of USAF Form 5 or a copy of a USN flight log properly endorsed to show solo flight status, or (3) official orders showing graduation from and rating as a lighter-than-air pilot by a military flying school, or (4) a copy of orders showing duty involving flying as a rated lighter-than-air pilot, or (5) a properly executed Certificate of Pilot Status, Form ACA–356, signed by the appropriate commanding officer.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.12–13 *Evidence of military discharge or release—commercial lighter-than-air pilot (FAA policies which apply to sec. 22.12 (j)).* Documentary evidence of honorable discharge or release from the armed forces should consist of an original or photostatic copy of such discharge or release. Persons discharged from the service or removed from flight status for reasons of flight deficiency, for the good of the service, or as a result of disciplinary action will not be issued a lighter-than-air pilot certificate on the basis of military competency.

(20 F. R. 7327, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13 *Free balloon pilot certificate.* An applicant for a free balloon pilot certificate

[4] See app. A for Guide to Satisfactory Performance of Required Maneuvers.

which is not limited to the operation of hot-air balloons shall comply with the requirements of paragraphs (a) through (h) of this section. An applicant for a free balloon pilot certificate which is limited to the operation of hot-air balloons shall comply only with the requirements of paragraphs (a) through (e).

(a) *Age.* 17 years is the minimum age for the issuance of a free balloon pilot certificate.

(b) *Character.* Applicant shall not be temperamentally unsuited for flying.

(c) *Citizenship.* Same as section 22.10 (c).

(d) *Education.* Applicant shall be able to read, speak, write, and understand the English language.

(e) *Physical condition.* Same as section 22.11 (e).

(f) *Aeronautical knowledge.* Same as section 22.11 (f).

(g) *Aeronautical experience.* Applicant shall have made not less than 8 ascents of an average duration of 2 hours, including 6 ascents under the supervision of a certificated free balloon pilot, 1 ascent in control to an altitude of 10,000 feet under such supervision, and 1 ascent as the sole occupant of the balloon.

(h) *Aeronautical skill.* Applicant shall demonstrate satisfactorily his ability to pilot and maneuver a free balloon in actual solo flight.

22.13–1 *Written examination (FAA policies which apply to sec. 22.13 (f)).* Applicants for a free balloon pilot certificate will be required to pass the appropriate written examination furnished by the Administrator within 24 months prior to the date of issuance of the certificate. To pass the examination the applicant is required to answer correctly, within one hour, 45 of the 50 questions on the examination which covers Civil Air Regulations, meteorology, navigation, and general operation of free balloons.[5] The applicant will be required to pass the written examination before the practical examination can be taken.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13–2 *Prerequisite for taking written examination (FAA policies which apply to sec. 22.13 (f)).* Applicant will be required to hold a valid student lighter-than-air pilot certificate.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13–3 *Evidence of flight experience (FAA policies which apply to sec. 22.13 (g)).* Flight experience required by section 22.13 (g) of this part must be substantiated by a logbook maintained in accordance with section 22.32 (f) of this part.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13–4 *Flight test (FAA policies which apply to sec. 22.13 (h)).*

(a) Applicant will be required to successfully accomplish the following maneuvers:[6]

(1) Ground handling and mooring.
(2) Preflight checks.
(3) Takeoffs.
(4) Ascents.
(5) Descents.
(6) Landings (positive static balance).

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13–5 *Quality of performance (FAA policies which apply to sec. 22.13 (h)).* The applicant will be required to demonstrate his ability to exercise reasonable judgment in all required flight maneuvers. Exercise of reasonable judgment will be demonstrated when the conduct of the flight maneuver results in compliance with Part 60 of this subchapter, avoidance of critical situations, and the observance of accepted good operating practices for the flight conditions encountered.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.13–6 *Conduct of flight tests (FAA policies which apply to sec. 22.13 (h)).* Following successful completion of the written examination, the flight test will be conducted by an Aviation Safety Agent. The test, including all maneuvers, will be discussed thoroughly with

[5] Complete information on the coverage of the free balloon 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. (25 cents)

[6] See app. A for Guide to Satisfactory Performance of Required Maneuvers.

the applicant so as to insure complete understanding of what is expected.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

Lighter-Than-Air Pilot Certificates

22.20 *Application.* Application for a lighter-than-air pilot certificate shall be made upon the form prescribed and furnished by the Administrator.

(a) *Revocation.* No person whose lighter-than-air pilot certificate has been revoked shall apply for or be issued a pilot certificate for a period of 1 year after the revocation except as the order of revocation may otherwise provide.

(b) *Nontransferability.* A lighter-than-air pilot certificate is not transferable.

22.20–1 *Where to obtain forms and make application (FAA policies which apply to sec. 22.20).*

(a) Application forms are obtainable from a representative of the Administration or one of its regional, district, or field offices.

(b) An application for a lighter-than-air pilot certificate is to be presented in person to an Aviation Safety Agent or to a designated lighter-than-air pilot examiner.

(c) An applicant qualifying on the basis of military competency (see sec. 22.11 (i) and sec. 22.12 (j) of this part) is to present his application to an Aviation Safety Agent.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.21 *Duration.*

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

(d) The Administrator or his authorized representative may issue a temporary lighter-than-air pilot certificate for a period of not to exceed 3 months from date of issuance, subject to the terms and conditions specified therein by the Administrator.

(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.

22.21–1 *Reissuance of certificates held by aliens (FAA policies which apply to sec. 22.21 (c)).* Lighter-than-air pilot certificates or free balloon 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.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.21–2 *Issuance of temporary lighter-than-air pilot certificates (FAA policies which apply to sec. 22.21 (d)).* Temporary lighter-than-air pilot certificates are issued to qualified applicants by Aviation Safety Agents and designated lighter-than-air pilot examiners pending the examination of the applicants' records and the issuance of certificates of greater duration by the Administrator.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.22 *Recent experience requirements.*

(a) *General.*

(1) A student who has not piloted an airship within 90 days shall not pilot such aircraft in solo flight until he has passed a flight check given by a commercial lighter-than-air pilot and that fact has been endorsed by such pilot in the student pilot logbook.

(2) The holder of a private or commercial lighter-than-air pilot certificate shall not pilot an airship carrying passengers, unless within the preceding 90 days he has had at least 5 takeoffs and landings.

(b) *Night flight.* No person shall pilot a lighter-than-air aircraft carrying passengers during the period from one hour after sunset to one hour before sunrise, unless he has made at least 5 takeoffs and landings to a full stop during the hours of darkness within the preceding 90 days.

(c) *Instrument flight.* A pilot shall not pilot an airship under instrument flight rules, unless he has had at least 6 hours of instrument flight under actual or simulated instrument conditions during the preceding 6 calendar months. At least 50 percent of the above required time must have been accomplished in actual flight.

22.23 *Reinstatement.* A private or commercial lighter-than-air pilot certificate or a free balloon pilot certificate which was effective on or after January 1, 1942, and has expired, may be reinstated upon application to an authorized representative of the Administrator prior to February 1, 1948.

22.24 *Examinations and tests.*

(a) *General procedure.* The examinations and tests prescribed in this part shall be conducted by an authorized officer or employee of the Administrator or by a properly qualified person designated for the purpose by the Administrator. All examinations and tests will be held at such times and places as the Administrator may designate.

(b) *Physical examination.* Prior to taking a flight test for a lighter-than-air pilot certificate, an applicant shall have met the appropriate physical requirements within the time limitations hereinafter prescribed:

(1) *Private lighter-than-air pilot certificate.* Within the preceding 24 months.

(2) *Commercial lighter-than-air pilot certificate.* Within the preceding 12 months.

(c) *Reexaminations.*

(1) An applicant for a private or commercial lighter-than-air pilot certificate or for a free balloon pilot certificate who has failed to pass any prescribed theoretical examination may apply for reexamination at any time after 30 days of the day of failure or after he has received not less than 5 hours instruction on each subject of the examination failed from a certificated ground instructor rated for such subject and presents a statement from such instructor showing the amount of instruction given and stating that he deems the applicant qualified to pass the required examination in such subject.

(2) An applicant for a private or commercial lighter-than-air pilot certificate or for a free balloon pilot certificate who has failed to pass any practical examination or test may apply for reexamination only after he has logged at least 3 additional hours of flight time.

(d) *Aircraft used in tests.* The applicant shall furnish suitable certificated aircraft for any flight test required.

22.24–1 *Examinations and tests (FAA policies which apply to sec. 22.24).* Written examinations will be given only by Aviation Safety Agents. Flight tests may be conducted by Aviation Safety Agents or designated private or commercial lighter-than-air pilot examiners.

(20 F. R. 7328, Oct. 1, 1955, effective Nov. 15, 1955.)

22.25 *Change of address.* Within 30 days after any change in the permanent mailing address of a holder of a lighter-than-air pilot certificate, the holder shall notify the Administrator in writing of such change. Such notice shall be mailed to the Federal Aviation Agency, attention Aircraft and Airmen Records Branch, Washington 25, D. C.

22.26 *Termination of certificates.* All lighter-than-air pilot certificates issued to individuals other than United States citizens prior to September 27, 1950, shall expire on September 26, 1951, but they may be reissued with a duration of 12 months without further demonstration of technical competence.

Pilot Regulations

22.31 *Flight limitations and privileges.*

(a) *Student lighter-than-air pilot.*

(1) The holder of a student lighter-than-air pilot certificate shall not operate a free balloon in solo flight until:

(i) He has demonstrated thorough familiarity with the provisions of Part 60 of this subchapter dealing with contact flight by passing a written examination of such provisions and such fact has been certified to by his instructor on the student lighter-than-air pilot certificate;

(ii) He shall have had a minimum of six instruction flights in free balloons of not less than 1 hour duration each and such fact has been certified to by his instructor on the student pilot certificate.

(2) The holder of a student lighter-than-air pilot certificate shall not pilot an airship in solo flight until:

(i) He has demonstrated thorough familiarity with the provisions of Part 60 of this subchapter dealing with contact flight by passing a written examination of such provisions and such fact has been certified to by his instructor on the student lighter-than-air pilot certificate;

(ii) He shall have had a minimum of six instruction flights in free balloons of not less than 1 hour duration each and shall have logged at least 1 hour of actual solo flight in a free balloon and such fact shall be certified to by his instructor on the student lighter-than-air pilot certificate. If the student pilot possesses a free balloon pilot certificate such certification shall not be required;

(iii) He shall have had a minimum of 35 hours of dual instruction in airships which shall include level flight, right and left turns, landing and takeoffs, and shall be deemed competent by his instructor to make such flight, which fact shall be certified to by his instructor on the student lighter-than-air pilot certificate.

(3) The holder of a student lighter-than-air pilot certificate shall not pilot any lighter-than-air aircraft carrying any person other than a certificated commercial lighter-than-air pilot, a member of the crew, or another certificated student lighter-than-air pilot whose presence in the aircraft is authorized by the instructor under whose direction the flight is being made. Such person shall not pilot any lighter-than-air aircraft for hire.

(b) *Private lighter-than-air pilot.*

(1) The holder of a private lighter-than-air pilot certificate shall not pilot an airship carrying any persons or property for hire nor give any flight or instrument instruction therein.

(2) The holder of such certificate may pilot a free balloon for hire and may give flight instruction therein.

(c) *Commercial lighter-than-air pilot.* The holder of a commercial lighter-than-air pilot certificate may pilot for hire any lighter-than-air aircraft carrying passengers or property and may give either flying instruction or instrument instruction therein.

(d) *Free balloon pilot.* The holder of a free balloon pilot certificate shall not pilot any lighter-than-air aircraft except a free balloon but may pilot a free balloon for hire carrying passengers or property and give flight instruction therein.

(e) *Medical certificate and renewal.* Any person while piloting a lighter-than-air aircraft shall have on his person a medical certificate or other evidence satisfactory to the Administrator showing that he has met the physical requirements within the following time limits:

(1) Student pilot, private pilot, or free balloon pilot—24 calender months.

(2) Commercial pilot—12 calendar months.

22.32 *Miscellaneous.*

(a) *Display.* The holder of any lighter-than-air pilot certificate shall keep his certificate in his personal possession at all times when piloting lighter-than-air aircraft and shall present the same for inspection upon request of any passenger, any authorized officer or employee of the Administrator or Board and of any State or municipal official charged with the duty of enforcing local laws or regulations involving Federal compliance.

(1) *Medical certificate.* A medical certificate issued by an authorized medical examiner of the Administrator or other evidence satisfactory to the Administrator that the pilot has meet the appropriate physical

523719 O-59—2

requirements prescribed in this part shall be carried by such pilot while piloting aircraft.

(b) *Surrender.* The holder of a lighter-than-air pilot certificate shall surrender, upon request, such certificate to any officer or employee of the Administrator if it has been suspended or revoked or if it has expired.

(c) *Operation during physical deficiency.* The holder of a lighter-than-air pilot certificate shall not pilot any lighter-than-air aircraft during the period of any known physical deficiency which would render him during that period unable to meet the physical requirements with which he complied in order to secure his certificate.

(d) *Inspection.* An applicant for, or the holder of, a lighter-than-air pilot certificate shall offer full cooperation with respect to any inspection or examination which may be made of such person upon proper request by any authorized representative of the Administrator.

(e) *Simulated instrument flight.* No person shall pilot a lighter-than-air aircraft in flight under simulated instrument conditions unless a certificated lighter-than-air safety pilot shall be present at all times and have ready access to the controls and adequate vision from the aircraft.

(f) *Logbooks.* Every certificated lighter-than-air pilot and every person receiving flight instruction shall keep an accurate record of his flying time in a logbook in which the entries with respect to solo flying time shall be certified to by him and such entries respecting dual instruction shall have been certified to by the lighter-than-air pilot giving the instruction. This logbook shall be presented for inspection upon request and reasonable notice to any authorized representative of the Administrator or Board of any State or municipal officer enforcing local regulations or laws involving Federal compliance.

(1) *Form.* Such logbook shall be a bound record and the entries shall be accurate, legible, and in ink or indelible pencil so arranged as to facilitate easy reference thereto.

(2) *Content.* The logbook shall contain entries including at least the following: The date of flight; the make and model of the lighter-than-air aircraft flown; the aircraft identification mark; a statement classifying the type of flight (whether solo, dual instruction, instrument, or night flying time); the duration of the flight; the points between which such flight was made; and, in addition, when any flight results in serious damage to the aircraft, a notation to this effect.

(3) *Logging of flight time.* No flight time shall be logged as such unless the lighter-than-air aircraft flown is a public or certificated aircraft.

(4) *Logging of instrument flight time.* No instrument flight time shall be logged as such unless the lighter-than-air aircraft is flown solely by reference to instruments either under actual or properly simulated flight conditions. Over-the-top flying shall not be logged as instrument flight time.

(Sec. 22.32–1, 22.32–2, 22.32–3, and 22.32–4 published in 20 F. R. 7328–9, Oct. 1, 1955, effective Nov. 15, 1955; deleted in 22 F. R. 236, Jan. 11, 1957, effective Jan. 11, 1957.)

Definitions

22.40 *Lighter-than-air aircraft.* A lighter-than-air aircraft is an aircraft whose support is chiefly due to buoyancy derived from aerostatic forces.

(a) *Free balloon.* A free balloon, as used in this part, shall mean a lighter-than-air-aircraft not restrained from free flight by any connection with the ground nor equipped with any power plant or propelling device, the ascent and descent of which may be controlled by releasing ballast or gas and the direction of flight of which is determined by the wind.

(b) *Airship.* An airship, as used in this part, shall mean a lighter-than-air aircraft other than a fixed or free balloon.

22.41 *Solo flight time.* Solo flight time, as used in this part, shall mean flight time when the pilot is in command and actually at the controls of the lighter-than-air aircraft regardless of the presence of any other

crew members in the aircraft who may act under his direction.

(a) *Actual solo flight time.* Actual solo flight time, as used in this part, shall mean flight time when the pilot is the sole occupant of the lighter-than-air aircraft.

22.42 *Dual instruction.* Dual instruction, as used in this part, shall mean flight time as a student at the controls of a lighter-than-air aircraft under the immediate direction of a pilot who is in command of the aircraft and authorized to give instruction therein.

22.43 *Pilot in command.* Pilot in command shall mean the pilot responsible for the operation and safety of the aircraft during the time defined as flight time.

22.44 *Flight time.* Flight time shall mean the total time from the moment the aircraft first moves under its own power for the purpose of flight until the moment it comes to rest at the end of the flight.

22.45 *Authorized representative of the Administrator.* An authorized representative of the Administrator shall mean any employee of the Federal Aviation Agency or any private person, authorized by the Administrator to perform any of the duties imposed upon him by the provisions of this part.

Appendix A

Guide to Satisfactory Performance of Required Maneuvers

The flight test items are explained below, with a guide as to required performance and important factors which apply to each.

Private and/or Commercial Lighter-Than-Air Pilot-Certificate

1. Ground Handling and Mooring.

(a) *Performance.*

(1) Demonstration of ability to "fly" the airship on the ground.

(2) Adequate knowledge of ballasting, trimming procedure, and pressure control.

(3) Correct use of controls and engines.

(b) *Important factors.*

(1) Smoothness and proper use of controls to minimize yawing and pitching.

(2) Smooth use of throttles to prevent ship from drifting astern or ahead.

(3) Careful attention to ballasting to insure that ship does not become too heavy or too light for the existing condition of field and weather.

(4) Trimming technique to insure maximum controllability while in the hands of ground crew and particularly prior to unmasting to insure that ship is not excessively bow heavy after unmasting. (Applies when this maneuver is executed incident to the test, otherwise applicant will be examined orally on this phase; i. e., unmasting.)

(5) Maintenance of adequate gas pressure in order that full control travel may be realized and bow mooring assembly (envelope) stresses minimized.

2. Preflight checks.

(a) *Ship hangared or moored to mast.*

(1) *Performance.*

(i) Inspection of:

(*a*) Exterior and interior of ship, including review of daily weightoff.

(*b*) Amount of fuel, oil, and ballast aboard, including standard ship equipment (loose gear).

(ii) Check of—

(*a*) Control tension and operation.

(*b*) Superheat.

(*c*) Radio.

(iii) Preparation for and actual starting and warming engines.

(iv) Adjustment and check of instruments.

(v) Check of ship's trim.

(vi) ICS or oral check to insure all stations manned, doors closed, sand ballast properly stowed and manned.

(2) *Important factors.*

(i) Thoroughness of all checks.

(ii) Use of checkoff list.

(b) *Ship in hands of ground crew.*

(1) *Performance.* A visual check of fuel and oil aboard, if ground handling conditions permit; otherwise, information furnished by the pilot being relieved will suffice, including his oral report of discrepancies, static condition, and trim of ship. (Desired information can be furnished by radio prior to the initial landing.)

(2) *Important factors.*

(i) Expeditious changing of crews, if ground handling of ship is difficult.

(ii) Presence of applicant on the field prior to the landing to observe landing conditions, if applicable.

3. Runups.

(a) *Performance.*

(1) Runup of engines to recommended power settings to scavenge the cylinders of accumulated exhaust gases and oil, for checking accessories, performance, and power output of engines.

(2) On ships equipped with a flight engineer's station, all operations, with the exception of the first one, normally will be performed by the flight engineer. When ship is in the hands of the ground crew, runup time for each engine shall be held to a minimum to facilitate ground handling. Normally, initial runup will be performed at the mast or in a hangar by a certificated mechanic and final runup by the pilot is for scavenging purposes and a final check of instruments, magnetos, and general performance. There may be occasions when ground handling conditions will be such that scavenging of cylinders will be the only operation practicable.

(b) *Important factors.*

(1) Smoothness of throttle use and absence of "torching."

(2) Instruments and accessories check.

(3) Testing controls for freedom and full travel.

(4) Check of traffic on the ground and in the air.

(5) Control-tower check for takeoff clearance, if required.

4. Takeoffs.

(a) *Performance.*

(1) Selection of suitable takeoff site.

(2) Smooth safe takeoff.

(b) *Important factors.*

(1) Traffic check.

(2) Selection of takeoff site and heading.

(3) Precise application of power during "up-ship" takeoff.

(4) Smooth application of power as rapidly as conditions will permit during a "heavy" takeoff.

(5) Maintenance of a positive angle of inclination consistent with the dictates of existing conditions (normally, 50 percent of the maximum angle permissible) in order that the ship may not become airborne with marginal controllability and adequate elevator control may be insured in the event of loss of power or sudden reduction in wind velocity.

(6) Use of dampers and blower as necessary in order to maintain adequate pressure, particularly if a gas pressure drop results from loss of superheat or other reasons.

(7) Direction of rudder pilot as necessary, should ship be equipped with two-pilot controls. (In such cases, one set of controls shall be manned by a certificated lighter-than-air pilot. Applicant's takeoff proficiency with rudder controls (K-type or equivalent) need not be demonstrated unless he shows lack of general proficiency, particularly with regard to laxity in directing the rudder pilot.)

(8) Smooth reduction in power as soon as well airborne and as soon as conditions permit.

(9) Coordination of controls.

(i) Light tail-wheel contact during takeoff is not considered disqualifying, particularly when the airship is "heavy," the takeoff area small, and the wind light. However, a negative angle of inclination during takeoff after controllability (adequate elevator response) is a disqualifying and hazardous maneuver in most instances.

5. Ascents.

(a) *Performance.*

(1) Ascents at rates up to 600 feet per minute (private), 1,200 feet per minute (commercial), maintaining gas pressure between 1 inch and 1¾ inches of water.

(2) Ship in prescribed trim (within reasonable limits) when ascent terminates at designated altitude.

(b) *Important factors.*

(1) Knowledge of the air system and its limitations.

(2) Trimming procedure.

(3) Coordination.

(4) Smooth change in ship's attitude.

(5) Ability to control rate of ascent within reasonable limits, particularly while flying in turbulent air.

(6) Full awareness of the necessity for adequate pressure control and the effect static trim has on controllability.

(i) The airship should be in static equilibrium or nearly so, when practicable. The precision with which the maneuvers can be executed will depend largely upon the turbulence of the air at the time of execution. Accordingly, no set formula can be prescribed for evaluation of results; experience is the best guide. Ascents should terminate well below pressure height in the interest of safety and in

order to insure normal operation of the air system.

6. Turns (right and left) and figure 8's.

(a) *Performance.*

(1) Turns (right and left) at cruising speed, at approximately minimum turning radius.

(2) Maintaining constant altitude (plus or minus 100 feet) provided turbulence is not excessive.

(b) *Important factors.*

(1) Coordination.

(2) Alertness (looking before turning left, and asking copilot to look before turning right).

(3) Rudder technique in controlling constantly changing drift angle.

(4) Ability to anticipate the need for elevator control to counteract the elevator effect produced by the rudder while turning.

(i) The method of determining the accuracy of turns is optional. Satisfactory results may be obtained by use of road intersections, turning within well-spaced section lines (using the four sides of the area for reference), using a prominent tree or structure as a pylon, etc. It is expected that right-hand turns made from the elevatorman position (K–type) will be executed with less precision than those executed from the rudderman position (K–type), and vice versa.

7. Straight and level flight.

(a) *Performance.*

(1) Flight at constant altitude (plus or minus 100 feet, provided turbulence is not excessive) at cruising speed, maintaining cruising gas pressure.

(2) Straight flight with reference to highways and section lines or a specified compass heading.

(b) *Important factors.*

(1) Coordination of controls.

(2) Maintenance of heading and altitude with a minimum of yawning and pitching.

(3) Smooth use of controls.

(4) Adjustment and maintenance of the trim of the ship for maximum controllability.

(5) Maintenance of gas pressure within cruising limits.

(i) The maneuver is for the purpose of checking the applicant's ability to control the ship in a smooth, well-coordinated manner, permitting changes in altitude, direction, and attitude consistent with the turbulence of the air encountered. The use of brute force, involving large angles of control movements which place undue stress on the ship, is to be avoided.

8. Precision turns (180° and 360°).

(a) *Performance.*

(1) Turns at constant altitude through 180° and 360° during actual or simulated instrument conditions with a degree of accuracy consistent with air conditions encountered.

(2) Maintenance of gas pressure of not less than 1 inch and not more than 1¾ inches of water.

(b) *Important factors.*

(1) Altitude.

(2) Pressure.

(3) Coordination.

(4) Accuracy of heading.

9. Climbing turns.

(a) *Performance.*

(1) Turns while climbing at 400 to 600 feet per minute, maintaining gas pressure specified in *Ascents.*

(2) Starting and terminating the maneuver with the ship in approximately neutral dynamic trim.

(b) *Important factors.*

(1) Coordination.

(2) Alertness.

(3) Pressure control and trim.

(i) Reasonable deviation from prescribed rate of ascent is permitted, particularly if the air is turbulent.

10. Diving turns.

(a) *Performance.*

(1) Turns while descending at 400 to 600 feet per minute, maintaining gas pressure specified in *Ascents.*

(2) Starting and terminating the maneuver with the ship in approximately neutral dynamic trim.

(b) *Important factors.*

(1) Coordination.

(2) Alertness.

(3) Pressure control and trim.

(i) Reasonable variation in the rate of descent is permitted, particularly if the air is turbulent.

11. Descents.

(a) *Performance.* Descents at rates up to 600 feet per minute (private) and 1,200 feet per minute (commercial) maintaining gas pressure between 1 inch and 1¾ inches of water, terminating the maneuver with ship in approximately neutral dynamic trim.

(b) *Important factors.*

(1) Coordination.

(2) Pressure and trim.

(i) Reasonable variation in the rate of descent is permitted.

12. Estimated time of arrival (ETA) in-flight computation.

(a) *Performance.*

(1) ETA in-flight computation of an actual or theoretical flight of not less than 100 miles at cruising speed along an established airway at an altitude of not more than 2,000 and not less than 1,000 feet.

(2) Consideration of weather and conditions anticipated.

(3) Estimation of fuel requirement for the flight.

(b) *Important factors.*

(1) Applicant's knowledge of performance characteristics of the ship being flown.

(2) Interpretation of weather reports and ability to estimate weather trends likely to occur during the period of the flight.

(3) Judgment.

13. Radio operation and tuning.

(a) *Performance.*

(1) Knowledge of how to tune to a prescribed frequency (station) and peak the signal, to differentiate voice from course signals when tuned to a range station, to recognize an improperly tuned signal, and to recognize distortion due to improper use of volume control.

(2) Correct use of the radio on builds and fades by proper use of volume control, if used in radio range navigation.

(3) Recognition of the effect of excessive volume in analyzing signals in the bisignal or twilight zone.

(b) *Important factors.*

(1) Correct tuning.

(2) Use of volume control.

14. Radio orientation.

(a) *Performance.* Orientation by any recognized method which is practicable under all conditions on the particular range being used and which will accomplish orientation in the least possible time.

(b) *Important factors.*

(1) Identification of range an on-course signals.

(2) Recognition of fades, builds, and bisignals.

(3) Selection of best orientation method.

(4) Precise execution of orientation.

(5) Technique in bracketing range legs.

(6) Control of signal volume.

(7) Proper maneuvering of airship throughout as to altitude, heading, trim, and pressure.

(8) Cone identification.

(9) Coordination.

(10) Judgment.

15. Beam or radial bracketing and tracking.

(a) *Performance.*

(1) Flight along a given range leg with a minimum variation of heading in order to maintain position relative to the range leg.

(2) Estimation of drift and average heading.

(b) *Important factors.*

(1) Position.

(2) Heading.

(3) Constant altitude.

(4) Trim.

(5) Pressure.

(6) Estimation of drift and average heading.

(7) Radio operation (use of manual volume control).

16. Locating cone of silence or station.

(a) *Performance.* Recognition of the cone of silence or station by an accepted method.

(b) *Important factors.*

(1) Elimination of false cones.

(2) Accuracy of cone.

(3) Recognition of build and fade.

(4) Correct heading after leaving cone.

17. Traffic control and approach procedure.

(a) *Performance.*

(1) Standard airship instrument approach (letdown) procedure for airport being used.

(2) ADF approach (optional).

(i) Applicant will be required to use only such radio equipment as has been allotted to him. Radio failures and other unusual conditions may be included at any time during the approach.

(b) *Important factors.*

(1) Obtaining clearance.

(2) Following such clearance explicitly.

(3) Timing (allowance being made for existing wind conditions).

(4) Adherence to approved or agreed upon minimums for approach and pull-up.

(5) Proper maneuvering of ship throughout as to attitude, altitude, trim, pressure, and headings.

(6) Judgment used in any given unusual conditions.

(7) Reaction and ability to make quick, accurate corrections.

(8) Timing and smoothness of control.

(i) There may be occasions when deviation from the standard approach procedure will be required or desirable because of existing conditions, such as making a descent with precise rate control and zero ground speed, maintaining position over a range, until contact is established.

18. Landings (positive static balance).

(a) *Performance.*

(1) Normal landing with the ship 200 pounds statically heavy, placing the ship in the hands of the ground crew with minimum forward speed.

(2) Termination of landing (ground speed zero) with ship in positive or neutral trim.

(3) Weighoff and trim check prior to the final approach, using a checkoff list (if required for the type).

(b) *Important factors.*

(1) Weighoff and trim technique.

(2) Smooth, coordinated use of controls.

(3) Tower clearance (if required).

(4) Precise use of throttles.

(5) Touching down or placing ship in the hands of the crew with minimum forward speed, pressure normal, and control adequate.

(6) Static trim upon completion of landing.

(7) Judgment, particularly with regard to the applicant's decision to land on the wheel or to the crew as a result of landing conditions.

19. Landings (negative static balance).

(a) *Performance.*

(1) Normal landing with ship 200 pounds statically light placing the ship in the hands of the ground crew with minimum forward speed consistent with existing wind conditions.

(2) Weighoff and trim check prior to the final approach, using a checkoff list (if required for the type).

(b) *Important factors.*

(1) Weighoff and trim technique.

(2) Smooth, coordinated use of controls.

(3) Tower clearance (if required).

(4) Precise use of throttles.

(5) Placing ship in the hands of the crew with minimum forward speed, with pressure normal, and with adequate control.

(i) Negative, nose heavy, trim should be only sufficient to permit landing with maximum controllability, trimmed as near neutral as conditions permit.

Free Balloon Pilot Certificate [1]

1. Ground handling and mooring.

(a) *Performance.* Demonstration not required; oral examination acceptable.

(1) Knowledge of wind effect on balloon during ground handling.

(2) Weighoff.

(3) False weighoff.

(4) Ripcord use.

(b) *Important factors.*

(1) Precise weighoff procedure.

(2) Ability to recognize a false weighoff, or make sufficient weighoffs to insure that a true one is obtained.

(3) Use of ripcord to minimize damage to balloon and injury to personnel.

2. Preflight checks.

(a) *Performance.*

(1) Visual inspection of accessible portions of the balloon and rigging.

(2) Distribution of ballast.

(3) Check of equipment and instruments.

(4) Location of ripcord with relation to valve cord in order that there be no question concerning the identity of each.

(5) Check of gas valve to insure no sticking in open or partially open position and removal of appendix tieoff.

(b) *Important factors.*

(1) Thoroughness of all checks.

4. Takeoffs.

(a) *Performance.*

(1) Selection of suitable takeoff site.

(2) Well-controlled, safe takeoff.

(b) *Important factors.*

(1) Adjustment of balloon's static condition to suit existing condition of wind, terrain, and proximity of obstructions.

(2) Timing of pilot's release order, particularly if balloon envelope is oscillating.

(3) Use of drag rope, when expedient.

5. Ascents.

(a) *Performance.*

(1) Ascents at rates consistent with the quantity of ballast available.

(b) *Important factors.*

(1) Ability to ascend so as to maintain a safe altitude with the least expenditure of ballast (as is necessary with an airship in the event of engine failure or the making of repairs in flight).

(2) Ability to maintain constant altitude or slow rate of ascent when feasible.

11. Descents.

(a) *Performance.* Descents with a minimum expenditure of gas and ballast, using the drag rope when practicable.

(b) *Important factors.*

(1) Knowledge of the effect of superheat.

(2) Timed operation of gas valve.

(3) Judicious use of ballast.

18. Landings (positive static balance).

(a) *Performance.* Normal landing in a smooth, well-controlled manner, either by valving gas or valving gas and operating the rip panel ("ripping").

(b) *Important factors.*

(1) Use of drag rope, when practicable.

(2) Timing.

(3) Valve and ballast technique.

(4) Judgment.

[1] Maneuvers are numbered in accordance with the outline established for Private and for Commercial Lighter-Than-Air Pilot Certificate Flight Test. (See page 15.)

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