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DEPARTMENT OF COMMERCE

CIVIL AERONAUTICS ADMINISTRATION

WASHINGTON

CIVIL AERONAUTICS

MANUAL 60
PART 3

AIRWAY TRAFFIC CONTROL

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21282

C O N T E N T S

	Page
INTRODUCTION	1
DEFINITIONS	1
CONTACT FLIGHT RULES	3
Ceilings and visibilities	3
Through or on top of cloud formations	5
Pilot requirements	6
Contact flight plans	7
INSTRUMENT FLIGHT RULES	9
Control procedures	9
Requirements prior to departure	10
Setting altimeters	11
Instrument flight plans	17
Approval of flight plans	19
Arrival report	19
Altitude requirements	20
Communication procedures	23
Two-way radio failure	24
Enroute reports	25
Flight plan change	27
Aircraft holding	28
Aircraft landing	32
OUTSIDE OF AIRWAY TRAFFIC CONTROL AREA	33
Procedures	34
Departing aircraft	35
Enroute aircraft	35
Arriving aircraft	35
Special procedures	36

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CIVIL AERONAUTICS MANUAL 60

PART 3

AIRWAY TRAFFIC CONTROL

INTRODUCTION

This part of Civil Aeronautics Manual 60 contains an explanation of the system of airway traffic control operated by the Civil Aeronautics Administration, including supplementary procedures and phraseologies based on Part 60 of the Civil Air Regulations. It should be understood that these supplementary procedures and phraseologies are not regulations in themselves but that they are recommended practices which provide for safety in operation of aircraft in air commerce and are adapted to ready understanding by the flying public.

More detailed information as to control procedures and operating practices observed by airway traffic control centers is contained in Chapter C, Part 1, Airway Traffic Control Section of the Airways Operation Division Manual of Operations, entitled "Standard Control Procedures and Practices."

DEFINITIONS

The following definitions are utilized in connection with the operation of an airway traffic control center:

(1) Altitude Separation - "Altitude separation" is the primary method of effecting separation of aircraft in flight and is accomplished by the assignment of different altitude levels.

(2) Time Separation - "Time separation" is the secondary method of effecting separation of aircraft in flight and is accomplished by requesting the pilot of an aircraft either to lose time to arrive over a specified fix at a specified time or to hold over a specified fix for a specified time.

(3) Lateral Separation - "Lateral separation" of aircraft in flight is utilized only in effecting separation of aircraft flying in opposite directions, provided that such aircraft are flying along a well defined radio range course, and are on opposite sides of such course.

21282

(4) Approach Sequence Number - "Approach sequence number" is a priority schedule specifying the sequence of approach of aircraft at a given point existing at the time of issuance of such number.

(5) Traffic Clearance - A "traffic clearance" from an airway traffic control center is an authorization to fly an aircraft solely with respect to known air traffic conditions, and includes flight plan approval, traffic control instructions (flight plan amendments) and traffic information. A "traffic clearance" in no way approves a violation of any Civil Air Regulation.

(6) Essential Traffic - "Essential traffic" information is information on aircraft which are expected to be overtaken, passed, or approached within a distance of less than 15 minutes in actual flying time when such aircraft are within a level of 4000 feet vertically above or below the aircraft being cleared.

(7) Approach Clearance - The "approach clearance" is the airway traffic control clearance issued to the pilot of an aircraft making a flight subject to instrument flight rules authorizing an approach for a landing by such aircraft.

(8) Approach Time - The "approach time" is the time at which approach may be commenced.

(9) ATC (Airways) - "ATC," or "Airways," are abbreviations used in interphone or other conversation to mean an airway traffic control center of the Administrator of Civil Aeronautics.

(10) Tower - "Tower" is an abbreviation used in interphone or other conversation to mean an airport control tower.

(11) Contact Flight Plan - A "Contact flight plan" is a flight plan containing the information specified in Part 60 when filed for a flight in accordance with contact flight rules.

(12) Instrument Flight Plan - An "instrument flight plan" is a flight plan containing the information specified in Part 60 when filed for a flight in accordance with instrument flight rules.

CONTACT FLIGHT RULES

In providing for the control of air traffic in the interest of safety, the Civil Air Regulations recognize the fact that there are two general weather conditions which determine the amount of ground control required for the purpose of minimizing the hazards of collision between aircraft in flight.

The first of these general conditions is when the pilot of an aircraft has sufficient visibility in all directions to permit him to see other aircraft in sufficient time to maneuver his own aircraft so as to avoid collision with other aircraft. A flight through this condition is commonly known as a flight under "Contact Flight Rules."

The second of these general conditions is when the visibility is not good enough to permit "Contact Flight Rules" to apply and pilot of an aircraft cannot readily see another aircraft because of haze, fog, smoke, snow, rain, or other obstruction to his vision. Flight through this condition is known as a flight under "Instrument Flight Rules."

In order to define specifically the conditions during which pilots of aircraft can "see and be seen" sufficiently well to avoid collision the Civil Air Regulations prescribe certain limits within which flight under "Contact Flight Rules" may be made. These limits are portrayed in Figures 1 to 6 inclusive.

Ceilings and Visibilities

During the hours of daylight, aircraft must be flown at least 300 feet below the overcast and at least 500 feet above open terrain, and there must be a visibility of at least one mile. This means that for flight in accordance with "Contact Flight Rules," during the hours of daylight, there must be a ceiling of at least 800 feet and a visibility of at least one mile. (See Fig.1)

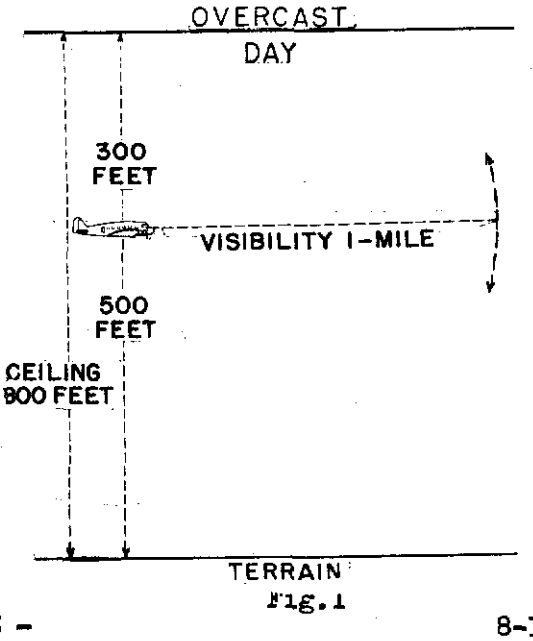

Fig.1

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During the hours of darkness, aircraft must be flown at least 500 feet below the overcast and at least 500 feet above open terrain, and there must be a visibility of at least two miles. This means that for a flight to be made during the hours of darkness in accordance with the "Contact Flight Rules," there must be a ceiling of at least 1000 feet and a visibility of at least two miles. (See Fig. 2)

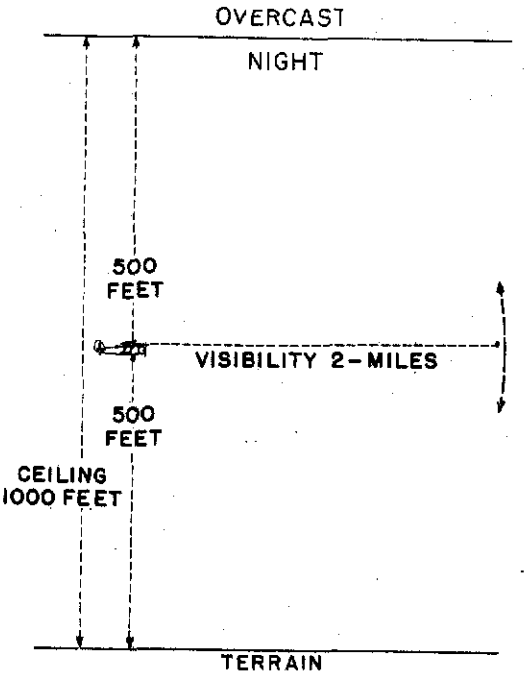

Fig. 2

Whenever precipitation occurs in any form, aircraft must be flown at least 500 feet below the overcast and at least 500 feet above open terrain, and there must be a visibility of at least one mile during the hours of daylight, and two miles during the hours of darkness. This means that for a flight in accordance with the "Contact Flight Rules," when precipitation is occuring in any form, there must be a ceiling of at least 1000 feet and a visibility of at least one mile day and two miles night. (See Fig. 3)

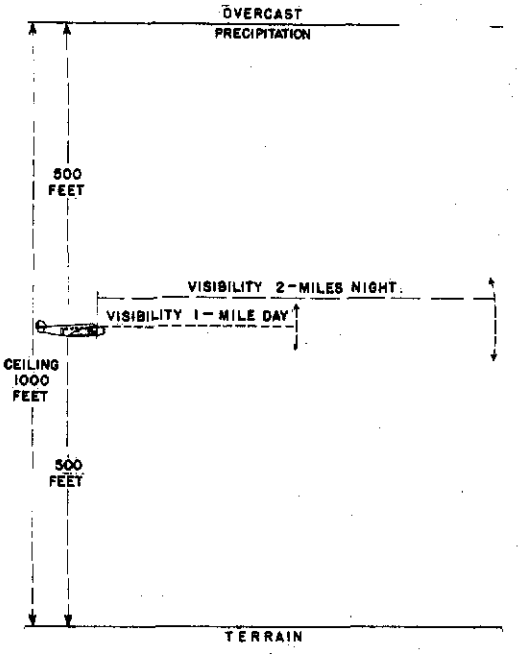

Fig. 3

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Since most of the slower aircraft fly at low altitudes, and most of the faster aircraft fly at high altitudes, aircraft flying within a level at or below 1000 feet above the terrain may do so with a minimum visibility of one mile day and a minimum visibility of two miles night; however, aircraft flying above 1000 feet above the terrain must have three miles visibility at all times.

At certain designated "control airports," (see Appendix to Part 60 for a list of control airports) the thousand foot level does not apply, and pilots flying within the control zone of such airports (3 mile radius) must have at least three miles visibility at all times unless the flight is otherwise authorized by the air traffic control tower operator at such airport. (See Fig. 4)

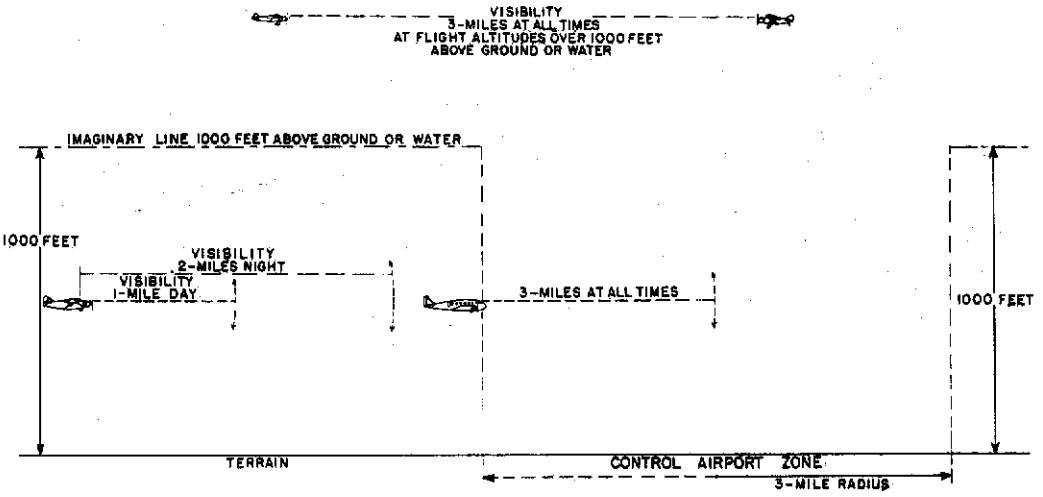

Fig. 4

Through or On-top of Cloud Formations

Aircraft being flown in accordance with the "contact flight rules" may fly through cloud levels if not flown at any time closer than 2000 feet horizontally to any cloud formation. (See Fig. 5)

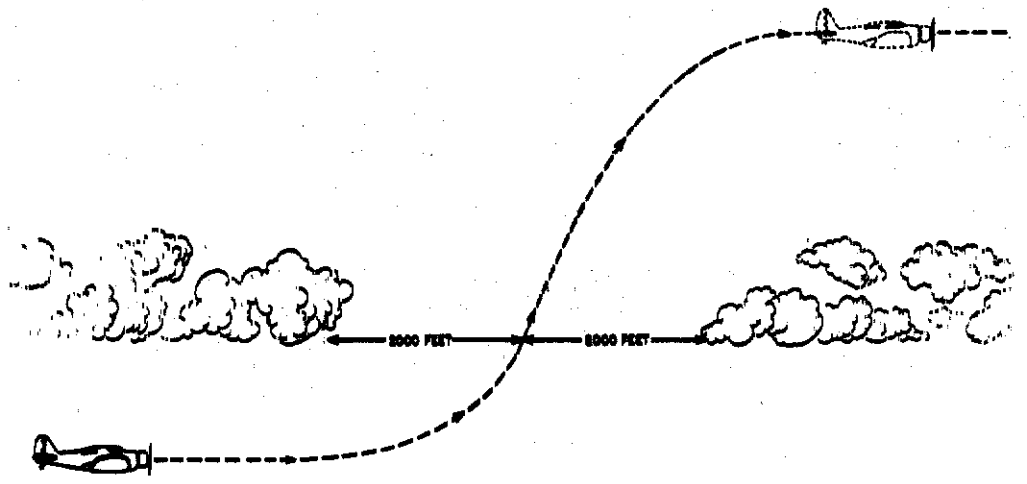

Fig. 5

Aircraft being flown in accordance with the "contact flight rules" may be flown on top of a cloud formation if the altitude and the flight path of the aircraft can at all times be controlled by visual reference to the ground or water. (See Fig. 6)

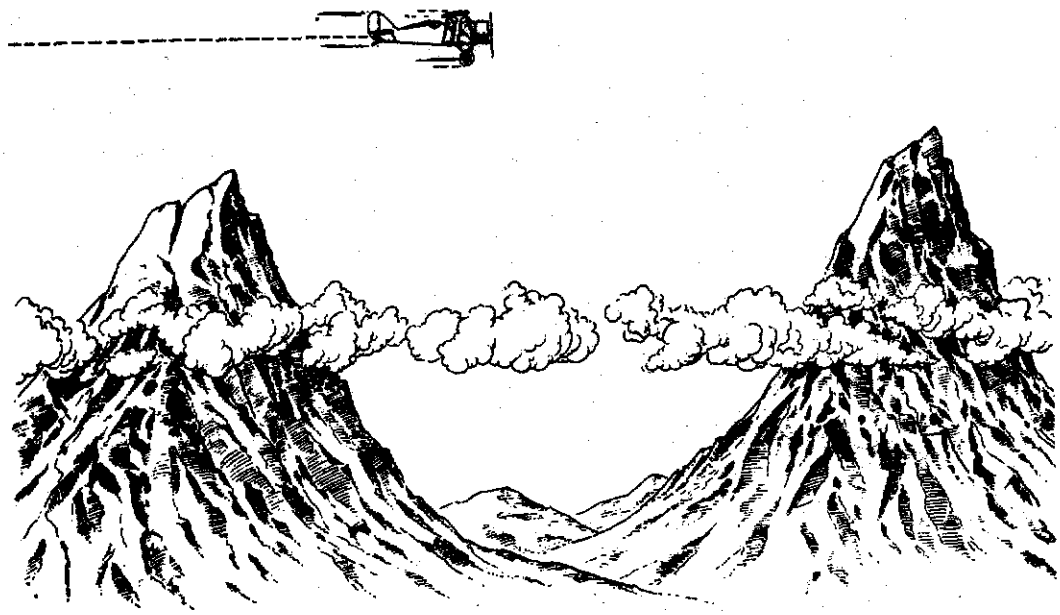

Fig. 6

Pilot Requirements

The pilot of an aircraft flying in accordance with the conditions of flight described in Figures 1 to 6 inclusive, may do so without submitting a flight plan, he need not have an instrument rating and his aircraft need not be equipped with blind flying instruments or two-way radio.

A pilot may, however, submit a flight plan for a flight in accordance with the contact flight rules if he so desires, and he may, in the interest of good practice and perfecting his flying technique, perform a flight according to instrument flight rules (complete flight plan including specified altitude levels, two-way radio reports over fixes, reporting change in flight plan, etc.), even though the aircraft is flown under contact flight rule conditions.

In any event, it is considered good flight technique always to fly at the prescribed even or odd thousand foot levels required by the instrument flight rules whenever flight is performed above 1,000 feet above the ground or water.

21282

Contact Flight Plans

If a pilot desires to submit a flight plan for a flight in accordance with the contact flight rules, the following information is required and may be submitted to the nearest airway traffic control center, airport control tower, airway communication station or military post either in person, by telephone or by radio:

(1) The aircraft identification mark, or name of governmental service and call numbers of aircraft, or name of air carrier operator and trip number. When one flight plan is being filed for a formation flight, the flight commander's aircraft identification only is required.

Examples: "NC12345;" "Army 8386;" "United trip 7."

(2) The number of aircraft making the flight, if the aircraft are in formation, the overall area to be occupied by the formation, and the type of aircraft.

Examples: "3 B18." "Stinson."

(3) The name of the pilot, or of the flight commander if aircraft are in formation.

Examples: "Jones;" "Lt. Smith."

(4) Point of departure, or position of aircraft if flight plan is filed enroute.

(5) The proposed cruising altitude or altitudes above sea level and route of flight. When altitude over a fix will be different than the cruising altitude, such information also should be included.

Examples: "Cruising 6,000, crossing Baltimore at 4,000," "Flying contact flight rules direct to Harrisburg."

(6) Point of first intended landing.

(7) The proposed cruising airspeed (the speed of the aircraft without reference to wind conditions) in miles per hour.

(8) Information concerning radio equipment aboard the aircraft.

Examples: "No radio;" "Receiver only;" "Transmitting on 3105 Kc."

(9) The proposed or actual time of departure.

(10) The estimated elapsed flying time in hours and mimutes until arrival on the ground at the point of first intended landing.

Example: "Estimated elapsed time 3 hours 35 minutes."

(11) Remarks which might be useful for control purposes, including advice as to whether or not the flight plan should be transmitted to point of intended landing. If the pilot requests that the flight plan be transmitted to point of intended landing, he is required to forward an arrival report to point of departure immediately upon completion of flight.

In connection with item (5), proposed cruising altitude or altitudes, a pilot may submit two types of altitude information in a contact flight plan, as follows:

(1) A contact flight plan may contain "CFR" (contact flight rules) instead of specific altitude levels, indicating that the pilot proposes to conduct flight at all times in accordance with the contact flight rules prescribed in Part 60 of the Civil Air Regulations (see figures 1 to 6 inclusive). No traffic clearances for the exercise of control will be issued by an airway traffic control center to a pilot submitting this type of altitude information unless it is necessary for a center to restrict or suspend contact operations in the interest of safety. The only report required of a pilot submitting this type of flight plan is an arrival report, and then only if he has advised that one will be forwarded upon arrival. (See item (11)).

(2) A contact flight plan may contain as altitude information a specific altitude level followed by "CFR" (for example, "flying 7000 feet contact flight rules"), indicating that the pilot proposes to fly at the specified altitude level if and as long as weather conditions permit, but in any event the flight will be conducted at all times in accordance with the contact flight rules. (See Fig. 7). This type of flight plan will be acceptable if (a) aircraft is equipped with functioning two-way radio, (b) pilot will attempt to report over designated radio fixes in the same manner as a flight under instrument flight rules and (c) pilot will report any change in altitude as soon as possible after making such change. Under such conditions, traffic clearances will be issued to aircraft flying within airway traffic control areas by the airway traffic control centers.

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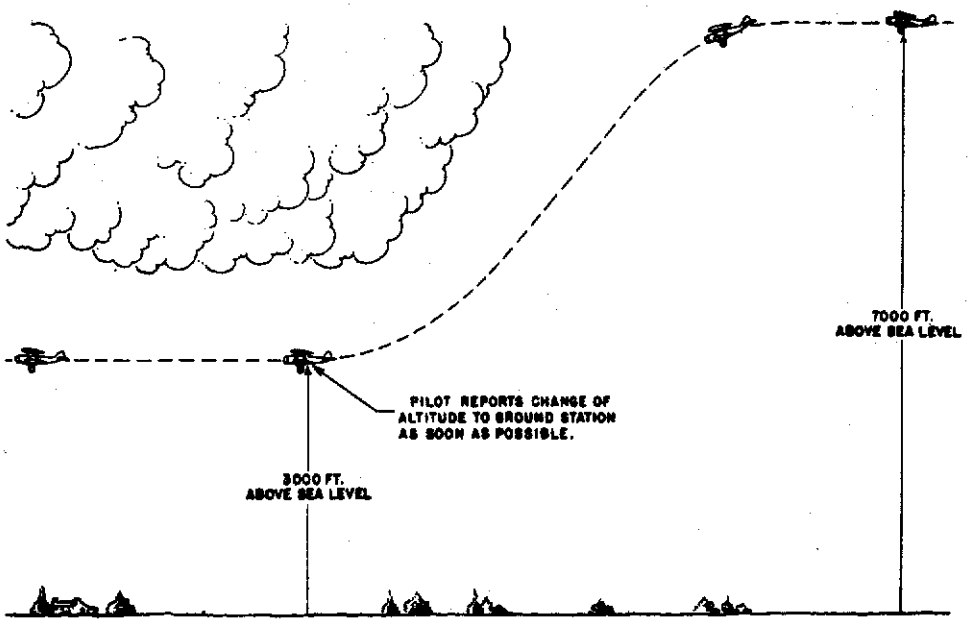

Fig. 7

INSTRUMENT FLIGHT RULES

The preceding portion of this part of Civil Aeronautics Manual 60 has portrayed the "Contact Flight Rules" which apply to flight of aircraft when pilots "can see and be seen." The following section of the Manual explains how a flight is made when a pilot cannot "see and be seen" sufficiently to proceed under "Contact Flight Rules" but must conduct his flight under "Instrument Flight Rules."

To administer the "Instrument Flight Rules," the Administrator of Civil Aeronautics has established airway traffic control centers and provided the necessary communication facilities for the proper functioning of these centers.

Control Procedures

In controlling air traffic, airway traffic control centers effect separation of aircraft, vertically, by assigning different altitude levels; horizontally, by prescribing a minimum amount of flying time between aircraft at the same level flying in the same direction; and laterally, by the fact that pilots are required to fly on opposite sides of a radio range course. (See Fig. 8)

It should be understood by a pilot that he always has the privilege of requesting control procedures other than those which may be imposed by a center if he feels that he has information available which would make such other procedures more practicable. Airway traffic control centers attempt to furnish alternate procedures whenever possible and will give every consideration to pilots' requests for a change in control procedures.

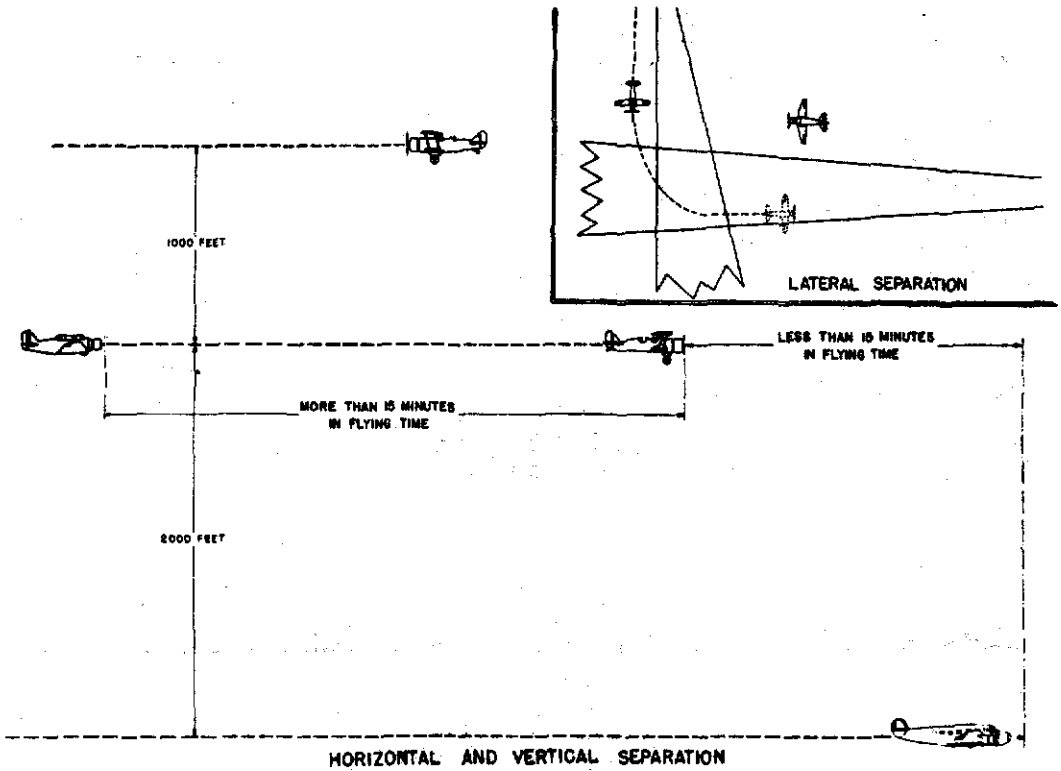

Fig. 8

In addition to effecting necessary separation between aircraft in the interest of safety, airway traffic control centers advise each pilot of other air traffic in which he is interested (essential traffic) and advise him when to expect his approach clearance so that he may be acquainted with any air traffic delay anticipated.

Requirements Prior to Departure

Each airway traffic control center has under its jurisdiction certain portions of the civil airways known as its "Control Area," and before an aircraft can depart from within, or enter an airway traffic control area, certain requirements must be met. (For information as to locations of airway traffic control areas, see current map issued by Administrator of Civil Aeronautics entitled "Airway Traffic Control Areas.")

For flight subject to the "Instrument Flight Rules," pilot and aircraft must be properly rated and equipped for flight by instruments, one of these requirements being that the aircraft be equipped with properly functioning two-way radio. (For complete requirements, see Part 60 of tne Civil Air Regulations.)

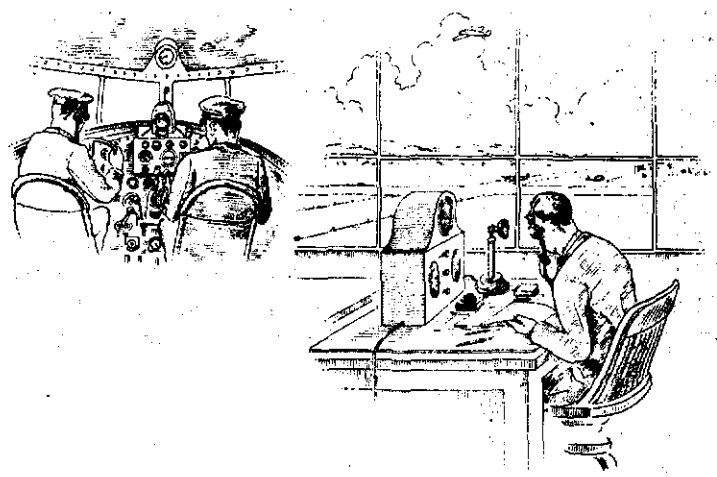

Fig. 9

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Prior to departure from within, or prior to entering an airway traffic control area, a pilot must submit to an airway traffic control center (see Fig. 10) either in person, by telephone, or by radio, flight plan (proposed time of departure, proposed altitude, point of first intended landing and other pertinent information), and obtain approval therefor.

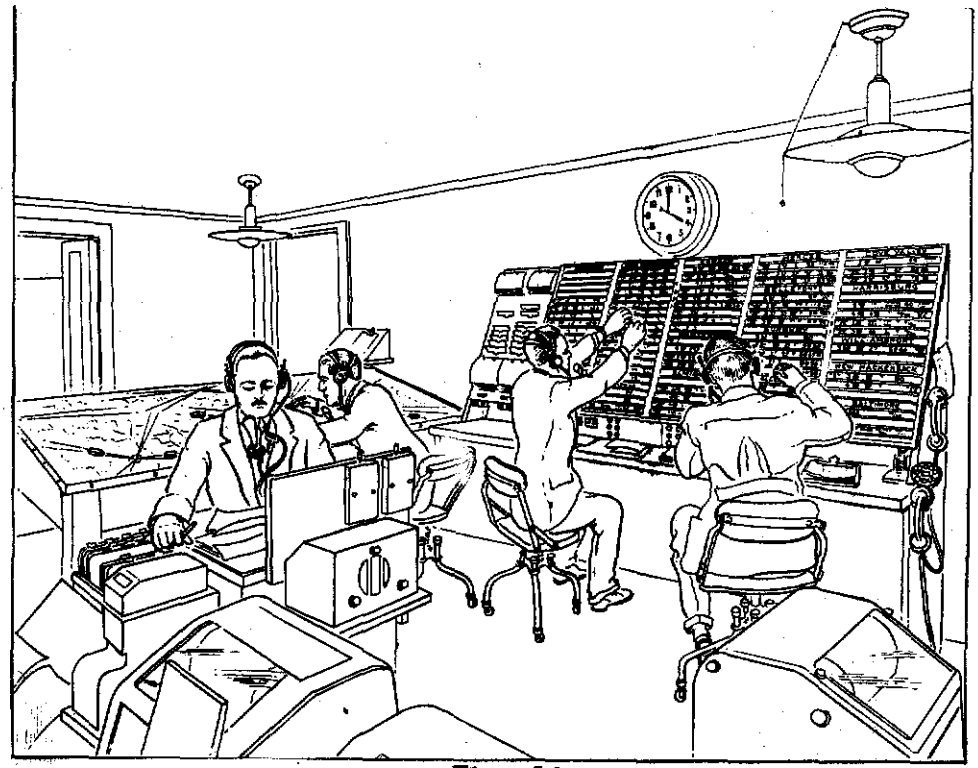


Fig. 10

Setting Altimeters

Before proceeding further with an explanation of the instrument flight rules, the method of obtaining altitude of an aircraft above sea level should be understood thoroughly. Since the accuracy of the altitude indicated by an altimeter is dependant mainly upon the setting of the altimeter, there follows an explanation and discussion of this subject.

Altimeter Setting Definition - The "Altimeter Setting" is a pressure in inches, used for setting a pressure-scale type sensitive altimeter in an aircraft so that the pointers of the altimeter will indicate very closely the field elevation above sea level when the aircraft is on the airport, provided that the altimeter is functioning properly and is free from error, and that the setting was determined by a properly equipped station near the airport, and that the existing setting is used.

Official altimeter settings include an allowance corresponding to about 10 feet of altitude. The allowance is designed so that a sensitive altimeter calibrated in strict accordance with U. S. standard atmosphere and set in agreement with the existing official altimeter setting

1856

will indicate an altitude about 10 feet lower than the actual altitude of the instrument above sea level. The purpose of this allowance is to cause the altimeters in aircraft to indicate more nearly the altitude of the landing wheels above sea level than the actual altitude of the instrument itself. If the lowest part of an aircraft is more than or less than 10 feet below the location of the altimeter, the pilot must make allowance for the difference.

Sources of Altimeter Setting -

(1) Official altimeter settings are reported by U. S. Weather Bureau Reporting Stations near the four times, 1:30 AM, 7:30 AM, 1:30 PM, and 7:30 PM Eastern Standard Time, daily. Such stations are located at an airport or render airway meteorological service. These reporting stations furnish altimeter settings to the local airport control tower, local federal airway communication station and other parties through interoffice airport telephone circuits or other available means of communication in order that all ground altimeters can be set identically and thereby insuring that all altimeters in aircraft operating out of a specified location will be set identically when altimeter settings are received from one of the ground stations.

(2) Hourly teletype or radio sequence weather reports transmitted by the federal communication facilities as received from a weather reporting station equipped with a mercurial barometer will include the altimeter setting existing at the station at the time of the hourly observation.

(3) Local weather reports and sequence weather reports which are broadcast by federal airway communication stations on the basis of reports originating at weather reporting stations will include the appropriate altimeter setting in the broadcast report. Broadcast of altimeter setting will be made in accordance with the following example:

"Altimeter Setting Twenty-Nine Ninety-Five" for 29.95 inches
"Altimeter Setting Thirty Ten" for 30.10 inches.

Setting the Altimeter - To obtain altitude above sea level, the pilot should set the pressure scale of the altimeter in the aircraft to coincide with the altimeter setting received from one of the sources described in paragraphs (1), (2) and (3) above. Aircraft altimeters should be set by pilots in accordance with existing pressure

reading (altimeter setting) as reported by the nearest weather reporting station prior to departure (see example (1) below), while enroute (set altimeter to the altimeter setting of the next reporting station midway between the next station and the preceding station, see example (2) below) and prior to landing (see example (3) below). A record of existing altimeter settings for all reporting stations on the route of flight should be made for reference purposes in the event altimeter settings cannot be obtained once flight has commenced.

Examples -

(1) Assume an airport with an elevation of 750 feet above sea level and the existing altimeter setting for that airport is reported as 30.10 inches. Pilot should set the pressure reading of the aircraft altimeter to 30.10 after which the pointers of the altimeter should indicate 750 feet (height reading), which is the altitude of the wheels of the aircraft above sea level while the aircraft is on the airport. Should the altimeter read higher or lower than 750 feet in this example, the pilot should keep this error in mind during the course of the flight and especially when landing. Sensitive type altimeters should not be set to the elevation of the airport prior to take-off when a current altimeter setting is available since this method of setting the altimeter would not afford any indication of possible instrumental or other error.

(2) Assume an aircraft being flown between points X and Y with intermediate stations reporting altimeter settings at A, B and C. Pilot should maintain his altimeter set to the point X reading until midway between X and A whereupon the altimeter should be set to the current altimeter setting at point A. The point A setting should be maintained until midway between A and B whereupon the altimeter should be set to the current altimeter setting at point B. The point B setting should be maintained until midway between B and C whereupon the altimeter should be set to the current altimeter setting at point C and the point C setting should be maintained until midway between C and Y whereupon the altimeter should be set to the current altimeter setting at point Y.

(3) Assume an aircraft approaching an airport at which the current altimeter setting is reported as 29.96 inches and the elevation above sea level of the airport is 1210 feet. Prior to

11856

starting the instrument approach the pilot should set the pressure reading of the altimeter to 29.96 and upon landing at the airport the pointers of the altimeter should read 1210 feet. The pilot should keep in mind that the readings are not always exact because of instrument errors which may vary from 30 to 100 feet.

Airports at which altimeter settings are not reported - Pilots arriving or departing from airports for which altimeter settings are not available may obtain the approximate altimeter setting for such airports by considering the altimeter settings of the reporting stations nearest the location where landing or departure will be made and using what would appear to be a logical setting for the airport in question. Meteorological sea-level pressures expressed in millibars (1 mb. equals 0.02953 inches) are not accurately convertible to altimeter settings unless such reports are reported by stations or ships not more than 100 feet above sea level. The error in converting meteorological sea-level pressure to altimeter setting for a reporting station at a high elevation is very serious, especially in winter. Error of perhaps 800 feet may occur under such circumstances (actual altitude lower than indicated altitude.)

Pressure Change - It should be understood that as a flight progresses the barometric pressure generally is increasing or decreasing, which requires that consideration be given to possible error in the altimeter reading (both for sensitive and non-sensitive type altimeters) because of pressure change. In flying from a high pressure area to a lower pressure area with the same altimeter setting, the indicated altitude will be generally higher than the actual altitude. Conversely, in flying from a low pressure area to a higher pressure area with the same altimeter setting, the indicated altitude will be generally lower than the actual altitude.

Temperature Error - Before explaining temperature error, it should be understood that all sea level altitudes used in connection with the control of air traffic are based on the indicated altitude since the temperature error will affect all altimeters in the same vicinity to the same extent and relative separation between aircraft will be maintained. Pilots should consider temperature error only with respect to insuring that the actual altitude of the aircraft permits ample clearance of terrain and obstructions.

On consideration of eliminating tables in computing temperature error, the following rules may be applied to determine the temperature error so that appropriate compensation can be made therefor:

(1) For each 10° F. that the actual mean air column temperature is lower or higher than the standard mean air column temperature the actual altitude above sea level is lower or higher respectively, than the indicated altitude above sea level by approximately two percent of the indicated height above the elevation of the base of the obstruction.

(a) The actual mean air column temperature is determined by adding the temperature as reported by the reporting station nearest the base of the obstruction and the temperature at the proposed or indicated cruising altitude and divide the answer by two. If the temperature at the proposed or indicated altitude is not available it can be determined by applying the following rule: "For every thousand feet increase in altitude the temperature will decrease by $5\frac{1}{2}^{\circ}$ F." This rule is an estimate of temperature on the safe side.

(b) The standard mean air column temperature can be determined by applying the following rule: "The standard mean air column temperature equals 59° minus 1.78° times number of thousand feet of proposed or indicated altitude." This rule is based on the following: "Consider standard sea level temperature as 59° F. For every thousand feet increase in altitude the standard temperature will decrease by 3.566°."

NOTE: The word "mean" as used in paragraphs (a) and (b) above means "average" and applies to the entire air column.

Example: Consider a flight over a route with the highest obstruction as 8,500 feet, base of which is 4,000 feet above sea level and cruising altitude of 10,000 feet is selected.

Determination of actual mean air column temperature - The actual temperature reported by a reporting station in the vicinity of the base of the obstruction is -2°. Apply rule two in paragraph (1)(a) above to determine the actual temperature at 10,000 feet, as follows:

$(10{,}000' - 4{,}000') \div 1{,}000' = 6$ (number of thousand feet increase in altitude)

$5\frac{1}{2}^{\circ} \times 6 = 33^{\circ}$ (decrease in temperature)

$-2^{\circ} + (-33^{\circ}) = -35^{\circ}$ (actual temperature at 10,000 feet)

Apply rule one in paragraph (1)(a):

$-35^{\circ} + (-2^{\circ}) = -37^{\circ}$ (addition of the temperature reported at the base of the obstruction and the temperature at the proposed altitude)

$-37^{\circ} \div 2 = -18.5^{\circ}$ (actual mean air column temperature)

Determination of standard mean air column temperature - The standard mean temperature is obtained by applying rule in paragraph (1)(b), as follows:

$59^{\circ} - (1.78^{\circ} \times 10) = 41.17^{\circ}$

Determination of temperature error - In this example the actual mean temperature is approximately 60° lower than the standard mean temperature (-18.5° minus 41.17° = 59.67° lower than standard mean temperature). In applying rule in paragraph (1):

60° ÷ 10° = 6 (number of 10° that the actual mean temperature is lower than the standard mean temperature)

6 x 2% = 12% (percentage to be applied to the indicated height of 6000 feet above elevation of the base of the obstruction)

12% x 6000' = 720' (number of feet the actual altitude is lower than the indicated altitude)

10,000' - 720' = 9,280' (actual altitude)

Accordingly, under instrument conditions the flight level of 12,000 feet should be selected for the flight over this route, considering prescribed flight levels of even and odd thousand feet, in lieu of the flight level of 10,000 feet, since this level will not allow clearance of 1,000 feet of obstructions as required by the Civil Air Regulations.

Altimeters not equipped with pressure scale adjustment - The Civil Air Regulations require that aircraft flown subject to the instrument flight rules be equipped with a sensitive altimeter having a pressure scale allowing for adjustment to varying altimeter setting pressures. However, since it is recommended that aircraft flown under contact flight rules conform to the same altitude levels above sea level as are required by the instrument flight rules, the proper method of setting altimeters not equipped with a pressure scale adjustment should be understood. Altimeters of this type always should be set prior to take-off, so that the pointers of the altimeter read the elevation of the airport above sea level. Subsequently, a fair measure of accuracy of the reading may be obtained by resetting the altimeter during flight on consideration of altimeter settings of reporting stations nearest the route of flight.

Example - Assume that a pilot has adjusted his altimeter prior to take-off so that the altimeter reads the elevation of the airport above sea level. He has previously noted the current altimeter settings of reporting stations on, or nearest the route of flight if there are no reporting stations on route of flight. Procedures as outlined under "Setting the Altimeter" on pages 12, 13, and top of page 14, should be followed with the exception that the altimeter will be set by the altitude scale in lieu of the pressure scale as follows: Assume point X (point of departure) reported altimeter setting of 30.20 inches and point A, 29.90 inches, which is a difference of .30 of an inch or 300 feet. For practical purposes, it is considered that one-tenth (.10) of an inch change in altimeter setting is equivalent to a change in

altitude of 100 feet. Accordingly, when the pilot is midway between points X and A he should adjust his altimeter to read 300 feet less and following this procedure for flight beyond point A on consideration of altimeter settings for points beyond point A.

Instrument Flight Plans

A flight plan for a flight in accordance with the instrument flight rules must contain the same information required for a flight in accordance with the contact flight rules (see "Contact Flight Plans"), and, in addition, the pilot is required to specify an alternate airport as prescribed in Part 60 of the Civil Air Regulations.

In connection with item (5), proposed cruising altitude or altitudes, a pilot may submit two types of altitude information in an instrument flight plan, as follows:

(1) An instrument flight plan may contain specified altitude levels above sea level depending upon the color of the airway to be flown and the direction of flight. This type of altitude information indicates that the pilot is qualified and the aircraft equipped for flight in accordance with the instrument flight rules as prescribed in Part 60 of the Civil Air Regulations, and further, that the pilot will conform to all provisions of the instrument flight rules.

A pilot submitting this type of flight plan for flight within an airway traffic control area will at all times receive traffic clearances from airway traffic control centers. If a pilot submits this type of flight plan for a flight started under contact flight rule weather conditions and encounters instrument flight rule weather conditions, flight may be continued in accordance with the current traffic clearance received from the appropriate airway traffic control center without further permission being necessary. (See Fig. 11)

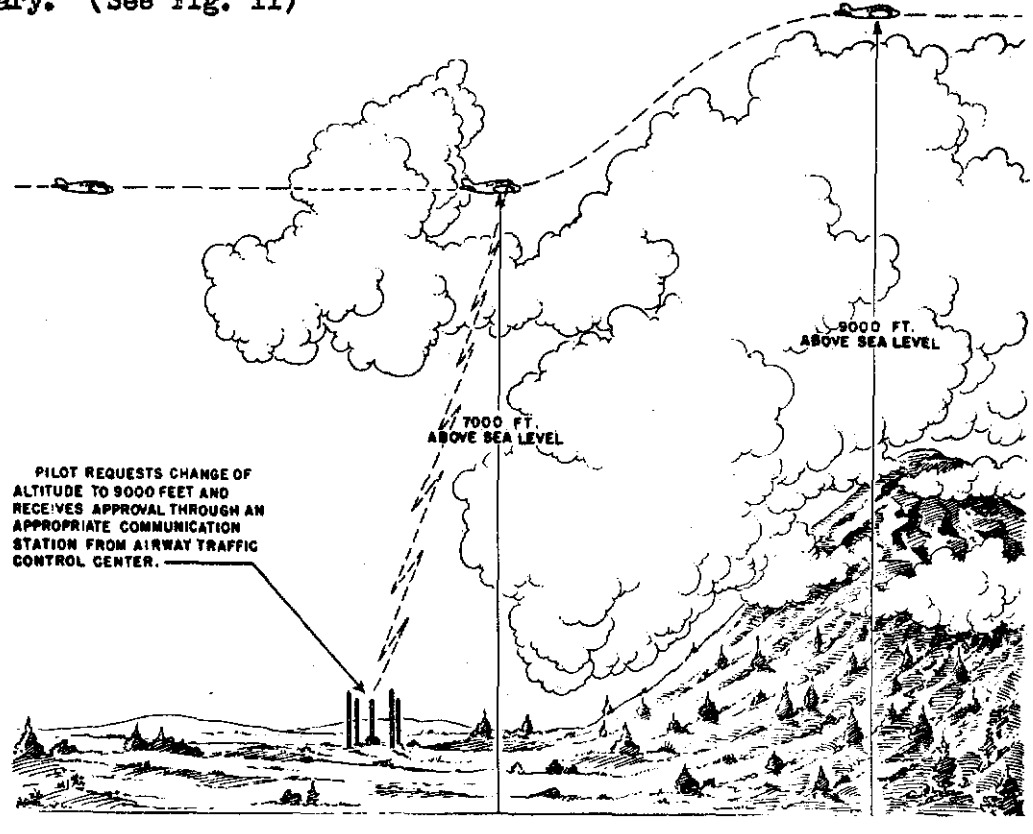


Fig. 11

(2) An instrument flight plan may contain "CTC" (Contact) followed by a specific altitude level (for example, flying contact or 3,000 feet"), indicating that pilot is properly qualified, that aircraft is properly equipped and that flight will be conducted in accordance with the instrument flight rules prescribed in Part 60 of the Civil Air Regulations. This type of altitude information is acceptable, however, only for flight within an airway traffic control area.

The abbreviation "CTC" indicates that flight will be conducted by visual reference to the ground or water at any altitude down to 500 feet above the ground and that when visual contact can no longer be maintained pilot will continue flight at the specified altitude following the abbreviation "CTC". In every case the alternate altitude specified in this type of flight plan will be the lowest sea level altitude for the terrain over which flight will be made.

When a pilot changes from a visual contact flight to the alternate altitude specified in the flight plan, he should report such change to the appropriate communications facility as soon as possible. (See Fig. 12)

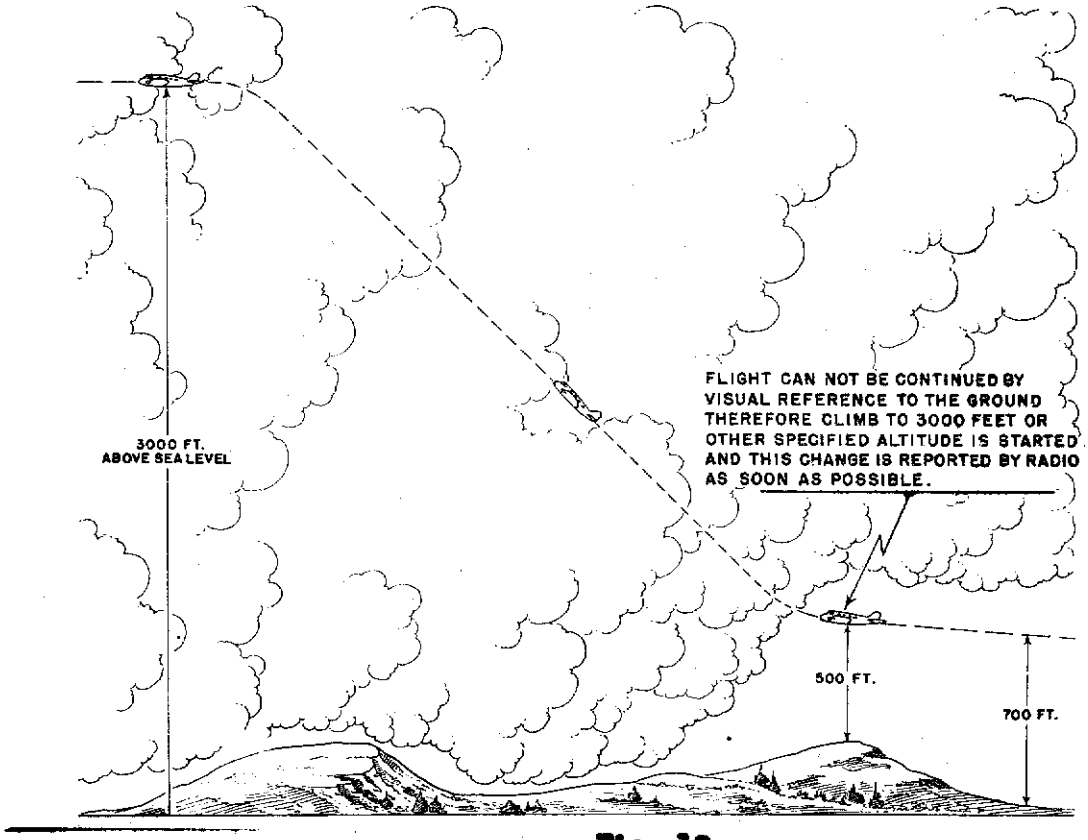


Fig. 12

The following procedures govern the submission of a flight plan concerning a flight to be made within an airway traffic control area:

Airway Traffic Control Center at Airport of Departure - A pilot of an aircraft filing a flight plan at an airport at which is located an airway traffic control center, may file such flight plan with the airway traffic control center either in person, by telephone, or by radio through the airport control tower.

Airway communications station at Airport of Departure - A pilot of an aircraft filing a flight plan at an airport at which is located an airway communications station but no airway traffic control center may file such flight plan with the airway communications station either in person, by telephone, or by radio.

Neither airway traffic control center nor airway communications station at Airport of Departure - A pilot of an aircraft filing a flight plan at an airport at which is not located either an airway traffic control center or an airway communications station, may file such flight plan with the nearest airway traffic control center or airway communications station either by telephone, by telegraph, by military teletype facilities, or by radio.

Approval of Flight Plans

Approval of flight plan by an airway traffic control center will be in the form of a traffic clearance indicating the extent of the control area over which the flight plan is approved, including any necessary amending traffic control instructions, and accompanied by essential traffic information. Such traffic clearances always are issued in standard phraseology commencing with "(Name of) Airway Traffic Control clears you, or advises, etc." Flight plans cannot be considered as approved unless the clearance is preceded by this prefix. Prior to or upon reporting over the clearance point to which a traffic clearance has been issued, the pilot of such aircraft must receive further traffic clearance to another point if flight is to continue on an approved flight plan. The pilot of an aircraft leaving an airway traffic control area will be "Cleared out of airway traffic control area _____ miles _____ (direction of) ____ (location)," indicating that after leaving the control area, flight cannot be controlled by an airway traffic control center and pilot will be governed by the procedures specified in Part 60 of the Civil Air Regulations.

Approval of a flight plan by an airway traffic control center is an approval only insofar as known air traffic conditions are concerned, and such approval does not constitute authority to violate any provision or provisions of the Civil Air Regulations. A flight plan implying a violation of the Civil Air Regulations may be approved by an airway traffic control center if warranted by existing traffic conditions, but the pilot submitting the flight plan will be responsible for any violation subsequently committed.

Arrival Report

As specified in Part 60 of the Civil Air Regulations, whenever a flight plan is submitted to an airway communication station of the Administrator for transmission to the point of intended landing, an arrival message must be submitted to the appropriate communication facility for transmission to the point of departure. Under some conditions a pilot may desire to submit a flight plan to an airway traffic control

center for traffic information purposes only, not wishing that the flight plan be transmitted to point of intended landing. In such instances a pilot should state that flight plan should not be transmitted to point of intended landing as no arrival message will be filed (such flight plans are known as "QVQ" flight plans).

If a required report of the arrival of an aircraft or of cancellation of the flight at an intermediate point has not been received within a reasonable time after the estimated time of arrival of the aircraft, steps will be taken to trace the aircraft by inquiry of intermediate stations. An unreported aircraft is maintained on the flight progress boards in an airway traffic control center for a period of at least thirty minutes after estimated time of arrival, during which time other aircraft movements may be restricted or suspended in an effort to prevent possibility of collision between the unreported aircraft and other air traffic. Should the aircraft still be unreported after the thirty minute period, the airway traffic control center may resume normal traffic after all concerned have been appropriately notified. Failure to complete flight with an arrival report may subject the pilot to a civil penalty.

Altitude Requirements

Aircraft on instruments (in the overcast) must be flown at least 1000 feet above the terrain. (See Fig. 13)

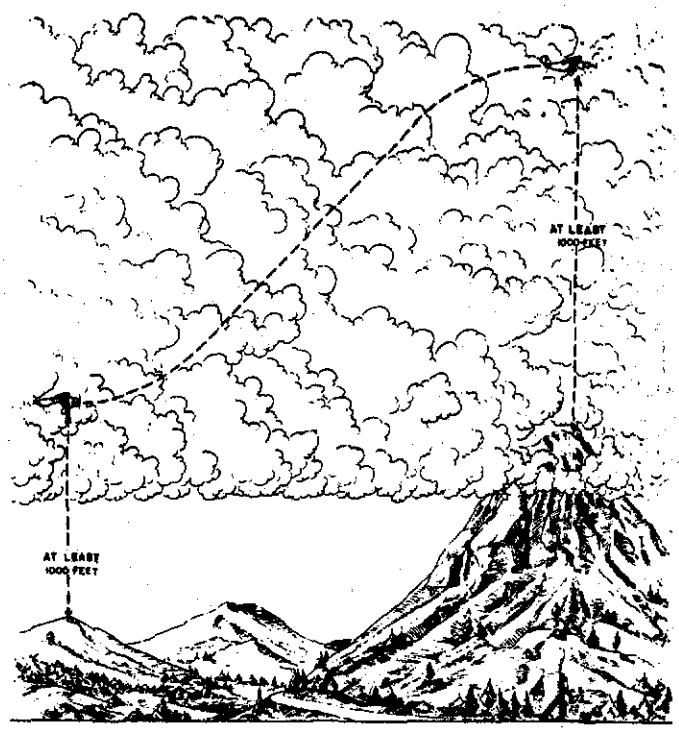
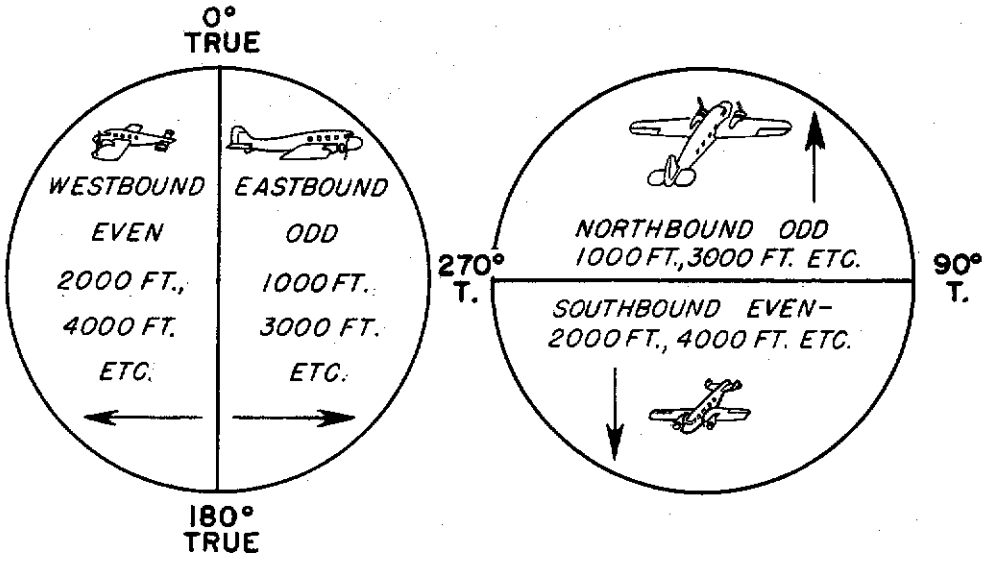


Fig. 13

Aircraft must be flown at prescribed even or odd thousand foot levels above sea level depending upon the color designation of the civil airway being flown, and the direction of flight, unless other altitudes are assigned or approved by an airway traffic control center. (See Fig. 14)



GREEN OR RED CIVIL AIRWAYS **AMBER OR BLUE CIVIL AIRWAYS**

(ALL ALTITUDES MUST BE ABOVE SEA LEVEL)

Fig. 14

Unless other altitude is assigned or approved by an airway traffic control center, an aircraft while flying through an airway intersection must be flown 500 feet higher than the altitude for the airway being followed if such airway does not have priority over the other airway at the intersection. The order of priority of airways is green, amber, red and blue.

Example - At an intersection of a green airway and an amber airway, a pilot flying along the green airway maintains the proper even or odd thousand foot level through the intersection while a pilot flying on the amber airway increases the proper even or odd thousand foot level for his direction of flight on the amber airway by 500 feet (3500, 4500, etc.) and maintains this altitude through the intersection.

Unless other altitude is assigned or approved by an airway traffic control center, an aircraft while crossing a civil airway at other than an airway intersection must be flown 500 feet higher than the proper altitude for flight on the airway being crossed, depending upon its color designation and direction of flight while crossing.

11856

Example - An aircraft crossing a green airway eastbound (0 to, but not including, 180 degrees true) would be flown at 3500, 5500, 7500, etc., and an aircraft crossing a green airway westbound (180 to, but not including, 0 degrees true) would be flown at 4500, 6500, 8500, etc., but such altitudes need be observed only while crossing the airway.

Unless otherwise instructed by an airway traffic control center, an aircraft while crossing a civil airway intersection must be flown so that the airway is crossed at an angle of at least 45 degrees to the airway. (See Fig. 15)

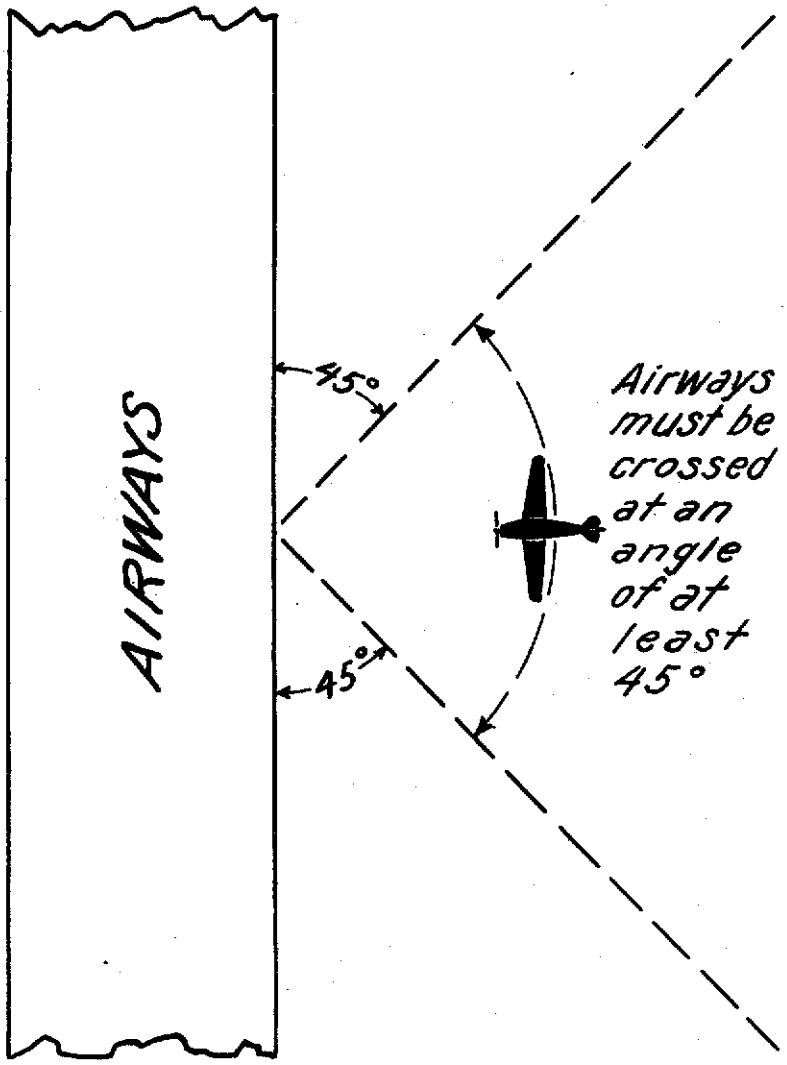


Fig. 15

Communication Procedures

Each airway traffic control center is directly connected by interphone and/or teletype with the various communication facilities located within its control area. (See Fig. 16)

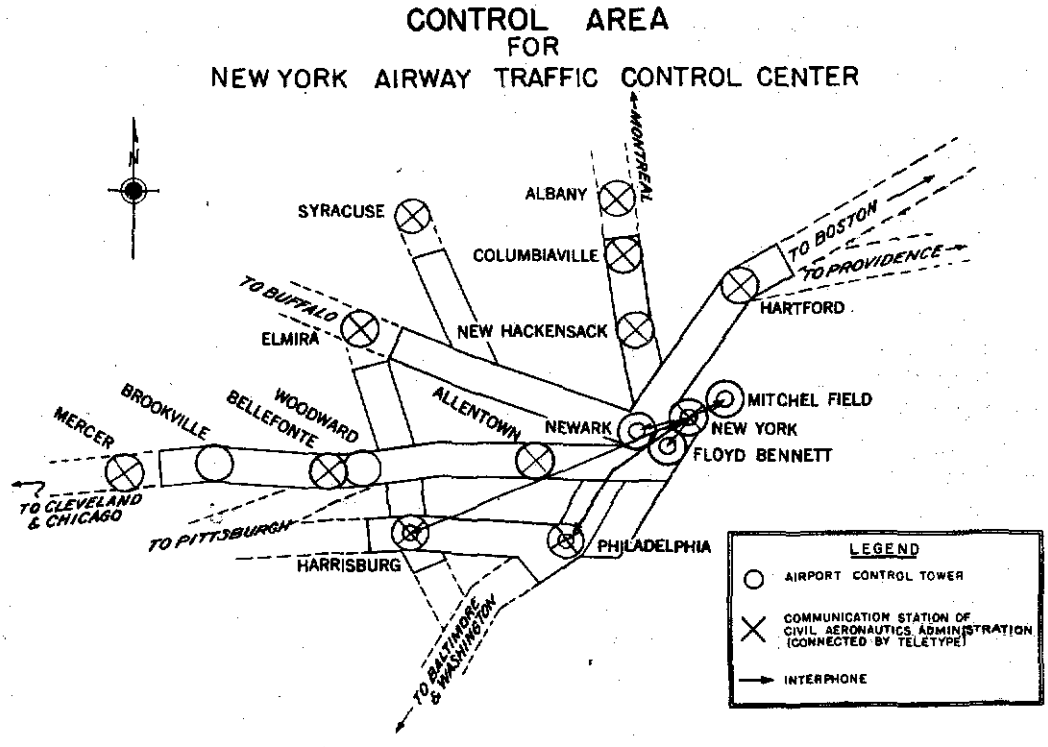


Fig. 16

An airway traffic control center does not communicate directly with pilots of aircraft, but utilizes available radio communication facilities with which contact is maintained by interphone and teletype facilities. (See Fig. 17)

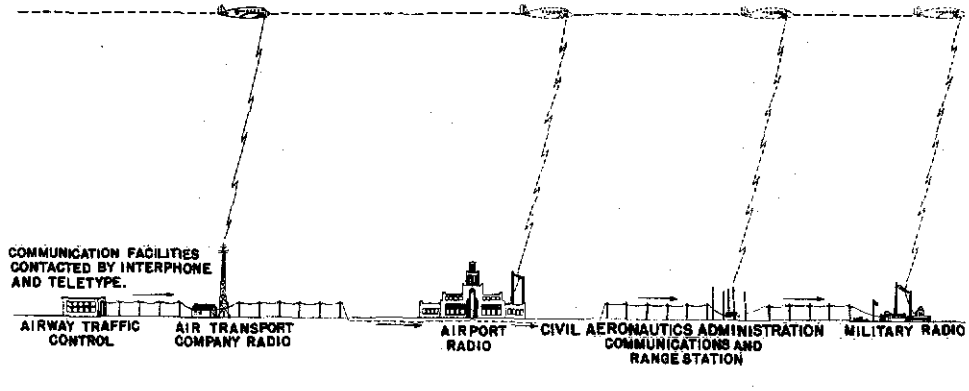


Fig. 17

All aircraft (including any air carrier aircraft), maintaining communication through airway communications stations of the Administrator are required to maintain continuous listening watch on the voice channel of the simultaneous radio range feature of such stations. When an airplane is approaching an airport at which landing is proposed, listening watch should be maintained on the voice channel of the radio range until after aircraft has been "cleared to the tower" after which communication may be established and maintained with the airport control tower at such airport, if one is in operation. If no airport control tower is in operation at the airport of destination, continuous listening watch shall be maintained on the voice channel of the radio range until the aircraft is landed.

Aircraft maintaining communication through air transport company radio or military radio are required to maintain continuous listening watch on such radio facilities until after aircraft has been "cleared to the tower" after which communication may be established and maintained with the airport control tower. If none is in operation at the airport of destination, continuous listening watch should be maintained on the air transport or military radio until aircraft is landed.

It is considered the responsibility of an aircraft operator handling communications through its facilities to advise a center promptly if it has been unable to deliver a message within 5 minutes of the expected delivery time. Unless specific acknowledgment of receipt by pilot has been requested by a center, it is assumed that a message has been delivered satisfactorily to a pilot unless the aircraft operator otherwise advises the center. Likewise, it is considered the responsibility of an aircraft operator to advise a center promptly in the event of two-way communication failure with one of its aircraft.

Two-way Radio Failure

In the event of failure of two-way radio communication between an aircraft and the ground and pilot cannot continue flight in accordance with the contact flight rules and does not make an emergency landing, the following procedures will govern such flight:

(a) If no approach clearance time has been received, continue flight in accordance with flight plan and make landing at point of intended landing as closely as possible to estimated time of arrival.

(b) If approach clearance time has been received, comply with current traffic clearance and instructions and maintain last assigned altitude to the point of intended landing, starting approach at the approach clearance time.

(c) If holding instructions have been received, comply with these instructions until such time as it will be necessary to continue flight so as to arrive at the point of intended landing at approach clearance time and start approach at that time. After leaving holding point initial approach altitude shall be obtained as quickly as possible.

Enroute Reports

Pilots are required to maintain a constant listening watch on the appropriate radio frequency (the voice channel of the radio range being flown, military radio stations, air carrier company radio stations and/or airport control towers) in order that they may be ready to receive any air traffic control instructions which may be issued by an airway traffic control center through one of these facilities. During the course of the flight pilots are required, in addition, to make "flight progress reports" which include time and altitude of the aircraft over designated radio fixes on the route being flown. (See Fig. 18. Also see appendix to Part 60 of the Civil Air Regulations for a list of designated radio fixes according to airways.)

In addition to the flight progress reports, pilots are required to observe the following reporting procedures when flying within an airway traffic control area:

Estimates - Pilots should, if possible, include in each report an estimated time of arrival over the next designated radio fix, but in any event, should forward an estimated time of arrival and requested altitude

21282

over the radio fix preceding the airport of intended landing, and an estimated time of arrival over such airport when reporting over the second fix preceding such airport.

Note: If, after reporting over the radio fix preceding airport of intended landing, it becomes apparent estimated time of arrival will be in error in excess of three minutes, a corrected estimate should be made and forwarded to the center.

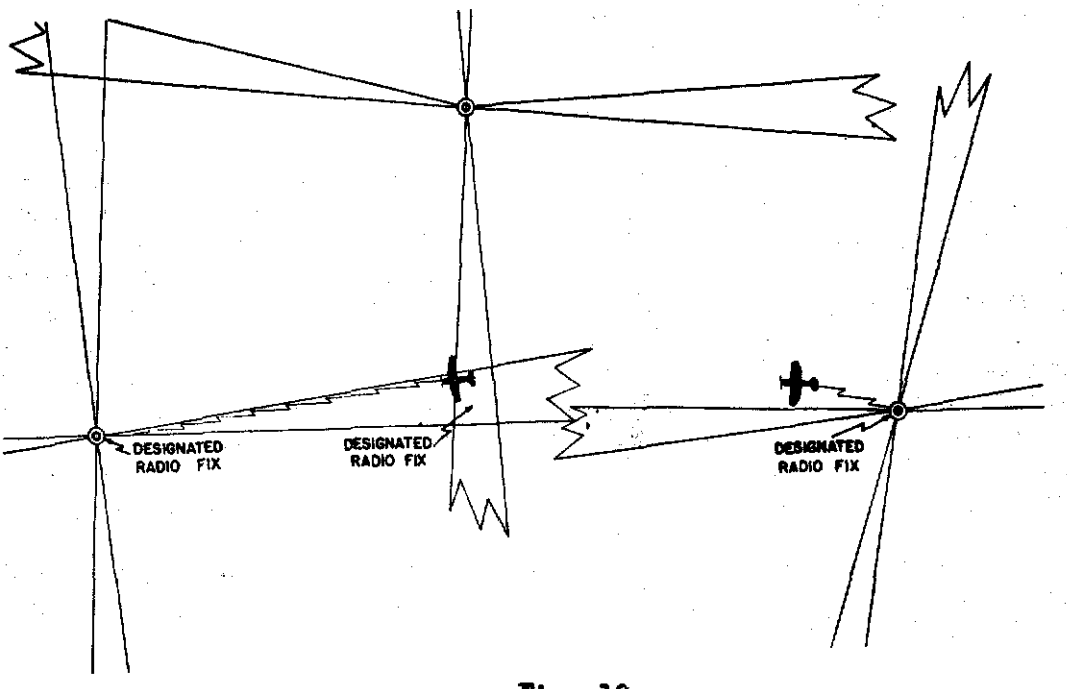


Fig. 18

Weather Reports - Weather reports made by the pilot of an aircraft need be forwarded to an airway traffic control center only when so requested by such center, or when pilot encounters unanticipated or unusual weather conditions, such as icing conditions, turbulence, etc.

Altitude Changes - Pilots of aircraft changing altitude should report the following information:

(1) At all times, immediately upon vacating present altitude for an assigned altitude and immediately upon attaining the assigned altitude.

(2) At all times, immediately upon attaining initial approach altitude when executing a standard instrument approach.

1856

(3) At all times when an approach for a landing has been missed, advising that landing has been missed and requesting further instructions.

(4) At the specific request of an airway traffic control center, upon starting procedure turn on final instrument approach.

(5) At the specific request of an airway traffic control center, when passing 1,000 foot levels while descending or climbing.

(6) At the specific request of an airway traffic control center, upon attaining cruising altitude.

Flight Plan Change

The pilot of an aircraft flying within an airway traffic control area, desiring to make a change in an approved flight plan (see Fig. 19) must, unless an emergency exists, obtain approval for such proposed change from the airway traffic control center having jurisdiction. This request and approval is relayed through appropriate communication facilities to and from the airway traffic control center.

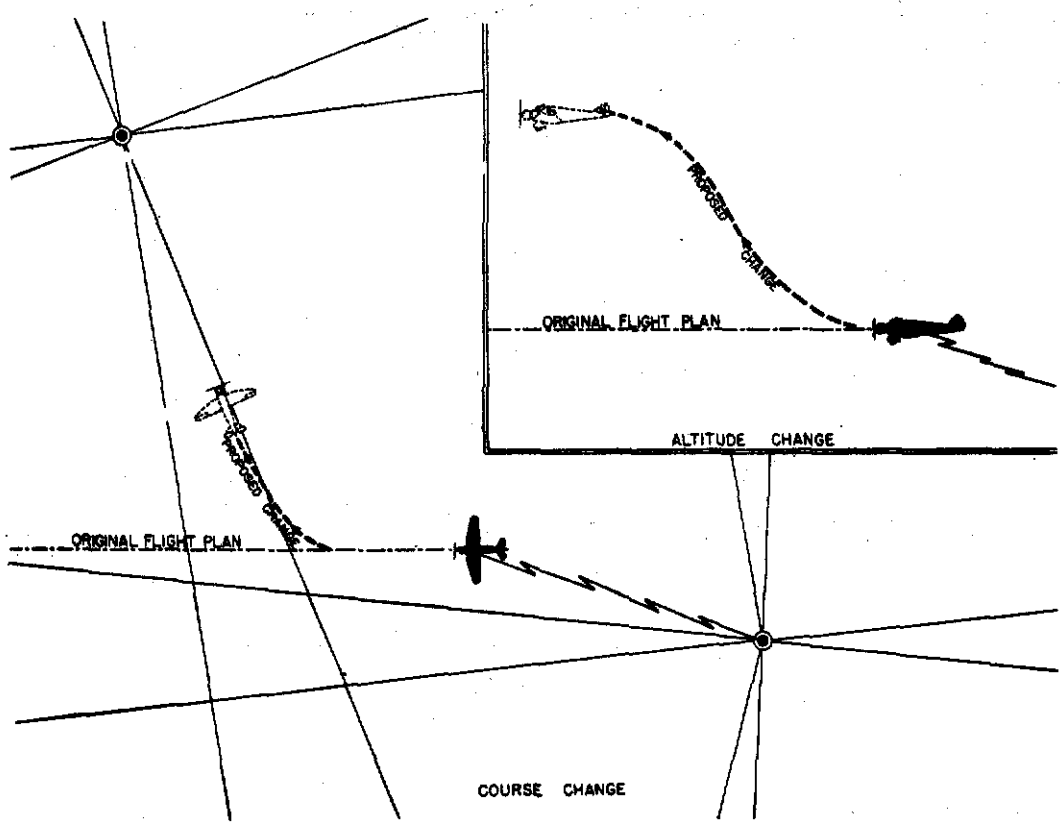


Fig. 19

In addition to the altitude and course changes, increasing or decreasing the speed of an aircraft by increasing or decreasing power constitutes a change in flight plan, and the pilot of an aircraft making a flight subject to instrument flight rules within an airway traffic control area must obtain approval from the appropriate airway traffic control center prior to effecting such change in flight plan. An approach clearance issued by an airway traffic control center is an approval for one approach only, and additional approaches also are considered as constituting a change in flight.

Aircraft Holding

Flight paths which aircraft are to assume, when instructions are received from an airway traffic control center to hold between specified points, are illustrated in the following examples and diagrams.

> Note: Turns as indicated in these procedures may be made away from or toward the range station as desired. Turns to the right or left of the on-course signal also may be made as desired by the pilot, unless specifically requested by an airway traffic control center to make turns in specified quadrants.

(1) Flight path of aircraft when instructed to hold on a specified radio range leg between the range station and a point indicated by a given number of minutes and direction of flight from the station. (See Fig. 20)

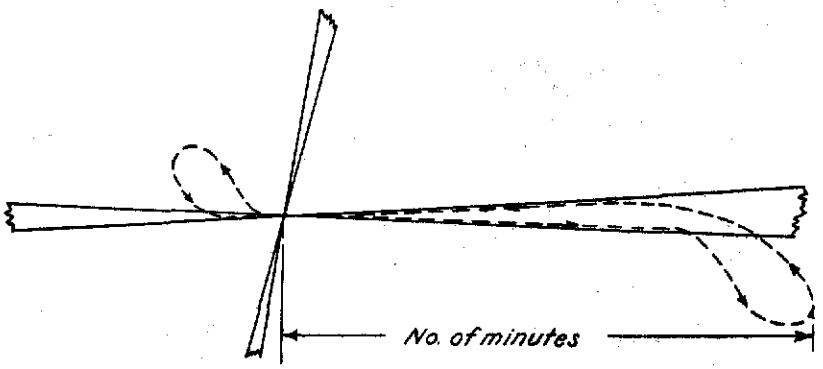


Fig. 20

Example: In accordance with procedure number one above instructions issued to a pilot by the Washington Airway Traffic Control Center to hold on the south leg of the Washington range may be in one of the following forms:

"Hold on south leg of Washington range between station and point five minutes south until further advised," or

"Hold on south leg of Washington range between station and point five minutes south until 9:40."

(2) Flight path of aircraft when instructed to hold on a specified radio range leg between a radio fix and a point, indicated by a given number of minutes and direction of flight from the radio fix. (See Fig. 21)

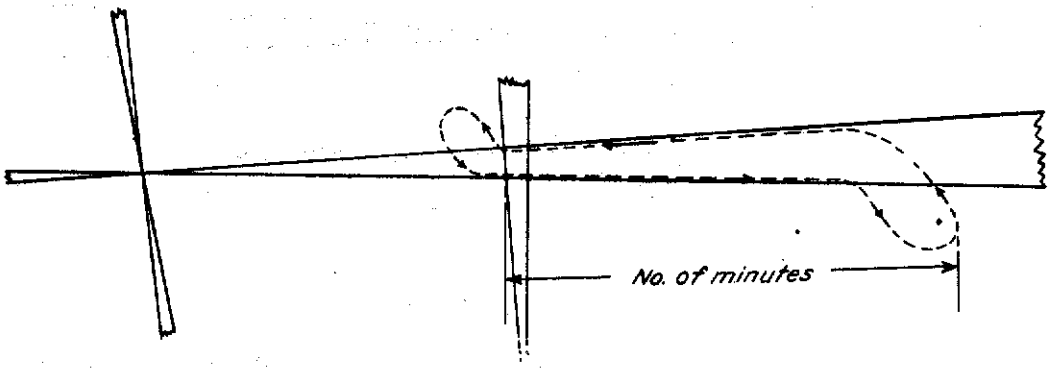


Fig. 21

Example: In accordance with procedure number two above, instructions issued to a pilot by the Washington Airway Traffic Control Center to hold on the south leg of the Washington range may be in one of the following forms:

Note: The radio fix used in this example is Mason Springs Intersection, which is the intersection of the south leg of Washington range and the east leg of Gordonsville range.

"Hold on south leg of Washington between Mason Springs Intersection and point four minutes south until further advised," or

"Hold on south leg of Washington between Mason Springs Intersection and point four minutes south until 10:35."

When UHF fan markers are used in control procedures, the same procedure and flight path as indicated in procedure number (2) above will be used, except that in this example "Mason Springs Marker" would be substituted for "Mason Springs Intersection."

(3) Flight path of aircraft when instructed to hold on specified radio range legs between points indicated by specified number of minutes from station. (See Fig. 22)

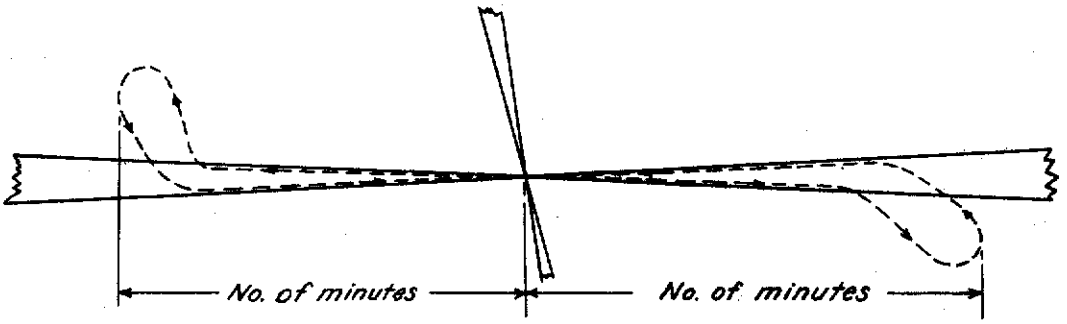


Fig. 22

Example: In accordance with procedure number (3) above, instructions issued to a pilot by the Cleveland Airway Traffic Control Center to hold on the east and west legs of the Cleveland range may be in the following forms:

"Hold on east and west legs of Cleveland range between points four minutes east and five minutes west from station until further advised," or

"Hold on east and west legs of Cleveland range between points four minutes east and five minutes west from station until 4:30."

(4) Flight path of aircraft when instructed to hold in a specified direction from a designated holding point. (Note: Holding points are defined and issued by airway traffic control centers only to aircraft operators having their own communication facilities.) The term "hold" used in connection with this procedure means that a standard flight path should be observed as follows:

"Flight path of an aircraft will follow the right edge of the on-course signal of the leg of the appropriate radio range indicated by the definition of the holding

point, between the specified holding point and four minutes flying time therefrom in the direction specified, completing procedure turns at the specified holding point four minutes therefrom." (See Fig. 23)

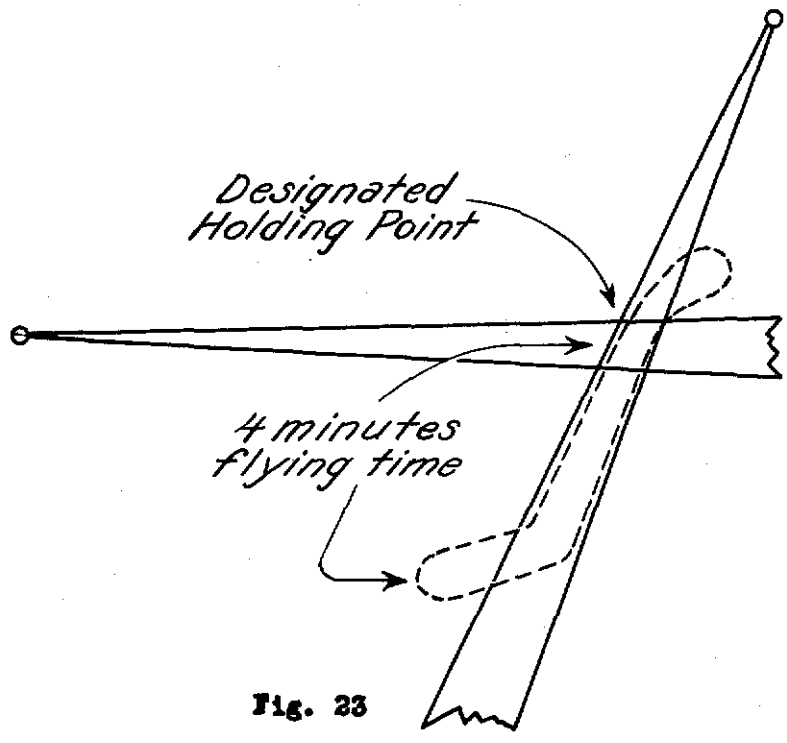


Fig. 23

Example - In accordance with procedure number four above, instructions issued to a pilot by the New York Airway Traffic Control Center to hold in the standard manner south of the intersection of the on course signals of the south leg of the New York range (La Guardia Field) and the east leg of the Allentown range (defined as "Keyport Intersection") would be in the following form:

"Hold south of Keyport."

(5) Flight path of aircraft when instructed to hold at a specified location under contact conditions can be accomplished by circling or following any other desired course, but remaining in the immediate vicinity of location specified. Such holding procedure should be accomplished on the right side of airway unless specifically requested by an airway traffic control center to observe holding procedure in some other manner. The right side of the airway should be determined by considering direction of flight prior to starting holding procedure.

Example - In accordance with procedure number five above, instructions issued to a pilot by the Chicago Airway Traffic Control Center to hold at Lansing, Illinois, may be in one of the following forms:

11856

"Hold at Lansing until further advised," or

"Hold at Lansing until 10:30."

Aircraft Landing

Aircraft proposing to make an approach for a landing using the same radio range are placed in an "approach sequence;" with such a procedure each pilot is advised of his number to approach and aircraft are spaced vertically at 1000 foot intervals. (See Fig. 24) Aircraft in such "pancake" formation are stepped down to the next level after the aircraft ahead has vacated that level.

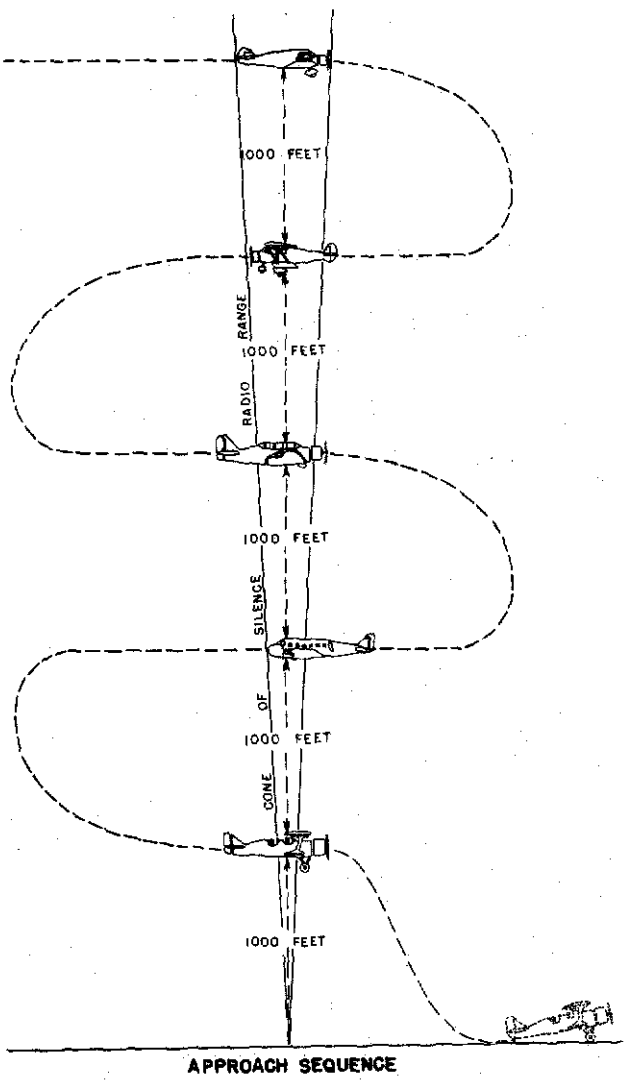


Fig. 24

In the event landing is not completed within 15 minutes (or the time allowed for a standard instrument approach) after passing over the radio range station on the initial approach, or within 15 minutes after being issued approach clearance under conditions of approach sequence assignment, a pilot under such circumstances shall obtain further instructions from the airway traffic control center within the control area of which flight is being made. Such airway traffic control center then will determine whether pilot will be allowed another immediate attempt or instruct him to stand by on a designated leg of the range at a certain

altitude until other aircraft in line have landed or taken off. This decision will be based upon existing conditions such as remaining fuel, weather trend, etc. A decision to route an aircraft to an alternate airport will be made by the pilot or aircraft operator involved after conferring with the airway traffic control center concerned.

Emergency Descent - Should it become necessary for an aircraft holding at an assigned altitude to make an emergency descent for a landing through other traffic, the pilot of such aircraft through appropriate communication facilities should so advise the airway traffic control center within the control area of which landing is proposed.

Upon receipt of advice that an aircraft is making an emergency descent through traffic at assigned altitudes over an airport, the airway traffic control center concerned will immediately call the airway communications station concerned with an "Emergency to All Concerned" and request an emergency broadcast on the appropriate radio range frequency which shall be transmitted as follows:

EMERGENCY TO ALL CONCERNED:
EMERGENCY LANDING AT _____ AIRPORT
ALL AIRCRAFT BELOW _____ THOUSAND FEET WITHIN
RADIUS OF _____ MILES OF _____ RADIO RANGE
LEAVE _____ LEG/S IMMEDIATELY.

Upon receipt of such a broadcast, pilots of aircraft affected should clear specified areas in accordance with emergency instructions, and should as soon as possible through the appropriate communications facility obtain further instructions.

Immediately after such an emergency broadcast has been requested, the airway traffic control center involved will forward further instructions to the proper communications agency for transmission to aircraft affected by the broadcast.

OUTSIDE OF AIRWAY TRAFFIC CONTROL AREA

While the preceding portion of this part of Civil Aeronautics Manual 60 has dealt with the control of air traffic within airway traffic control areas by airway traffic control centers, certain portions of the civil airways are not as yet within the airway traffic control areas.

Until such time as airway traffic control facilities are extended to provide complete coverage of all of the civil airways within the United States, air traffic information and advisory service is provided at intersections of airways (control zones of intersection) by airway communications stations. (For locations of airway traffic control areas and control zones of intersection, see current map issued by the Administrator of Civil Aeronautics entitled "Airway Traffic Control Areas.")

Procedures

When flying outside of airway traffic control areas, pilots must establish contact with airway communications stations located at control zones of intersection when within 25 miles of such a station. The pilot is required to advise the station of his estimated time of arrival over the radio range station, his altitude, and any other pertinent information, and the communications station in turn will forward to the pilot such information and advice concerning air traffic within 25 miles of the station (within the control zone of intersection) as may be of interest to the pilot. (See Fig. 25)

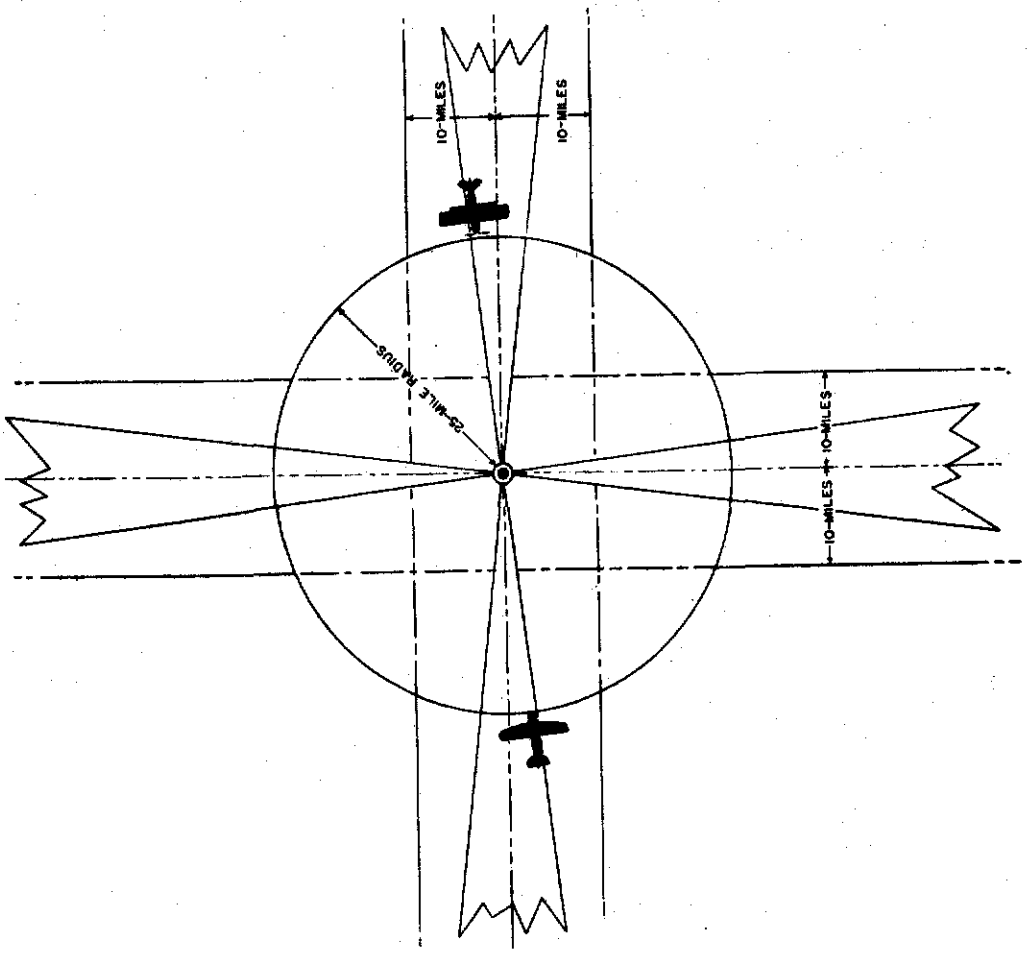


Fig. 25

The following procedures govern the submission of a flight plan concerning a flight to be made outside of an airway traffic control area:

General - No flight plan or approval thereof is required by the Civil Air Regulations for any flight made wholly outside an airway traffic control area, except at control zones of intersection as described below. An airway communications station serving a control zone of intersection will function in the capacity of furnishing and making available to pilots or aircraft operators, upon request, information on any known aircraft movement within such control zone of intersection. All communications with aircraft will be in the form of information, advice, and suggestion.

21282

Departing Aircraft - Pilots of aircraft departing for flight subject to instrument flight rules from a point within a control zone of intersection must forward to the airway communications station prior to departure the expected time of departure, the altitude through such zone, and the course or courses proposed to be followed while within the zone, as prescribed in Part 60 of the Civil Air Regulations. If it appears that the proposed departure may conflict with other aircraft movements within the control zone of intersection, the communications operator will so advise the pilot submitting the information on the proposed flight. The pilot then should alter the proposed departure so that confliction with other known aircraft movements may be avoided. If it appears that the proposed departure will not conflict with any other known traffic within the control zone of intersection, the communications operator will advise the pilot accordingly and departure should then be made as soon thereafter as is practicable. When practicable, issuance of such advices to pilots may be effected by the airway communications stations through available airport control tower radio. A flight plan as defined in Part 60 of the Civil Air Regulations may be filed by a pilot for transmission to the point of first intended landing and this flight plan will be transmitted by available facilities if practicable but delivery cannot be assured.

Enroute Aircraft - Pilots of aircraft making a flight subject to instrument flight rules shall report prior to entering a control zone of intersection and forward the expected time of arrival over the center of such zone, the altitude through such zone, and the course or courses proposed to be followed while within such zone, as prescribed in Part 60 of the Civil Air Regulations. If it appears that flight of the aircraft through the control zone of intersection may conflict with other aircraft movements, the communications operator on duty will ascertain through consultation with the local representative of any aircraft operator concerned and the airport control tower, if one is in operation, the most practicable procedure to be observed and the pilot of the aircraft concerned will be advised accordingly. If it appears that the flight through the control zone of intersection will not conflict with other aircraft movements, the communications operator on duty will so advise the pilot of the aircraft concerned.

Arriving Aircraft - Pilots of aircraft making a flight subject to instrument flight rules and proposing landing within a control zone of intersection, must prior to entering such control zone of intersection, forward the expected time of arrival over the intended point of landing within such zone, the altitude at which control zone of intersection is entered, and the proposed altitude over the radio range station on the initial approach for a landing. Upon receipt of such a report from an aircraft proposing a landing within a control zone of intersection, the communications operator on duty at the airway communications station serving such zone will consult with the local representatives of aircraft operators and the airport control tower, if one is in operation, determining the most practicable procedure to be followed, and the pilots of the aircraft concerned will be advised accordingly. When practicable, issuance of such advices to pilots may be effected by the airway communications station

through available airport control tower radio.

Special Procedures - At a control zone of intersection served by a voice radio communications station of the Administrator which is in direct communication (telephone or interphone) with a ground two-way radio station of an aircraft operator, the aircraft of such operator need not contact the airway communications station directly but may forward the necessary information through the operator's communications facilities or available airport control tower radio, and the communications operator will forward necessary information to the operator's representative for transmission to the aircraft through the operator's communication facilities, or to available airport control tower operator for transmission to the aircraft through the airport control tower radio. Upon departure from the preceding terminal and thereafter, upon any change in proposed flight procedure while enroute, the operator's representative should forward to such airway communications station the flight plan of the inbound aircraft, indicating cruising altitude and estimated time of arrival over the center of, or over the intended point of landing within such control zone of intersection. If this procedure is followed, it will not be necessary for such aircraft to make a report upon entry to the control zone of intersection. Where only air carrier aircraft are involved, the necessary procedures should be determined by the local representatives of the air carrier concerned, and in these cases no action relative to such aircraft will be required by personnel of the airway communications station.

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2128