U. S. DEPARTMENT OF COMMERCE
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Civil Aeronautics Administration
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Airman Agency Certificates

Ground and Flying School Ratings

Revised May 15, 1946

Civil Aeronautics Manual 50

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 15 cents

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INTRODUCTION

This manual prescribes in detail the minimum facilities, equipment, personnel, and curricula that must be provided by a civilian aviation school to be eligible for certificate and rating as an air agency. Such curricula, facilities, equipment, and personnel will satisfy the requirements of Part 50 of the Civil Air Regulations.

One of the major differences to be found in this manual as compared to prior requirements is the complete elimination of ground school requirements from primary and commercial flying schools. There is no longer any connection between the two, either from a standpoint of certification or attendance. An approved primary or commercial flying school graduate is not required to have completed an approved ground school course. Obviously, the accomplishment of such a course is desirable; however, the flying school is in a position to determine whether it shall have such a requirement or provide some other means of insuring that its students successfully accomplish the prescribed written examinations prior to graduation.

An applicant meeting the prescribed requirements may obtain an air agency certificate with a rating for any one or all of the following:

1. Basic ground school.
2. Advanced ground school.
3. Primary flying school.
4. Commercial flying school.
5. Instrument flying school.
6. Flight instructor school.

F. M. LANTER,
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Airman Agency Certificates

Ground and Flying School Ratings

Section I.—GROUND SCHOOL RATING

A. GENERAL REQUIREMENTS

The following general requirements apply to all types of ground school ratings:

The applicant must provide a space of permanent nature properly heated, lighted, and ventilated. The building should contain adequate toilet and washroom facilities. Ample separate space must be provided for classrooms and equipment, sufficient to accommodate the largest number of students scheduled for attendance at any one time. If more than one classroom is provided, at least one of them must accommodate a minimum of 20 students. Each student should be provided with a desk-chair or chair and desk suitable for writing examinations. Classrooms shall be maintained in neat, clean, and renovated condition, and shall be lighted with illumination of sufficient intensity to promote study without eyestrain. A blackboard large enough for explanation by means of diagrams should be provided.

B. BASIC GROUND SCHOOL RATING

1. EQUIPMENT

Sufficient texts and related reading material must be available, covering Civil Air Regulations, engines, aircraft, meteorology, navigation, and radio.

2. PERSONNEL

Persons employed as ground instructors must be certificated in accordance with Part 50 of the Civil Air Regulations.

3. CURRICULUM

The applicant must provide a basic ground instruction curriculum satisfactory to the Administrator. Such curriculum must include not less than 50 hours instruction in the subjects listed below, followed by examination on each subject:

a. Civil Air Regulations

At least 10 classroom hours instruction to include:

(1) Part 01 of Civil Air Regulations: Airworthiness certificates, transferability, certificate rules, logbooks, accidents, periodic inspection, registration, and transfer.
(2) Part 20: Pilot Certificates.
(3) Part 43: General Operation Rules.
(4) Part 60: Air Traffic Rules.
(5) Air Traffic Control Practices and Procedures.
(6) Part 98: Definitions.

b. Meteorology

At least 15 classroom hours of instruction to include:

(1) Recognition of weather, icing, fog, and frontal conditions.
(2) General cloud formations.
(3) Study of weather maps, teletype sequences, and elementary weather forecasting.
(4) Pressure areas, including motion of air masses, isobars, and winds aloft.
(5) Humidity and its relation to visibility.
(6) Temperature dew point relationship, and precipitation.
(7) How to use knowledge of meteorology in private flying in promoting safety.

c. Aerial Navigation

At least 15 classroom hours of instruction to include:

(1) Study of the Sectional Aeronautical Chart, including explanation of how charts are made, with emphasis on the Lambert Conformal Projection.
(2) The navigational methods, including piloting, dead reckoning, and radio.
(3) Navigational instruments: types, errors, and practical usage.
(4) Practical navigation problems: dead reckoning, piloting, ETA's, flight plans, wind-triangle solutions using a simple computer, and maximum endurance problems.

d. Radio

At least 5 hours of instruction to include:

(1) Explanation of radio aids to flight.
(2) Use of simple receiver and transmitter, including tuning and voice procedure.
(3) Morse code: memorizing of code, sufficient to provide ready recognition of radio range identification signals.
(4) Use of loop antenna in homing on broadcast and other stations.
(5) Distress signals and visual signals (on parking line).

e. General Service of Aircraft

At least 5 hours of instruction to include:

(1) Care of aircraft: line inspection, procedures, and general safety precautions.
(2) Care of engines: octane ratings, detonation, warming up and idling precautions, full throttle operation, and icing.
(3) Operations limitations: performance characteristics as effected by full load, altitude, and temperature conditions. Reason for placard limits, acceleration limits, flight in rough air, and other restrictions in the interest of safety.
(4) Inspections required.
(5) Use of aircraft instruments and errors inherent in the instrument.
(6) Use and care of parachutes.
(7) Use of logbooks.
(8) Explanation of major and minor repairs.
(9) Explanation of aircraft operation record.

C. ADVANCED GROUND SCHOOL RATING

1. EQUIPMENT

In addition to the equipment required in a basic ground school, Section B, page 1, the applicant shall furnish the following:

a. Two wing panels, each of a different construction.

b. Two different makes of aircraft engines, one of which may be liquid cooled. One should be cut down to show engine construction and operation.

c. Sufficient material to instruct in the theory and use of modern high-powered aircraft components. This should include, either in model or blueprint diagram form:

(1) Controllable pitch propellers, electric and hydraulic.
(2) Flaps.
(3) Retractable landing gear.
(4) Manifold pressure gauge.
(5) Superchargers.
(6) Cowl flaps.
(7) Oil temperature control.
(8) Instruments (dual tachometers, dual manifold pressure gauge, temperature pressure group, gyro horizon, gyro compass, turn and bank indicator, rate of climb indicator, radio, compass, and automatic pilot.
(9) Deicing equipment.
(10) Electrical systems, including generators, voltage regulators, aviation batteries, fuses, and circuit breakers.
(11) Accessories, including fuel pumps, oil pumps, magnetos.

2. PERSONNEL

Persons employed as ground instructors must be approved in accordance with Part 50 of Civil Air Regulations.

3. CURRICULUM

The applicant must provide an advanced curriculum which is satisfactory to the Administrator. Such curriculum must include not less than 100 hours of instruction in the subjects listed below.

a. Civil Air Regulations

At least 10 classroom hours instruction to include:

(1) Part 01 of Civil Air Regulations: Airworthiness certificates, transferability, certificate rules, logbooks, accidents, periodic inspection, registration, and transfer.
(2) Part 20: Pilot Certificates.
(3) Part 43: General Operation Rules.
(4) Part 60: Air Traffic Rules.
(5) Air Traffic Control Practices and Procedures.
(6) Part 98: Definitions.

b. Meteorology

At least 20 classroom hours of instruction to include:

(1) Recognition of weather.
(2) Detailed study of cloud formations and accompanying weather.
(3) Weather map analysis.
(4) Amateur weather forecasting based on successive teletype sequences. This should include sufficient study of teletyped weather data to permit ready interpretation of teletype symbols.
(5) Knowledge of air masses, meaning of isobars and their relation to winds aloft.
(6) Pressure areas, including fronts.
(7) Fog: kinds of fog, when to expect fog, and dissipation thereof.
(8) Icing: when to expect icing, kinds of icing, and how to avoid it.
(9) Study of relationship of temperature dew point in forecasting.

c. Aerial Navigation

At least 20 classroom hours instruction to include:

(1) Study of map and chart making, including various types of projections, with emphasis on the Lambert Conformal Projection.
(2) Study of all forms of navigational methods, with explanation of each, including piloting, dead reckoning, radio, and instrument. Emphasis on map reading in piloting, and use of all instruments in dead reckoning.
(3) Use of radio in navigation, including radio direction finder, radio range, and loop antenna. (See Radio; courses should not overlap, but should complement each other.)
(4) Study of all navigational instruments and their limitations.
(5) Practical navigation problems: planning a flight, laying and measuring a course, solution of wind triangle with computer, estimating ETA, filing flight plan, check-points, fuel consumption, emergencies, unexpected headwinds, alternate landing field, and maximum endurance under economy cruising conditions.
(6) Use of Civil Aeronautics Administration publications (Airman's Guide, etc.).

d. Radio

At least 10 classroom hours of instruction on this subject to include:

(1) Kinds of radio receivers, tuning, explanation of frequencies, effect of static and night effects.
(2) Radio transmitters: how to use, voice procedures, Federal Communications Commission regulations, antennas and microphone technique.
(3) Code: reception of signals of identification of radio ranges with immediate recognition of call letters.
(4) Theory of loop antenna in homing and in establishing a radio fix.
(5) Radio range and its use, including method of simple orientation procedure.
(6) Use of airway Aids to Navigation: flight plans, radio markers, beacons, aeronautical lights, and airport traffic control.
(7) Distress signals.

e. Aircraft Engines

At least 20 hours instruction to include:

(1) Principles of the internal combustion engine.
(2) Fuels: octane rating and detonation.
(3) Construction and design: metals, tolerances, compression ratios, and horsepower.
(4) Classification and construction of engine components.
(5) Lubrication and cooling systems.
(6) Carburetion and ignition.
(7) Propellers: fixed, adjustable, controllable, and constant speed, full-feathering.
(8) Disassembly.
(9) Inspection and maintenance.
(10) Overhaul, repair, timing, and assembly.
(11) Trouble shooting.
(12) Logbooks and other records.
(13) Practices: precautions in the operation of engines, such as starting, warm-up, idling, testing, and full-throttle operation.

f. Aircraft

At least 20 hours on this subject to include:

(1) Aerodynamics and theory of flight.
(2) Factors of aircraft design, construction, and rigging.
(3) Aircraft operation placards: necessity for limitations as to speed, load factors, rough air, gross load, and center of gravity limits; how to determine safe loadings, with C.G. limits.
(4) Aircraft construction and materials used.
(5) Repair and maintenance.
(6) Logbooks and records.
(7) Aircraft accessories.

D. CERTIFICATE OF ACCOMPLISHMENT

Upon completion of the instruction specified for either basic or advanced ground school, an examination covering each general subject should be given. Students obtaining a passing grade may be given a certificate of completion, specifying the courses, credit hours given, and grades received. For uniformity, the following form is suggested:

CERTIFICATE OF ACCOMPLISHMENT

THIS IS TO CERTIFY that _____,
(name)

_____, was graduated from the _____
(address) (basic—advanced)

_____ curriculum of the _____,
(basic—advanced) (school)

_____. Air Agency No. _____.
(address)

The record of this graduate is as follows:

COURSES SATISFACTORILY COMPLETED

Subject	*Credit Hours*	*Grade*

I CERTIFY that the above statements are true.

_____
(*School*)

_____
(*Signature*)

_____
(*Title*)

DATE:

SEAL:

E. BIBLIOGRAPHY

The following aids to study are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and may be purchased at the prices listed. Remittances must be by cash or money order.

Part 01 of CAR	Airworthiness Certificates	$0.05
Part 20 of CAR	Pilot Certificates	.05
Part 43 of CAR	General Operation Rules	.05
Part 50 of CAR	Airman Agency Certificates	.05
Part 60 of CAR	Air Traffic Rules	.05
Part 98 of CAR	Definitions	.05
Bulletin No. 5	Flight Instructor's Manual	.35
Bulletin No. 23	Civil Pilot Training Manual	.65
Bulletin No. 24	Practical Air Navigation	1.00
Bulletin No. 25	Meteorology for Pilots	.75
Bulletin No. 26	Aerodynamics for Pilots	.30
Bulletin No. 27	Pilots' Airplane Manual	.30
Bulletin No. 28	Pilots' Powerplant Manual	.75
Bulletin No. 29	Pilots' Radio Manual	.25
Bulletin No. 31	Patter for Elementary Flight Maneuvers	.15
Bulletin No. 32	Fundamentals of Elementary Flight Maneuvers	.20
Path of Flight	(Elementary Text on Air Navigation)	.40
Realm of Flight	(Elementary Textbook on Weather for the Pilot)	.60

Section II.—FLYING SCHOOL RATING

A. GENERAL REQUIREMENTS

The following general requirements apply to all types of flying school ratings:

1. Office Facilities

Applicant must provide suitable space of a permanent nature, properly heated, lighted, and ventilated, to house adequately equipment necessary to the proper conduct of business matters and the preparation of records appropriate to the flight operation. (This equipment should include chairs, desks, filing cabinets, and typewriters.)

2. Student Readyroom

A suitable space of a permanent nature must be provided, properly heated and lighted, to accommodate flight students receiving instruction. (This space must provide chairs, clothes racks or lockers, bulletin boards, and appropriate aeronautical charts.) In addition, adequate toilet and washroom facilities must be provided.

3. Hangar Facilities

The applicant must provide a hangar or hangars of substantial construction adequate to house all flight equipment used in the approved school operation, and all such flight equipment shall be continually housed therein. The hangar floor must consist of such material as wood, concrete, asphalt, brick, tile, or any other such surface not subject to rapid oil deterioration and permitting adequate cleaning.

4. Maintenance and Repair Facilities

A suitable space, properly heated and lighted, completely isolated, or separated from the storage hangar, preferably by fire-resistant walls, must be provided to conduct all necessary periodic inspections, repairs, and other maintenance functions. Sufficient tools, mechanical devices, and appropriate aircraft and engine manufacturers' manuals, must be provided to adequately perform all maintenance operations. In the event the shop space cannot accommodate the assembled aircraft, space may be provided in the storage hangar for the conduct of periodic inspections, if such space is adequately heated and

lighted and the aircraft may be completely isolated therein while undergoing such inspection. If the above facilities are not provided, a contractual agreement with a maintenance and repair agency, providing these facilities are acceptable to the Administrator, will be deemed adequate if such services and facilities are immediately available.

B. PRIMARY FLYING SCHOOL RATING

In addition to the general requirements listed in Part A (page 7) the applicant for primary flying school rating shall provide the following:

1. LANDING AREA

The applicant must show that a landing area is available for use in giving flying instruction. The landing area must have a sufficient number of landing strips or be an all-way field, providing 1,800 feet effective length and 300 feet width for take-offs and landings thereon within 30 degrees of the prevailing wind direction. Where such a landing strip is not provided, the landing area may be deemed adequate if the landing strips which are provided permit landings and take-offs within 30 degrees of the wind direction 75 percent of the time. The minimum effective length requirement specified above is a sea-level requirement and must be increased 1 percent for each 100 feet the landing area is above sea level. Where the landing area is only 300 feet in width, an additional 100 feet of width must be available for taxiing and parking of aircraft. The landing surface must be suitable for the safe take-off and landing of aircraft under normal weather conditions, and must be marked in accordance with the requirements prescribed by the Administrator. The landing area must have approaches permitting a 20-to-1 glide path to all required landing strips. Each required landing strip must be in such condition that an aircraft at any point thereon must be visible from any point on such landing strip. Where the required landing strips do not meet this requirement, such landing area may be approved provided there is installed a control tower of sufficient height that the entire landing area is visible, and traffic control is exercised by visual signals using an approved type light gun or radio. Individuals serving in the capacity of traffic controllers must be certificated as control tower operators.

In the event any of the required landing strips are less than 1,800 feet in effective length, but not less than 1,500 feet in actual length, such landing areas may be approved if the applicant demonstrates to the satisfaction of the Administrator that the flight equipment to be used will take off within 50 percent of the total landing strip length and will clear all obstacles in the take-off path by at least 50 feet. Such demonstration must be accomplished with the aircraft loaded to allowable gross, and under average wind conditions for the locality involved.

2. FLIGHT EQUIPMENT

All airplanes used for flight instruction under the terms of a flying school certificate must be properly certificated and registered in the name of the applicant or operated under a lease, the terms of which must be satisfactory to the Administrator. At least one such airplane must be provided for each 15 students regularly enrolled as certificated flying school students. Such airplane must be capable of carrying two persons and two parachutes without exceeding the gross weight limitations set forth in the Aircraft Operation Record, and must be suitable to perform the maneuvers necessary to accomplish the flight test prescribed for a private pilot certificate.

3. PARACHUTES

An applicant must have available at least two parachutes manufactured under a valid type certificate and maintained in accordance with the Civil Air Regulations. Sufficient additional such parachutes must be furnished to prevent undue delay in the normal progress of all students undergoing flight training.

4. PERSONNEL

a. Flight

Each person employed to give, or giving, flight instruction must hold a valid commercial pilot certificate and flight instructor rating.

b. Maintenance

Applicant shall have sufficient certificated personnel, either regularly employed or under contract, to maintain aircraft used for flight instruction in full airworthy condition at all times. Not more than five uncertificated personnel may be under the supervision of one aircraft and engine mechanic.

5. CURRICULUM

The applicant must provide a primary flight curriculum satisfactory to the Administrator. Such curriculum must include not less than 35 hours of flying time. The course must be arranged to give each student a minimum of 15 hours dual and 13 hours of solo flight time. A minimum of 8 hours dual instruction must be given prior to solo flight and is to be included in the 15 hours of required dual.

In the event two-control nonspinnable aircraft are to be used as flight equipment, the curriculum shall include not less than 25 hours of flying time, including a minimum of 12 hours of dual and 10 hours of solo flight time. A minimum of 5 hours of dual instruction must be given in this type of aircraft prior to solo flight and is to be included in the 12 hours of required dual.

Any curriculum to be satisfactory to the Administrator must include the following:

a. Before any flight instruction is started, ground instruction should be given each student in the following:

Familiarization with the airplane, including explanation of controls, throttle, instruments, fuel systems, brakes, instruction signals, use of safety belts, and the location of fire extinguisher and first-aid kit. The student should also be instructed regarding local and special air traffic rules and warned regarding propeller danger and the starting and running of engines without some qualified person at the controls.

b. Prior to solo flight, the student should also be given additional ground instruction on procedures and precautions to be observed in:

(1) Swinging propellers.
(2) Starting engines.
(3) Warming up engines.
(4) Stopping of engines.
(5) The line inspection of aircraft.
(6) The use and care of parachutes.

c. The dual instruction prior to solo should include both theoretical and practical instruction in:

(1) Taxiing (into wind, down wind, cross wind, and gusty wind).
(2) Orientation.
(3) Straight and level flight.
(4) Medium turns (introducing precision as soon as possible).
(5) Confidence maneuvers.
(6) Coordination exercises (elementary eights, "S" turns across road, etc.).
(7) Flying rectangular courses.
(8) Normal climbs and glides.
(9) Climbing and gliding turns.
(10) Take-offs.

(11) Landings (90-degree and 180-degree approaches to be introduced as soon as possible with explanation of key position).
(12) Emergency procedures.
(13) Stalls (power on and power off).
(14) Spins (if appropriate).

NOTE: Never exceed two turns in the spins and introduce demonstrations of possible inadvertent entries from steep turns, climbing turns, skids, etc. The meaning of crossing controls should be explained and students warned against control misuse.

d. The above should be followed by additional dual and solo practice in the foregoing as well as a suitable amount of dual instruction, periodic checks and solo practice on:

(1) Precision landings (90-degree and 180-degree side approaches).
(2) Spirals.
(3) Slips (forward).
(4) Stalls (power on and off).
(5) Slow flight (sufficient to thoroughly acquaint the student with aircraft characteristics at minimum controllable speed).
(6) Spins (if appropriate).
(7) Precision turns with shallow, medium, and steep banks.
(8) 720-degree power turns at maximum bank (steepest bank possible without loss of altitude).
(9) Medium (30-degree to 45-degree) figure eights on or around pylons.
(10) Dual and solo cross-country. A minimum of 2 hours' dual and 5 hours' solo cross-country experience should be provided in the curriculum. This must include a solo cross-country flight with two intermediate full-stop landings, one leg of which must be at least 100 miles in length.

e. Where flight instruction is given in a seaplane, the following preflight instruction should also be included in the curriculum:

(1) Explanation of float action.
(2) Retraction of water rudders.
(3) Determination of wind direction.
(4) Fundamentals of water handling.
(5) Fundamentals of aviation seamanship.
(6) Use of life preservers.
(7) General care of seaplanes.

f. Where seaplanes are used the following additional maneuvers should be included:

(1) Semistall and full stall landings.
(2) Power approaches and power landings given under average water conditions and on glassy water.
(3) Where practicable, landings and take-offs on various bodies of water such as a bay (tide action) and streams (currents).
(4) Precision sailing (with and without power).
(5) Precision docking, beaching, and mooring.
(6) Forced landings, executed to buoy markers.

Additional dual instruction and solo practice should follow to attain proficiency in all maneuvers. Instruction should be given on cross-wind landings and take-offs where practicable. Power approaches and landings should be demonstrated. A general review and check by the instructor, including a complete flight test on all maneuvers required in the prescribed private pilot's flight test, should be given.

The apportionment of dual and solo time and the amount of instruction and practice in each of the above maneuvers should be sufficient to enable the student to successfully demonstrate his proficiency in each to the degree required of a private pilot.

Discussions of maneuvers should be conducted as necessary before and after each flight, and explanations and precautions as outlined in Flight Instructor's Manual, Civil Aeronautics Bulletin No. 5, revised October 1940, and Civil Pilot Training Manual, Civil Aeronautics Bulletin No. 23, should be utilized.

C. COMMERCIAL FLYING SCHOOL RATING

1. Landing Area

Applicant must show that a landing area is available for use in giving flying instruction. The landing area must have a sufficient number of landing strips of not less than 1,800 feet effective length and 300 feet in width to permit take-offs and landings thereon within 30 degrees of the prevailing wind direction. The minimum effective landing strip length requirements, specified above, is a sea-level requirement and must be increased 1 percent for each 100 feet the landing area is above sea level. Where the landing area is only 300 feet in width, an additional 100 feet of width must be available for taxiing or parking of aircraft. The landing area surface must be suitable for the take-off and landing of aircraft under normal weather conditions, and must be marked in accordance with the requirements prescribed by the Administrator. The landing area must have approaches permitting a 20-to-1 glide path to all required landing strips. Each required landing strip must be in such condition that an aircraft at any point thereon must be visible from any other point on such landing strip. Where the required landing strips do not meet this requirement, such landing area may be approved provided there is installed a control tower of sufficient height that the entire landing area is visible, and traffic control is exercised by visual signals using an approved type light gun, or radio. Individuals serving in the capacity of traffic controllers must be certificated as control tower operators. Suitable boundary and obstruction lights must be provided. Portable lights may be used provided they are of adequate intensity and no fire hazard exists.

2. Flight Equipment

An applicant for commercial flying school rating must possess flight equipment sufficient to provide:

a. Training in aircraft of over 50 horsepower with both tandem and side-by-side seating arrangement.

b. Training in aircraft of 145 horsepower or over.

Together the aircraft must provide such equipment and devices necessary to properly instruct in the functioning and operation of flaps, manifold pressure, and radio.

One such airplane must be appropriately equipped for night flying as set forth in Part 43 of the Civil Air Regulations.

The aircraft required may be either owned and registered in the name of the applicant, or under lease, the terms of which are satisfactory to the Administrator.

3. Parachutes

Same as required for primary flying school.

4. Personnel

a. Flight.

Same as for primary flying school.

b. Maintenance

Same as for primary flying school.

5. CURRICULUM

An applicant for commercial flying school rating must provide a flight instruction curriculum satisfactory to the Administrator. Such curriculum must consist of not less than 160 hours of flying time for the purpose of qualifying persons for commercial pilot certificates. Any curriculum to be satisfactory to the Administrator must include:

a. A minimum of 50 hours of dual and check time must be given. Eight (8) hours of such instruction must be given prior to first solo flight.

b. A minimum of 105 hours of supervised solo must be given.

c. A total of 10 hours of dual and solo night flying instruction must be given. At least 3 hours should be night cross-country over lighted airways, whenever practicable.

d. A minimum of 25 hours of dual and solo cross-country flying must be given. During the course of instruction at least one solo cross-country flight should be made to a point not less than 300 miles distant from the point of departure. During such flight at least three full stop landings at different points along the route should be made. In the course of the student's training, his flight record must indicate one flight wherein all radio aids to air navigation that are available have been utilized and must include the preparation and use of a predetermined flight plan.

e. A minimum of 10 hours' solo must be given in tandem seating aircraft.

f. A minimum of 10 hours' solo must be given in side-by-side seating aircraft.

g. A minimum of 10 hours' solo must be given in aircraft of 145 horsepower or over.

h. The first 35 hours of instruction and solo practice must be identical with the private-pilot flight curriculum. Students who have successfully completed such curriculum in a certificated flying school or possess a private pilot certificate may be given appropriate credit when applying for the commercial pilot flight course.

i. The flight curriculum should be arranged so as to give instruction and solo-flight practice on all maneuvers necessary to enable a student to demonstrate proficiency to a degree required of a commercial pilot.

Such maneuvers, in addition to those taught and practiced in the primary course, are:

(1) Emergency maneuvers, such as simulated forced landings and recovery from stalls, entered from both level and steeply banked attitudes.
(2) Spirals. (To include spirals with constant bank and constant air speed, and also spirals around predetermined object on ground.)
(3) Cross-wind take-offs and landings.
(4) Lazy eights.
(5) Chandelles.
(6) Two-turn precision spins. (Recovery started within 10 degrees plus or minus of heading on which maneuver is begun.)
(7) Power approaches and wheel landings.
(8) Dragging areas.

j. Where flight instruction is given in a seaplane, the following preflight instruction should also be included in the curriculum:

(1) Explanation of float action.
(2) Retraction of water rudders.
(3) Determination of wind direction.
(4) Fundamentals of water handling.
(5) Fundamentals of aviation seamanship.
(6) Use of life preservers.
(7) General care of seaplanes.

k. Where seaplanes are used the following additional maneuvers should be included:

(1) Semistall and full stall landings.
(2) Power approaches and power landings given under average water conditions and on glassy water.
(3) Where practicable, landings and take-offs on various bodies of water such as a bay (tide action) and streams (currents).
(4) Precision sailing (with and without power).
(5) Precision docking, beaching, and mooring.
(6) Forced landings, executed to buoy markers.

D. FLIGHT INSTRUCTOR SCHOOL RATING

GROUND SCHOOL

1. GENERAL

An applicant for flight instructor flying school must provide a classroom properly heated, lighted, ventilated, and maintained. The classroom should be of ample space to accommodate the largest number of students scheduled for attendance at any one time. Each student should be provided with a desk-chair or chair and desk suitable for taking of notes and writing examinations. The classroom shall be maintained in neat, clean condition at all times, and light intensity shall be such as to promote study without eyestrain. The equipment must include a blackboard of sufficient size for explanation by means of diagrams, and suitable texts and other informative literature on the art of flight instructing.

2. PERSONNEL

Persons employed as ground instructors must be possessed of a valid commercial pilot certificate and flight instructor rating.

3. CURRICULUM

a. The applicant must provide a ground instruction curriculum satisfactory to the Administrator. Such curriculum must include not less than 40 hours' instruction on "Analysis and Performance of Maneuvers" and "Psychology, Technique and Methods of Flight Instruction."

b. A curriculum satisfactory to the Administrator shall include, but not be limited to:

(1) Steps in teaching students how to fly—
  (a) Preparation—knowledge of what to say and how to say it.
  (b) Definition of what is to be taught in a specific lesson. (Statement of Aims.)
  (c) Explanation of maneuvers. (Presentation.)
  (d) Demonstration of maneuvers.
  (e) Student's practice.
  (f) Determination of student's progress and review of weak points.
(2) Common errors in instruction—
  (a) Lack of planned instruction.
  (b) Variations in terminology used in flight instruction.
  (c) Giving instruction in flight which could better be given on ground.
  (d) Failure to stress important or key points.
  (e) Poor speech habits, e. g., failure of instructor to speak clearly, etc.
  (f) Bad personal habits—impatience, lack of promptness, etc.
  (g) Failure to overcome prejudices with respect to other people's "peculiarities."
  (h) Emphasizing pet "hobbies" or "peeves."

(3) How students learn—
   (a) Importance of directed practice as compared with mere repetition.
   (b) Effect of old habits on learning how to fly. (Habit interference.)
   (c) Difficulties in trying to learn too much, too fast.
   (d) Value of training aids, e. g., charts, models, films, etc.

(4) Adapting training to individual students—
   (a) Slow versus fast learners.
   (b) Under-versus over-confident students.
   (c) The "problem child."
   (d) Preparatory planning of each student's lessons in order to deal with his individual problems.

(5) Keeping student interested—
   (a) Judicious use of praise and blame.
   (b) Informing student of his progress.
   (c) Importance of instructor appreciating student's problems.

(6) Keeping student fit—
   (a) Minimizing student fatigue.
   (b) Dealing with questions regarding health in relation to flying, e. g., ear trouble, the common cold, air sickness, etc.
   (c) Dealing with problem of "muscular tension."
   (d) Maintaining emotional stability.

(7) Finding out how student is progressing—
   (a) Reasons for standardization of check flights.
   (b) Subjective observation.
      (1) CAA rating procedures and other rating scales.
      (2) Training in use of above.
   (c) Objective evaluation.
      (1) Flight inventory.
      (2) Graphic methods.
      (3) Use of above techniques.
   (d) Difficulties in observing student's performance.
      (1) Errors of observation.
      (2) Elimination of errors.

(8) Checking up on your ability as an instructor—
   (a) Need for periodic check-up.
   (b) The teaching "Self-Audit."

(9) Summary of points to remember in flight instruction—
   (a) Plan instruction, on ground and in air, to meet student's problems.
   (b) Give all instruction possible on ground so that student has a clear idea of what is expected of him before start of flight lesson.
   (c) Keep instruction in air simple, clear, and concise.
   (d) Keep student interested and try to understand his problems.
   (e) Give student ample opportunity to review maneuvers already learned.
   (f) Direct student's solo practice along lines in which he is most inadequate.
   (g) Emphasize importance of judgment and necessity to "plan ahead."

(10) Civil Air Regulations—

(11) Analysis and Performance of Maneuvers—

(12) Final Examination—

(a) Each student will "instruct" the class on topics assigned in advance. Student's method of presentation will be criticized in light of principles of flight instruction discussed in course.

(b) Analysis and performance of maneuvers.

Suggested Study Material

Flight Instructor's Manual, Bulletin No. 5	$0.35
Civil Pilot Training Manual, Bulletin No. 23	.65
Patter for Elementary Flight Maneuvers, Bulletin No. 31	.15
Fundamentals of Elementary Flight Maneuvers, Bulletin No. 32	.20
Parts 20, 43, and 60 of the Civil Air Regulations (each)	.05

Foregoing material may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

FLYING SCHOOL

In addition to the general requirements listed in Part A, the applicant for Flight Instructor School Rating shall provide the following:

1. LANDING AREA

Applicant must show that a landing area is available for use in giving flying instruction. The landing area must have a sufficient number of landing strips of not less than 1,800 feet effective length and 300 feet in width to permit take-offs and landings thereon within 30 degrees of the average wind direction. The minimum effective landing-strip length requirement, specified above, is a sea-level requirement and must be increased 1 percent for each 100 feet the landing area is above sea level. Where the landing area is only 300 feet in width, an additional 100 feet of width must be available for taxiing or parking of aircraft. The landing area surface must be suitable for the safe take-off and landing of aircraft under normal weather conditions, and must be marked in accordance with the requirements prescribed by the Administrator. The landing area must have approaches permitting a 20-to-1 glide path to all required landing strips. Each required landing strip must be in such condition that an aircraft at any point thereon must be visible from any other point on such landing strip. Where the required landing strips do not meet this requirement, such landing area may be approved provided there is installed a control tower of sufficient height that the entire landing area is visible, and traffic control is exercised by visual signals using an approved type light gun or radio. Individuals serving in the capacity of traffic controllers must be certificated as control tower operators.

2. FLIGHT EQUIPMENT

Airplanes used for flight instruction must be properly certificated and either owned by the applicant or leased, the terms of such lease being satisfactory to the Administrator. Such airplane must be of at least 50 horsepower and capable of carrying two persons and two parachutes, and minimum gas and oil as required by Civil Air Regulations, without exceeding the gross weight limitations set forth in the Aircraft Operation Record, and must be suitable to perform the maneuvers as prescribed for the flight instructor rating test. Aircraft may be of either open or cabin type. Aircraft used must be equipped with suitable interphone or intercockpit communication system.

3. PARACHUTES

Same as for primary flying school rating.

4. PERSONNEL

Same as for primary flying school rating.

5. CURRICULUM

Applicant for flight instructor flying school rating must provide a flight instruction curriculum satisfactory to the Administrator. Such curriculum must consist of not less than 25 hours' flying time for the purpose of qualifying persons for the flight instructor rating. A curriculum satisfactory to the Administrator must include the following:

a. A minimum of 10 hours' dual and solo practice in the performance of all elementary, intermediate, and advanced maneuvers, to enable the student to demonstrate these with smoothness and precision and to assist him to develop an easy, confident manner when flying.

b. A minimum of 15 hours in the practice of giving flight instruction in all elementary, intermediate, and advanced maneuvers, where the instructor will ride as trainee, simulating the usual errors of the novice pilot, and the student acts as instructor. Purpose is to develop proficiency in the analysis of maneuvers and to evolve a technique of imparting this knowledge under actual flight conditions.

c. Curriculum shall include, but not be limited to, the following maneuvers:

(1) Elementary—

(a) Straight and level flight.
(b) Medium turns.
(c) Confidence maneuvers.
(d) Taxiing.
(e) Normal climbs.
(f) Medium climbing turns.
(g) Normal glides.
(h) Medium gliding turns.
(i) Steep turns.
(j) Stalls and slow flight maneuvers without power.
(k) Stalls and slow flight maneuvers with power.
(l) Spins.
(m) "S" turns along a road.
(n) Medium and steep eights up and down a road.
(o) The square or rectangular course.
(p) Take-offs.
(q) Landings.
(r) Forced landings.

(2) Intermediate—

(a) Eights across a road.
(b) Eights "around" pylons.
(c) Eights "on" pylons.
(d) Gentle turns.
(e) Precision turns.
(f) Steep climbing turns.
(g) Steep gliding turns.
(h) Tight spirals.
(i) 90-degree approach for a landing.
(j) 180-degree side approach for a landing.
(k) 360-degree approach for a landing (simulated).
(l) Spirals for a landing (simulated).

(m) Forward slips.
(n) Controlled slipping turns.
(o) Cross-wind take-offs.
(p) Cross-wind landings.
(q) Down-wind landings (moderate winds).
(r) Power approaches and wheel landings.
(s) Dragging areas.
(t) Accidental and cross-control spins (climbing and level flight turns).

3. Advanced—
(a) Lazy eights.
(b) Chandelles.
(c) Precision spins (1½, 2, and 3 turns).

d. A minimum of 15-minute discussion period must be provided before and after each flight.

e. Where seaplanes are used the following additional maneuvers should be included:
(1) Semistall and full stall landings.
(2) Power approaches and power landings given under average water conditions and on glassy water.
(3) Where practicable, landings and take-offs on various bodies of water such as a bay (tide action) and streams (current).
(4) Precision sailing (with and without power).
(5) Precision docking, beaching, and mooring.
(6) Forced landings executed to buoy markers.

f. The curriculum submitted shall show the order of introduction of maneuvers, together with the total dual and solo time allotted to each stage or group of maneuvers.

g. Given concurrently with the flight training shall be ground school training consisting of a minimum of 20 hours in "Psychology, Technique and Methods of Flight Instruction."

E. INSTRUMENT FLYING SCHOOL RATING

GROUND SCHOOL

1. GENERAL

An applicant for instrument ground school must provide a classroom, properly heated, lighted, ventilated, and maintained. The classroom should be of ample space to accommodate the largest number of students scheduled for attendance at any one time. Each student should be provided with a desk-chair or chair and desk suitable for taking notes and writing examinations. The classroom shall be maintained in neat, clean, condition at all times, and light intensity shall be such as to promote study without eyestrain. The equipment must include a blackboard of sufficient size for explanation by means of diagrams, and suitable texts and other informative literature.

2. PERSONNEL

Persons employed as ground instructors must be certificated in accordance with Part 50 of the Civil Air Regulations, or must possess valid instrument ratings.

3. CURRICULUM

The applicant must provide an instrument ground school curriculum satisfactory to the Administrator. Such curriculum should include not less than 30 hours of classroom instruction on the subjects listed below.

a. Civil Air Regulations

At least 2 classroom hours of instruction to include:

Parts 01, 20, 43, and 60 of CAR. In addition to parts stressed in the advanced ground school curriculum, special emphasis should be given to Part 60 and Instrument Flight Rules.

b. Meteorology

At least 5 hours of instruction, of which 1 should be practical weather observation and the identification of weather conditions, to include:

(1) Those subjects listed for advanced ground school rating, and
(2) Detailed study of conditions found under instrument flying conditions, with emphasis on icing conditions.
(3) Advanced meteorology: weather maps, fronts, and analysis.

c. Aircraft and Theory of Flight

At least 3 hours of classroom instruction to include:

(1) Study of aircraft equipment: deicing equipment, static eliminators, effect of ice on propeller, and wing efficiency.
(2) Power required under various load conditions, and change in stalling speeds therein.

d. Navigation

At least 5 classroom hours' instruction to include:

(1) Navigational problems under instrument conditions.
(2) Use of computer.
(3) Methods of obtaining fixes.
(4) Correction of drift to regain position.
(5) Alternate airport problems.
(6) Radio orientation (at least three methods).

e. Instruments, Radio, and Navigational Aids

At least 5 classroom hours' instruction to include:

(1) Review of all instruments and errors that may be encountered under instrument conditions.
(2) Study of radio aids to instrument flight, in aircraft.
(3) Tuning radio, and use of volume control.
(4) Description of various radio aids, furnished by the Department of Commerce.

f. Instrument Flight Procedures

At least 10 classroom hours' instruction, to be given in phase with or before actual flight training, to include:

(1) Technique of instrument flight.
(2) Beam and bracketing procedures.
(3) Let-down procedures.
(4) Air Traffic Control procedures.
(5) Flight plans.

FLYING SCHOOL

In addition to the general requirements listed in Part A, the applicant for Instrument Flying School Rating shall provide the following:

1. LANDING AREA

Applicant must show that a landing area is available for use in giving flying instruction. The landing area must have a sufficient number of landing strips of not less than

1,800 feet effective length and 300 feet in width to permit take-offs and landings thereon within 30 degrees of the prevailing wind direction. The minimum effective landing strip length requirement, specified above, is a sea-level requirement and must be increased 1 percent for each 100 feet the landing area is above sea level. Where the landing area is only 300 feet in width, an additional 100 feet of width must be available for taxiing or parking of aircraft. The landing area surface must be suitable for the safe take-off and landing of aircraft under normal weather conditions, and must be marked in accordance with the requirements prescribed by the Administrator. The landing area must have approaches permitting a 20-to-1 glide path to all required landing strips. Where the required landing strips do not meet this requirement, such landing area may be approved provided there is installed a control tower of sufficient height that the entire landing area is visible, and that traffic control is exercised by visual signals using an approved type light gun or radio. Individuals serving in the capacity of traffic controllers must be certificated as control tower operators.

2. FLIGHT EQUIPMENT

Applicant shall furnish at least one aircraft for instrument flight instruction equipped for instrument flight in accordance with Section 43.30(c) of the Civil Air Regulations. Such aircraft, with hood or polaroid sheeting installed, shall afford visibility to the instructor, and observer if necessary, equivalent to that afforded the pilot without such installation. Further, the aircraft, with necessary crew, parachutes, fuel, and oil aboard, must be capable of maintaining a climb of 300 feet per minute at 2,000 feet above ground elevation and must permit accomplishment of all maneuvers listed in Section 20.422 of the Civil Air Regulations.

NOTE.—The installation of polaroid sheeting which is immediately detachable shall not be considered as constituting undue restriction to the visibility of the instructor or observer.

3. PARACHUTES

Same as required for primary flying school.

4. PERSONNEL

All personnel giving instrument instruction in aircraft shall be possessed of at least a commercial pilot rating, rated for the aircraft to be used, and a valid instrument rating. All personnel giving instrument instruction in Link trainers shall possess a ground instructor certificate with Link trainer rating when provisions have been completed for the issuance of such rating.

5. CURRICULUM

This curriculum must include not less than 30 hours of flight instruction, of which not more than 10 hours of simulated flight in Link trainer may be included, provided that each hour of simulated flight be given prior to 2 hours of actual flight and that the subject matter be in phase with the flight instruction.

The curriculum, to be satisfactory to the Administrator, must include at least the following:

a. Climbs and climbing turns.
b. Level flight.
c. Timed turns.
d. Steep turns (over 45 degrees).
e. Stalls, and approaches to stalls.
f. Recovery from abnormal attitudes.
g. Slow flight and controlled descent.

h. Radio range orientation, including at least three methods.
i. Beam bracketing and following.
j. Cone identification.
k. Airport and Airway Traffic Control, holding and emergency procedures.
l. Final approach.
m. Missed approach.
n. Practical speed, wind, drift problems.

Section III.—GENERAL

A. APPLICATION

Application for air agency certificate is to be submitted to the office of the local inspector. Forms for this purpose have been prepared by the Civil Aeronautics Administration and they may be obtained upon request from any inspector. Unless it is desired to deviate from the curriculum as set forth in Manual 50, it will only be necessary that a statement signed by the applicant be submitted with the application, to the effect that the curriculum as appearing in Manual 50 will be adhered to. Otherwise, curriculum in detail must accompany the applications. In marginal cases, where there is reasonable doubt of the landing area complying with the average prevailing wind condition, the applicant will be required to furnish the inspector proof that the field meets this requirement.

When the applicant has determined that he meets the minimum requirements the local inspector will, upon receipt of the application, conduct his inspection to determine that the facilities are satisfactory. The school will be inspected in accordance with the minimum requirements as set forth in Manual 50 and Part 50 of the Civil Air Regulations. Copies of Civil Air Regulation Part 50 may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for the price of 5 cents. Money order or check should accompany the request.

When it is found that the facilities comply with the requirements of Manual 50, the inspector or regional office will issue the permanent air agency certificate. The applicant will later receive, from the Washington office, an engraved formal certificate.

Continued compliance with the minimum requirements at all times is necessary. Frequent inspection of each certificated school will be conducted by the supervising inspector.

For convenience in locating the nearest Civil Aeronautics Administration representative, there follows a list of the regional offices from which his name and address may be obtained.

Region 1—Regional Administrator, 385 Madison Avenue, New York, N. Y.
Region 2—Regional Administrator, 84 Marietta Street, N.W., Atlanta, Ga.
Region 3—Regional Administrator, 608 S. Dearborn Street, Chicago, Ill.
Region 4—Regional Administrator, P. O. Box 1689, Fort Worth, Texas
Region 5—Regional Administrator, 9th Floor, City Hall Bldg., Kansas City, Mo.
Region 6—Regional Administrator, 1500 Fourth Street, Santa Monica, Calif.
Region 7—Regional Administrator, P. O. Box 3224, Seattle, Wash.
Region 8—Regional Administrator, P. O. Box 440, Anchorage, Alaska

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