Civil Aeronautics Manual 34

Flight Navigator Certificates

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Introductory Note

This manual contains in consolidated form (1) Civil Air Regulations Part 34, Flight Navigator Certificates, dated September 1, 1956, Amendment 34–1, and the editorial changes required by Special Regulation 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 34, dated October 15, 1956, and all supplements thereto. As amendments and other pertinent materials pertaining to Part 34 are issued, they will be included in this manual.

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Flight Navigator Certificates

Applicability and Definitions

34.1 ***Applicability of this part.*** **This part establishes certification and general operating rules for flight navigators.**

34.2 ***Definitions.*** **As used in this part, terms are defined as follows:**

Administrator. **The Administrator is the Administrator of the Federal Aviation Agency.**

Approved. **Approved, when used alone or as modifying terms such as means, method, action, equipment, etc., means approved by the Administrator.**

Authorized representative of the Administrator. **An authorized representative of the Administrator is any employee of the Federal Aviation Agency or any private person, authorized by the Administrator to perform particular duties of the Administrator under the provisions of this part.**

Certification Rules

34.5 ***Application for certificate.*** **An application for a certificate shall be made on a form and in a manner prescribed by the Administrator.**

34.5–1 *Where to obtain application forms (FAA policies which apply to sec. 34.5).* Application forms can be obtained from Aviation Safety district offices, Aviation Safety agents, and designated flight navigator examiners. Application for the written examination may be made at any Aviation Safety air carrier or international district office. Application for the practical examination and the certificate may be made to any Aviation Safety agent or a designated flight navigator examiner.

(Sec. 34.10–1 published in 20 F. R. 1094, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.5–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.6 ***Issuance.***

(a) A flight navigator certificate shall be issued by the Administrator to an applicant who meets the requirements of this part.

(b) Pending a review of the applicant's application and supplementary documents and the issuance of a certificate by the Administrator, an authorized representative of the Administrator may, subject to such conditions and limitations as the Administrator may prescribe, issue a temporary flight navigator certificate to an applicant who meets the requirements of this part.

34.6–1 *Issuance of temporary certificates (FAA policies which apply to sec. 34.6 (b)).* Temporary flight navigator certificates are issued to qualified applicants by Aviation Safety agents pending the examination of the applicant's record and the issuance of a certificate of greater duration by the Washington office.

(Sec. 34.12–1 published in 20 F. R. 1094, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.6–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.7 ***Duration.***

(a) A flight navigator certificate issued to a United States citizen shall remain in effect until surrendered, suspended, revoked, or otherwise terminated by order of the Administrator. A certificate issued to an applicant other than a United States citizen shall remain in effect for a period no longer than 12 months after the date of issuance, but it may be reissued without further demonstration of technical competence.

(b) A temporary flight navigator certificate shall remain in effect for a period no longer than 3 months after the date of issuance.

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

(d) 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.

34.8 *Change of address.* Within 30 days after any change in the permanent mailing address of a certificated flight navigator, he shall notify the Administrator in writing of his new address. The notice shall be mailed to the Federal Aviation Agency, attention Aircraft and Airmen Records Branch, Washington 25, D. C.

General Certificate Requirements

34.21 *Citizenship.* An applicant for a flight navigator certificate may be a citizen of any country or a person without nationality.

34.22 *Age.* 21 years is the minimum age for the issuance of a flight navigator certificate.

34.23 *Education.* An applicant shall be able to read, write, speak, and understand the English language.

34.24 *Examinations and tests.* Examinations and tests shall be conducted by an authorized representative of the Administrator at such times and places as the Administrator may designate. The passing grade for such examinations and tests shall be at least 70 percent.

34.25 *Reexamination after failure.* An applicant who has failed any prescribed written or practical examination or test may not apply for reexamination within a 30-day period unless he presents a statement signed by a certificated flight navigator, a certificated ground instructor, or an equally qualified individual acceptable to the Administrator, which attests that the applicant has received an additional 5 hours of instruction in each of the subjects failed and that the applicant is considered competent for reexamination.

34.25–1 *Reexamination of practical test (FAA policies which apply to sec. 34.25).* When the flight test portion of the practical examination has been failed, the 5 hours of additional instruction must be given in flight.

(Sec. 34.13–1 published in 20 F. R. 1094, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.25–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.25–2 *Statements of instruction (FAA policies which apply to sec. 34.25).* Statements of instruction will be accepted only from the following individuals under the conditions shown below:

(a) *Certificated Flight Navigator.* All sections of the written examination, the ground test, and the flight test.

(b) *Certificated Ground Instructor.* Section 1 of the written examination if rated on Civil Air Regulations, and section 3 of the written examination if rated on Meteorology.

(c) *Supervising or Check Navigator with the Armed Forces.* Sections 2, 3, and 4 of the written examination, the ground test, and the flight test.

(d) *Operations Official for an Approved Flight Navigator Course.* All sections of the written examination, the ground test, and the flight test.

(Sec. 34.13–2 published in 20 F. R. 1094, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.25–2 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.26 *Substantiation of experience.* An applicant shall present documentary evidence, satisfactory to the Administrator, to substantiate the experience qualifications for a flight navigator certificate.

34.27 *Physical standards.* An applicant shall present evidence that he has, within the 12 months immediately preceding the date of application, met the physical standards of the second class prescribed in Part 29 of the Civil Air Regulations: *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, as would not require the ability to distinguish such aviation signal colors.

34.27–1 *Color deficiency limitation (FAA policies which apply to sec. 34.27).* When an applicant holds a medical certificate bearing the notation "DEFECTIVE COLOR VISION," the flight navigator certificate will bear the limitation "NOT VALID FOR USE OF AERONAUTICAL CHARTS OR NAVIGATION EQUIPMENT WHICH REQUIRES ABILITY TO DISTINGUISH AVIATION SIGNAL RED, AVIATION SIGNAL GREEN, OR WHITE."

(Sec. 34.5–1 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.27–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

Qualifications for a Certificate

34.31 *Experience.*

(a) An applicant shall:

(1) Have at least 200 hours of satisfactory flight navigation including celestial and radio navigation and dead reckoning: *Provided,* That a pilot who has logged 500 hours of cross-country flight, of which 100 hours shall have been at night, may be credited with not more than 100 hours toward this experience; and

(2) Have satisfactorily determined his position in flight not less than 25 times by night by celestial observations and not less than 25 times by day by celestial observations in conjunction with other aids; or

(b) An applicant shall be a graduate of a flight navigator course approved by the Administrator.

34.31–1 *Satisfactory flight navigation experience (FAA policies which apply to sec. 34.31 (a) (1)).* Flight time applied exclusively to the practice of long-range navigation methods, with emphasis being placed on celestial navigation and dead reckoning, will be considered satisfactory flight navigation experience. This flight time should be substantiated by a logbook, by records of the armed services or certificated air carriers, or by a letter signed by a certificated flight navigator. Any statement or letter substantiating experience should be attached to the application form. If a logbook is used to substantiate flight experience, the notation "logbook checked" with the initials of the Aviation Safety agent or flight navigator examiner should be made on the application form.

(Sec. 34.6–1 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.31–1 to coincide with revised CAR numbering as of Sept. 15, 1956.)

34.31–2 *Credit for pilot experience (FAA interpretations which apply to sec. 34.31 (a) (1)).* Pilots must have logged at least 500 hours of cross-country flight, of which at least 100 hours must have been at night, before any credit for this time can be given toward the flight navigation experience requirements. Pilots who meet the specified cross-country flight time conditions will be given credit for 100 hours of satisfactory flight navigation experience.

(Sec. 34.6–2 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.31–2 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.31–3 *Determination of position in flight by celestial observations (FAA policies which apply to sec. 34.31 (a) (2)).* On the application form the applicant will certify that he has determined his position in flight not less than 25 times by night by celestial observations and not less than 25 times by day by celestial observations in conjunction with other aids.

(Sec. 34.6–3 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.31–3 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.31–4 *Statement of graduation from approved flight navigator course (FAA policies which apply to sec. 34.31(b)).* An applicant who applies as a graduate of a flight navigator course approved by the Administrator must present a statement of graduation, signed by an official of the approved school, which should be attached to the application form and made a part of the airman's record.

(Sec. 34.6–4 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.31–4 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.31–5 *Requirements for approved flight navigator courses (FAA rules which apply to sec. 34.31(b)).*

(a) *General.* A graduate of an approved flight navigator course is deemed to have met the minimum experience requirements for the flight navigator certificate. For this reason, it is essential that an approved course of training for flight navigators include sufficient coverage of the subject to insure the required minimum proficiency of applicants who apply for certification as graduates of an approved course.

(b) *Application for approval.* An agency or applicant desiring approval of a flight navigator course must submit to the local Aviation Safety district office three copies of the course outline, a description of the facilities and equipment to be used, and a list of instructors with their qualifications, together with a letter to the Administrator requesting approval.

(c) *Training course outline.*

(1) *Format.* The ground course outline and the flight course outline shall be combined in one looseleaf binder and shall include a table of contents divided into two parts—ground course and flight course. Each part of the table of contents must contain a list of the major subjects, together with hours allotted to each subject and the total classroom and flight hours.

(2) *Ground course outline.* It is not mandatory that a course outline have the subject headings arranged exactly as listed in this subparagraph. Any arrangement of general headings and subheadings will be satisfactory provided all the subject material listed here is included and the acceptable minimum number of hours is assigned to each subject. Each general subject shall be broken down into detail showing items to be covered.

If any agency desires to include additional subjects in the ground training curriculum, such as international law, flight hygiene, or others which are not required, the hours allotted these additional subjects may not be included in the minimum classroom hours.

The following subjects with classroom hours are considered the minimum coverage for a ground training course for flight navigators:

Subject	*Classroom hours*
Civil Air Regulations	5
To include:	
Part 34.	
Part 40.	
Part 41.	
Part 42.	
Part 43.	
Part 60.	
Meteorology	40
To include:	
Basic weather principles.	
Temperature.	
Pressure.	
Winds.	
Moisture in the atmosphere.	
Stability.	
Clouds.	
Hazards.	
Air masses.	
Front weather.	
Meteorology—Continued	
To include—Continued	
Fog.	
Thunderstorms.	
Icing.	
World weather and climate.	
Weather maps and weather reports.	
Forecasting.	
International Morse code:	
Ability to receive code groups of letters and numerals at a speed of eight words per minute.	
Navigation Instruments (exclusive of radio and radar)	20
To include:	
Compasses.	
Pressure altimeters.	
Airspeed indicators.	
Driftmeters.	
Bearing indicators.	
Aircraft octants.	
Instrument calibration and alignment.	
Charts and Pilotage	15
To include:	
Chart projections.	
Chart symbols.	
Principles of pilotage.	
Dead Reckoning	30
To include:	
Air plot.	
Ground plot.	
Calculation of ETA.	
Vector analysis.	
Use of computer.	
Search.	
Absolute Altimeter With Applications	15
To include:	
Principles of construction.	
Operating instructions.	
Use of Bellamy's formula.	
Flight planning with single drift correction.	
Radio and Long-Range Navigational Aids	35
To include:	
Principles of radio transmission and reception.	
Radio aids to navigation.	
Government publications.	

Subject	*Classroom hours*
Radio and Long-Range Navigational Aids—Continued	
To include—Continued	
Airborne D/F equipment.	
Errors of radio bearings.	
Quadrantal correction.	
Plotting radio bearings.	
ICAO Q code for direction finding.	
Loran.	
Consol.	
Celestial Navigation	150
To include:	
The solar system.	
The celestial sphere.	
The astronomical triangle.	
Theory of lines of position.	
Use of the Air Almanac.	
Time and its applications.	
Navigation tables.	
Precomputation.	
Celestial line of position approach.	
Star identification.	
Corrections to celestial observations.	
Flight Planning and Cruise Control	25
To include:	
The flight plan.	
Fuel consumption charts.	
Methods of cruise control.	
Flight progress chart.	
Point-of-no-return.	
Equitime point.	
Long-Range Flight Problems	15
Total (exclusive of final examinations)	350

(3) *Flight course outline.*

(i) A minimum of 150 hours of supervised flight training shall be given, of which at least 50 hours of flight training must be given at night, and celestial navigation must be used during flights which total at least 125 hours.

(ii) A maximum of 50 hours of the required flight training may be obtained in acceptable types of synthetic flight navigator training devices.

(iii) Training must be given in dead reckoning, pilotage, radio navigation, celestial navigation, and use of the absolute altimeter.

(iv) Flights should be at least four hours in length and should be conducted off civil airways. Some training on long-range flights is desirable, but is not required. There is no limit to the number of students that may be trained on one flight, but at least one astrodome or one periscopic sextant mounting must be provided for each group of four students.

(d) *Equipment.*

(1) Classroom equipment shall include one table at least 24" x 32" in dimensions for each student.

(2) Aircraft suitable for the flight training must be available to the approved course operator to insure that the flight training may be completed without undue delay. The approved course operator may contract or obtain written agreements with aircraft operators for the use of suitable aircraft. A copy of the contract or written agreement with an aircraft operator shall be attached to each of the three copies of the course outline submitted for approval. In all cases, the approved course operator is responsible for the nature and quality of instruction given during flight.

(e) *Instructors.*

(1) Sufficient classroom instructors must be available to prevent an excessive ratio of students to instructors. Any ratio in excess of 20 to 1 will be considered unsatisfactory.

(2) At least one ground instructor must hold a valid flight navigator certificate, and be utilized to coordinate instruction of ground school subjects.

(3) Each instructor who conducts flight training must hold a valid flight navigator certificate.

(f) *Revision of training course.*

(1) Requests for revisions to course outlines, facilities, and equipment shall follow procedures for original approval of the course. Revisions should be submitted in such form that an entire page or pages of the approved outline can be removed and replaced by the revisions.

(2) The list of instructors may be revised at any time without request for approval, provided the minimum requirement of paragraph (e) of this section is maintained.

(g) *Credit for previous training and experience.*

(1) Credit may be granted by an operator to students for previous training and experience which is provable and comparable to portions of the approved curriculum. When granting

such credit, the approved course operator should be fully cognizant of the fact that he is responsible for the proficiency of his graduates in accordance with subdivision (i) of subparagraph (3) of this section.

(2) Where advanced credit is allowed, the operator shall evaluate the student's previous training and experience in accordance with the normal practices of accredited technical schools. Before credit is given for any ground school subject or portion thereof, the student must pass an appropriate examination given by the operator. The results of the examination, the basis for credit allowance, and the hours credited shall be incorporated as a part of the student's records.

(3) Credit up to a maximum of 50 hours toward the flight training requirement may be given to pilots who have logged at least 500 hours while a member of a flight crew which required a certificated flight navigator or the Armed Forces equivalent. A similar credit may also be given to a licensed deck officer of the Maritime Service who has served as such for at least one year on ocean-going vessels. One-half of the flight time credited under the terms of this paragraph may be applied toward the 50 hours of flight training required at night.

(h) *Students records and reports.* Approval of a course shall not be continued in effect unless the course operator keeps an accurate record of each student, including a chronological log of all instruction, subjects covered and course examinations and grades, and unless he prepares and transmits to the local Aviation Safety district office not later than January 31 of each year, a report containing the following information for the previous calendar year:

(1) The names of all students graduated, together with their school grades for ground and flight subjects.

(2) The names of all students failed or dropped, together with their school grades and reasons for dropping.

(A sample form is illustrated in figure 1 for guidance.)

(i) *Quality of instruction.* Approval of a course shall not be continued in effect unless at least 80 percent of the students who apply

BLANK NAVIGATION SCHOOL

ANNUAL REPORT
APPROVED FLIGHT NAVIGATOR COURSE

Date_____

Name of student	Date enrolled	Date graduated or failed	Final grade		Date and reasons for dropping student
			Ground	Flight	

Figure 1. Sample form of annual report of approved flight navigator course.

within 90 days after graduation are able to qualify on the first attempt for certification as flight navigators.

(j) *Statement of graduation.* Each student who successfully completes an approved flight navigator course shall be given a statement of graduation. An acceptable statement of graduation is as follows:

FEDERAL AVIATION AGENCY,
Washington 25, D. C.

GENTLEMEN: This is to certify that _____ (Name of graduate) on _____ (Date of graduation) successfully completed a course of training for flight navigators which is approved by the Administrator of the Federal Aviation Agency.

Signed _____
Title _____
School _____

(k) *Inspections.* Approved course operations will be inspected by authorized representatives of the Administrator as often as deemed necessary to insure that instruction is maintained at the required standards, but the period between inspections shall not exceed 12 months.

(l) *Change of ownership, name, or location.*

(1) *Change of ownership.* Approval of a flight navigator course shall not be continued in effect after the course has changed ownership. The new owner must obtain a new approval by following the procedure prescribed for original approval.

(2) *Change in name.* An approved course changed in name but not changed in ownership shall remain valid if the change is reported by the approved course operator to the local Aviation Safety district office. A letter of approval under the new name will be issued by the regional office.

(3) *Change in location.* An approved course shall remain in effect even though the approved course operator changes location if the change is reported without delay by the operator to the local Aviation Safety district office, which will inspect the facilities to be used in the new location. If they are found to be adequate, a letter of approval showing the new location will be issued by the regional office.

(m) *Cancellation of approval.*

(1) Failure to meet or maintain any of the requirements set forth in this section for the approval or operation of an approved flight navigator course shall be considered sufficient reason for cancellation of the approval.

(2) If an operator should desire voluntary cancellation of his approved course, he should submit the effective letter of approval and a written request for cancellation to the Administrator of the Federal Aviation Agency through the local Aviation Safety district office.

(n) *Duration.* The authority to operate an approved flight navigator course shall expire 24 months after the last day of the month of issuance.

(o) *Renewal.* Application for renewal of authority to operate an approved flight navigator course may be made by letter to the local Aviation Safety district office at any time within 60 days prior to the expiration date. Renewal of approval will depend upon the course operator meeting the current conditions for approval and having a satisfactory record as an operator.

(Sec. 34.6–5 published in 20 F. R. 1090, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.31–5 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.32 *Knowledge.* An applicant shall pass a written examination on the following subjects:

(a) Those provisions of the regulations in this subchapter pertinent to the duties of a navigator in the navigation of aircraft;

(b) The fundamentals of flight navigation, including flight planning and cruise control.

(c) Practical meteorology, including the analysis of weather maps, weather reports, and weather forecasts; weather sequence abbreviations, symbols, and nomenclature;

(d) Types of air navigation facilities and procedures in general use;

(e) The calibration and use of instruments used in air navigation;

(f) Navigation by dead reckoning;

(g) Navigation by celestial means;

(h) Navigation by means of radio aids;

(i) Pilotage and map reading; and

(j) Interpretation of navigational aid identification signals.

34.32–1 *Written examination (FAA policies which apply to sec. 34.32).*

(a) *Eligibility to take written examination.* The flight navigator written examination will be given to any person who meets the eligibility requirements of sections 34.21, 34.22, 34.23, 34.27, and 34.31.

(b) *The examination.* The examination is of the multiple choice type and consists of four sections (Civil Air Regulations, Fundamentals of Air Navigation, Meteorology, and Plotting and Computing), each of which is graded separately. A minimum grade of 70 percent is required to pass each section. An applicant will not be required to complete section 3, Meteorology, of the examination if he holds a valid airline transport pilot certificate or an instrument rating, or a Form ACA–578A issued within the past 24 months showing successful completion of this subject for the airline transport pilot certificate or the instrument rating.

(c) *Examination procedure.* The examination is divided into Parts I, II, and III, each of which must be completed at one session. Part I covers the sections on Civil Air Regulations, Fundamentals of Air Navigation, and Meteorology. The time limit is 3 hours. Parts II and III cover the section on Plotting and Computing. The time limit is 4 hours for Part II and 6 hours for Part III. No applicant will be permitted to start any part of the examination unless the remaining hours that the office will be open exceed the time limit of the part.

Each applicant must provide his own plotter, divider, and computer for the examination. Work paper, plotting sheets, the Air Almanac, H. O. No. 9, Part II, and the proper volumes of H. O. No. 218 will be provided by the examining agent. If an applicant wishes to use blank forms and other navigation or logarithmic tables, he may do so, provided that such forms and tables are submitted to the examining agent for scrutiny prior to the beginning of the examination. No other material may be brought to the examination room. Papers used for computation during the examination must be surrendered to the examining agent before the applicant leaves the examination room.

Examination answer sheets are graded in the Washington, D. C., office and a report of grades is mailed directly to the applicant. This report will be accepted within a period of 24 months as evidence of having met the knowledge requirements for the certificate.

(Sec. 34.7–1 published in 20 F. R. 1092, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.32–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

34.33 *Skill.*

(a) An applicant shall pass a practical examination in the operation of flight navigational equipment.

(b) An applicant shall accomplish practical tests in aircraft navigation by:

(1) Dead reckoning;

(2) Celestial means; and

(3) Radio aids to navigation.

34.33–1 *Practical examination (FAA policies which apply to sec. 34.33).*

(a) *Eligibility to take practical examination.* The applicant must satisfactorily complete the written examination prior to taking the practical examination. Where delay would cause inconvenience to an applicant or an air carrier, the practical examination may be given prior to the applicant receiving his "Report of Written Examination," or when the applicant has failed any section of the written examination except section 4, Plotting and Computing. A designated flight navigator examiner is not authorized to give the practical examination under these circumstances, unless he receives prior approval from the supervising FAA agent.

(b) *Demonstration of skill.* An applicant will be required to pass practical tests on the prescribed subjects. These tests may be given by Aviation Safety personnel and designated flight navigator examiners.

(c) *The examination.* The practical examination consists of a ground test and a flight test as itemized on the examination check sheet shown in figure 2. Each item must be completed satisfactorily in order for the applicant to obtain a passing grade. Items 5, 6, 7 of the ground test may be completed orally, and items 17, 22, 23, 33, 34, 35, 36, 37, 38, and 39 of the flight test may be completed by an oral examination when a lack of ground facilities or navigation equipment makes such procedure necessary. In these cases a notation to that effect

18. FLIGHT NAVIGATOR PRACTICAL EXAMINATION CHECK SHEET

(To be completed by FAA Representative)

PLACE OF EXAMINATION	DATE OF EXAMINATION

TYPE AND REG. NO. OF AIRCRAFT USED	NAME OF AIR CARRIER OR AIRCRAFT OWNER

GRADING LEGEND S—SATISFACTORY (70-100) U—UNSATISFACTORY (0-69)

ITEM NO.	ITEM	GRADE		ITEM NO.	ITEM	GRADE	
		EXAMINER	AGENT			EXAMINER	AGENT
	GROUND TEST			31.	CORRECTION AND PLOTTING OF RADIO BEARINGS		
1.	STAR IDENTIFICATION (*Pointer system*)			32.	DIVERSION TO ALTERNATE — C. H., ETA, FUEL REM.		
2.	USE OF STAR FINDER			33.	BASIC ADJUSTMENTS OF LORAN RECEIVER		
3.	SHOTS AGAINST PRECOMPUTED CURVE			34.	KNOWLEDGE AND USE OF LORAN		
4.	3-STAR FIX OR LOP OF SUN			35.	KNOWLEDGE AND USE OF CONSOL METHOD		
5.	COMPENSATION AND SWINGING OF COMPASS			36.	USE OF ABSOLUTE ALTIMETER		
6.	ALIGNMENT OF DRIFT METER			37.	DETERMINATION OF "D" FACTORS		
7.	ALIGNMENT OF ASTRO-COMPASS OR PER. SEXTANT			38.	DETERMINATION OF DRIFT BY ALTIMETRY		
	FLIGHT TEST			39.	INTERPRETATION AND APPLICATION OF ALTIMETER DATA		
8.	INTERPRETATION OF WEATHER DATA			40.	SINGLE LOP INTERPRETATION (*Radio, press, celes.*)		
9.	PREPARATION OF FLIGHT PLAN			41.	SINGLE LOP APPROACH		
10.	COMPUTATION OF FUEL LOAD			42.	USE OF ASTRO-COMPASS		
11.	DETERMINATION OF PNR AND EQUITIME POINT			43.	DETERMINATION OF COMPASS DEVIATION		
12.	PREPARATION OF CRUISE CONTROL CHART			44.	ACCURACY OF CELESTIAL FIXES		
13.	USE AND INTERPRETATION OF CRUISE CONTROL CHART			45.	SELECTION OF BODIES FOR OBSERVATION		
14.	EQUIPMENT CHECK			46.	HANDLING OF ROUTINE REPORTS		
15.	LOCATION OF EMERGENCY EQUIPMENT			47.	LOG ENTRIES		
16.	KNOWLEDGE OF EMERGENCY EQUIPMENT			48.	WEATHER OBSERVATION AND INTERPRETATION IN FLIGHT		
17.	USE OF FLUX-GATE AND GYROSYN COMPASSES			49.	DETERMINATION OF WIND FROM FIXES		
18.	SETTING AND ALTERING COURSES			50.	ESTIMATES FOR LETDOWN		
19.	CHART KNOWLEDGE			51.	OVER-ALL SPEED		
20.	PILOTAGE			52.	OVER-ALL ACCURACY		
21.	COMPUTER ABILITY			53.	ALERTNESS		
22.	DETERMIN. OF TRACK, G. S. AND WIND BY DOUBLE DRIFT			54.	CO-ORDINATION OF NAVIGATION METHODS		
23.	DETERMIN. OF G. S. AND WIND BY DRIFT METER TIMING			55.	CO-ORDINATION OF DUTIES WITH TIME		
24.	AIR PLOTS						
25.	ETA'S						
26.	KNOWLEDGE AND USE OF RADIO FACILITIES						
27.	CARE IN TUNING						
28.	STATION IDENTIFICATION						
29.	USE OF MANUAL LOOP						
30.	EVALUATION OF RADIO BEARINGS						

REMARKS:

FROM	TO	HOURS	
		DAY	NIGHT

Figure 2. Flight navigator practical examination check sheet.

shall be made in the "Remarks" space on the check sheet.

(d) *Examination procedure.* An applicant will provide an aircraft in which celestial observations can be taken in all directions. Minimum equipment shall include a table for plotting, a drift meter or absolute altimeter, an instrument for taking visual bearings, and a radio direction finder.

More than one flight may be used to complete the flight test and any type of flight pattern may be used. The test will be conducted chiefly over water whenever practicable, and without regard to radio range legs or radials. If the test is conducted chiefly over land, a chart should be used which shows very little or no topographical and aeronautical data. The total flight time will cover a period of at least four hours. Only one applicant may be examined at one time, and no applicant may perform other than navigator duties during the examination.

When the test is conducted with an aircraft belonging to an air carrier, the navigation procedures should conform with those set forth in the carrier's operations manual. Items of the flight test which are not performed during the routine navigation of the flight will be completed by oral examination after the flight or at times during flight which the applicant indicates may be used for tests on those items. Since in-flight weather conditions, the reliability of the weather forecast, and the stability of the aircraft will have considerable effect on an applicant's performance, good judgment must be used by the agent or examiner in evaluating the tests.

GROUND TEST. For the ground test, in the order of the numbered items on the examination check sheet, an applicant will be required to:

(1) Identify, without a star identifier, at least six navigational stars and all planets available for navigation at the time of the examination and explain the method of identification.

(2) Identify two additional stars with a star identifier or sky diagrams and explain identification procedure.

(3) Precompute a time-altitude curve for a period of about 20 minutes and take 10 single observations of a celestial body which is rising or setting rapidly. The intervals between observations would be at least one minute. Mark each observation on the graph to show accuray. All observations, after corrections, shall plot within 8 minutes of arc from the time-altitude curve, and the average error shall not exceed 5 minutes of arc.

(4) Take and plot one 3-star fix and 3 LOP's of the sun. Plotted fix or an average of LOP's must fall within 5 miles of the actual position of the observer.

(5) Demonstrate or explain the compensation and swinging of a liquid-type magnetic compass.

(6) Demonstrate or explain a method of of aligning one type of drift meter.

(7) Demonstrate or explain a method of aligning an astro-compass or periscopic sextant.

FLIGHT TEST. For the flight test, in the order of the numbered items on the examination check sheet, an applicant will be required to:

(8) Demonstrate his ability to read weather symbols and interpret synoptic surface and upper air weather maps with particular emphasis being placed on winds.

(9) Prepare a flight plan by zones from the forecast winds or pressure data of an upper air chart and the operator's data.

(10) Compute from the operator's data the predicted fuel consumption for each zone of the flight, including the alternate.

(11) Determine the point-of-no-return for the flight with all engines running and the equitime point with one engine inoperative. Graphical methods which are part of the company's operations manual may be used for these computations.

(12) Prepare a cruise control (howgozit) chart from the operator's data.

(13) Enter actual fuel consumed on the cruise control chart and interpret the variations of the actual curve from the predicted curve.

(14) Check the presence on board and operating condition of all navigation equipment. Normally a check list will be used. This check will include a time tick or chronometer comparison. Any lack of thoroughness during this check will justify this item being graded unsatisfactory.

(15) Locate emergency equipment, such as, the nearest fire extinguisher, life preserver, life rafts, exits, axe, first aid kits, etc.

(16) Recite the navigator's duties and

stations during emergencies for the type of aircraft used for the test.

(17) Demonstrate the proper use of a flux gate compass or gyrosyn compass (when available), with special emphasis on the caging methods and the location of switches, circuit breakers, and fuses. If these compasses are not part of the aircraft's equipment, an oral examination will be given.

(18) Be accurate and use good judgment when setting and altering headings. Erroneous application of variation, deviation, or drift correction, or incorrect measurement of course on the chart will be graded as unsatisfactory.

(19) Demonstrate or explain the use of characteristics of various chart projections used in long-range air navigation, including the plotting of courses and bearings, and the measuring of distances.

(20) Demonstrate ability to identify designated landmarks by the use of a sectional or WAC chart.

(21) Use a computer with facility and accuracy for the computation of winds, drift correction and drift angles, ground speeds, ETA's, fuel loads, etc.

(22) Determine track, ground speed, and wind by the double drift method. When a drift meter is not part of the aircraft's equipment, an oral examination on the use of the drift meter and a double drift problem shall be completed.

(23) Determine ground speed and wind by the timing method with a drift meter. When a drift meter is not part of the aircraft's equipment, an oral examination on the procedure and a problem shall be completed.

(24) Demonstrate the use of an air plot for determining wind between fixes and for plotting pressure lines of position when using pressure and absolute altimeter comparisons.

(25) Give ETA's to well defined check points at least once each hour after the second hour of flight. The average error shall not be more than 5 percent of the intervening time intervals, and the maximum error of any one ETA shall not be more than 10 percent.

(26) Demonstrate knowledge and use of D/F equipment and radio facility information. Grading on this item will be based largely on the applicant's selection of those radio aids which will be of most value to his navigation, the manner with which he uses equipment, including filter box controls, and the precision with which he reads bearings. The aircraft's compass heading and all compass corrections must be considered for each bearing.

(27) Use care in tuning to radio stations to insure maximum reception of signal and check for interference signals. Receiver will be checked to ascertain that antenna and BFO (Voice–CW) switches are in correct positions.

(28) Identify at least three radio stations using international Morse code only for identification. The agent or examiner will tune in these stations so that the applicant will have no knowledge of the direction, distance, or frequency of the stations.

(29) Take at least one radio bearing by manual use of the loop. The agent or examiner will check the applicant's bearing by taking a manual bearing on the same station immediately after the applicant.

(30) Show the use of good judgment in evaluating radio bearings, and explain why certain bearings may be of doubtful value.

(31) Determine and apply correctly the correction required to be made to radio bearings before plotting them on a Mercator chart, and demonstrate the ability to plot bearings accurately on charts of the Mercator and Lambert conformal projections.

(32) Compute the compass heading, ETA, and fuel remaining if it is assumed that the flight would be diverted to an alternate airport at a time specified by the agent or examiner.

(33) Check the counter scales of a Loran receiver for accuracy, and explain the basic (face) adjustments which affect tuning and counter alignment. A guide sheet may be used for this test.

(34) Demonstrate a knowledge of the basic principle of Loran and the ability to tune a Loran receiver, to match signals, to read time differences, to plot Loran LOP's, and identify and use sky waves.

(35) Take and plot bearings from a consol station and explain the precautions which must be taken when tuning a radio receiver for consol signals. Also, discuss those conditions which affect the reliability of consol bearings.

(36) Demonstrate the ability to properly operate and read an absolute altimeter.

(37) Determine the "D" factors for a series of compared readings of an absolute altimeter and a pressure altimeter.

(38) Determine drift angle or lateral displacement from the true heading line by application of Bellamy's formula or a variation thereof.

(39) Interpret the altimeter comparison data with respect to the pressure system found at flight level. From this data evaluate the accuracy of the prognostic weather map used for flight planning and apply this analysis to the navigation of the flight.

(40) Interpret single LOP's for most probable position, and show how a series of single LOP's of the same body may be used to indicate the probable track and ground speed. Also, show how a series of single LOP's (celestial or radio) from the same celestial body or radio station may be used to determine position when the change of azimuth or bearing is 30° or more between observations.

(41) Select one of the celestial LOP's used during the flight and explain how to make a single line of position approach to a point selected by the agent or examiner, giving headings, times, and ETA's.

(42) Demonstrate the proper use of an astro-compass or periscopic sextant for taking bearings.

(43) Determine compass deviation as soon as possible after reaching cruising altitude and whenever there is a change of compass heading of 15° or more.

(44) Take celestial fixes at hourly intervals when conditions permit. The accuracy of these fixes shall be checked by means of a Loran, radio, or visual fix whenever practicable. After allowing for the probable error of a Loran, radio, or visual fix, a celestial fix under favorable conditions should plot within 10 miles of the actual position.

(45) Select celestial bodies for observation, when possible, whose azimuths will differ by approximately 120° for a 3-body fix and will differ by approximately 90° for a 2-body fix. The altitudes of the selected bodies should be between 25° and 75° whenever practicable.

(46) Have POMAR and any other required reports ready for transmission at time of schedule, and be able to inform the pilot in command promptly with regard to the aircraft's position and progress in comparison with the flight plan.

(47) Keep a log with sufficient legible entries to provide a record from which the flight could be retraced.

(48) Note significant weather changes which might influence the drift or ground speed of the aircraft, such as, temperature, "D" factors, frontal conditions, turbulence, etc.

(49) Determine the wind between fixes as a regular practice.

(50) Estimate the time required and average ground speed during a letdown, under conditions specified by the pilot in command.

(51) Work with sufficient speed to determine the aircraft's position hourly by celestial means and also make all other observations and records pertinent to the navigation. The applicant should be able to take the observation, compute, and plot a celestial LOP within a time limit of 8 minutes; take and plot a Loran LOP within a time limit of 3 minutes for ground waves and 4 minutes for sky waves; observe the absolute and pressure altimeters and compute the drift or lateral displacement within a time limit of 3 minutes.

(52) Be accurate in reading instruments and making computations. Errors which are made and corrected without affecting the navigation will be disregarded unless they cause considerable loss of time.

An uncorrected error in computation (including reading instruments and books) which will affect the reported position more than 25 miles, the heading more than 3°, or any ETA more than 15 minutes will cause this item to be graded unsatisfactory.

(53) Be alert to changing weather or other conditions during flight which might affect the navigation. An applicant should not fail to take celestial observations just prior to encountering a broken or overcast sky condition; and he should not fail to take a bearing on a radio station, which operates at scheduled intervals and which would be a valuable aid to the navigation.

(54) Show a logical choice and sequence in using the various navigation methods according to time and accuracy, and check the positions

determined by one method against positions determined by other methods.

(55) Use a logical sequence in performing the various duties of a navigator and plan work according to a schedule. The more important duties should not be neglected for others of less importance.

(Sec. 34.8–1 published in 20 F. R. 1092, Feb. 22, 1955, effective Feb. 28, 1955; redesignated sec. 34.33–1 to coincide with revised CAR numbering as of Sept. 1, 1956.)

Operating Rules

34.41 ***Certificate required.*** **No individual shall serve as a flight navigator in air commerce on an aircraft of United States registry without, or in violation of the terms of, a certificate issued in accordance with the provisions of this part. He shall have his certificate in his personal possession when performing his duties.**

34.42 ***Display.*** **A flight navigator shall, upon request, present his airman and medical certificates for examination by any authorized representative of the Civil Aeronautics Board or the Administrator, or by any State or local law enforcement officer.**

34.43 ***Medical certificate.*** **No individual shall exercise the privileges accorded by a flight navigator certificate unless he has in his personal possession while so serving a medical certificate or other evidence satisfactory to the Administrator showing that he has met the physical requirements approprate thereto within the preceding 12 months.**

34.44 ***Operation during physical deficiency.*** **No individual shall exercise the privileges accorded by a flight navigator certificate during any period of known physical deficiency or increase in physical deficiency which would render him unable to meet the physical requirements prescribed for the issuance of his currently effective medical certificate.**

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