

A N C

**PROCEDURES
for the control of
AIR TRAFFIC**

UNITED STATES NAVY

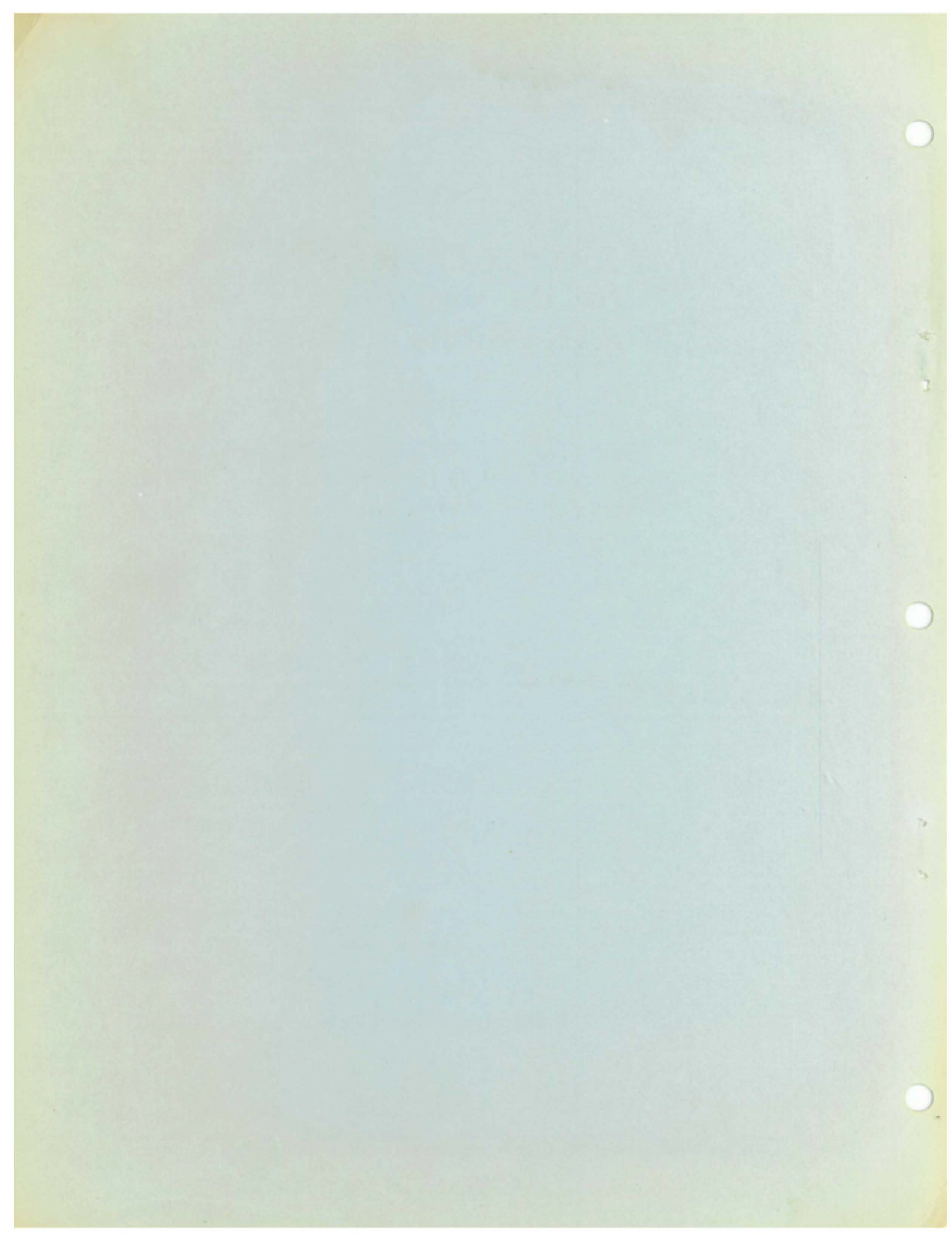
UNITED STATES AIR FORCE

UNITED STATES COAST GUARD

CIVIL AERONAUTICS ADMINISTRATION

Revised Second Edition

(Includes Revisions Prior to November 1, 1952)



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This manual of air traffic control procedures has been officially approved by the Chief of Naval Operations, the Chief of Staff, U.S. Air Force, the United States Coast Guard and the Administrator of Civil Aeronautics as a standard for use by their respective services.

For the Chief of Naval Operations:



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For the Civil Aeronautics Administration:



C. F. Horne,
Acting Director,
Office of Federal Airways,
Civil Aeronautics Administration.

PREFACE TO REVISED SECOND EDITION

This edition of Air Force--Navy--CAA Procedures for the Control of Air Traffic has been prepared for the purpose of incorporating new and revised procedures which have been approved for use by military and civil air traffic control agencies.

Revision of the second edition previously has been accomplished three times, by use of "inked in" changes and by distribution of individual replacement pages for inclusion in the manual. Use of these methods a fourth time, however, has been deemed to be less feasible than issuance of a completely revised edition of the publication; due to the number of changes currently involved.

This revised second edition incorporates all changes approved prior to November 1, 1952, including Revisions 1, 2 and 3, and, therefore, supersedes the second edition dated March 15, 1950, in its entirety.

An asterisk has been placed to the left of each new or revised paragraph and section to signify the changes in procedures made with this edition.

FOREWORD

This manual of air traffic control procedures has been officially adopted by the United States Navy Department, the United States Air Force, the United States Coast Guard, and the Civil Aeronautics Administration to standardize the operation of the air traffic control services .

These procedures are to be observed by air traffic control personnel of Air Force, Navy, CAA and other civil air traffic control agencies. However, instances will arise where air traffic can be controlled more efficiently and safely by deviation from these standards. In such cases, controllers on duty are expected to use their best judgment.

Standard phraseologies for use in air traffic control are prescribed in this manual, but these cannot, of course, cover every situation that may arise. In all cases, however, these standards require that clearances and information shall be transmitted as clearly and concisely as possible .

Personnel are expected at all times to give full cooperation and every possible service to the aeronautical public consistent with the performance of their duties .

Any recommendations concerning the procedures in this manual should be forwarded to one of the following addresses:

Chief of Naval Operations, Navy Department, Washington 25, D.C .

Chief of Staff, U. S. Air Force, Washington 25, D. C.

Coast Guard Headquarters, 1300 Pennsylvania Avenue, N. W.
Washington 25, D. C.

Airways Operations Division, Office of Federal Airways,
Civil Aeronautics Administration, Washington 25, D. C.

Recommendations received by each agency will be coordinated with the other agencies concerned through joint meetings.

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PROCEDURES FOR THE CONTROL OF AIR TRAFFIC

GENERAL

1.00 DEFINITIONS

- Agency.** The U.S. Air Force (AF); the U.S. Navy; the U.S. Coast Guard; or the Civil Aeronautics Administration.
- Airport.** A defined area on land or water, including any buildings and installations, normally used for the take-off and landing of aircraft.
- Airport Traffic.** Aircraft operating on and in the vicinity of an airport and other traffic operating on the movement area.
- Control Tower.** A facility to provide for supervision of airport air traffic.
- Air Route Traffic Control Area.** (See Control Area).
- Air Route Traffic Control Center.** A facility established by competent authority to provide adequate supervision of air traffic within a specified control area.
- Air Traffic.** Aircraft in operation anywhere in the air space and on that area of an airport normally used for the movement of aircraft.
- Air Traffic Clearance.** Authorization by air traffic control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within a control zone or control area.
- Air Traffic Control.** A service established by competent authority to promote the safe, orderly, and expeditious flow of air traffic.
- Air Traffic Controller.** A person responsible for providing air traffic control service.
- Airway.** A path through the navigable air space designated by the Administrator, suitable for interstate, overseas, or foreign air commerce.
- Alternate Airport.** An airport specified in the flight plan to which a flight may proceed when a landing at the point of first intended landing becomes inadvisable.
- Approach Control.** A service established to control IFR flights arriving at, departing from, and operating in the vicinity of airports, by means of direct and instantaneous communication between Approach Control personnel and all aircraft operating under their control.
- Approach Sequence.** Two or more aircraft awaiting an approach clearance.
- Expected Approach Time.** The time at which it is expected that an arrival will be cleared to commence its approach procedure preparatory to landing.
- Arrival.** An arriving aircraft.
- ATC.** Air Traffic Control.
- CAA.** Civil Aeronautics Administration.
- CAR 60.** United States Civil Air Regulations, Part 60.
- Center.** An air route traffic control center.

Clearance. An air traffic clearance.

Clearance Limit. The point to which an aircraft is cleared.

Competent Authority. A representative authorized to act for an agency.

Control Area. An airspace of defined dimensions, designated by the Administrator, extending upwards from an altitude of 700 feet above the surface, within which air traffic control is exercised.

Control Zone. An airspace of defined dimensions, designated by the Administrator, extending upwards from the surface, to include one or more airports, and within which rules additional to those governing flight in control areas apply for the protection of air traffic.

Cruising Altitude. A constant altimeter indication, in relation to sea level, maintained during a flight or portion thereof.

Departure. A departing aircraft.

Flight Plan. Specified information filed either verbally or in writing with Air Traffic Control, relative to the intended flight of an aircraft.

Holding Point. A specified location, identified by visual or other means, in the vicinity of which the position of an aircraft in flight is maintained in accordance with Air Traffic Control instructions.

ICAO. International Civil Aviation Organization.

IFR. The symbol used to designate Instrument Flight Rules.

IFR Conditions. Weather conditions below the minimum prescribed for flights under VFR.

Movement Area. The part of an airport reserved for the taking off, landing and maneuvering of aircraft.

Reporting Point. A geographical location in relation to which the position of aircraft is reported.

Rescue Coordination Center. A center which initiates, coordinates, and terminates search and rescue within an assigned area.

Rescue Control Center. A unit subordinate to a safety center established to direct search and rescue activities.

Safety Center. A coordinated activity consisting of an Air Route Traffic Control Center and a Rescue Coordination Center.

Separation. A specified longitudinal, vertical, or lateral separation between two or more aircraft in flight.

Separation Standards. The minimum longitudinal, vertical, or lateral separation provided IFR traffic.

State. Any nation of the world. (International usage).

Take-off Clearance. Authorization by an airport traffic control tower for an aircraft to take off.

Tower. An airport traffic control tower.

VFR. The symbol used to designate Visual Flight Rules.

VFR Conditions. Weather conditions equal to or above the minimum prescribed for flights under VFR.

VFR Traffic. Aircraft operating solely in accordance with VFR.

* 1.0100 Air Traffic Control procedures contained herein shall be uniformly applied in all air route traffic control centers and airport traffic control towers operated by the United States Navy, United States Air Force, and Civil Aeronautics Administration, and by other civil air traffic control agencies. This includes all air-traffic control-tower operators certificated by the Civil Aeronautics Administration.

1.0101 Where military necessity requires a reduction in separation standards, specific request for such deviation must be obtained in writing from the competent authority. These lower standards will apply only between aircraft directly under the jurisdiction of the competent authority making such request, and shall be fully covered by operations letters issued by the center or tower concerned.

1.0102 Control of instrument flight rule air traffic is based on the provisions of Civil Air Regulations, Part 60 and the amendments thereto. The issuance of traffic clearances by centers and towers constitutes authority for the pilot to proceed only insofar as known air traffic is concerned.

1.0103 The basic plan for the control of air traffic involves the establishment of air route traffic control centers at strategic locations. To expedite the movement of aircraft arriving and departing at certain airports served by airport traffic control towers established by competent authority, the control of IFR traffic, as well as VFR traffic, is delegated to tower personnel.

1.0104 Where a military agency has jurisdiction over a control area, supervision of the center or tower/s will be determined by agreement among all agencies concerned.

1.0105 Under certain conditions it may not be desirable to establish a control area due to limited air traffic or absence of adequate navigational facilities. In this event, a suitable control zone may be established wherein the control of traffic will be the responsibility of a tower.

1.02 APPLICATION OF CONTROL PROCEDURES

1.0200 The control of instrument flight rule air traffic shall be applied in all control areas and control zones. Control areas and control zones will be designated by the appropriate authority.

1.0201 For the proper coordination and control of air traffic, it will be necessary under certain conditions to establish control areas over international waters as well as territories of other States, and to place such areas under the jurisdiction of United States Air Route Traffic Control Centers. The boundaries of control areas and control zones outside the continental limits of the United States will normally be designated by the appropriate authorities by mutual agreement between the States concerned under the auspices of ICAO.

1.03 AIR TRAFFIC CONTROL SERVICE

1.0300 Objective: The primary objective of the Air Traffic Control service shall be to promote the safe, orderly, and expeditious movement of air traffic. This shall include:

- (1) Preventing collisions between aircraft and between aircraft and obstructions on the movement area.
- (2) Expediting and maintaining an orderly flow of air traffic.
- (3) Assisting the person in command of an aircraft by providing such advice and information as may be useful for the safe and efficient conduct of a flight.
- (4) Notifying appropriate organizations regarding aircraft known to be or believed to be in need of search and rescue aid, and assisting such organizations as required.

1.04 TYPES OF SERVICE

1.0400 Area Traffic Control: Area Traffic Control is administered from an air traffic control center and provides Air Traffic Control Service for air traffic operating within a specified control area.

1.0401 Airport Traffic Control: Airport Traffic Control is established to provide adequate supervision of all traffic on the movement area and aircraft flying in visual reference to the ground in the immediate vicinity of an airport.

1.04010 Airport Traffic Control may operate either within the boundaries of a control area or at locations not supervised by a center.

1.0402 Approach Control: Approach Control is a service established to provide separation of air traffic arriving at, departing from, or operating in the vicinity of an airport by means of direct and instantaneous communication between Approach Control personnel and all aircraft under their control.

1.04020 Approach Control personnel are governed by clearances received from the center with regard to coordination of control.

1.0403 Flight Assistance Service: Flight Assistance Service is provided to assist persons in command of aircraft by supplying information concerning known flight conditions, and to initiate search and rescue action for aircraft "overdue" at point of intended landing. (See Civil Aeronautics Administration and Weather Bureau Manual "Standard Procedures for Flight Assistance Service").

1.05 ALLOCATION OF RESPONSIBILITY

1.0500 Towers and Centers:

1.05000 Visual Flight Rules: The only separation of air traffic not operating on an IFR flight plan in weather conditions equal to or better than the VFR minimums shall be that effected by a tower.

1.05001 Authorizing VFR Operations in the Control Zone below VFR conditions where no tower is located: Authorization, by air route traffic control centers, of VFR operations, below VFR conditions, in Control Zones shall be in accordance with the following:

1.050010 When IFR traffic conditions permit, an airport operator (or his representative) may be authorized to permit local VFR operations, such as landings and take-offs, when the weather is below the VFR condition specified in CAR 60. The following phraseology shall be used in this connection:

LOCAL VFR OPERATIONS IN THE IMMEDIATE VICINITY OF (Name of) AIRPORT ARE AUTHORIZED UNTIL (Time). Any special instructions, such as the maximum altitude which may be used, should be added.

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1.0500100 The airport operator is responsible for the establishment of adequate traffic patterns for such operation.

1.050011 Requests for approval of departure from or entry into a control zone shall be handled individually. In each case, standard separation (Section 2.00) shall be effected between such operations and all IFR traffic, as well as other operations of the same nature.

Example: ATC CLEARS (Aircraft Ident.) OUT OF/TO ENTER CONTROL ZONE (Number (Number of) MILES (Direction) of (Airport) CRUISE NOT ABOVE (Altitude) WHILE IN CONTROL ZONE.

1.050012 Standard separation (Section 2.00) shall be provided between all VFR operations operating in less than VFR conditions and all IFR flights operating on a traffic clearance.

1.05002 Instrument Flight Rules: The control of IFR traffic shall be effected by centers and those towers controlling IFR traffic (Approach Control) in accordance with instructions contained in Sections 2 and 4 of this manual.

* 1.050020 The control of more than one approach sequence may be effected by approach control provided the division of control between the center and approach control is defined in a center/approach control letter of agreement. When approach control responsibility is being delegated to a military approach control facility the center/approach control letter of agreement also shall be approved by competent military authority.

2. PROCEDURES FOR THE CONTROL OF INSTRUMENT FLIGHT RULE TRAFFIC

2.00 SEPARATION STANDARDS

* 2.0000 General: Longitudinal, vertical, or lateral separation shall be provided all aircraft operating on IFR traffic clearances (unless the cruising altitude "AT LEAST 500 ON TOP" has been authorized), except that a "VFR conditions" restriction may be applied to climb or descent and shall be applied when longitudinal, vertical, or lateral separation is not provided during climb or descent. These standards need not be applied in a Control Zone if:

- (1) In the opinion of the airport traffic controllers adequate separation can be provided by the tower when each aircraft is continuously visible to the tower controller; or
- (2) Each aircraft is continuously visible to pilots of other aircraft concerned and the pilots thereof can maintain their own separation and so advise.

2.01 LONGITUDINAL SEPARATION

2.0100 Longitudinal Separation: The longitudinal spacing of aircraft at the same altitude by a minimum distance expressed in units of time, so that after one aircraft passes over a specified position, the next succeeding aircraft at the same altitude will not arrive over the same position within less than the minimum number of minutes.

2.0101 Minimums:

* 2.01010 Aircraft flying on the same or converging courses:

- (1) Ten minutes if radio facilities permit frequent determination of position and speed; otherwise 15 minutes.
- (2) Five minutes if a preceding aircraft is 25 miles or more per hour faster than a succeeding aircraft with both aircraft departing from the same or

adjacent locations, or between en route aircraft having reported over the same fix, or between departing and en route aircraft after the en route aircraft has reported over the fix serving the point of the departure.

2.01011 Aircraft flying on crossing courses: Ten minutes if radio facilities permit frequent determination of position and speed; otherwise 15 minutes.

2.0102 Altitude Change - Same Direction Traffic: When lateral separation is not provided and an aircraft will pass through the altitude of another aircraft, the following longitudinal separation shall be provided:

- (1) Five minutes at the time altitude levels are crossed, and provided that such separation is authorized only when:
 - (a) The vertical separation at the time of commencement of change is 2000 feet or less; and
 - (b) A leading aircraft is being cleared for descent through the altitude of a following aircraft, or a following aircraft is being cleared for climb through the altitude of a leading aircraft; and
 - (c) The altitude change is commenced within ten minutes after the time the second aircraft has reported over a reporting point.

2.0103 Altitude Change - Opposite Direction Traffic:

- (1) Where lateral separation is provided, longitudinal separation is not required when an aircraft is to pass through the altitude level of another aircraft.
 - (a) Essential traffic information shall be issued.
 - (b) The aircraft changing altitude level shall be cleared to climb/descend well to the right of the course.
- (2) Where lateral separation is not provided, vertical separation shall be provided for at least ten minutes prior to and after the time the aircraft are estimated to pass, or are estimated to have passed. If reports are received that aircraft have passed each other, this minimum need not apply.
- (3) Where opposite direction traffic is regularly provided vertical separation because of inadequate radio navigation facilities or other reasons, the required procedures shall be contained in operations letters approved by competent authority.

2.0104 Application : Longitudinal separation shall be established by requiring aircraft to depart at a specified time, to lose time to arrive over a geographical location at a specified time, or to hold at a geographical location until a specified time. As an alternative procedure, or in emergencies, aircraft may be required to reverse course.

2.01040 Pilots in direct radio communication with each other and operating with the aid of navigation facilities which provide frequent determinations of position and speed may, with their concurrence, be requested to maintain minimum longitudinal separation between their aircraft.

2.02 VERTICAL SEPARATION

2.0200 Vertical Separation: The vertical spacing of aircraft.

2.0201 Minimum: 1000 feet, except as provided all operators on long transoceanic routes where a reduction in altitude separation is necessary due to the relatively few cruising altitude levels available which permit proper fuel economy below altitudes which require continuous use of oxygen equipment.

2.02010 No separation is required for en route traffic operating "at least 500 feet on top" if frequent pilot reports indicate a generally unlimited ceiling on top and a flight visibility of at least 3 miles. During the hours of daylight, holding aircraft operating under these conditions will require no separation.

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2.03 LATERAL SEPARATION

2.0300 Lateral Separation: The lateral spacing of aircraft at the same altitude by requiring operation on different routes or in different geographical locations as determined by visual observation or by use of radio navigational facilities.

* 2.0301 Types and Minimums:

- (1) Right-Side Separation--The lateral spacing obtained by requiring aircraft to fly on opposite sides of an L/MF or VAR radio range (aural) course when more than 15 miles away from the station. (Right-side separation is not applicable within 15 miles of a station.)
- (2) Quadrant Separation--The lateral spacing of aircraft obtained by requiring flight in different quadrants of the same radio navigation facility.
- (3) Geographical Separation--The lateral spacing indicated by position reports over different geographical locations as determined visually or by reference to radio aids.
- (4) Course Separation--The lateral spacing obtained by requiring flight on courses which diverge by at least 45 degrees and where radio navigational track guidance is not applicable.
- (5) Track Separation--The lateral spacing within 15 miles of a VOR facility obtained by requiring flight on courses of that facility which diverge by at least 30 degrees. Beyond 15 miles of a VOR station track separation may be obtained by requiring flight on courses that diverge by at least 15 degrees. For other than VOR courses, track separation shall be obtained by assigning different specified tracks which can be accurately determined by radio.

2.0302 Right-Side Separation: Right-side separation shall normally be applied only to effect altitude change. Aircraft shall be considered as occupying all space from the on-course signal to the right edge of the airway. (CAR 60 requires only that a pilot remain to the right of the center line of an airway).

2.03020 Where radio navigation facilities are not adequate for right-side separation, opposite direction traffic shall be separated vertically. Right-side separation shall apply to aircraft on such courses when it has been definitely determined that the aircraft are and will remain, on opposite sides of the same course of a specified radio facility during the time lateral separation is required. Right-side separation should not be used in the immediate vicinity of a radio range station due to the narrowness of course signals.

2.03021 In emergencies, same or opposite direction traffic may be separated by requiring flight on opposite sides of, and well off, a well-defined track which can be accurately determined by radio.

2.04 ALTITUDE ASSIGNMENT

2.0400 Priority: An aircraft at an altitude shall normally have priority over other aircraft desiring that altitude. When two or more aircraft are at the same altitude, the preceding aircraft shall normally have priority

* 2.0401 Minimum Altitudes: A controller shall not assign nor authorize flight at an altitude along any route below the minimum IFR altitudes established by the Administrator for such route. Where a minimum IFR altitude has not been established, a controller shall not assign nor authorize flight at an altitude known to be lower than the minimum safe altitude as prescribed by Civil Air Regulations (60.17).

2.04010 When it is necessary for an aircraft to make a change in en route altitudes due to a higher or lower minimum IFR altitude, control shall normally be predicated upon the aircraft beginning climb or descent immediately after passing the fix beyond which the higher or lower minimum applies. However, if the en route altitude being

flown is below the minimum IFR crossing altitude established by the Administrator for the fix beyond which a higher minimum IFR en route altitude applies, control shall be predicated upon the aircraft beginning ascent prior to reaching the fix so as to cross the fix at the established crossing altitude or at a higher altitude if specified in the clearance. When necessary, Air Traffic Control may expedite descent to a lower altitude prior to reaching the fix beyond which a lower minimum IFR en route altitude applies by authorizing the use of an altitude at or above the initial approach altitude established for the fix for the direction of the flight.

* 2.04011 When it is necessary for an aircraft to make a change in en route altitudes on Canadian Airways, due to a higher minimum IFR altitude, United States facilities exercising control over such aircraft shall normally predicate control on the assumption that the aircraft will cross the fix at the altitude established as the minimum IFR altitude beyond the fix, or at a higher altitude if specified in the clearance.

2.0402 Application: When an aircraft reports vacating an altitude, the vacated level may be assigned to another aircraft, except that if severe turbulence is known to exist, the first aircraft must have reported at another level before such assignment is made.

2.04020 Pilots in direct communication with each other may, with their concurrence, be requested to maintain a specified vertical separation between their aircraft during descent or climb.

2.0403 Cruising Altitudes: Insofar as practicable, cruising altitudes of aircraft flying to the same destination shall be assigned in a manner that will be correct for an approach sequence at destination.

* 2.0404 On-Top Altitude: "At least 500 feet on top" may be assigned for flight above a cloud, haze, smoke or other formation if the flight visibility is at least three miles, provided the ceiling is generally unlimited above the formation. A known definite top must exist and the aircraft shall be advised of its reported height when this clearance is issued. Caution shall be exercised in assigning "on top" altitudes to long-range flights operating over areas where the height of the formation is not known. The use of "at least 500 feet on top" shall be discontinued if any pilot reports that weather conditions are not satisfactory for application of 500 feet on top procedures, even though the visibility may be reported as three miles or more and the ceiling as unlimited above the overcast.

2.0405 Altitude Changes: When necessary, an aircraft may be requested to change altitude at a specified time or place.

2.05 HOLDING AIRCRAFT

2.0500 Holding Aircraft: Aircraft shall be held at a specified holding point to provide minimum separation between aircraft which are awaiting their turn to land and/or to provide longitudinal separation from other aircraft. When aircraft are held at a point en route and no expected approach clearance time is issued, the holding clearance shall contain a time limit, using the phrase "EXPECT FURTHER CLEARANCE AT (Time)".

2.0501 Weather Below Landing Minimums: When the weather is below the landing minimums of an aircraft in approach sequence, the following action may be taken:

- (1) An approach clearance shall be issued to the number one aircraft in the holding sequence. If the pilot then advises he desires to hold and await improvement in the weather, such action will be approved unless the reported weather is above the minimums for other aircraft in the approach sequence.
- (2) In the latter case, the approach clearance shall be cancelled and the number one aircraft shall be removed from its position in the holding sequence. The aircraft shall be cleared to an adjacent fix for further holding awaiting weather

change or redispatching, or given appropriate climbing clearance to place it at the top of the approach sequence, in order that the other holding aircraft may be permitted to land. The aircraft operator (if any) shall be advised of the action taken immediately after the clearance is issued, if practicable.

- (3) Approach controllers shall, before taking the action outlined in (2) above, coordinate the rerouting of the flight with the center in order to avoid conflict with traffic under center control.

2.0502 Non-Directional Radio Stations, Compass Locators and Fan Type Marker Stations shall be utilized as holding points only if the facility is associated with a course of a Radio Range Station or ILS Localizer by means of which the holding pattern may be accurately established, unless the aircraft is equipped with a radio compass, or other equipment which may be utilized to definitely establish the desired holding pattern.

2.05020 Non-Directional Radio Stations, Compass Locators, Fan Type Marker Stations and any other type of facility which is not constantly monitored, shall not be utilized for control purposes if failure of the pilot definitely to identify the facility would result in inadequate separation or endanger the safety of aircraft.

2.0503 Long-Range Flights: Caution must be exercised when issuing holding clearances to long-range flights. Consideration should be given to the aircraft's fuel reserve and to the fact that pilots of such flights are subject to a greater degree of fatigue than pilots of short-range flights, and it may not be advisable, therefore, to require long-range flights to hold for an extended period.

2.0504 Standard Holding Flight Path: The standard holding flight path of an aircraft is to follow the specified course inbound to the holding fix, make a 180-degree standard rate (three degrees per second) turn to the right, fly a parallel straight course outbound from the holding fix for two minutes, make another 180-degree standard rate turn to the right and again follow the specified course inbound.

2.05040 Deviation: A pilot's request to deviate from the standard holding flight path may be approved if known traffic conditions permit.

* 2.0505 Separation From Other Traffic: When aircraft are being held in flight, appropriate lateral, longitudinal, or vertical separation minimums shall be provided between the holding aircraft and other aircraft while such other aircraft are within five miles of the boundary of the holding pattern airspace area.

* 2.05050 When aircraft are being held in flight at different holding fixes whose holding pattern airspace areas overlap, appropriate vertical separation minimums shall be provided between such holding aircraft.

* 2.0506 Whenever an aircraft is cleared to a clearance limit other than the destination airport, the altitude of the aircraft at such clearance limit must be protected from other aircraft, even though holding instructions have not been issued, because the aircraft will hold in the event that further clearance is not received by the time it reaches the fix.

2.06 CONTROL PROCEDURES

2.0600 General: If a position report is not received within a reasonable length of time after the estimated time over a reporting point, subsequent control shall not be based on the assumption that the estimated time is accurate. Action shall be taken to obtain the report no later than 5 minutes after the estimated time over the reporting point, when the report has any bearing on the control of aircraft.

2.0601 Flight Conditions: Pilots may be requested to forward specific information on flight conditions which might be useful to Air Traffic Control.

2.0602 Where necessary, specific flights may be requested to forward a complete weather report with each scheduled position report.

2.0603 Alternate Procedures: When an IFR traffic clearance authorizes VFR operation during climb or descent, alternate clearance shall be issued if there is a possibility that VFR flight may become impracticable.

* 2.0604 Center Coordination: Centers shall forward appropriate flight plan data and control information pertinent to all instrument flights from center to center as the flight progresses except that flight plans on flights specifying VFR for the first portion of the route and IFR for a latter portion, beginning in another control area, shall be forwarded by the flight plan station direct to the center in whose area IFR flight will be commenced, via Service "B" (air-carrier communications channels in the case of scheduled air-carrier aircraft, and military flight service communications channels for military aircraft). To insure search and rescue service for aircraft operating on IFR flight plans, it is necessary that flight plan data be forwarded to the center in whose flight advisory area the point of intended landing is located, even though the flight will not enter the control area of that center, unless the pilot closes the IFR flight plan when the flight leaves the last control area.

2.06040 The appropriate flight plan data and control information shall normally be transmitted via Service "F" and in sufficient time to permit reception of the data by the adjacent center not later than 30 minutes prior to the time the flight is estimated to enter the adjacent center's area. If, in the opinion of the controller on duty, Service "F" facilities are inadequate, the data shall be transmitted in the form of a control message via Service "B". The control message shall be transmitted by the originating center to the associated communications station via Service "F". The communications station associated with the center to whom the control message is addressed will forward the message to the appropriate center sector via Service "F".

2.06041 The following data shall be forwarded from center to center as an IFR flight progresses:

- (1) Flight identification and type aircraft.
- (2) Estimate and altitude over the last fix within the control area and the altitude of entry into the adjacent center's area if different from the altitude over the last fix.
- (3) Actual ground speed, if determined, or estimated ground speed (the estimated ground speed used in calculating the estimate over the last fix).
- (4) Point of departure; the remaining portion of the route of flight, as specified in the original or amended clearance; and the point of first intended landing.
- (5) The estimated time of arrival as specified in the flight plan (time of departure plus elapsed time) based on the time zone of the departure point.
- (6) Clearance information:
 - (a) Clearance limit, if other than the airport of destination.
 - (b) Special information, if issued.
- (7) Altitude/s requested by the pilot. (As specified in the flight plan or subsequently requested en route).

The information contained in Item (5) shall not be forwarded on scheduled air-carrier or military aircraft. If required, the center controlling the point of destination may secure the estimated time of arrival from the air-carrier operator, the appropriate Flight Service Center, or the flight plan station serving the point of departure. Information concerning any other information specified in the flight plan may be similarly obtained.

The information contained in Item (7) need not be transmitted if agreements between adjacent centers permit deletion of this information. If information concerning the altitudes requested by the pilot is deleted by agreement between any two centers along route of flight, centers controlling subsequent portions of the route shall not request the information.

2.06042 When 5 minute longitudinal separation in accordance with 2.01010 (2) is utilized and less than the minimum longitudinal separation for the route will exist at the time the aircraft enter the area adjacent to the area of departure, the adjacent center shall be advised of the separation being used.

2.06043 Whenever it is necessary to issue clearances requiring a change in the operation of an aircraft within another center's control area, before such aircraft enters the control area of the center issuing the clearances, such instruction shall be routed through the center concerned for approval and transmission to the aircraft.

2.0605 Air Evacuation Flights: Every effort should be made to afford maximum possible priority to the movement of Air Evacuation aircraft in accordance with the request of the pilot for each individual flight. Particular consideration should be given to priority in landing sequence, priority of take-off, and the avoidance of turbulence.

2.07 CONTROL OF LONG-RANGE FLIGHTS

2.0700 General: Commensurate with the orderly flow of long-range traffic, every effort should be made to permit departing aircraft to proceed on course with as few turns or other maneuvers as possible. Heavy take-off loads make the early portion of flight very critical, and this factor should be considered in the control of departing aircraft. When it is determined beforehand that it will be necessary to delay the departure of a flight, the operator thereof shall be notified as soon as possible to avoid the necessity of holding aircraft on the airport with the engines running for extended periods of time.

2.0701 Position Reporting: Within the limits of the available communications facilities, the minimum number of position reports necessary for adequate control should be required. Due to extreme unreliability, dead reckoning position reports are unsuitable for normal air traffic control purposes. Control should be based only on celestial, radio, radar, or Loran fixes or on a fix obtained by a combination of two or more of these methods. Any limitation imposed by delays inherent in the available communications system must be considered in the issuance of clearances. Control shall be based on reported fixes, and should never be based on the assumption that a subsequent position report will be promptly received.

2.08 DEPARTURES AND ARRIVALS (The following restrictions are in addition to separation minimums specified in 2.01, 2.02, and 2.03).

2.0800 General: When control is based thereon, the clearance shall specify direction of take-off and turn after take-off; track to be made good before proceeding on desired course; altitude to maintain before continuing climb to assigned altitude; time or point at which altitude change shall be made; and any other necessary maneuver.

* **2.0801 Minimum Time Separation--Departure:** Three-minute separation at the time altitude levels are crossed if a departure will be flown through the altitude level of a preceding departure and both departures propose to follow the same course. Action must be taken to insure that the three-minute separation will be maintained or increased when altitude levels are crossed.

* **2.08010 Two-minute separation** at the time courses diverge if aircraft propose to fly the same course immediately after take-off and then follow different courses, provided aircraft will follow diverging courses within 5 minutes after take-off. Action must be taken to insure that the two-minute separation will be maintained or increased during the period the aircraft are following the same course.

2.08011 One-minute separation if aircraft propose to fly different courses and lateral separation is provided immediately after take-off. This minimum may be reduced when aircraft are using parallel runways provided an operations letter covering the procedure has been approved by competent authority.

2.0802 Direction of take-off: Departures may be expedited by suggesting a take-off direction when the wind velocity does not exceed 10 miles per hour. It is the pilot's responsibility to decide between making such take-off or waiting for normal take-off in a preferred direction.

* **2.0803 VFR Departure:** Departures may be cleared to maintain flight in VFR conditions until a specified time or to a specified location if reports indicate that aircraft can continue with 3 miles' visibility and can remain 500 feet vertically and 2,000 feet horizontally from all clouds.

Note: Caution should be exercised when using this procedure whenever a ceiling exists in that it may require the pilot to violate terrain clearance regulations in order to maintain 500 feet vertical separation from clouds.

2.0804 Special Reports: Arrivals may be requested to report when leaving or passing a reporting point, starting procedure turn on final approach, or other information required by the controller to expedite departures.

2.0805 Take-off Limitations: When take-off clearance is based on the position of an arrival the following shall apply:

2.08050 If the arrival will make a complete instrument approach (initial and final approach) a departure may

- (1) Take off in any direction until arrival has started procedure turn on final approach;
- (2) Take off in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after arrival has started procedure turn leading to final approach, provided that the take-off will be made at least three minutes before the arrival is estimated over the airport.

2.08051 If the arrival will make a straight-in approach (final approach only) a departure may

- (1) Take off in any direction until five minutes before the arrival is estimated over the airport;
- (2) Take off in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach of the arrival until three minutes before the arrival is estimated over the airport.

The above take-off limitations need not apply at Approach Control locations, as specified in Section 4.

2.0806 Approach Clearance: Except at locations where Approach Control is in operation, succeeding aircraft shall not be authorized to commence final descent for a landing until the first aircraft is in communication with and is sighted by tower personnel and reasonable assurance exists that normal landing can be accomplished.

2.09 EXPECTED APPROACH TIME

2.0900 Expected Approach Time: The time at which it is expected that an arrival will be cleared to commence its approach procedure preparatory to landing.

2.0901 Issuance to Aircraft: Expected approach time shall be issued and currently revised. Approach Control shall issue revised expected approach time to aircraft under its jurisdiction.

2.09010 If the aircraft is within the control area of intended landing when determination of delay is made, the expected approach time shall be issued as soon as practicable. If aircraft approaching the area are expected to be delayed 1 hour or more, the expected approach time shall be issued immediately through the adjacent center.

2.0902 Excessive Delays: ATC should advise aircraft operators and Military Flight Service when excessive delays to arrivals and departures are anticipated. If departures are delayed to avoid excessive holding at destination, ATC shall normally clear such flights in the order in which the flight plans are filed.

2.10 APPROACH SEQUENCE

2.1000 Approach Sequence: An approach sequence is established as follows:

2.1001 Priority: The first aircraft estimated to arrive over the point from which approaches are commenced will normally be the first aircraft to approach. Other aircraft will normally have priority in the order of their estimated arrivals over such point.

2.1002 Altitude Assignment: Altitudes at holding points shall be assigned in a manner that will facilitate clearing each aircraft to approach in its proper priority. Normally, the first aircraft to arrive over a holding point should be at the lowest altitude, with following aircraft at successively higher altitudes.

2.11 APPROACHES

2.1100 Approaches: Specific approaches may be required to expedite traffic.

2.1101 Instrument Approach: The initial approach altitude, the point (in minutes or miles from the appropriate reporting point) at which procedure turn will be started, the procedure turn altitude and the final approach course shall be specified. The missed-approach procedure shall be specified when deemed necessary.

2.11010 The provisions of 2.1101 need not be applied where a standard instrument approach procedure is established and pilots are known to be familiar with the procedure, including the missed-approach procedure as specified in an air carrier company manual or an official tabulation of instrument approach procedures.

* 2.11011 If visual reference to the ground is established before completion of the approach procedure, it is expected the entire procedure will be executed unless the pilot requests and is granted clearance to proceed directly to the airport or the pilot cancels his IFR flight plan.

2.11012 When the reported ceiling is below the initial approach altitude authorized over the radio navigation facility at point of intended letdown, the reported ceiling, visibility and altimeter setting shall be transmitted in the approach clearance to other than air carrier aircraft. The center shall effect transmission by requesting the communications station to "give current weather". At locations provided with approach control, this information shall be transmitted by the tower to all aircraft, including air carrier, on the initial transmission to such aircraft. Subsequent changes shall be forwarded to the aircraft as they become available.

2.11013 (Unassigned).

2.1102 Contact Approach: An aircraft may be authorized to execute a contact approach if requested by the pilot. Standard separation shall be effected between aircraft so cleared and between such aircraft and other arriving or departing aircraft.

2.1103 (Unassigned)

2.1104 No Specified Approach: Traffic permitting, a specified approach shall not be required.

2.12 COORDINATION BETWEEN CENTERS AND TOWERS

2.1200 General: Coordination between centers and towers will be effected as follows:

2.1201 Authority: Towers will observe such instructions as are issued by the appropriate center.

2.1202 Towers Providing Approach Control Service: A tower may issue clearances to any aircraft released to tower control without reference to the center, except that when an approach has been missed the center will be advised immediately and subsequent action coordinated between the center and tower.

* 2.12020 Clearing Departures: Approach control towers shall be responsible for providing separation between departing aircraft, and between departures and all other aircraft under their jurisdiction as specified in Section 4. The center clearance to departing aircraft shall include the clearance limit, cruising altitudes, routing and other departure restrictions necessary to provide separation from other traffic not under the jurisdiction of approach control. Time of take-off, direction of turn, altitude restrictions after take-off and other specific restrictions necessary to effect separation from aircraft under its jurisdiction shall be determined by approach control. The time of take-off shall be specified in the center clearance only if necessary to coordinate the departure with traffic not under approach control jurisdiction. A clearance void time shall be specified by the center if a delayed departure would result in conflict with traffic not released to tower control. A clearance void time determined by the tower shall not be later than that issued by the center. Close coordination is essential between approach control and the center and shall be effected to prevent traffic confliction.

2.12021 Clearing Arrivals: The center will clear aircraft to the holding point, including holding information and expected approach time in such clearance. If the approach sequence is such that succeeding arrivals would be required to hold at high altitudes, such arrivals should be cleared to other points until lower altitude levels are vacated in the approach sequence.

2.120210 (Unassigned).

* 2.120211 After coordination with the tower, a center may clear arrivals to hold at visual holding points until further advised by Approach Control.

* 2.12022 Aircraft Movement Data - -Approach Control Towers: Approach Control shall keep centers promptly advised of pertinent data on IFR traffic such as:

- (1) Highest altitude in use by Approach Control at the holding point.
- (2) Average time interval between successive approaches as determined by the tower.
- (3) Revision of the expected approach time issued by the center when the tower calculation indicates a variation of 10 minutes or more.
- (4) Arrival times over holding point or statement that aircraft is under tower control, if released prior to arrival over holding point.
- (5) Departure times of departing aircraft.
- (6) Available information relating to overdue or unreported aircraft.
- (7) Missed approaches.

* 2.12023 Aircraft Movement Data - -Centers: Centers shall keep approach Control promptly advised of pertinent data on IFR traffic, such as:

- (1) Identification, type and point of departure of arriving aircraft.
- (2) Estimated time and proposed altitude of arriving aircraft over holding point or actual time if aircraft is released to Approach Control after arrival over the holding point.
- (3) Expected approach time issued.
- (4) Statement that aircraft has been released to Approach Control, including the point or time at which released if other than the clearance limit.
The information in (1), (2), (3), and (4) shall be transmitted as follows:
(Ident.), (Type) FROM (Point of departure) ESTIMATED
(Holding Point), (Time), (Altitude), EXPECTED APPROACH
CLEARANCE (Time). TOWER CONTROL, or TOWER
CONTROL AT (Time or Fix).

(5) Anticipated delay to departing IFR traffic.

2.12024 A tower may authorize flight in a control zone in weather conditions lower than the VFR minimums after coordination with the center.

2.12025 Unassigned.

2.12026 Traffic Information: When necessary to issue detailed traffic information to departures, a center may request a tower to forward such information, in standard phraseologies, by reference to flight data possessed by the tower.

* 2.12027 Any additional procedures necessary for proper coordination of approach control at individual airports shall be contained in a center/approach control letter of agreement. A letter of agreement between a center and military approach control facility shall be approved by competent military authority.

2.1203 Towers Not Providing Approach Control Service: The tower may authorize VFR flight in a control zone in weather conditions lower than the VFR minimums after coordination with the center.

* 2.12030 Division of Control: The center shall retain control of arriving aircraft until such aircraft have been cleared for approach and are in communication with the tower. Not more than one arrival shall be cleared for approach during IFR conditions.

2.12031 After coordination with the tower, a center may clear arrivals to visual holding points to hold until further advised.

2.12032 Aircraft Movement Data- -Towers: Towers shall keep centers promptly advised of pertinent data on IFR traffic such as:

- (1) Arrival and departure times.
- (2) Available information relating to overdue or unreported aircraft.

* 2.12033 Aircraft Movement Data - -Centers: Centers shall keep towers promptly advised of pertinent data on IFR traffic such as:

- (1) Identification, estimated time of arrival and proposed altitude of arrivals over holding point or airport at least 15 minutes prior to estimated arrival.
- (2) Approach clearance issued.
- (3) Anticipated delay to departing IFR traffic due to airway congestion.

2.13 CLEARANCES

2.1300 General: Clearances are based solely on expediting and separating air traffic and do not constitute authority to violate Civil Air Regulations. Clearances authorize flight within control zones and control areas only; no responsibility for separation of aircraft outside of these areas is accepted.

2.1301 Application: Clearances shall be issued prior to IFR flight within a control area.

2.1302 Broadcast: A clearance shall not be broadcast unless a center or tower so directs. A relay of a clearance over any communications channel which could be intercepted by the pilot is considered a broadcast.

2.1303 Clearance Limits: The center shall normally clear an aircraft from the point of departure to the airport of first intended landing.

* 2.1304 Assignment of Altitudes:

- (1) A center shall normally authorize only one altitude beyond its control area, i.e., that altitude at which the aircraft will enter the adjacent area. Phraseology shall normally be in accordance with 2.1404 (1). For example, a flight from Chicago to LaGuardia would be cleared by the Chicago Center to the LaGuardia Airport to maintain the altitude at which the aircraft will enter the Cleveland area. Any additional altitudes desired by the pilot will be requested by him en route. In this connection, pilots will be advised "REQUEST FURTHER ALTITUDE CHANGE EN ROUTE".

The phraseology contained in 2.1404 (7) shall be used in clearances to aircraft operating on direct routes which cross civil airways. If more than one altitude is specified, the phraseology in 2.1402 (4) shall be used with the phrase "AT (Altitude)."

- (2) When a flight has been cleared into a center's control area at an altitude which is below the established minimums for a subsequent portion of the route, action should be initiated by that center to issue a revised clearance to the aircraft even though the pilot has not requested the necessary altitude change. The center responsible for control at the point of first intended landing shall clear the aircraft for approach or issue other appropriate clearance as required. If a control tower is not in operation the center shall clear the aircraft to the airport, even though it is a repetition of the initial clearance limit. The airport of intended landing shall be the clearance limit even though such airport is outside of a control area. If it is necessary for the center controlling the last control area through which the aircraft passes to issue a clearance, such clearance shall include clearance out of the control area. If an amending clearance is not required, it will not be necessary to clear the aircraft out of the control area.

2.13040 Pilots filing flight plans specifying VFR within the control area of origin and IFR within an adjacent area shall not be cleared by the center of origin but shall be advised to contact the appropriate communication facility for clearance. Pilots specifying an instrument altitude for the first portion of a flight and VFR for a later portion shall normally be cleared to the fix at which the instrument portion of the flight terminates, to maintain cruising altitude. Phraseology shall be in accordance with 2.1404 (1).

2.13041 Whenever possible, a combined clearance shall be issued by the center adjacent to the area within which landing will be made. If weather and/or traffic conditions require, the center controlling the point of intended landing may request an

adjacent center to clear aircraft to a specific point during a specified period. Such clearances shall normally be issued to an aircraft only when within the control area adjacent to the area within which landing is to be made.

2.13042 Aircraft operating on an established schedule may be cleared through intermediate stops within a control area; however, if the proposed route of flight is through more than one control area, scheduled aircraft may be cleared through intermediate stops within other control areas only after coordination between the centers concerned.

2.13043 If aircraft are cleared to a point in another control area which is other than the airport of first intended landing, the center responsible for control at such clearance limit will authorize flight to the airport of first intended landing, if practicable.

2.13044 After the initial clearance has been issued to an aircraft at departure point, it will be the responsibility of the appropriate center to issue an amended clearance to eliminate traffic conflict, and issue traffic information if required.

2.13045 If the point of departure is not at a sufficient distance from the boundary of an adjacent control area to permit transmission of the necessary flight plan data to the adjacent center and allow adequate time for posting and analysis, coordination between centers shall be effected prior to departure of the aircraft.

2.1305 Composition: Clearances shall be composed as follows:

- (1) Flight or aircraft identification.
- (2) Clearance limit and route.
- (3) Altitude, approach, or departure procedure.
- (4) Any special information.
- (5) Message delivery information and/or cancellation time, if necessary

2.1306 Description: Clearance items shall be described as follows:

* 2.13060 A clearance limit shall be described by specifying the name of the appropriate reporting point or airport.

2.13061 The route of flight shall be included in each original clearance when deemed necessary.

2.13062 Altitude information shall consist of:

- (1) The cruising altitude or altitudes.
- (2) Altitudes over those reporting points which are to be crossed at other than the cruising altitude.
- (3) The place or time for starting climb or descent, when necessary.
- (4) Detailed procedures concerning departure or approach altitudes, when necessary.

* 2.13063 Reporting points or fixes specified in air traffic clearances shall be identified as intersections, range stations, compass locators, fan markers, etc., as the case may be, as follows:

- (1) When the clearance specifies a route of flight other than that proposed by the pilot.
- (2) When there are fixes along or near the route of flight bearing the same name or similar names and confusion might arise as to which of the fixes is to be used.
- (3) When it is believed that there is any possibility of confusion on the part of the pilot regarding the reporting points or fixes which shall be used.

2.1307 Issuance and Delivery of Clearances: Clearances shall be issued as follows:

2.13070 Departures: The center shall forward a clearance to the tower with the least possible delay after receipt of request made by the tower, or prior to such request if practicable.

* 2.13071 En Route: When an aircraft is cleared to a clearance limit and requires further clearance beyond that point, the clearance shall be issued at least five minutes before the aircraft is estimated over the reporting point where delivery is to be made.

Note: While a pilot should always receive the required clearance prior to arrival at the current clearance limit, occasions will arise when such may not be the case. In this event, the pilot is expected to hold at the clearance limit, maintaining the last assigned altitude and request further clearance. The provisions of paragraph 2.0506 require that the altitude of an aircraft be protected whenever further clearance is required.

2.13072 Responsibility for Clearance Delivery: It is the responsibility of the communications agency or aircraft operator to whom the clearance is issued to transmit it to the aircraft immediately when received unless an attempt delivery time is included in the clearance. The center or tower shall be notified if the clearance is not delivered within five minutes after receiving the clearance or the attempt delivery time when one is specified. When notification of non-delivery is received, the center shall advise the communication agency of further action to be taken. i.e., advise the communication agency to continue attempting to deliver and to report if undelivered by a specified time, attempt to deliver at a specified time, or cancel the clearance, etc.

2.14 STANDARD PHRASEOLOGIES

2.1400 General: Clearances shall be issued in accordance with the phraseologies herein. It is expected that personnel receiving a clearance for transmission to an aircraft will transmit such clearance in the exact phraseology in which it is received. It is essential that each clearance contain positive and concise data, phrased in a standard manner. Each traffic clearance shall be prefixed with the phrase "ATC CLEARS (Ident.)" whenever a clearance limit is contained in the clearance.

Example: "ATC CLEARS EASTERN FOUR TO THE RICHMOND AIRPORT. CRUISE SIX THOUSAND....."

The phrase "ATC ADVISES (Ident.)" shall be used whenever information such as expected approach time, undetermined delay, and essential traffic is issued.

Example: "ATC ADVISES EASTERN FOUR TO EXPECT APPROACH CLEARANCE AT...."

The phrase "ATC CLEARS (Ident.)" shall be used for all other transmissions.

Example: "ATC CLEARS EASTERN FOUR TO DESCEND TO FIVE THOUSAND IMMEDIATELY....."

These phrases are to be used only when the clearance will be relayed from a center or tower to a pilot through any communications agency such as an air carrier radio operator, military communications station or CAA communications station. Towers shall use the phrases whenever a clearance is received from a center for transmission to a pilot. Clearances initiated by tower personnel and issued directly to pilots shall conform to standard tower phraseologies.

2.1401 Clearance Limit: The initial clearance shall specify a clearance limit phrased as follows:

- ATC CLEARS (Ident.)
- (1) FROM.....TO.....("FROM....." may be eliminated if clearance is understandable without it); or
 - (2) THROUGH.....TO.....; (if aircraft is cleared through an intermediate stop to a point beyond the intermediate stop); or
 - (3) OUT OF CONTROL AREA/ZONE (Number of) MILES (Direction) OF (Reporting point).

Note: Phraseology (3) will normally be used as a clearance limit only when the flight will not again enter a control area.

* 2.1402 Route of Flight: The route of flight, when included in a clearance, shall be specified immediately after the clearance limit. The following phraseologies or combinations thereof, shall be used:

- (1) DIRECT;
- (2) VIA (Reporting point) AND (Reporting point);
- (3) VIA (Color or Victor) AIRWAY (Number)
- (4) CROSS/JOIN (Color or Victor) AIRWAY (Number) (Number of) MILES (Direction) OF (Reporting point).

2.1403 Local Flight: A clearance for local flight on specified courses of a specified radio facility:

ATC CLEARS (Ident.) TO FLY (Location/s) COURSES AND/OR QUADRANTS (Name of facility) WITHIN RADIUS (Number of) MILES FROM STATION.

2.1404 Maintaining Altitude: Clearances requiring that an aircraft maintain a specified altitude, a specified altitude in relation to an overcast or other well-defined formation, or altitude separation from another aircraft.

MAINTAIN

- (1) (Altitude); or
- (2) (Altitude) TO (Reporting point); or
- (3) (Altitude) UNTIL PAST (Reporting point); or
- (4) (Altitude) UNTIL (Time); or
- (5) (Altitude) UNTIL ADVISED BY (Name of) TOWER; or
- (6) (Altitude) UNTIL FURTHER ADVISED; or
- (7) (Altitude) WHILE IN CONTROL AREA; or
- (8) AT LEAST 500 FEET ABOVE ALL CLOUDS, HAZE, SMOKE, OR FOG LEVEL; or
- (9) (Number of feet) ABOVE/BELOW (Aircraft Ident.).

2.1405 Climb or Descent: Clearances requiring that an aircraft climb or descend to a specified altitude:

CLIMB TO (Altitude); or

DESCEND TO (Altitude)

(1) IMMEDIATELY; or

(2) IMMEDIATELY AFTER PASSING (Reporting point); or

(3) AT (Time).

CLIMB; or DESCEND

SO AS TO REACH (Altitude) AT (Time); or

AT (Reporting point).

* 2.1406 Clearance authorizing an aircraft to descend or climb between specified altitude levels in VFR conditions:

CLIMB IN VFR CONDITIONS FROM (Altitude) TO (Altitude); or

DESCEND IN VFR CONDITIONS FROM (Altitude) TO (Altitude); or

CLIMB IN VFR CONDITIONS ABOVE (Altitude); or

DESCEND IN VFR CONDITIONS BELOW (Altitude); or

IF NOT POSSIBLE (Alternate Procedures) AND ADVISE.

2.1407 Change of Altitude: Requiring that an aircraft remain well to the right of a course during altitude change:

CLIMB/DESCEND WELL TO RIGHT OF COURSE.

2.1408 Cruising and Crossing Altitudes: Clearances requiring that an aircraft cruise at or cross a reporting point at a specified altitude with no specific time for altitude change:

CROSS (Reporting point) AT (Altitude)

CROSS (Reporting point) AT OR ABOVE (Altitude)

CRUISE (Altitude).

2.1409 Reporting Levels: Clearances requiring an aircraft to report on leaving or reaching specified altitude levels:

REPORT LEAVING (Altitude level or levels);

REPORT REACHING (Altitude level or levels).

NOTE: Altitude level or levels shall include

either the desired numerical values or

even or odd thousand-foot levels.

* 2.1410 Specific Instrument Approach: Clearances specifying instrument approach utilizing specific facilities:

CLEARED FOR (Type and/or name of approach, i.e., standard range;

ADF; ILS; VOR; fan marker; back course ILS, etc.) APPROACH

including, when considered necessary,

INITIAL APPROACH AT (Altitude) PROCEDURE TURN AT (Altitude)

(Number of) MINUTES OR MILES (Direction) and/or FINAL

APPROACH ON (Location) COURSE OF (Name of facility); or,

STRAIGHT-IN APPROACH TO AIRPORT OR (Type of) APPROACH TO (Name of) AIRPORT.

2.1411 Contact Approach: Authorization at a pilot's request for a ground contact approach:

CONTACT APPROACH APPROVED; IF NOT POSSIBLE

(alternate procedures) AND ADVISE.

* 2.1412 Missed Approach: The missed approach procedure shall be specified when deemed necessary.

* 2.1413 Any Approach: The omission of specific approach procedures will indicate any type of approach may be used at the discretion of the pilot.
(Example: 'CLEARED FOR APPROACH')

2.1414 Departure Procedures: Clearances specifying direction of take-off and/or direction of turn after take-off:

TAKE-OFF (Direction) and/or TURN (Right or Left)
AFTER TAKE-OFF.

2.1415 Release: Instructions authorizing a tower to release an aircraft for take-off subject to the discretion of the tower with respect to arriving aircraft:

RELEASE SUBJECT YOUR DISCRETION WITH
RESPECT TO (Ident./s).

2.1416 Special Procedures: Clearances requiring that an aircraft follow a specific course:

MAKE GOOD A TRACK OF (Number of) DEGREES
MAGNETIC FROM (Location) UNTIL (Time, location or altitude); or
MAKE GOOD A TRACK BISECTING (Location)
QUADRANT OF (Name of facility) UNTIL (Time, altitude or location).

NOTE: In utilizing these procedures,
caution should be exercised to insure
aircraft will clear all obstructions
and terrain in accordance with speci-
fied minimums, and to insure that the
desired track can be accomplished
effectively, considering wind direction
and velocity.

* 2.1417 Holding: Procedures requiring that aircraft be held in specified direction from a specific holding point:

- (1) Standard Pattern: HOLD (Direction) OF (Holding point); UNTIL (time); or UNTIL ADVISED BY (Name of) APPROACH CONTROL ON (Blank) KILOCYCLES/MEGACYCLES.
- (2) Published Non-Standard Pattern: HOLD (Direction) OF (Holding point) NON-STANDARD PATTERN; UNTIL (time); or UNTIL ADVISED BY (Name of) APPROACH CONTROL ON (Blank) KILOCYCLES/MEGACYCLES.
- (3) Detailed Holding Instructions: HOLD ON (Specified) COURSE OF (Name of facility) BETWEEN (Location) AND POINT (Number of minutes and direction); UNTIL (Time); or UNTIL ADVISED BY (Name of) APPROACH CONTROL ON (Blank) KILOCYCLES/MEGACYCLES.
 - (a) MAKE ALL TURNS (Direction) OF COURSE;
 - (b) MAKE ALL TURNS IN (Direction and quadrant identification) QUADRANT.

NOTE: The phrase "ON (Blank) KILOCYCLES/MEGACYCLES" shall be used except when deemed unnecessary.

2.14170 Detailed holding instructions shall normally be issued:

- (1) When assigning non-standard patterns which are not depicted on the U. S. Coast and Geodetic Survey Radio Facility Chart Series; or
- (2) When assigning standard patterns at locations where non-standard patterns are depicted on U. S. Coast and Geodetic Survey Radio Facility Chart Series; or
- (3) For two weeks after receipt of the appropriate U. S. Coast and Geodetic Survey Radio Facility Chart which correctly depicts new or revised non-standard patterns, or which deletes previously depicted non-standard patterns; or
- (4) On pilot's request; or
- (5) When deemed necessary by the controller.

2.1418 Visual Holding: Instructions requiring that an aircraft be held at a specific location by visual reference to the ground or water:

HOLD AT (Location) UNTIL (Time); or UNTIL ADVISED BY (Name of) TOWER.

- * 2.1419 Expected Approach Time: Clearances relative to expected approach time: EXPECT APPROACH CLEARANCE AT (Time);

2.1420 Indefinite Delay: Delay not determined. (Revised expected approach time shall be forwarded as soon as determination can be made):

DELAY INDEFINITE EXPECT APPROACH CLEARANCE NOT LATER THAN (Time).

2.1421 Longitudinal Separation Clearances: Clearances requiring that an aircraft lose time to establish longitudinal separation from another aircraft or to maintain longitudinal separation from another aircraft:

LOSE TIME SO AS TO ARRIVE OVER (Reporting point) AT (Time).

MAINTAIN (Number of minutes) SEPARATION FROM (Aircraft Ident.).

2.1422 Essential Traffic Information: Phraseologies to be used in connection with the issuance of essential traffic information:

TRAFFIC IS (Essential traffic information); or ADDITIONAL TRAFFIC IS (Essential traffic information); or NO ESSENTIAL TRAFFIC REPORTED.

- * 2.1423 Approach Control: The following shall constitute the last item of the center clearance when an aircraft, previously issued a holding clearance, is to contact a tower for further clearance. For example, this phraseology will apply when an aircraft

holding at a higher altitude than "over traffic" is subsequently cleared to a lower level and released to Approach Control:

CONTACT (Name of) APPROACH CONTROL ON
(Blank) KILOCYCLES/MEGACYCLES FOR FURTHER
CLEARANCE.

NOTE: The phrase "ON (Blank) KILOCYCLES/MEGACYCLES" shall be used except when deemed unnecessary.

2.15 TRAFFIC INFORMATION

2.1500 Essential Traffic: Essential traffic for a particular aircraft is same direction IFR traffic on the same or converging courses which is, or will be, 1,000 feet or less vertically and within less than minimum longitudinal separation from such aircraft; and opposite direction IFR traffic on the same or converging courses which is, or will be, within less than the minimum time separation for altitude change (2.0103) and occupies, or will pass through, the altitude of such aircraft.

2.1501 Detailed Traffic Information: Direction of flight and estimated time and altitude over the reporting point nearest the point at which the aircraft which are essential traffic should pass, overtake or approach, and any alternate procedures issued, shall be given when an aircraft will pass through the altitude level of other aircraft concerned.

2.1502 General Traffic Information: Direction of flight and cruising altitude shall be given when the aircraft which are essential traffic are at different constant altitudes.

* 2.1503 Issuance: Traffic information should be issued to aircraft:

- (1) When deemed necessary by the controller.
- (2) When right-side separation is effected; or
- (3) At any time if requested by the pilot;

Traffic information issued to aircraft separated by five minutes in accordance with 2.01010 (2) shall include the filed air speed of the aircraft concerned.

NOTE: With respect to subparagraph (1) above, controllers should furnish traffic information when emergency or unusual conditions such as severe turbulence exist.

2.16 EMERGENCY PROCEDURES

2.1600 General: The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. The procedures outlined herein are intended as a general guide to air traffic control personnel. Centers and towers shall maintain full and complete coordination, and personnel shall use their best judgment in handling emergency situations.

2.1601 Emergency Descent: Upon receipt of advice that an aircraft is making an emergency descent through other traffic, immediate steps shall be taken to minimize conflict with other aircraft. ATC personnel shall immediately broadcast by means of the appropriate radio facility or, if not possible, request the appropriate communications station to immediately broadcast the following:

EMERGENCY TO ALL CONCERNED: EMERGENCY
LANDING AT (Name of) AIRPORT. ALL AIRCRAFT
BELOW (Number of) FEET WITHIN (Number of)
MILES OF (Name of radio facility) LEAVE (Location)
COURSE(S) IMMEDIATELY.

2.16010 Action by Pilot: It is expected that pilots receiving such broadcast will clear the specified areas, maintaining the last assigned altitude and stand by on the appropriate radio frequency for further instructions from the center or tower.

2.16011 Subsequent Action by Air Traffic Control: Immediately after such emergency broadcast has been made, the center or tower concerned shall forward further instructions to all aircraft involved as to additional procedures to be followed during and subsequent to the emergency descent.

2.1602 Two-Way Radio Failure: If two-way radio communication between an aircraft and the ground fails prior to the aircraft establishing communication with the tower, the center may issue an appropriate clearance to be broadcast over suitable radio facilities. If failure occurs after the aircraft and tower are in communication, the tower may broadcast any necessary clearance to the aircraft.

2.16020 Pilot Actions: The pilot will observe one of the following procedures:

- (a) If operating under VFR conditions, proceed under VFR and land as soon as practicable, or
- (b) Proceed according to the latest air traffic clearance.

2.160200 If the pilot proceeds according to the latest traffic clearance but has not received and acknowledged a clearance to the tower and if other instructions to the contrary are not received, he shall be expected to observe the following and control will be effected accordingly:

- (1) If the pilot has received and acknowledged a clearance to the destination airport or the radio facility serving that point, he shall continue flight at the altitude(s) last assigned by Air Traffic Control, or the minimum instrument altitude, whichever is the higher, to the radio facility serving the destination airport.
- (2) If the pilot has received and acknowledged a clearance to a point other than the destination airport or the radio facility serving the destination airport, he shall continue flight at the altitude(s) last assigned by Air Traffic Control or the minimum instrument altitude, whichever is the higher, to the radio facility serving the destination airport.

- (3) If holding clearance has been received, the pilot shall comply with the clearance until such time as it will be necessary to continue flight so as to arrive at the radio facility serving the destination airport at the expected approach time last received and acknowledged, maintaining the last assigned altitude or the minimum instrument altitude, whichever is the higher.
- (4) If holding clearance has been received, but no expected approach time has been received, the pilot shall comply with the clearance until the time Air Traffic Control has specified that further clearance may be expected. He shall then continue, maintaining the last assigned altitude or the minimum instrument altitude, whichever is the higher.

NOTE: The minimum instrument altitude referred to is the minimum established for that portion of the route over which the operation is conducted, regardless of the direction of flight.

2.160201 Approach: Descent from the altitude maintained to the radio facility serving the destination airport shall be made on the final approach course and shall start at the expected approach time last received. If no expected approach time was received, descent shall be started at the last estimated arrival time specified by the pilot, or as soon as possible thereafter. A full standard instrument approach should be executed unless a VFR approach can be made.

2.160202 Alternate Airport: If approval of the aircraft operator is obtained, a center may request a clearance to be broadcast to the pilot to proceed, at the minimum instrument altitude, to the alternate airport specified in the flight plan.

2.17 UNREPORTED AIRCRAFT

2.1700 Unreported Aircraft: To minimize any possibility of collision with unreported aircraft, the center or tower shall restrict other traffic which may conflict, until 30 minutes after whichever of the following is applicable: The time at which approach clearance was delivered to the pilot; the expected approach time last delivered to the pilot; the arrival time over the radio facility serving the destination airport; or the current ATC or pilot estimate (whichever is the later) of initial arrival over such radio facility.

2.1701 Resumption of Normal Traffic: If the aircraft is still unreported after the above period, pertinent information concerning the aircraft shall be forwarded to operators and pilots of the aircraft concerned and normal control resumed if they so desire. It is the responsibility of such operators and pilots to determine whether they will resume normal operations or take other action.

* 2.1702 At CAA locations where radar is available, arriving or departing aircraft may, with pilot concurrence, be cleared to climb or descend through the altitude/s of an unreported aircraft provided:

- (1) The controlled aircraft is in direct communication with the radar controller;
- (2) Positive identification is established and maintained;
- (3) Radar separation is maintained from all observed targets, until such time as lateral, longitudinal, or vertical separation is established; and
- (4) Due consideration is given to the limitations of the radar equipment, i.e., precipitation interference, radar antenna pattern, coverage, blind spots, etc.

* 2.1703 The above procedures are also applicable at those locations served by military radar provided that procedures are covered by joint letters of agreement delegating control responsibility of the aircraft involved to the military radar operator during such periods.

*2.18 USE BY ATC OF NAVIGATIONAL FACILITIES AWAITING FLIGHT CHECK

* 2.1800 VHF Facilities: The navigational, voice and identification features of all VHF navigational facilities will be considered shut down while in a "ground checked only, awaiting flight check" status.

* 2.1801 Non-Simultaneous LF/MF Facilities: The navigational feature of non-simultaneous LF/MF facilities will be considered as shut down while in a "ground checked only, awaiting flight check" status.

* 2.1802 Simultaneous LF/MF Facilities: The navigational feature of all simultaneous LF/MF navigational facilities will remain on the air. This type facility will be considered usable as a nondirectional radio beacon only and the on-course guidance feature of the range must be disregarded entirely. This will mean loss of right side separation, loss of intersections, loss of reporting points, loss of holding points and loss of standard range approach procedures depending on the utility of the particular facility concerned. Simultaneous LF/MF radio ranges may continue to be used as ADF approach aids as follows:

- (1) By scheduled air carrier, providing that their operations specifications authorize an ADF instrument approach to the airport concerned.
- (2) By all other types of operators if an ADF instrument approach procedure for the airport concerned has been prescribed by the Administrator, or if an approach is conducted using the same course for an ADF track as that specified in the approved range procedure and with identical altitudes as used in the range approach.

NOTE: Paragraph 2.18 is based on Regulations of the Administrator, Part 609, Section 609.3, and is not applicable in those areas excluded by such regulations.

3. AIRPORT TRAFFIC CONTROL PROCEDURES

3.0 GENERAL

3.00 Responsibility of Airport Traffic Control Towers:

3.000 An airport traffic control tower is responsible for the issuance of clearances and information to pilots of aircraft for the purpose of preventing collision between:

- (1) Aircraft operating on the ground at the landing area.
- (2) Aircraft and vehicles operating on the landing area.
- (3) Aircraft in the traffic pattern, and landing and taking off at the landing area.
- (4) Aircraft operating under instrument flight rules after control of such aircraft has been delegated to the tower by the appropriate air route traffic control center.

3.001 An airport traffic control tower is also responsible for the issuance and relay of information and clearances which will prevent unnecessary delays to aircraft using a landing area, and which will permit the proper use of the landing area by aircraft.

3.01 Responsibility of Pilots:

3.010 When flying in visual flight rule weather conditions it is considered the direct responsibility of the pilot to avoid collision with other aircraft. Under such conditions, the information and clearances issued by the control tower are intended to aid pilots to the fullest extent in avoiding collisions.

3.011 When flying in instrument flight rules weather conditions it is obviously impossible for the pilot to assume the responsibility of avoiding collision with other aircraft except as directed by the ground control agency. Therefore, it is of the utmost importance that all clearances issued by a control tower to pilots of aircraft under its jurisdiction be adequate, concise, and definite inasmuch as the pilot has no other means of ascertaining the proximity of other aircraft.

3.1 CONTROL OF TRAFFIC ON AND IN VICINITY OF LANDING AREA

3.10 General:

3.100 Airport traffic controllers shall maintain a continuous watch on all visible flight operations in the control zone, including aircraft, vehicles, and personnel on the landing area, and shall control such traffic in accordance with the procedures set forth herein and all applicable air traffic rules. If there are other landing areas within the zone, traffic at all landing areas

within the zone shall be coordinated so as to eliminate any hazardous conflicts of traffic patterns.

3.11 Critical Positions of Aircraft in the Traffic and Taxi Patterns:

3.110 The following positions of aircraft in the traffic and taxi patterns (illustrated in Figure 1) are the positions where the aircraft normally receives airport traffic control clearances. The aircraft should be watched closely as they approach these positions so that proper clearances may be issued without delay. Where practicable all such clearances should be issued without waiting for the pilot to initiate the call:

- (1) Pilot initiates call to taxi for departing flight. Runway-in-use information and taxi information given.
- (2) If there is conflicting traffic the departing aircraft will be held at this point. The pilot will normally run up motors here.
- (3) Take-off clearance is issued here, if not practicable at position 2.
- (4) Clearance to land or landing sequence number is issued here.
- (5) Clearance to taxi to hangar line or parking area is issued here.
- (6) Parking directions issued here if necessary.

3.12 Determination of Proper Runways to Use for Landings and Take-offs:

3.120 When surface wind velocity is six miles per hour or more, aircraft shall ordinarily be authorized to use the runway most nearly aligned into the wind and the tetrahedron shall, if controllable, be set so as to indicate such runway.

3.1200 The tetrahedron, if controllable, will release automatically and swing into the wind when the velocity reaches a predetermined value. Ordinarily this will be between 10 and 15 miles per hour.

* 3.121 When the surface wind velocity is less than 6 miles per hour, aircraft shall be authorized to use the runway which has been designated as the "calm wind" runway. The actual wind direction and velocity shall be stated since, under certain conditions, some types of aircraft are not approved for take-off or landing with a tail wind component. The "calm wind" runway shall normally be the runway having the most advantages such as greater length, shorter taxiing distance, better approach, etc. The tetrahedron shall be set so as to indicate such runway under these conditions.

3.122 If the runway in use is not considered suitable for the operation involved, the controller may offer a choice of runway or the

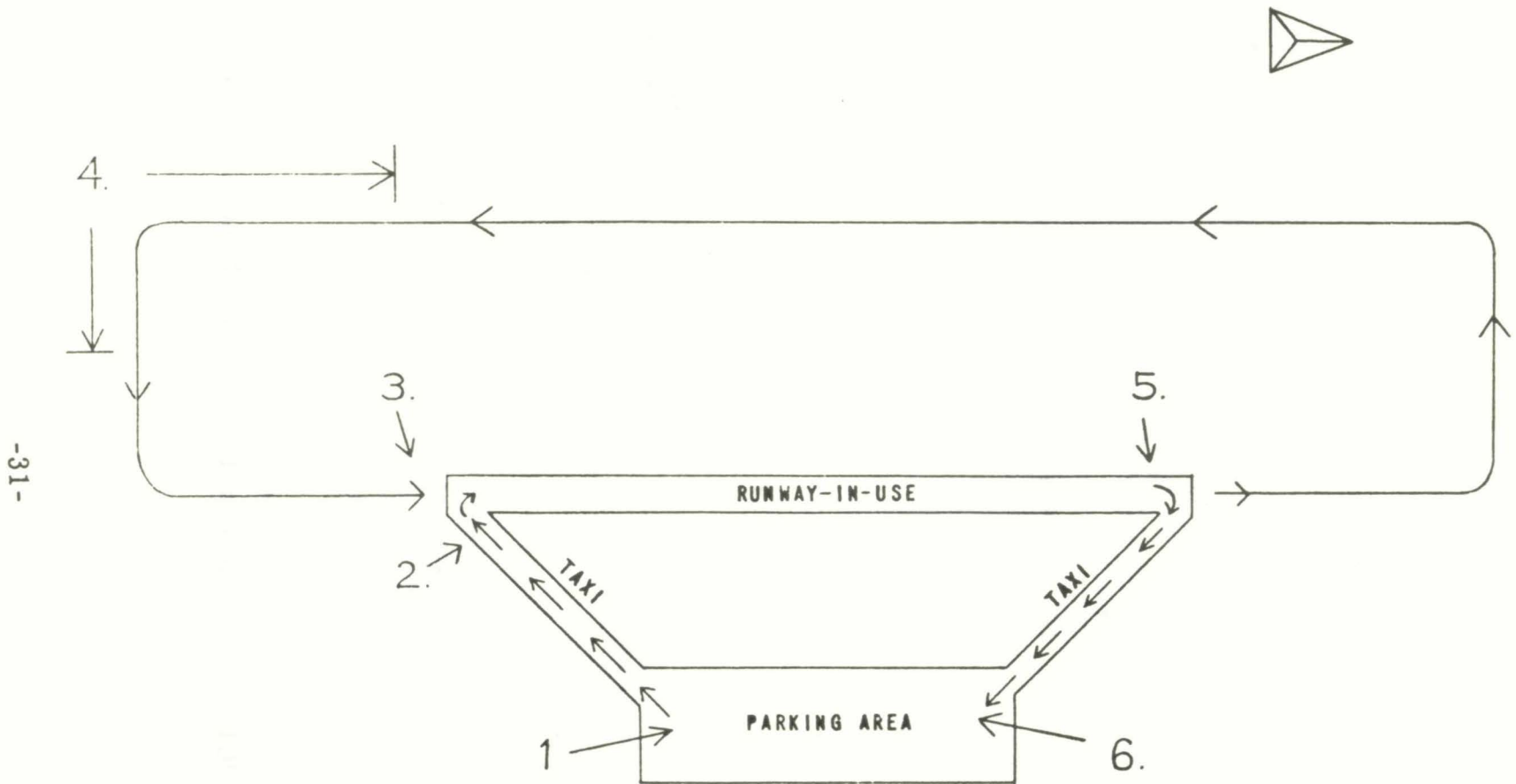


FIGURE 1. Critical Positions of Aircraft from an Airport Traffic Control Viewpoint

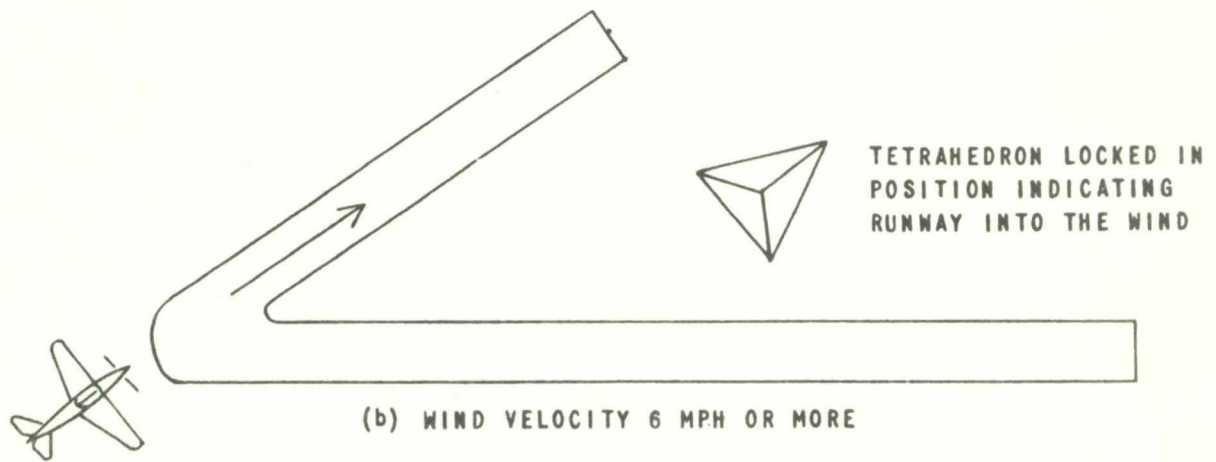
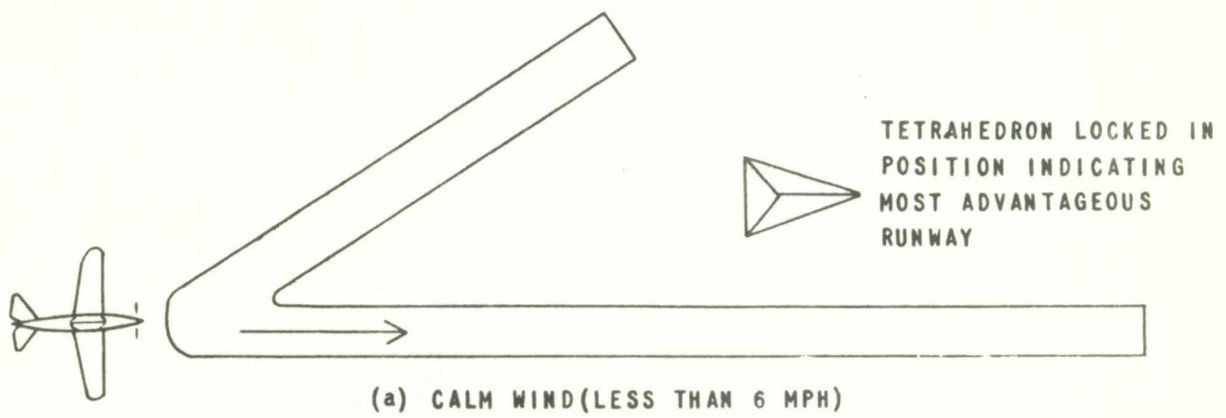


FIGURE 2. Method of Determining Runway To Use

pilot may request clearance to use another runway.

3.13 Control of Taxiing Aircraft:

3.130 The importance of issuing definite, concise directions to pilots of taxiing aircraft cannot be overemphasized. The visibility problem in an airplane is most acute when taxiing. Very few aircraft afford any forward vision for several yards directly in front of the airplane and the pilot must depend to a large degree upon the control tower to issue necessary information which will assist him in determining the proper taxi route and preventing collision with other aircraft or objects.

3.131 It is particularly difficult for the pilot to determine the best taxi route on a strange airport. Clearances and information to pilots concerning taxi routes should be simple and direct such as "TURN LEFT AT FIRST INTERSECTION, TAXI STRAIGHT AHEAD TO THE END OF THE RUNWAY. THEN TURN RIGHT." etc. The pilot should also be warned of parked aircraft or other objects along or near his taxiing route.

3.132 Aircraft should not be permitted to taxi on the runway if at all possible to provide other taxiing routes. The guiding principle in handling taxiing traffic is "keep the runway-in-use ready for use as much as possible."

3.133 Aircraft shall not be permitted to hold on the end of the runway-in-use whenever another aircraft is effecting a landing. At those airports where there are no intersecting taxiways at the approach end of the runway, aircraft shall be held clear of the edge of the runway and at an angle of 90 degrees from the landing direction until cleared to take-off position.

3.134 The direction of taxiing aircraft and avoidance of collision within loading and parking areas is considered the primary responsibility of the aircraft operator and/or airport management, as well as the pilot.

3.135 It shall not be the responsibility of towers to control areas not visible from the tower. Due to local obstructions, there are many airports where portions of usable runways, taxi strips and loading areas are not visible from the tower. At such locations it is expected that control tower personnel will take appropriate action to advise all concerned of those areas which are not visible from the tower. The airport management should be encouraged to place appropriate signs at such locations and publicize their existence by displaying suitable charts or diagrams in shops, hangars and operations offices.

* 3.136 The use of radio communications channels for communications between the tower and aircraft shall be as follows:

- (1) Arriving Aircraft. After landing, the pilot shall be advised when to change to the appropriate ground control channel for receipt of taxi instructions from the tower. Normally, this change-over shall be accomplished after the aircraft has cleared the active runway or area.

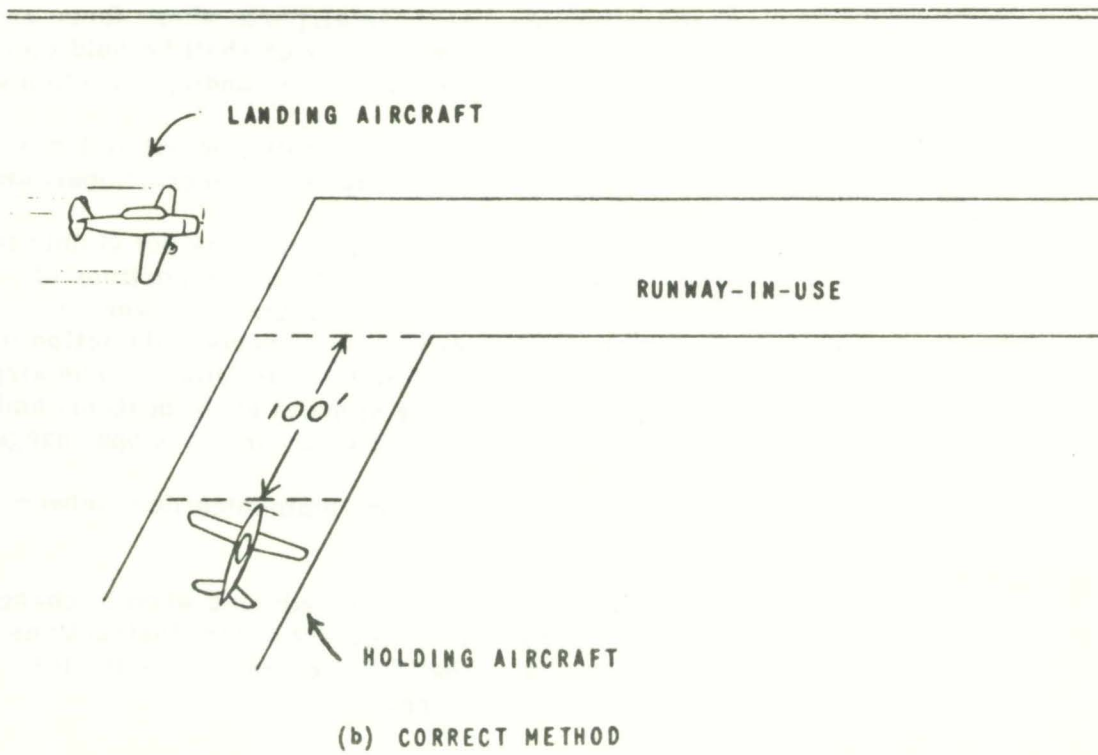
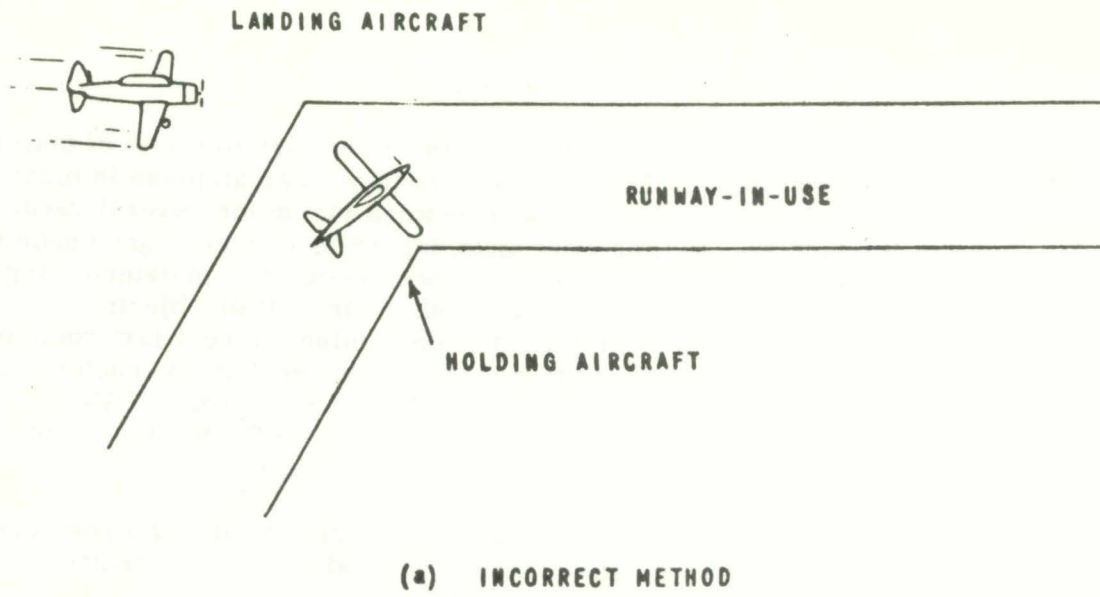


FIGURE 3. Method of Holding Aircraft

- (2) **Departing Aircraft.** Prior to taxiing, aircraft shall communicate with the tower on the appropriate ground control frequency for taxi and clearance information and remain tuned to this frequency until ready for take-off. Take-off clearance, and further communication with the tower if necessary, shall be handled on the appropriate airborne frequency.
- (3) When aircraft and tower are not both equipped with the VHF ground control frequency, the appropriate tower low frequency shall be used for communications between the tower and aircraft on the ground.

3.14 Control of Traffic in the Traffic Pattern:

3.140 Aircraft in the traffic pattern shall be controlled to provide the separation minimums outlined below except that:

- (1) Formation flights of aircraft are exempted from the separation minimums with respect to separation from other aircraft of the same flight.
- (2) Aircraft operating in different areas or lanes on airports equipped with runway or mat facilities suitable for simultaneous landings or take-offs are exempted from the separation minimums.
- (3) Separation minimums shall not apply to aircraft operating under military necessity as determined by competent authority.

3.141 Sufficient separation shall be effected between arriving aircraft to insure that the succeeding landing aircraft on the same runway will not cross the airport boundary in its final glide until the preceding aircraft has cleared the runway-in-use.

3.142 Sufficient separation shall be effected between departing aircraft to insure that an aircraft will not commence take-off until the preceding departing aircraft has crossed the end of the runway-in-use or has started a turn.

3.143 Sufficient separation shall be effected between arriving and departing aircraft to insure:

- (1) That a landing aircraft will not cross the airport boundary in its final glide until the preceding departing aircraft has crossed the far end of the runway-in-use.
- (2) That an aircraft taking off will not commence take-off until the preceding landing aircraft has cleared the runway-in-use.

3.144 Reduced Separation Minimums, Light-Weight Single-Engine Aircraft of Similar Operating Characteristics:

3.1441 During periods of congestion whenever traffic can be safely and efficiently controlled thereby, control may be exercised to effect the following

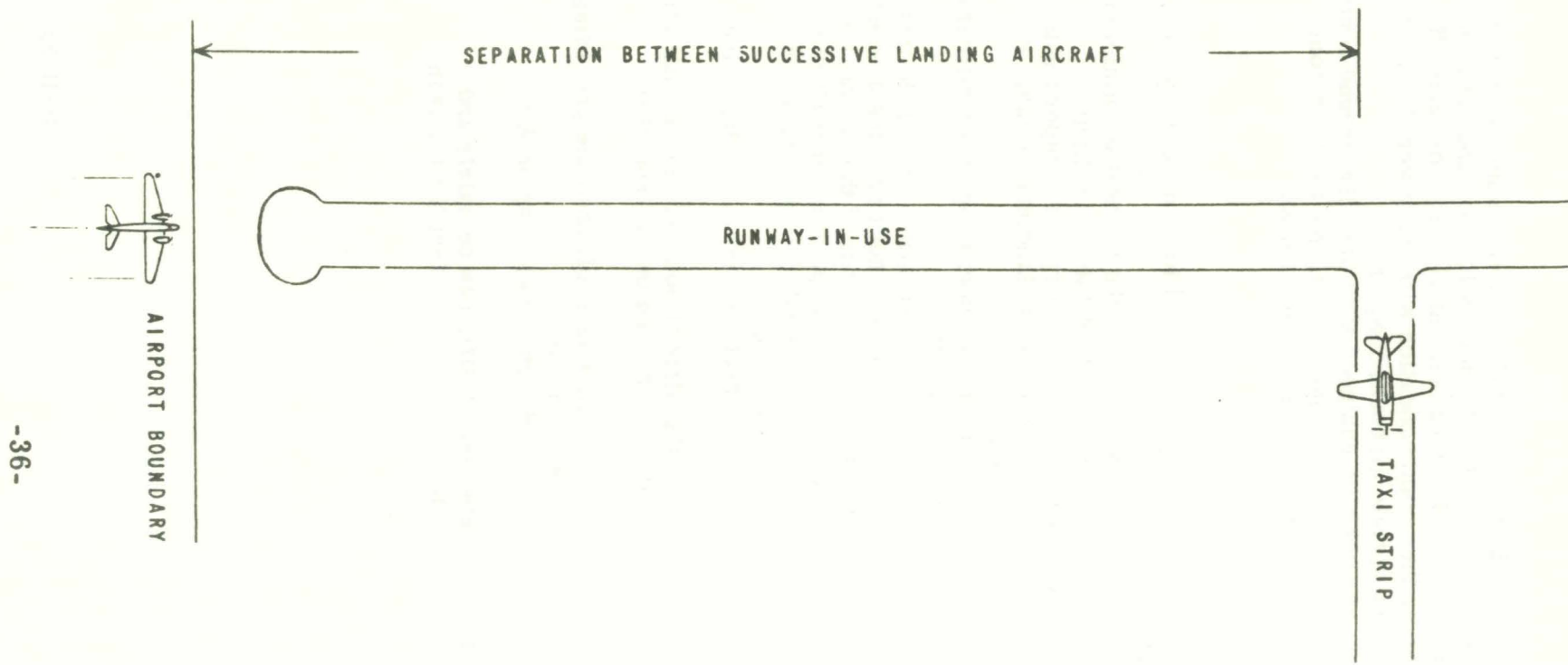


FIGURE 4. Separation Between Successive Landing Aircraft

minimum separation between arriving and/or departing light-weight single-engine aircraft of similar operating characteristics.

(1) Landing:

Sufficient separation shall be effected between arriving aircraft to insure that succeeding landing aircraft on the same runway will not cross the airport boundary until the preceding landing aircraft has landed and is clear of the runway, or if the preceding landing aircraft is making a touch and go landing, is airborne on taking off (as defined in 3(a) below.)

(2) Take-off:

Sufficient separation shall be effected between departing aircraft to insure that an aircraft will not commence take-off until the preceding departing aircraft is airborne (as defined in 3(a) below.)

(3) Landings and Take-offs:

- (a) That a landing aircraft will not cross the airport boundary until the preceding aircraft taking off is definitely airborne, i.e., has traversed at least the first 3000 feet of the runway. The determining factor in each case should be whether the following aircraft has sufficient area available to land or take off safely in the event the preceding aircraft, through unforeseen circumstances, blocks a portion of the useable runway.
- (b) An aircraft taking off will not commence take-off until the preceding landing aircraft has cleared the runway-in-use.

3.145 Sufficient separation should be effected between aircraft in flight in the traffic pattern to allow the spacing of arriving and departing aircraft as outlined in the foregoing. In no event shall separation between aircraft in flight be less than the minimums specified by Air Force, Navy, or Civil Air Regulations.

NOTE: At many airports the location of the control tower will not permit accurate determination of separation between the paths of successive aircraft in the pattern, landing or taxiing on the same runway or taxiway, particularly when the movement of these aircraft is at an angle to the controller's line of vision. Extreme caution, therefore, should be exercised in the issuance of specific control instructions which

are used to prevent collision. For example, when a succeeding aircraft is overtaking the aircraft ahead a specific control instruction might turn the preceding aircraft into the path of the other.

* 3.146 Nothing contained herein is to be construed as relieving a pilot of the responsibilities imposed upon him by the Civil Air Regulations or any other regulations, nor is it to be construed that the Airport Traffic Controller on duty is obligated to effect control in accordance with section 3.144 when, in his opinion, these procedures might constitute a hazard.

* 3.147 Normally, traffic shall be controlled in accordance with established patterns unless unusual circumstances dictate otherwise. However, when deviations from the normal pattern are required, due consideration shall be given to local regulations, prohibited areas and local noise abatement programs when authorizing such deviations.

3.15 Control of Other than Aircraft Traffic on the Landing Area:

* 3.150 The movement of personnel or vehicles on the landing area proper shall not be permitted unless permission has been granted for such movement by the airport traffic controller on duty in the control tower. Such authorized personnel, including drivers of all vehicles, shall be required to stop and wait for radio clearance or light signal from the control tower before crossing any runway or taxi strip unless on a portion of the landing area marked off by lights, flags, or other conventional warning signals. In radio conversation to pilots, the airport traffic controller shall identify personnel or vehicles on the landing area as distinctly as possible.

3.151 The maintenance of any landing area requires considerable use of vehicular traffic, such as snow plows, tractors, mowers, maintenance trucks, official cars for inspections, and miscellaneous other equipment in addition to the working parties and other personnel required for maintenance. Considerable care and judgment must be exercised in the dispatch of personnel or vehicles on any portion of the landing area since a collision with a fast-moving aircraft would be disastrous. At certain points during the take-off and landing of aircraft, a change of direction to avoid an obstacle will almost certainly result in ground-looping or overturning the aircraft with probable serious results. Another difficulty connected with the dispatch of personnel and vehicular traffic on the landing area is that the operators of the equipment and the personnel on foot are not always aware of the difficulties and limitations of handling heavily loaded aircraft and may fail to surrender sufficient right of way for safe operation.

3.152 In a few cases commanding officers or airport managers require all vehicular traffic to be equipped with radio receivers so that they may receive control tower signals, but in the majority of instances all pedestrian and vehicular traffic are controlled by light signals

3.153 Where continuous vehicular movement is involved over limited portions of the landing area, such as mowing the grass, the mowing is usually

accomplished in a portion of the field not being used for landing operations with the particular wind condition at that time. The mowing equipment is marked with appropriate flags or lights, and the mower may not cross the taxi strips or runways without receiving the proper light signal.

3.154 When construction work is in progress, the normal procedure is to close the entire construction area to aircraft operations and permit pedestrian and vehicular traffic to move at will within the marked-off area. Construction areas are usually marked off with appropriate flags in the daytime and appropriate lights at night.

3.16 Authorizing Use of Landing Area by Pilots of Arriving Aircraft:

3.160 If a pilot enters a control zone without proper authorization, he shall be permitted to land if his actions indicate he so desires. If circumstances warrant, an airport traffic controller may ask pilots of aircraft with whom he is in contact to give way so as to remove as soon as possible the hazard introduced by such unauthorized operation. In no case shall permission to land be withheld indefinitely.

3.1600 In cases of emergency, such as loss of radio communication, a pilot may be required, in the interests of safety, to enter a control zone and effect a landing without proper authorization. Airport traffic controllers should recognize the possibilities of emergency action and render all assistance possible. The entire concept of air traffic control is service to the flying public. While it is true that in some isolated instances a pilot might deliberately disregard regulations and enter a control zone in an unauthorized manner while not under stress of an emergency, the airport traffic controller should assist the pilot and take steps toward possible disciplinary action after the pilot has landed. Under no circumstances should discussions which have no relation to traffic control be carried on over the radio.

3.2 VISUAL SIGNAL PROCEDURES

3.20 Portable Traffic Light:

3.200 The portable traffic control light is a directive light which emits an intense, narrow beam of light. The color of the light (white, green or red) is controlled by the operator through a system of levers and triggers in the two handles. Signals are readily discernible to the pilot of any aircraft visible to the operator.

3.21 Advantages and Disadvantages of the Portable Traffic Signal Light:

3.210 The controller should be thoroughly familiar with the limitations of the traffic control light, and evaluate its capabilities in connection with its use.

3.211 The portable traffic light has the following advantages:

- (1) No radio equipment is required in the aircraft and therefore all aircraft can be controlled whether or not they possess radio.
- (2) The traffic light provides an emergency method of control in the event of radio failure--either in the tower or the aircraft.

3.212 The disadvantages are:

- (1) The pilot may not be looking at the control tower at the time a signal is directed toward him.
- (2) The information transmitted by a light signal is limited. One may only transmit an approval or dis-approval of the pilot's anticipated actions to him. No explanatory or supplementary information can be transmitted.

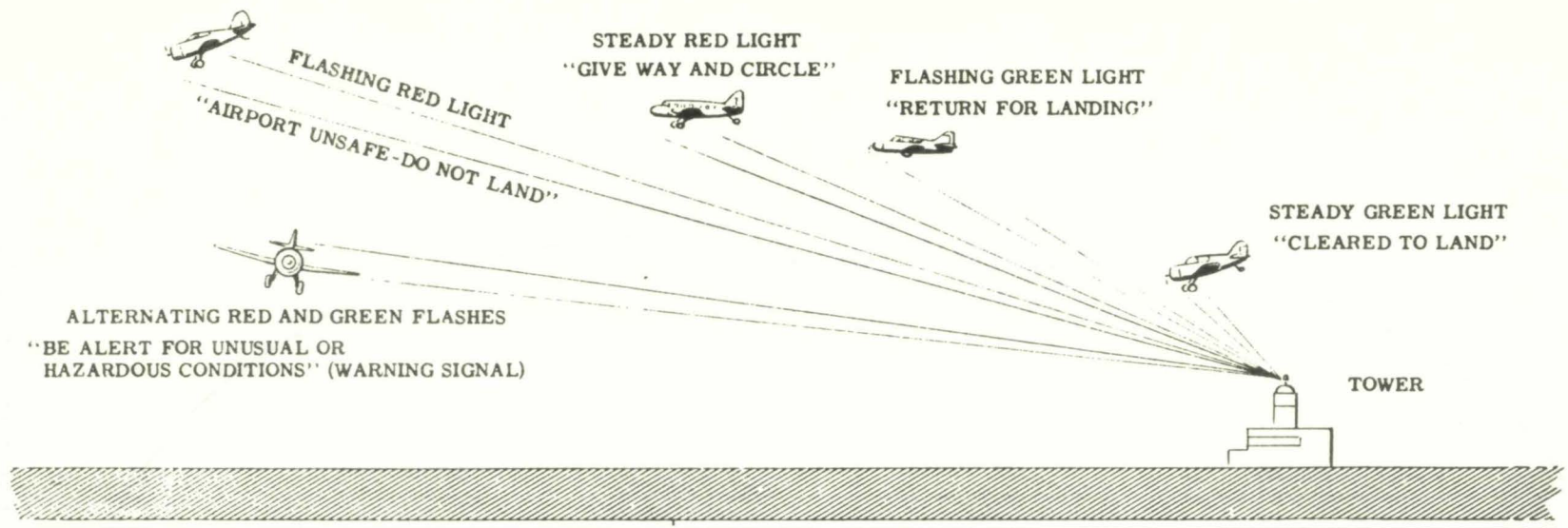
3.22 Operation of Portable Traffic Light:

3.220 The portable traffic light shall be used to control the movement of personnel and vehicles on the landing area and the landings and take-offs of any aircraft not equipped with radio unless such movements or landings and take-offs have been prearranged with the traffic controller.

* 3.221 Signals from a portable traffic light shall mean the following:

Color and Type of Signal	On the Ground	In Flight
STEADY GREEN	Cleared for take-off	Cleared to land
FLASHING GREEN	Cleared to taxi	Return for landing
STEADY RED	Stop	Give way to other aircraft and continue circling
FLASHING RED	Taxi clear of landing area in use	Airport unsafe - do not land
FLASHING WHITE	Return to starting point on airport
ALTERNATING RED & GREEN	General Warning Signal - Exercise Extreme Caution	

NOTE: A pilot wishing to attract the attention of the airport traffic controller during the hours of darkness may turn on a landing light and taxi the aircraft in a position so that the light is visible to the airport traffic controller. The landing light should remain on until appropriate signals are received from the tower, after which acknowledgment may be expected from the pilot as provided for in non-radio equipped aircraft. Pilots of aircraft not equipped with landing lights may blink their navigation lights to attract the attention of the tower.



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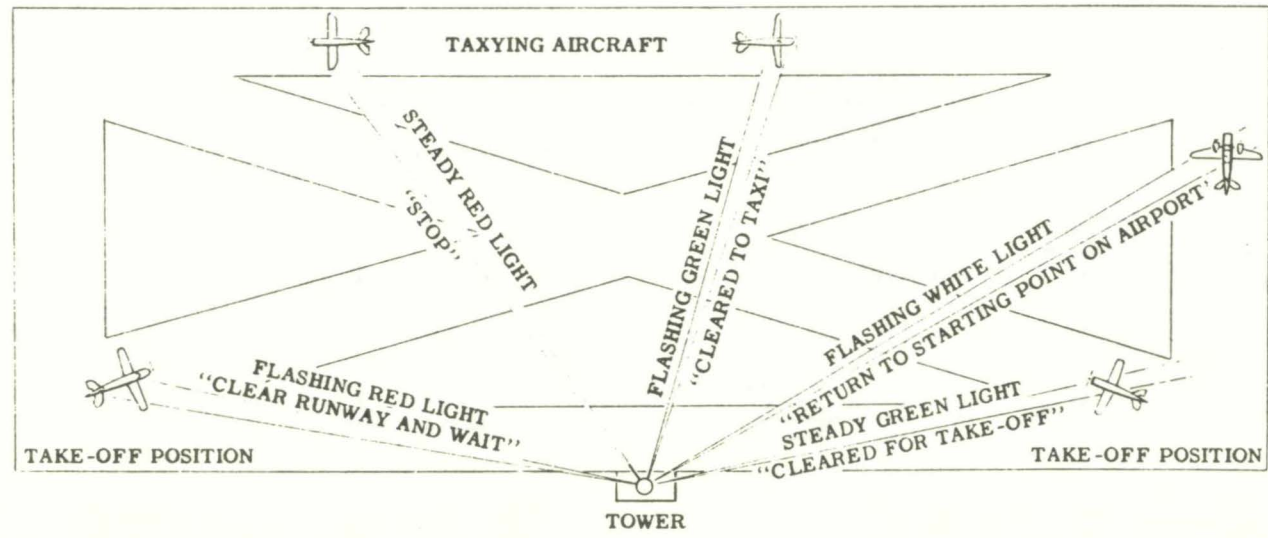


FIGURE 5. Visual Signals

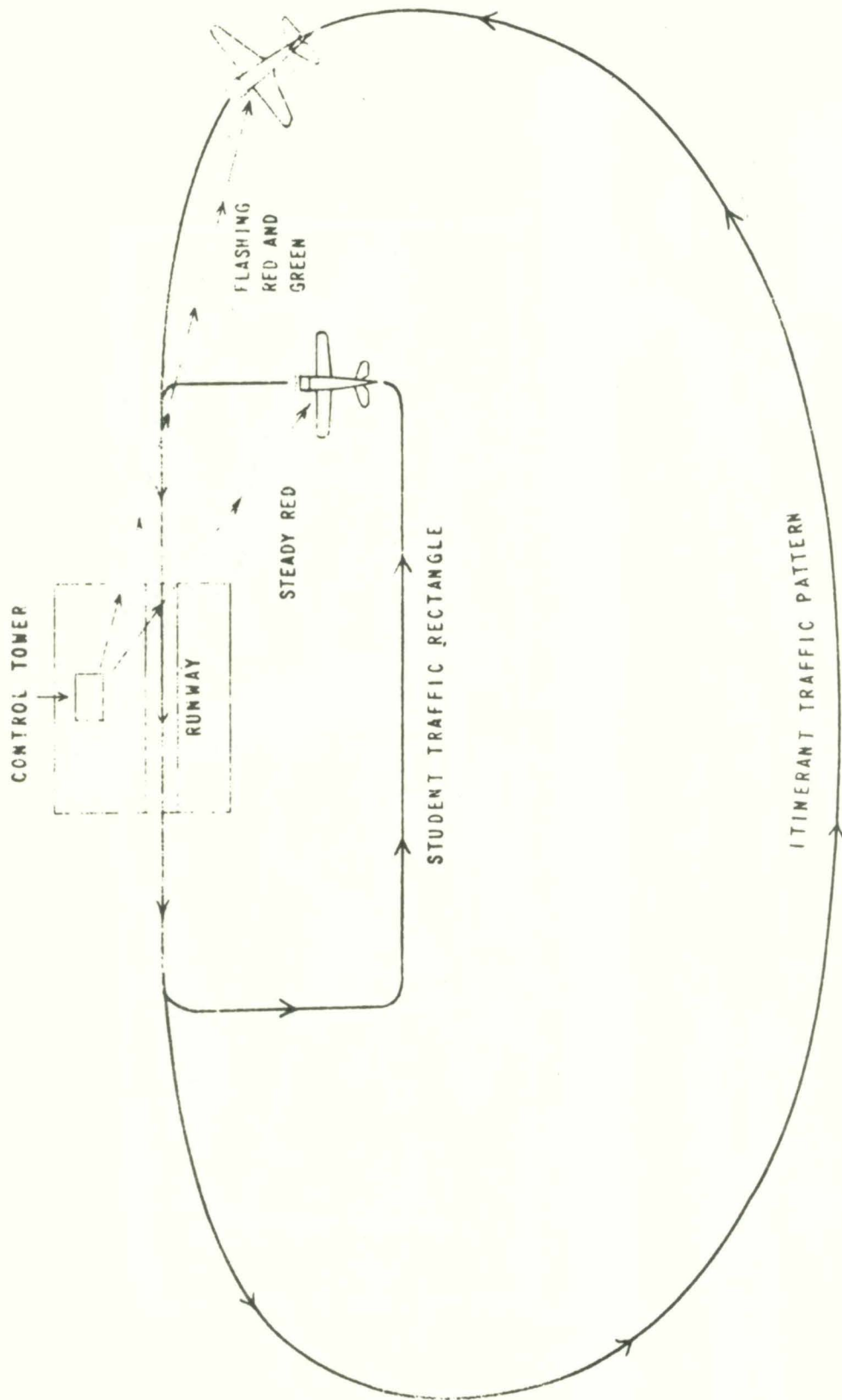


FIGURE 6. Example of the use of General Warning Light when two airplanes are on converging courses

3.2210 General Warning Signal - A series of alternating red and green flashes from a directed traffic control light shall be used as a general warning signal to advise a pilot or driver of a vehicle on the landing area to be on the alert for hazardous or unusual conditions. As an example, the warning signal may be directed to a pilot in flight to indicate a change of runway since this can prove hazardous if the pilot attempts to land cross traffic or cross wind.

3.22100 In controlling airport traffic by means of visual signals, the general warning signal shall be directed to pilots of the aircraft concerned as follows.

- (1) When aircraft are converging and there is a possibility of collision.
- (2) When hazardous conditions are present and the pilot must be unusually alert in order to complete the operation safely. Such conditions include obstructions, soft field, ice on runway, and many others.
- (3) When mechanical trouble is apparent to the controller and he has reason to believe that the pilot may not be aware of it.
- (4) At any other time when believed necessary in the opinion of the controller.

3.22101 Attention is directed to the fact that the warning signal is not a prohibitive signal and may be followed by either a red or green light as circumstances warrant.

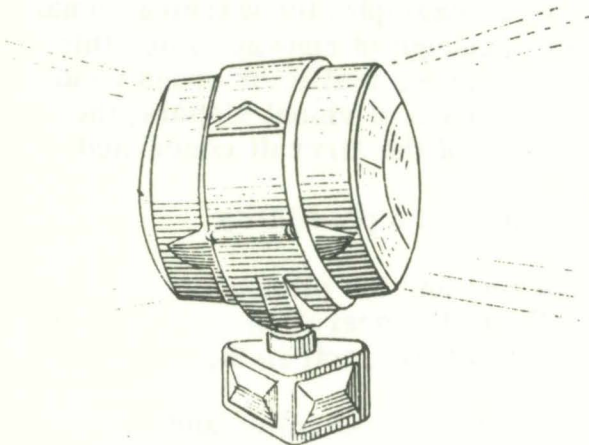
3.23 Light Signals to Indicate Restriction of Visual Flight Rule Operations in the Control Zone:

3.230 During the hours of daylight, the rotating airport beacon shall be operated to mean that the ground visibility in the control zone is less than 3 miles and/or the ceiling is less than 1000 feet and that a traffic clearance is required for landings, take-offs, and flight in the traffic pattern.

3.231 Between sunset and sunrise, flashing lights outlining the traffic direction indicator shall be operated to mean that ground visibility in the control zone is less than 3 miles and/or the ceiling is less than 1000 feet and that a traffic clearance is required for landings, take-offs, and flight in the traffic pattern.

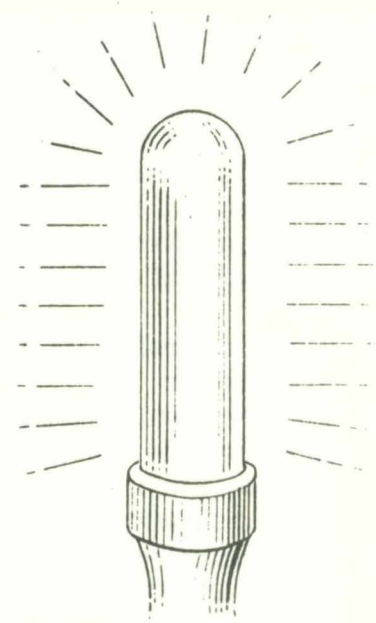
3.24 Light Signals to Indicate Clockwise (to the right) Flow of Traffic:

3.240 A flashing amber light shall be operated to mean that a clockwise flow of traffic around the airport is required unless otherwise authorized by the control tower.



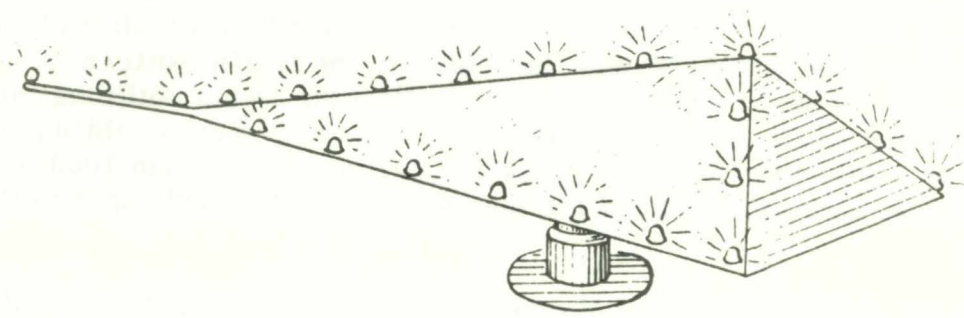
ROTATING BEACON (day only)

Ground visibility in control zone less than 3 miles and/or ceiling less than 1000 feet. Traffic clearance required for landings, take-offs, or flight in the traffic pattern in a control zone.



FLASHING AMBER LIGHT

CLOCK-WISE FLOW OF TRAFFIC



FLASHING LIGHTS OUTLINING TRAFFIC DIRECTION INDICATOR (night only)

Ground visibility in control zone less than 3 miles and/or ceiling less than 1000 feet. Traffic clearance required for landings, take-offs, or flight in the traffic pattern in a control zone.

FIGURE 7. Light Signals Used in Airport Traffic Control

3.25 Use of Flag Signals:

3.250 Flag signals are used by the military and naval services for special signals which usually apply only to the local activities at a particular landing area. Since these signals are not standard and usually have a special meaning at a particular location, it is not expected that an itinerant pilot will know their meaning or be guided by them. Accordingly, flag signals may be used for special local activities (such as primary or secondary training flights) as directed by the local commanding officer, but should not be used to govern flight of other than local aircraft unless it is known that the itinerant pilot is familiar with the flag signals and their meaning.

3.26 Special Light Signals:

3.260 Some military and naval establishments have special light signals, such as "course lights," which indicate landing direction, runway-in-use, traffic pattern to use, and other similar information for local activities. These lights are to be used as directed by competent authority, but as in the case of flag signals are to be confined to direction of pilots known to be familiar with the meaning of the special light signals.

3.3. RADIOTELEPHONE PROCEDURE AND TECHNIQUE

3.30 General: The operation of the radiotelephone facilities of an airport traffic control tower shall be accomplished in accordance with procedures outlined herein.

3.31 Calls and Replies:

3.310 Airport traffic control towers shall be identified during radiotelephone communication as follows:

3.3100 Air Force and civil towers - by the name of the airport followed by the word TOWER. Examples:

BOLLING TOWER WASHINGTON TOWER NORFOLK TOWER

3.3101 Navy towers - by the name of the service followed by the name of the airport and the word TOWER. Examples:

NAVY NORFOLK TOWER NAVY PATUXENT TOWER

3.311 Airway communication stations shall be identified during radiotelephone communication in the following manner:

3.3110 CAA interstate airway communication stations - by the name of the location followed by the word RADIO. Examples:

WASHINGTON RADIO NORFOLK RADIO

3.3111 Air Force communication stations associated with radio range facilities - by the name of the airport followed by the word AIRWAYS. Examples:

ANDREWS AIRWAYS

MITCHEL AIRWAYS

3.3112 Navy communication stations associated with radio range facilities - by the name of the facility followed by the word RADIO. Examples:

NAVY NORFOLK RADIO

NAVY JACKSONVILLE RADIO

3.312 Aircraft shall be identified during radiotelephone communications in the following manner:

* 3.3120 Military aircraft - by the name of the service or unit name followed by the complete service serial number or trip number. Examples:

AIR FORCE SEVEN EIGHT TWO NINE FOUR

AIR EVAC ONE FIFTY NINE

NAVY FOUR THREE SIX ONE

NATIONAL GUARD TWO ONE SIX ONE

* 3.3121 Civilian aircraft - by the aircraft make, if known, followed by the certificate number. Examples:

WACO TWO ONE SIX EIGHT FIVE

STINSON THREE SEVEN TWO Y

* 3.3122 Aircraft of foreign registry - by the aircraft radio call letters, by the registration number, by a combination of company name and radio call or by a combination of company name and trip number, as specified in flight plan. Examples:

PHALT - - - - -Radio Call

CFACB - - - - -Registration

SPEEDBIRD GABCD - - - - -Company Name and Radio Call

SPEEDBIRD 14 - - - - -Company Name and Trip Number

3.3123 After radio contact has been established, the aircraft radio identification may be reduced to not less than two digits or letters provided there is no possibility of error. Examples:

AIR FORCE TWO NINE FOUR

WACO SIX EIGHT

NOTE: Until the aircraft make is determined, the whole certificate number of registry should be used.

3.3124 The abbreviated name of the air carrier operator and trip number shall be utilized when calling air carrier aircraft. Air carrier trip numbers are spoken as a group figure (instead of as a serial figure) in accordance with the following examples:

UNITED FIFTEEN

EASTERN TWENTY-TWO

AMERICAN SIX

TWA FOUR THIRTY-SIX

3.313 The name of the pilot should not ordinarily be utilized in routine two-way radio communication.

3.314 The call-up procedure to be utilized in airport traffic control radio-telephone communications shall consist of the following:

<u>Item</u>	<u>Example</u>
(1) Designation of the station called	WACO ONE EIGHT ONE FOUR
(2) THIS IS	THIS IS
(3) Designation of the calling station	CLEVELAND TOWER
(4) Invitation to reply	OVER

3.315 The reply to an initial call-up shall consist of:

<u>Item</u>	<u>Example</u>
(1) Designation of the station called	CLEVELAND TOWER
(2) THIS IS	THIS IS
(3) Designation of the answering station	WACO ONE EIGHT ONE FOUR
(4) Invitation to reply	OVER

3.316 Communication shall be initiated by call-up and reply when:

- (1) Communication has not been established.
- (2) Previous contact has been terminated.

3.32 Exchange of Communications:

3.320 After contact has been established in accordance with the above, the airport traffic control tower should make a second call-up followed immediately by the message in accordance with the following:

<u>Item</u>	<u>Example</u>
(1) Designation of the station called	WACO ONE FOUR
(2) Body of the communication	(message)
(3) Invitation to reply	OVER

When no chance of mistaking identity of the tower is likely, the "THIS IS" and name of the tower shall be omitted after original contact has been made.

3.321 If it is reasonably certain that the aircraft will receive the initial call-up the tower may follow the first call-up with the message without waiting for the reply from the aircraft.

3.322 After communication has been definitely established, it may be continued without further call-up or identification other than preceding the message with the identification of the aircraft until termination of the contact.

3.33 Termination of Communication:

3.330 Acknowledgment of Receipt. A receiving station (either tower or aircraft) shall acknowledge receipt of a radiotelephone message by transmitting the AIRCRAFT IDENTIFICATION followed by the word, ROGER or other applicable procedure word. Examples:

STINSON TWO THREE ONE FIVE, ROGER

AIR FORCE SIX SEVEN TWO FOUR, ROGER

NOTE: The examples given above could be transmitted by either the tower or the aircraft since the object is to identify the aircraft concerned and to acknowledge the message received. It is usually unnecessary to identify the tower concerned as no mistake in tower identity is likely, but the aircraft concerned should be identified in every instance to prevent any possible mistake in aircraft identity.

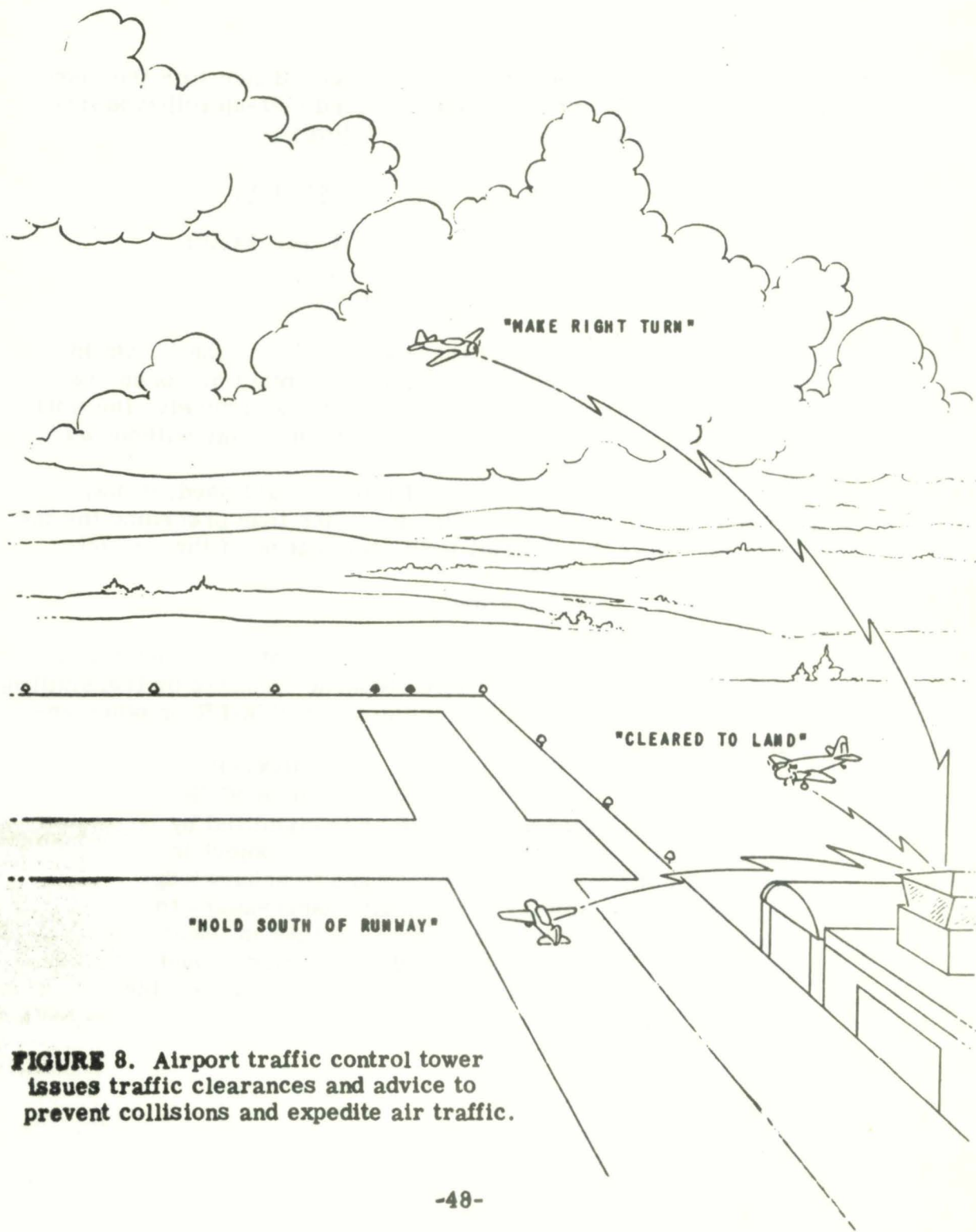


FIGURE 8. Airport traffic control tower issues traffic clearances and advice to prevent collisions and expedite air traffic.

3.4 STANDARD TRAFFIC CLEARANCES AND PHRASEOLOGIES

3.40 Traffic Clearances:

3.400 General-An airport traffic controller shall issue such traffic clearances and other information as are necessary for the prevention of collisions between aircraft under his jurisdiction.

3.401 A clearance issued by an airport traffic control tower is authority for a pilot to proceed only insofar as known air traffic conditions and field conditions are concerned and does not constitute authority for a pilot to violate any provision of Air Force, Navy, or Civil Air Regulations. The relay of information or advice to pilots from the airport management or a commanding officer is permitted. When such relay of advice is undertaken by controllers, the pilot shall be informed of the source of the message. However, denial of clearance for take-off shall be based only on considerations of traffic. No violations of 60.19 of the Civil Air Regulations shall be reported unless a take-off is made contrary to a controller's clearance based solely on traffic conditions.

3.4010 Clearances issued by airport traffic controllers are predicated upon known traffic and field conditions which affect safety in aircraft operations. Such traffic conditions will include not only aircraft in the air within the control zone and on the landing area over which control is being exercised, but also any vehicular traffic or other obstructions not permanently installed on the landing area in use.

3.4011 Should a clearance issued by the airport traffic controller not be acceptable to the pilot, he may request and, if practicable, receive an alternate clearance.

3.4012 (Unassigned).

3.41 Standard Phraseologies for Traffic Clearances:

3.410 In order to reduce the transmission time for each tower message, and to decrease misunderstandings, phraseologies have been standardized for use in airport traffic control. However, unusual situations will occur and the controller will have to exercise his best judgment in the use of additional phraseologies. In such cases he should use supplementary rather than substitute phrases.

3.4100 The standard phraseologies and clearances are listed in accordance with the purpose phrased by them, such as "clearance to enter traffic pattern," "clearance to land," "clearance to taxi," and other similar authorizations.

NOTE: Words capitalized shall be read as written, accompanied by values required by words in parentheses.

3.411 Clearance to Enter Traffic Pattern. Clearance governing flight from a visual reporting point, holding point or fix, or other outlying point to the traffic pattern at the landing area shall be in the following form:

- (1) (Flight identification)
- (2) THIS IS (name of tower) TOWER
- (3) (Reporting point)
- (4) (Time- minutes only)
- (5) AT (altitude in thousands and hundreds of feet)

- (6) CLEARED TO ENTER TRAFFIC PATTERN
- (7) AT (specified altitude) (if necessary)
- (8) RUNWAY (number of runway in use)
- (9) WIND (direction and velocity)
- (10) (Any special information)

Examples: AIR FORCE SEVEN EIGHT THREE FOUR THIS IS
NASHVILLE TOWER, LEBANON FOUR SIX AT TWO
THOUSAND, CLEARED TO ENTER TRAFFIC PATTERN,
RUNWAY TWO SEVEN, WIND WEST EIGHT.

NOTE: When parallel runways are available, the runway
in use shall be designated in the following manner.

Examples:

RUNWAY TWO THREE, LEFT
RUNWAY ONE EIGHT, CENTER

* 3.4110 The clearance to enter traffic pattern is issued to a pilot whenever it is desired that the aircraft approach the landing area in accordance with current traffic patterns. If clearance to enter traffic pattern is not appropriate for the existing traffic conditions, it shall be omitted and an alternate clearance such as "CLEARED TO LAND," or "CONTINUE APPROACH," or "REPORT OVER (specified point or distance from the airport)" or "(Right) or (Left) TURN TO RUNWAY (Number)" may be used at the discretion of the controller.

3.4111 The clearance to enter traffic pattern should not be confused with the clearance to land since the former is issued when the aircraft is some distance from the field and traffic conditions will not permit the issuance of a landing clearance.

3.4112 When it is desired to clear an aircraft to enter a traffic pattern which is not a conventional left-turn pattern, or where more than one pattern exists, the phraseology may be modified to include the designation of the pattern desired. An example for clearance into a right-turn pattern:

CLEARED TO ENTER RIGHT TRAFFIC PATTERN

3.412 Clearance to Land. A clearance to land shall be in the following form:

- (1) (Flight identification)
- (2) THIS (name of tower)TOWER
- (3) (Position)
- (4) AT (Altitude)
- (5) CLEARED TO LAND
- (6) RUNWAY (number of runway in use)
- (7) WIND (direction and velocity)
- (8) (Any special information)

NOTE: Item (2) may usually be omitted whenever the aircraft is under direct observation of the airport traffic controller. Items (3) and (4) may be omitted if the aircraft is in a well-defined traffic pattern. Items (6) and (7) may be omitted if previously given and no revision is necessary.

Example: NAVY SEVEN EIGHT FOUR THREE CLEARED TO LAND.

* 3.4120 Another example would be when a pilot reports in the control zone as follows:

TULSA TOWER THIS IS STINSON ONE TWO THREE FOUR,
TWO MILES SOUTH AT EIGHT HUNDRED

The tower would respond:

STINSON ONE TWO THREE FOUR THIS IS TULSA TOWER,
TWO MILES SOUTH AT EIGHT HUNDRED. CLEARED TO
LAND, RUNWAY THREE, WIND SOUTH, FOUR.

since no previous information concerning traffic direction and runway had been transmitted to this pilot.

3.413 Clearance to Taxi. Clearance to taxi shall be in the following form:

* 3.4130 Inbound Aircraft----

- (1) (Flight identification)
- (2) THIS IS (name of tower) TOWER. (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).
- (3) CLEARED TO (gate, loading ramp, hangar, parking space, etc.)
- (4) (Any special information relative to the use of taxi strips, intersecting runways, obstructions, maintenance operations, or other field activity or condition.)

Example: UNITED SEVEN CLEARED TO GATE FIVE, USE
CAUTION, GATE FIVE AREA NOT VISIBLE FROM
TOWER.

3.4131 Outbound Aircraft----

- (1) (Flight identification)
- (2) THIS IS (name of tower) TOWER. (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).
- (3) CLEARED TO RUNWAY (number of runway to be used)
- (4) WIND (direction and velocity)
- (5) (Any special information relative to use of taxi strips, intersecting runways, obstructions, maintenance operations, or other field activity or field condition. Include under this item altimeter setting and time check unless an aircraft operator has indicated in writing to the chief airport traffic controller that this service is not desired.)

Example: AIR FORCE ONE FIVE TWO SEVEN CLEARED TO
RUNWAY THREE TWO. WIND NORTHWEST ONE FIVE,
ALTIMETER THREE ZERO ZERO FOUR. TIME ZERO
NINE FIVE SIX.

3.4132 Clearance to Taxi from One Point to Another on Landing Area-----

- (1) (Flight identification)
- (2) THIS IS (Name of tower) TOWER. (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).
- (3) CLEARED TO (gate, loading ramp, hangar, parking space, etc.)
- (4) (Any special information)

Example: UNITED THIRTY-FOUR CLEARED TO HANGAR FOUR.

3.414 Clearance for Take-off. Clearance for take-off shall be in the following form:

- (1) (Flight identification)
- (2) THIS IS (name of tower) TOWER. (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).
- (3) (Any special information)
- (4) CLEARED FOR TAKE-OFF

Example: AIR FORCE SIX SEVEN THREE FOUR, CLEARED FOR TAKE-OFF.

* 3.4140 When a flight plan has been filed specifying IFR flight from the point of departure, the take-off clearance described above shall not be issued until control clearance has been transmitted to and acknowledged by the pilot concerned.

3.4141 The take-off clearance, as the name implies, is issued after the pilot has taxied to the end of the runway in use, tested his engines, and is ready for take-off. The pilot has previously received information on the runway in use, wind direction and velocity, the altimeter setting, time check, and the appropriate air route traffic control clearance. He is now interested in obtaining authorization to commence his take-off, and he needs information on such local traffic as may affect his flight or which he may approach while in flight within the control zone.

3.41410 Immediately after take-off, many pilots want their time off the ground. When this is requested, it may be given separately in the following form, or combined with a clearance to leave tower frequency:

- (1) (Flight identification)
- (2) OFF AT (time--minutes only)

Example: AMERICAN SIX OFF AT THREE ONE.

3.415 Clearance to Change Frequency. Normally, the pilot of a departing aircraft will guard the control tower frequency until outside the control zone, at which time he may leave the tower frequency without further contact. If, however, a pilot requests approval to leave the tower frequency before he is out of the zone, or if an airport traffic controller desires to authorize a pilot to leave the tower frequency before he is out of the zone, a clearance to leave the tower frequency shall be transmitted in the following form:

- (1) (Flight identification)
- (2) THIS IS (name of tower) TOWER, (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).

(3) (Any supplemental information)

(4) CLEARED TO LEAVE TOWER FREQUENCY

Example: EASTERN FIVE THIS IS WASHINGTON TOWER,
AMERICAN CONVAIR REPORTED OVER MT.
VERNON FOUR SIX AT TWO THOUSAND, CLEARED
TO LEAVE TOWER FREQUENCY.

3.416 Special Clearances:

* 3.4160 Clearance to engage in other than routine operations in the control zone shall be in the following form:

(1) (Flight identification)

(2) THIS IS (name of tower) TOWER. (May usually be omitted whenever the aircraft is under direct observation of the airport traffic controller).

(3) CLEARED TO MAKE RIGHT TURN; PRACTICE LOW APPROACH TO AIRPORT; CONTACT COLUMBUS NAVY GCA; etc.

NOTE: Special clearances are provided so that unusual situations, as well as routine range practice, etc., may be properly handled.

3.41600 Phraseologies for certain frequently used special clearances are as follows:

3.416000 Clearance for right turn after take-off shall be at the discretion of the controller. In the event it is not possible to approve the right turn when issuing clearance for take-off and the pilot has requested such right turn, the following phraseology will be used:

WILL ADVISE LATER, CLEARED FOR TAKE-OFF

3.416001 In the event right turn can be approved at the time of issuance of clearance for take-off, the following phraseology will be used:

RIGHT TURN APPROVED. CLEARED FOR TAKE-OFF

3.416002 Whenever it is desired that a pilot make a straight-in approach, although he cannot yet be cleared to land, the following phraseology will be used:

CLEARED TO MAKE STRAIGHT-IN APPROACH

3.416003 In the event aircraft are landing and taking off at an airport without coming to a stop during their landing roll, such operations shall be described as "touch and go" landings. Pilots shall be required to request approval of same by at least the time they are turning on their final approach leg. Approval for such operation shall be issued by use of the following phraseology:

CLEARED TO MAKE TOUCH AND GO LANDING

3.416004 In the event it is not possible to approve such an operation due to other air traffic, the following phraseology shall be used:

MAKE FULL STOP LANDING

3.416005 If an aircraft cannot be cleared onto the runway in use or whenever otherwise desired that the aircraft not move, the following phraseology shall be used:

HOLD YOUR POSITION

* 3.416006 If an aircraft can be cleared onto the runway in use but not cleared for take-off, the following phraseology will be used:

TAXI INTO POSITION AND HOLD

3.416007 When it is desired that a taxiing aircraft hold at specific position, the following phraseology will be used:

HOLD CLEAR OF (position); or HOLD ON TAXI STRIP

3.416008 Whenever pilots have indicated that they are not ready for take-off, although they have taxied onto the landing area, possibly due to their engine temperature being too low, etc., the following phraseology will be used:

ADVISE WHEN READY FOR TAKE-OFF

3.416009 Whenever it is desired that a pilot shorten the downwind leg, the following phraseology will be used:

MAKE SHORT APPROACH

3.416010 Whenever it is desired that the pilot lengthen the downwind leg, the following phraseology will be used:

MAKE LONG APPROACH

3.416011 In the event it is desired to indicate to pilots in the traffic pattern which aircraft they are to follow in the landing sequence, the following phraseology will be used:

**NUMBER (Number) TO LAND, FOLLOW (type of aircraft)
(location of aircraft to follow).**

NOTE: When describing location, descriptions such as "to your right," "above you," "one mile ahead of you," etc., are much more satisfactory than "north of you," "one mile east of you," etc .

3.416012 In the event an aircraft is on final approach and there is still sufficient time to clear a departing aircraft for take-off, the following phraseology will be used:

CLEARED FOR IMMEDIATE TAKE-OFF

3.416013 In the event an aircraft is on final approach and there is still sufficient time to clear a departing aircraft which is in take-off position, but some doubt exists as to whether or not the departing aircraft will take off immediately, the following phraseology will be used.

TAKE OFF IMMEDIATELY OR CLEAR THE RUNWAY

3.416014 In the event it is believed desirable to advise landing pilots of other aircraft in close proximity to the runway in use, the following phraseology will be used:

**AIRCRAFT TO (right or left); or AIRCRAFT ON BOTH
SIDES OF RUNWAY (number).**

3.416015 In the event an aircraft has encountered landing gear difficulty and has proceeded to close proximity to the control tower for control tower personnel to observe the landing gear, the following phraseology will be used.

If the gear appears to be in a normal position to the control tower personnel:

LANDING GEAR APPEARS TO BE DOWN AND IN PLACE

If it does not appear to be normal a description of the appearance should be given, such as:

**RIGHT WHEEL IS RETRACTED
LEFT WHEEL DOES NOT APPEAR TO BE IN PLACE**

3.416016 If an aircraft cannot be cleared to land and it is desired that it continue to circle the field, the following phraseology will be used:

CIRCLE THE FIELD

3.416017 When it is desired to delay an aircraft to effect separation and a circle of the field would take more than the required time, the following phraseology will be used if circumstances permit:

**MAKE A SHORT CIRCLE TO YOUR (right or left)
FROM PRESENT POSITION**

3.416018 When an aircraft is on final approach and it becomes necessary to cancel the landing clearance, the following phraseology will be issued:

GO AROUND

3.42 Description of Essential Local Traffic: Essential local traffic shall be described so as to facilitate recognition by pilots, as follows:

3.420 Military Traffic: Military traffic shall be described by the service classification, such as: "Bomber," "Navy Transport," "Basic Trainer," "Fighter," "Attack," "Patrol Landplane," "Patrol Seaplane," etc. Jet propelled aircraft shall be so described.

3.4200 Military traffic may be described by military type designation to military and other pilots known to be familiar with such designations. The military type designation of military aircraft shall be spoken as a group figure (instead of a serial figure) in radio-telephone communications in accordance with the following examples:

F	Eighty	PBY
B	Seventeen	SNJ
C	Fifty-four	TBF

3.421 Air Carrier Traffic:

3.4210 Air carrier traffic shall be described by the use of the abbreviated name of the air carrier operator followed by the type of aircraft. Examples:

AMERICAN DC-6 TWA Constellation

3.4211 Unassigned

3.422 Civil Nonscheduled Traffic: Civil nonscheduled traffic shall be described by at least the name of the manufacturer. The model, type, or color of the aircraft also may be used to facilitate identification. Examples:

WACO-CABIN BEECHCRAFT GREEN STINSON

3.43 Unassigned

3.430 Unassigned

3.44 Statement of Figures in Radiotelephone Transmissions:

* 3.440 Statement of Figures to Indicate Ceiling Heights, Altitudes, and Upper Air Levels. These figures in numbers smaller than 12,000 shall be spoken in even hundreds and thousands of feet. These figures in the number 13,000 and larger numbers shall be spoken as, example, "ONE THREE THOUSAND". Examples follow:

<u>Number</u>	<u>Statement</u>
500	FIVE HUNDRED
1300	ONE THOUSAND THREE HUNDRED
4500	FOUR THOUSAND FIVE HUNDRED
10000	TEN THOUSAND
12000	TWELVE THOUSAND
13000	ONE THREE THOUSAND

3.441 Statement of Serial Figures. All figures, other than the types

listed in 3.440 shall be spoken individually. Examples:

<u>Number</u>	<u>Statement</u>
18143	ONE EIGHT ONE FOUR THREE
26075	TWO SIX ZERO SEVEN FIVE

NOTE: The above includes aircraft identification numbers. A Waco, NC1746, would be identified as "WACO ONE SEVEN FOUR SIX."

* 3.4410 The figure "0" shall be spoken "Zero" when it occurs alone or in a group of figures other than those described in 3.440.

3.442 Time shall be stated in exactly four figures (except as noted in 3.4420) utilizing the 24-hour clock basis. The hour shall be stated by the first two figures and the minutes by the last two figures. Examples:

<u>Time</u>	<u>Statement</u>
0000 (Midnight)	ZERO ZERO ZERO ZERO
0920 (9:20 a.m.)	ZERO NINE TWO ZERO
1200 (Noon)	ONE TWO ZERO ZERO
1643 (4:43 p.m.)	ONE SIX FOUR THREE

3.4420 Time may be stated in minutes only (two figures) in airport traffic control radiotelephone communications when no misunderstanding is likely to occur.

3.4421 Time shall be stated to the nearest minute unless a time check is required in which case the time should be stated to the nearest quarter minute. Example:

11:05.17--ONE ONE ZERO FIVE AND ONE QUARTER

3.4422 The 24-hour clock day begins and ends at 0000 (midnight). The last minute of the last hour begins at 2359 and ends at 0000, which is the beginning of the first minute ending at 0001 of the first hour of the next day.

3.443 Field elevations shall be stated in feet in accordance with the following examples:

10 ft. - FIELD ELEVATION ONE ZERO
75 ft. - FIELD ELEVATION SEVEN FIVE
583 ft. - FIELD ELEVATION FIVE EIGHT THREE
600 ft. - FIELD ELEVATION SIX ZERO ZERO
1850 ft. - FIELD ELEVATION ONE EIGHT FIVE ZERO
2500 ft. - FIELD ELEVATION TWO FIVE ZERO ZERO

3.45 Procedures, Words and Phrases:

* 3.450 The following procedure words and phrases shall be used in airport traffic control radiotelephone communication when applicable:

<u>Word or Phrase</u>	<u>Meaning</u>
ACKNOWLEDGE-----	“Let me know that you have received and understand this message.”
AFFIRMATIVE-----	“Yes.”
BREAK-----	“I hereby indicate the separation between portions of the message.” To be used only where there is no clear distinction between the text and other portions of the message.
CORRECTION-----	“An error has been made in this transmission (or message indicated). The correct version is - - -.”
GO AHEAD-----	“Proceed with your message.”
HOW DO YOU HEAR ME?-----	Self-explanatory.
I SAY AGAIN-----	Self-explanatory.
NEGATIVE-----	“That is not correct.”
OUT-----	“This conversation is ended and no response is expected.”
OVER-----	“My transmission is ended and I expect a response from you.”
READ BACK-----	“Repeat all of this message back to me exactly as received after I have given ‘OVER’.”

ROGER-----“I have received all of your last transmission.” (To acknowledge receipt; shall not be used for any other purpose).

SAY AGAIN-----Self-explanatory.

SPEAK SLOWER-----Self-explanatory.

STAND-BY-----If used by itself means “I must pause for a few seconds.” If the pause is longer than a few seconds, or if “STAND-BY” is used to prevent another station from transmitting, it must be followed by the ending “OUT”.

THAT IS CORRECT-----Self-explanatory

VERIFY-----“Check coding, check text with the originator and send correct version.”

WORDS TWICE----- (a) As a request - “Communication is difficult. Please say every phrase twice.”

3.46 Abbreviation for CAA Air Traffic Control:

3.460 The abbreviation “ATC” will be used to indicate CAA Air Traffic Control, for example, “ATC CLEARS EASTERN FOUR” etc.

3.47 Identification of Aircraft at Night:

3.470 In addition to the prescribed provisions for identification of aircraft in the radotelephone procedure, further identification and location of aircraft may be established during the hours of darkness, by requesting the pilot to show a landing light, as “TWA NINE SHOW A LANDING LIGHT.”

3.48 Radio Control of Aircraft Not Transmitter Equipped:

3.480 In addition to the prescribed radio operating procedure, the following procedure is established for use in connection with control of aircraft in which radio equipment is limited to receivers.

3.481 Broadcasts of airport traffic control clearances or information to VFR traffic, requiring acknowledgment from the pilot, shall provide for such acknowledgment in the following manner:

- (1) When the aircraft is on the ground within the range of vision of the controller, the pilot shall be requested to acknowledge receipt of the broadcast by movement of ailerons or rudder, whichever action may be observed more readily, as:

ACKNOWLEDGE BY MOVING AILERONS

ACKNOWLEDGE BY MOVING RUDDER

- (2) When the aircraft is in the air the same purpose will be achieved by including a request to acknowledge receipt of the broadcast by rocking the wings, as:

ACKNOWLEDGE BY ROCKING YOUR WINGS

- (3) When the aircraft is either in the air or on the ground, during the hours of darkness, the same purpose will be achieved by requesting the pilot to blink his landing lights, as:

ACKNOWLEDGE BY BLINKING YOUR

LANDING OR NAVIGATION LIGHTS

3.5 LOCAL TRAFFIC INFORMATION

3.50 Essential Local Traffic:

3.500 When operating under visual flight rules it is the responsibility of the pilot to avoid collision with other aircraft. However, due to the restricted space on and around landing areas, it is often essential that traffic information be issued to aid the pilots to avoid collision between aircraft. Essential local traffic shall be considered to consist of the following:

- (1) Traffic within the control zone.
- (2) Ground traffic.

3.501 Essential traffic within the zone shall include all known traffic in the control zone which might constitute a hazard to the operation of the aircraft concerned.

3.502 Essential ground traffic shall include any aircraft, vehicle or personnel on the landing area or in a designated loading or parking area which might constitute a hazard to the operation of the aircraft concerned.

3.51 Issuance:

3.510 Detailed essential local traffic information shall be issued when, in the judgment of the controller, such information is necessary in the interests of safety, or when requested by a pilot.

3.6 INFORMATION ON FIELD CONDITIONS

3.60 General:

3.600 Essential information on field conditions is information, necessary to safety in the operation of aircraft, which pertains to the landing area or any facilities usually associated therewith. For example, construction work on a taxi strip not connected to the runway-in-use would not be essential information to any pilot except one who might wish to taxi in the vicinity of the construction work. As another example, if all traffic must be confined to runways, that fact should be considered as essential field information to any pilot not familiar with the airport.

3.601 The following field conditions shall be included as essential field information to all pilots:

- (1) Construction work along or near the runway-in-use.
- (2) Rough portions of the landing area proper whether marked or not.
- (3) Any maintenance apparatus or workmen on or near any portion of the landing area a pilot might elect to use.
- (4) Slippery condition of runways or taxiways.
- (5) Snow piled or drifted on the landing area proper, and width and length of cleared runway, if known.
- (6) Failure or irregular functioning of any portion of the field lighting system.
- (7) Aircraft parked close to runways or taxiways.

3.61 Responsibility for Notification of Field Conditions:

3.610 The agency which operates the airport shall be responsible for notifying the chief airport traffic controller of current field conditions.

3.62 Description:

3.620 Information on field conditions shall be stated concisely and clearly.

Examples:

- (1) MOWER ON WEST SIDE OF FIELD
- (2) CONSTRUCTION WORK ON NORTH END OF FIELD
- (3) REPAIR TRUCKS NEAR CENTER OF FIELD

3.63 Issuance:

3.630 Essential information on field conditions shall be given to every pilot concerned, either directly or indirectly, in sufficient time for the pilot to make proper use of such information.

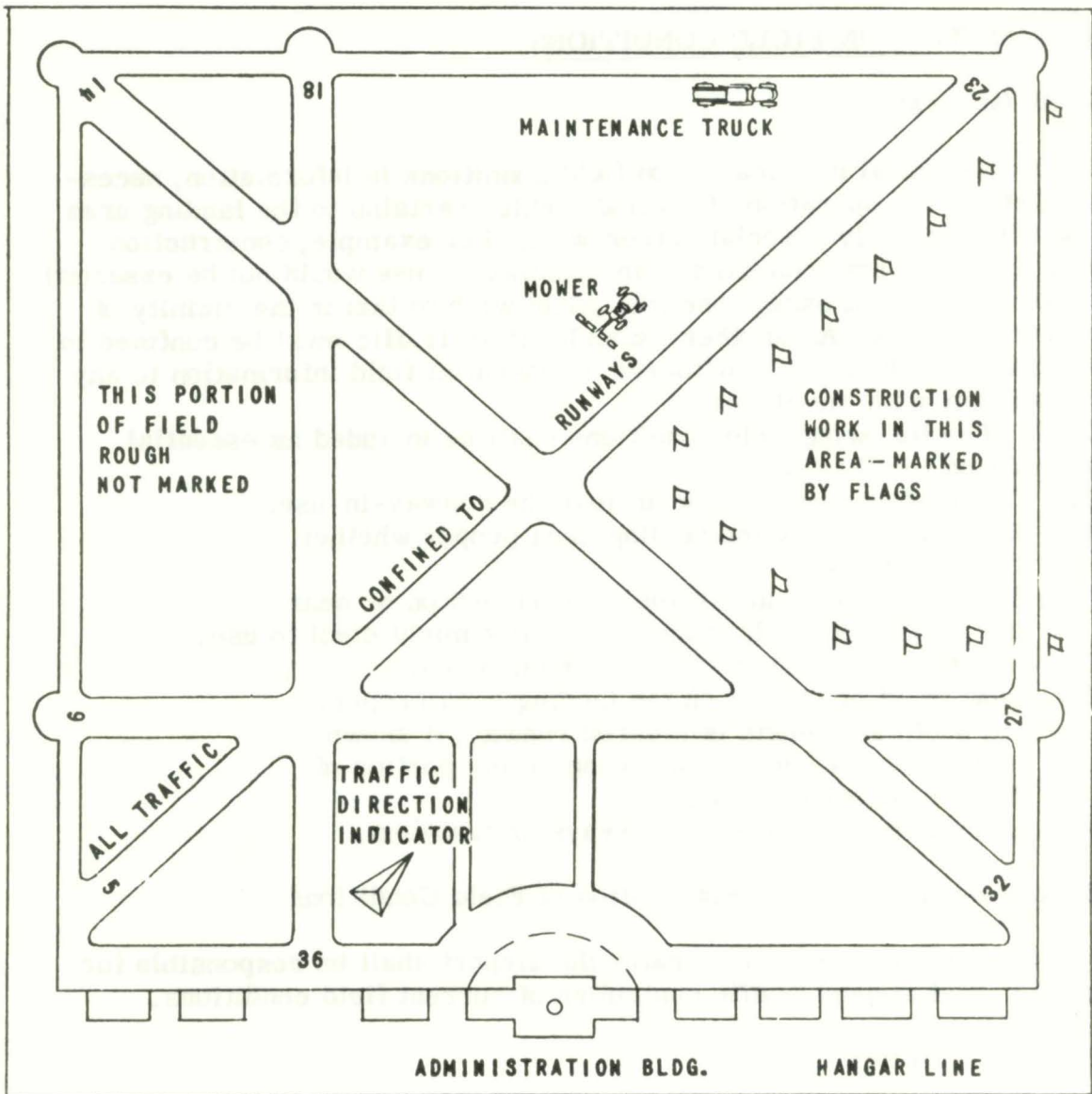


FIGURE 9. Typical Airport Showing Various Field Conditions

3.7 PREVENTIVE CONTROL

3.70 Description:

3.700 "Preventive control" may be defined as a system of control whereby useful preventive advice is given to pilots of aircraft in the air and a routine approval of the pilot's anticipated actions is eliminated. In other words, the pilot is expected to continue flight including landing in a normal manner unless otherwise advised by the airport traffic controller.

3.71 Control of Ground Traffic:

3.710 The airport traffic controller is concerned with the movements of taxiing aircraft, personnel, and vehicular traffic in exercising ground control. Taxiing aircraft offer the greatest problems due to the fact that the visibility is so limited in most aircraft while in a taxiing position that obstructions such as personnel, vehicles or other aircraft may not be readily seen even by the most careful pilots. Therefore, the controller must issue explicit warnings as to the proximity of other obstructions for all taxiing traffic. This requires that the control of ground traffic be identical with the control of ground traffic previously outlined under 3.1.

3.72 Control Zone Procedures:

3.720 Procedures for controlling traffic within and entering the control zone may be subdivided as follows:

3.7200 Traffic Joining the Traffic Pattern. Traffic joining the traffic pattern is primarily interested in obtaining information as to field conditions, runway-in-use, and the wind direction and velocity. This information should be given when the aircraft makes its initial radio contact at the contact reporting point, or approximately 15 miles from the airport. It is expected that the pilot of the aircraft joining the traffic pattern will properly space himself so that the proper separation will be maintained on the final glide for landing.

3.7201 Traffic in the Traffic Pattern. The traffic in the traffic pattern must be properly spaced at all times. This may be accomplished by advising one pilot to make a wider turn, and another pilot to make a shorter turn, or any other pertinent information. The aircraft which are actually in the traffic pattern should be aware of the runway-in-use by the time the traffic pattern is entered and, therefore, the only clearances which should be issued to such traffic are those necessary to obtain proper spacing.

* 3.7202 Landing Traffic. If the aircraft in the traffic pattern are properly spaced it will be unnecessary to issue detailed clearances to the landing traffic, such as "cleared to land". Rather, only prohibitive signals which will prevent collision will be issued. For example, one of two aircraft on final approach should be advised to "GO AROUND" if their separation is less than the prescribed minimum.

3.7203 Taking-off Traffic. All taking-off traffic shall be positively controlled inasmuch as such aircraft are taxiing traffic until the actual take-off is commenced.

3.73 Conditions Under Which Preventive Control May be Applied:

3.730 Preventive control has an immediate application at locations which have one or more of the following types of activities:

- (1) Air Force or Navy primary flying schools.
- (2) Air Force or Navy transitional schools.
- (3) Locally based squadrons or groups of military aircraft.
- (4) Local civilian operators or schools.

3.7300 In such cases mutual agreements and arrangements must be made with the responsible heads of these groups prior to the inauguration of preventive control. Such control is not to be employed for transient aircraft.

*** 3.8 SPECIAL VFR OPERATIONS WITHIN A CONTROL ZONE**

* 3.80 Pilots conducting flight in accordance with visual flight rules must obtain an air traffic clearance;

- (a) Before flying in a control zone when the ceiling within the control zone is reported to be less than 1,000 feet.
- (b) Before flying in a control zone at less than 500 feet vertically or 2,000 feet horizontally from any cloud formation.
- (c) Before flying in a control zone when the flight visibility within the control zone is less than three miles.
- (d) Before landing, taking off, or entering the traffic pattern of an airport within the control zone when the official ground visibility is reported to be less than three miles at the airport about which the control zone is centered.

* 3.800 The issuance of clearance for flight under the conditions in Paragraph 3.80 shall be predicated on known traffic conditions. Such clearance shall provide standard IFR separation between any aircraft so cleared, and between such aircraft and any IFR traffic operating in the control zone except that standard IFR separation need not be applied if:

- (a) In the opinion of the airport traffic controller, adequate separation can be provided by the tower and each aircraft is continuously visible to the tower controller; or
- (b) Each aircraft is continuously visible to pilots of other aircraft concerned and the pilots thereof can maintain their own separation and so advise.

* 3.801 When the ground visibility is less than three miles but not less than one mile, local VFR flights may be authorized in the zone (shooting landing, etc.) only if provision is made for the recall of these aircraft when traffic conditions become too congested to permit their continuance. The most practical method of doing this is only to clear aircraft which can maintain a continuous guard on the control tower frequency.

* 3.802 When the ground visibility is less than one mile, VFR operations may be authorized in the zone only in respect to those aircraft with which the tower has two-way radio communications, except that aircraft not meeting this requirement may be cleared to enter the control zone and land, or to take-off and depart directly from the control zone, traffic permitting.

3.81 Operations of Signal to Indicate Ground Visibility of Less Than Three Miles and/or a Ceiling of Less Than 1000 Feet.

3.810 The following procedures shall be observed when the ground visibility is officially reported to be less than three miles and/or the ceiling less than 1000 feet.

- (1) Operate the appropriate light signal.
 - (a) Rotating beacon during daylight hours.
 - (b) Flashing wind direction indicator lights between sunset and sunrise.
- (2) Recall all aircraft operating in the traffic pattern without a clearance.

3.82 Authority for Issuance of Traffic Clearances to VFR Operations:

3.820 The airport controller shall coordinate with the appropriate center prior to issuing traffic clearance for VFR flight in a control zone at less than the basic VFR weather minimums (500 feet vertically and 2000 feet horizontally from clouds and 3 miles visibility and a ceiling of 1000 feet).

3.9 OPERATING INSTRUCTIONS FOR AIRPORT TRAFFIC CONTROL TOWERS

3.90 General:

3.900 Purpose. The purpose of these instructions is to provide standard operating instructions for all airport traffic control towers. Only the broad phases of operation are included herein and it is expected that each operating agency will provide such additional detailed instructions as are necessary for efficient operation.

3.901 Supervision of Towers. Each operating agency shall establish and designate a person responsible for the supervision and operation of each airport traffic control tower. All other airport traffic control personnel, when on official duty in an airport traffic control tower, will be responsible to and governed by the person in charge. When more than one person is on watch in the tower, one controller shall be designated as the "SUPERVISING CONTROLLER" in charge of the watch.

3.91 Positions of Operation:

3.910 General. Each person on duty in an airport traffic control tower shall, while controlling or aiding in the control of air traffic, occupy one or more positions of operation. These positions of operation shall be established for the purpose of defining specific duties and fixing responsibility for the performance of prescribed functions, and shall be defined as follows:

3.9100 Local Control Position. The following are specific duties of this position of operation in addition to such supplementary duties as may be assigned by the chief controller:

- (1) To issue airport traffic control clearances and information, in accordance with applicable Civil Air Regulations, governing all air traffic and vehicular traffic on the landing area, air traffic departing from the landing area and air traffic operating in accordance with VFR in the control zone.
- (2) To guard radio frequencies of all aircraft regularly using the landing area and such special frequencies as may be required from time to time.
- (3) To issue essential local traffic information, as required, to pilots of aircraft taxiing on or in the vicinity of the landing area.
- (4) To furnish to pilots of aircraft taxiing on, and in the vicinity of the landing area, information concerning field conditions, altimeter settings, and time checks as required.

- (5) To forward to the local Weather Bureau Office and the appropriate center pilot weather reports as received and reports based upon personal observation of weather conditions from the control tower.
- (6) To notify operations offices, fire departments, police and ambulance services, as necessary, in the event of an accident or fire on or in the vicinity of the airport.
- (7) To study and initial all weather reports, notices to airmen and reports pertaining to the condition of the landing area or tower operating equipment.
- (8) To operate the appropriate airport lighting facilities as required by aircraft using the airport.
- (9) To perform the duties of Approach Control if personnel are not assigned to that position.

3.9101 Flight Data Position. The following are specific duties of this position of operation in addition to such supplementary duties as may be assigned by the chief controller:

- (1) To assist, as directed by the supervising controller, in the issuance of airport traffic control clearances and information and in the operation of control tower equipment.
- (2) To copy, and relay as necessary, all communication received over the interphone or telephone facilities.
- (3) To relay air route traffic control clearances and other control messages as instructed by an air route traffic control center.
- (4) To copy and relay, as directed, reports and information received by radio.
- (5) To properly post all required flight plans, flight progress reports, arrival reports, and departure reports.
- (6) To study and initial all weather information and notices to airmen and post such material on the designated board.
- (7) To provide for the continuous recording of radio transmissions by changing voice records promptly, as they are completed, at locations where voice recorders are installed.
- (8) To record air route traffic control messages and clearances on appropriate forms.
- (9) To record flight plans received from pilots (either by radio, interphone, or telephone) on appropriate forms.
- (10) To maintain airport traffic control operating forms.

3.9102 Approach Control Position. The following are specific duties of this position of operation in addition to such supplementary duties as may be assigned by the chief controller:

- (1) To direct, under the general supervision of the chief controller, the control activities of a control tower during a tour of duty.
- (2) To supervise all positions of operation to insure adequate separation between air traffic under the jurisdiction of the tower.
- (3) To issue air traffic control clearances and information in accordance with applicable Civil Air Regulations, to aircraft which are operating in accordance with IFR under the jurisdiction of the tower.
- (4) To guard radio frequencies of all aircraft regularly using the landing area and such special frequencies as may be required from time to time.
- (5) To furnish information concerning field and weather conditions, altimeter settings, and time checks to pilots approaching the landing area.
- (6) To study and initial all weather reports, notices to airmen and reports pertaining to the condition of the landing area, associated radio facilities, and tower equipment.
- (7) To supervise, direct, and train assistant airport traffic controllers and other junior personnel on the same watch.

3.9103 Combining Positions of Operation - When the number of personnel on duty is less than the number of positions of operation outlined above, positions of operation shall be combined in a manner prescribed by the chief controller so as to obtain the highest possible degree of efficiency in operation.

3.92 Radio Procedures:

3.920 Guarding Radio Frequencies. The supervising controller shall be responsible for maintaining a continuous guard of standard military, naval, and civil aircraft radio frequencies. He shall also maintain a guard, when necessary, on any special frequencies that may be required. The supervising controller shall also provide for the maintenance of a continuous guard of control tower transmissions from any other landing area in the control zone in which he is controlling traffic.

3.9200 Normally, the volume control on receivers guarding aircraft frequencies shall be adjusted so as to permit the easy reception of normal calls from aircraft over or in the vicinity of all contact reporting points. The volume shall not be reduced on any receiver on which a continuous guard is being maintained, except as follows:

- (1) The volume on any receiver or speaker may be momentarily reduced to permit the separate reception of transmissions which might be otherwise unintelligible.

- (2) The volume may be reduced momentarily when transmission from an aircraft might be annoyingly loud because of the nearness of the aircraft.
- (3) The volume may be reduced when either local or general electrical disturbances make it advisable in order to hear any transmissions at all but should be increased to normal volume as soon as possible.

3.9201 Tower personnel should check the receivers at least once during each watch to ascertain whether they are operating since failure of this equipment may occur without the knowledge of the personnel on duty. The receiver check may be accomplished by turning the noise suppressor off and increasing the volume until background noise is heard.

3.921 Transmission of Radiotelephone Messages. An airport traffic controller on duty shall be responsible for all radiotelephone transmissions emanating from the position, or positions, of operation under his jurisdiction.

3.9210 The following types of radiotelephone messages shall ordinarily be transmitted by the local control position:

- (1) Airport traffic control clearances and instructions.
- (2) Essential traffic information.
- (3) Field conditions, altimeter settings, and time checks.
- (4) Any message pertaining to safety of aircraft.
- (5) Instructions to radio equipped vehicular traffic on the landing area.

3.9211 The following types of radiotelephone messages may be transmitted by the flight data position at the discretion of the supervising controller:

- (1) Relay of air route traffic control clearances and control messages.
- (2) Acceptance and confirmation of flight plans filed by radio.
- (3) Any other message authorized by the supervising controller.

3.9212 The following types of radiotelephone messages may be transmitted by the approach control position to holding and approaching aircraft operating on an instrument flight plan after such aircraft have been assigned to the tower:

- (1) Clearances and instructions.
- (2) Essential traffic information.
- (3) Field and landing conditions, altimeter settings, and time checks.
- (4) Any message pertaining to safety of aircraft.

3.922 Relaying Information or Advice not Directly Associated With Traffic Control. In addition to traffic control communications which are associated with prevention of collision between aircraft within the control zone, the following communications are authorized for handling by an airport traffic controller:

- (1) Messages pertaining to the operation of the aircraft authorized for transmission by the commanding officer or the representative of the airport management.
- (2) Messages pertaining to the operation of the aircraft authorized for transmission by a representative of an aircraft operator to the aircraft of such operator.
- (3) Any message pertaining to safety of aircraft.

3.93 Operation of Interphone Facilities:

3.930 General. Interphone facilities are maintained to provide rapid voice communications service between agencies, for the exchange of information pertinent to the control of air traffic.

3.9300 The interphone system is divided into two categories: "local" circuits, which may consist of individual circuits between airport traffic control towers and various agencies in the vicinity, or may consist of a single circuit connecting all the agencies in the immediate vicinity of an airport, and "long lines" circuits which may connect two or more widely separated communications stations, towers, operations offices, and air route traffic control centers.

3.9301 An airport traffic control tower shall be the coordinating office of any local interphone system originating in the control tower. If such system also serves an airway communications station, coordination shall be effected jointly by both the station and tower.

3.931 Communications Authorized for Transmission on Interphone Systems. Interphone systems are maintained to permit the rapid handling of communications required to effect the control of air traffic. Authorized communications are those required for the control and safety of air traffic. A partial list of authorized material follows in the general order of importance. Priority shall be determined by the relative importance of a message to the control of air traffic, rather than by strict adherence to the order as listed herein.

3.9310 Emergency communications are communications concerning accidents, suspected accidents, and situations directly endangering life and property. Communications relative to accidents may be continued until essential information has been transmitted to all concerned, but shall not receive emergency classification after the emergency period has passed.

3.9311 Movement and control messages and plain English equivalents of "Q" signals pertaining to aircraft movements shall receive priority over other than emergency communications.

3.93110 When two or more movement or control messages are on hand for transmission their priority shall be in the following order, except that the order may be modified by consideration of the time element involved and their relative importance to the control of air traffic:

- (1) Clearances and control instructions
- (2) IFR movement messages
 - (a) Flight plans
 - (b) Progress reports
 - (c) Arrival reports
- (3) VFR movement messages

3.9312 Notices to Airmen. Each control tower shall compile a list of local aids to air navigation which may affect its operations. Malfunctioning of such aids shall be reported to the appropriate communications station for issuance of a notice to airmen and to the appropriate center for information.

3.932 Interphone Operating Procedures. Conversations shall be as brief and concise as possible without undue hesitation and in a uniform flow of language. Every effort shall be made to enunciate clearly and distinctly, paying special attention to numerals. Use of such words as "guess" and "think" is undesirable.

3.9320 When any doubt exists concerning the accuracy of a received message, the complete message or the essential parts should be repeated back to the sender for verification. Transmitting personnel may also request that a message be repeated back by the receiving personnel.

3.9321 "Q" signals shall be transmitted by means of their plain English equivalents. Station identifications shall not be spelled, but the name of the location spoken.

3.9322 Low priority traffic may be interrupted for the transmission of high priority traffic, not subject to delay. For example, the continuous transmission of a series of flight plans may be interrupted for the transmission of a traffic control clearance.

3.9323 The domestic phonetic alphabet should be used to indicate single letters, initials, or for spelling words whenever similar sounds or difficulties in transmission make such use necessary.

3.9324 When the origin and destination of a message are on the same circuit, the message shall be filed with the air route traffic control center, which will then make delivery to all concerned. However, local arrangements may be made with the appropriate air route traffic control center to depart from this principle when desired.

3.9325 Operating Initials. All personnel using interphone circuits shall use two-letter operating initials. The first and last initials of the operator's name should be used when appropriate. Any two letters, however, may be used to avoid confusion due to similarity of sounds. Letters having similar sounds, such as "B" and "P" and letter combinations which are difficult to pronounce should be avoided.

3.933 Methods of Originating and Completing Interphone Contacts. The following outlined procedures and phraseologies shall be used when initiating and completing contacts on standard interphone facilities.

3.9330 Voice calls and answers. Drops on the long-line interphone system shall be known by the name of the location followed by the name or standard abbreviation of the organization or facility. (On local interphone circuits, the "location" may be omitted). Examples:

MEMPHIS CONTROL
WESTOVER TOWER
PATTERSON OPERATIONS
NORFOLK NAVY TOWER
FORT WAYNE TWA
CASPER RADIO

3.93300 Initiate the call by use of prescribed procedures. If voice signaling is used, state the voice call of the organization desired, followed by the word "from" and the voice call of the organization calling.

- (1) All calls shall be answered by stating the voice call of the organization answering the call.
- (2) Each communication shall be preceded by a term indicating the type of message to follow, such as "flight plan," "clearance," "arrival," "progress report," etc. Messages of an emergency nature shall be preceded by the word "emergency." In voice signaling the descriptive term shall be incorporated in the call, as the last item of the call.
- (3) Each message shall be terminated by the operating initials of the transmitting personnel.
- (4) Personnel shall acknowledge receipt of messages by stating their operating initials.
- (5) All contacts are completed by air route traffic control center personnel, by stating the time in two figures to the nearest minute.

Example: Mechanical signaling (inbound to center).

(Center) "CLEVELAND CONTROL" (answering mechanical signaling).

(Tower) "BUFFALO TOWER, ARRIVAL REPORT."

(Center) "GO AHEAD."

(Tower) (Proceeds with message), "JL".

(Center) "HN, FOUR SIX."

3.93301 Except in the transmission of "emergency" messages, continuous calling should be tempered by good judgement. Stations should realize that air route traffic control centers often have only one person assigned to answer calls on two or more circuits. Air route traffic control centers should understand that communications stations, towers and operations office personnel are often engaged in duties such as weather observations, radio contacts, or outside telephone calls, which may delay the answering of interphone calls.

3.934 Connection of Circuits. Circuits will be connected only upon request or approval being received from an air route traffic control center, except that circuits may be connected at the request of a communications station or control tower adjacent to a control boundary, so located that a connection is necessary in order to communicate with the adjacent air route traffic control center.

3.9340 Request for connection of circuit shall be made in accordance with the following:

"FRESNO RADIO THIS IS BURBANK CONTROL, CONNECT OAKLAND CONTROL."

(Fresno signals Oakland Control and connects circuits. Message is completed in accordance with standard procedures).

"FRESNO RADIO THIS IS BURBANK CONTROL, RELEASE OAKLAND CONTROL."

(Fresno disconnects circuits).

3.935 Reporting Arrivals and Departures. The times of arrival and departure of all aircraft for which flight plans or clearances have been received, shall be reported promptly to the appropriate air route traffic control center or communications station.

3.9350 The times of arrival and departure as required above shall be exact as established upon the following basis:

- (1) Arriving aircraft shall be reported as "arrived" at the time the wheels touch the ground and it is apparent that the landing will be completed.
- (2) Departing aircraft shall be reported as "departed" at the time the wheels leave the ground.

3.936 Relaying Position Reports From Pilots of Aircraft En Route. Normally, pilots of aircraft en route will make position reports to U. S. Interstate Airway Communications Stations, Air Force or Navy Communications Stations, or private facilities. While pilots should be encouraged to continue this practice, airport traffic controllers shall not hesitate to relay such reports when they are addressed to the control towers. Pilots shall be referred to other communications agencies only if the service they request or need can be obtained in no other manner.

3.937 Relaying Reports on Condition of Field or Associated Facilities. When abnormal conditions concerning facilities which are pertinent to safety in the operation or traffic control of aircraft are observed by an airport traffic controller or are brought to the attention of the controller, such information shall, if warranted, be forwarded to the appropriate operations office, Civil Aeronautics Administration Communications Station and, if advisable, to the air route traffic control center within whose control area the tower is located.

3.94 Operation of Field Lighting System:

3.940 Boundary and obstruction lights and the rotating airport beacon shall be lighted continuously between sunset and sunrise, and in addition, the rotating beacon shall be lighted as necessary during the hours of daylight to indicate restriction of VFR operations within the control zone. At airports where no boundary lights are installed (or when boundary lights are inoperative), runway lights on the runway most nearly aligned with the wind, or the "calm wind" runway when appropriate, shall be lighted between sunset and sunrise.

* 3.9400 With the exception of rotating airport beacons, the commanding officer of a military establishment, or the airport manager at locations where a CAA control tower is in operation, may establish hours of operation of the field lighting system not in accordance with the above provided, however, that field lighting is available on a request basis. In such cases, the commanding officer or the airport manager shall assume the responsibility for such operations.

3.941 Floodlights and Runway Lights. Floodlights and runway lights, except as outlined above, shall be used in accordance with the following:

3.9410 As soon as the pilot of an aircraft is cleared to taxi out, the taxiways which he is to use shall be illuminated and as the pilot approaches the take-off position, the runway lights for the runway-in-use shall be switched on. The floodlights shall not be turned on until the pilot has taxied onto the runway and is facing the direction for take-off. The floodlights and the runway lights shall not be turned off until the pilot has cleared the edge of the field or requests that they be turned off.

3.9411 When a pilot is approaching to land, the runway lights shall be turned on as soon as the pilot reports in the control zone. The floodlights for the runway-in-use shall be lighted as soon as the aircraft is identified near the field unless the pilot requests that they be left off. In the latter event they shall be lighted briefly, before the aircraft enters the landing glide, to ascertain that the landing area to be used is clear of obstacles. If the floodlights are used for landing, they shall not be turned off before the pilot has turned on to a taxi strip, or intersecting runway, unless it is necessary for the pilot to taxi toward an unshadowed floodlight unit.

3.9412 As far as practicable, the airport traffic controller shall light only those portions of intersecting runways and taxi strips which the pilot must use in taxiing to the administration building, hangar line, or parking area.

* 3.95 Altimeter Settings:

3.950 Recording and Using Altimeter Settings. The "altimeter setting" issued by the weather reporting station at 0130, 0730, 1330, and 1930 Eastern Standard Time shall be recorded on a suitable altimeter setting record form. The ALTIMETER SETTING INDICATOR shall be the primary instrument for obtaining altimeter settings in the tower and all personnel shall refer to the INDICATOR for this data. No altimeter settings are to be obtained from the aircraft type altimeter (except where altimeter setting indicators are not installed). The aircraft type altimeter is to be used only as a secondary means of checking the altimeter setting indicator or as a primary instrument in case of malfunctioning of the latter.

3.9500 The altimeter setting indicators are a special form of aneroid barometer so designed that after installation and proper adjustment, the altimeter setting may be read directly from the scale of the instrument. The instrument is designed to indicate the altimeter setting when the elevation scale is set to the actual elevation of the instrument above sea level. The mechanism is enclosed in a sealed case with provision for the connection of a venting tube to outside free air.

3.9501 Comparisons between the readings of the indicator and the official altimeter setting issued by the U.S. Weather Bureau are necessary each six hours as in the case of the aircraft type altimeter. This shall be accomplished by completion of a separate altimeter record form for the indicator. The "CORRECTION FACTOR" should be entered on this form. For example, an altimeter setting of 30.01 is received from the Weather Bureau. The altimeter setting indicator reads 30.00 The correction factor, "+.01" is entered on the form. Thus, the actual altimeter setting is the value indicated by the instrument, plus or minus the correction factor. In the event the average wind velocity at the stated hours (0130,0730,1330,1930) exceeds 45 miles per hour, the instructions relative to obtaining the correction factor will not be effective and the previously determined correction factor will remain in use until a correction factor can be obtained when the average wind velocity is less than 45 miles per hour.

3.9502 Should the correction factor consistently exceed two one-hundredths of an inch (.02), either plus or minus, the maintenance technician should be advised and requested to reset the instrument. Should the correction factor exceed four one-hundredths of an inch (.04), plus or minus, the instrument should be removed from service and the maintenance technician advised.

3.9503 The procedures for recording and using altimeter settings obtained from the aircraft type altimeter will continue in accordance with the following: Immediately following receipt of the "altimeter setting" issued by the weather reporting station, provided the average wind velocity does not exceed 45 miles per hour, the knob on the tower altimeter shall be turned until the reading on the barometric scale is exactly the same as the official altimeter setting. The "height setting" shall also be recorded and this will be used for reference data until the next official altimeter setting is received from the weather reporting station. In the event the average wind velocity at the stated hours exceeds 45 miles per hour, the instructions relative to turning the knob on the altimeter and the determination of the height setting will not be effective and the previously determined height setting will remain in use until a height setting can be obtained when the average wind velocity is less than 45 miles per hour.

3.9504 When the existing altimeter setting is requested by a pilot, the airport traffic controller shall obtain the setting in accordance with the procedure outlined in 3.9501. In the event it is necessary to utilize the aircraft type altimeter to obtain the altimeter setting, the airport traffic controller shall turn the knob of the altimeter until the hands of the instrument indicate the same altitude as the last determined height setting. The existing altimeter setting will then be indicated on the barometric scale of the altimeter.

3.9505 Whenever adjusting the aircraft type altimeter to obtain a reading, the vibrator shall be operated so as to eliminate any lag in movement of the altimeter needle.

3.9506 Pressure-altitude, when required, shall be obtained from a table of altimeter settings and pressure altitudes compiled for the local landing area. If no such table is available, the pressure-altitude may be obtained in the following manner:

- (1) Determine the existing "altimeter setting."
- (2) From N. A. C. A. Report No. 538, "Altitude-Pressure Tables Based on United States Standard Atmosphere," or similar tables, obtain the altitude corresponding to the existing altimeter setting.
- (3) Add the altitude obtained from the altitude-pressure table to the field elevation. The algebraic sum will be the "pressure-altitude."

3.9507 At locations where approach control procedures have been established, the current altimeter setting shall be issued to the aircraft by the control tower in the initial contact if the aircraft is being controlled in accordance with the Standards for the Control of Instrument Flight Rule Traffic.

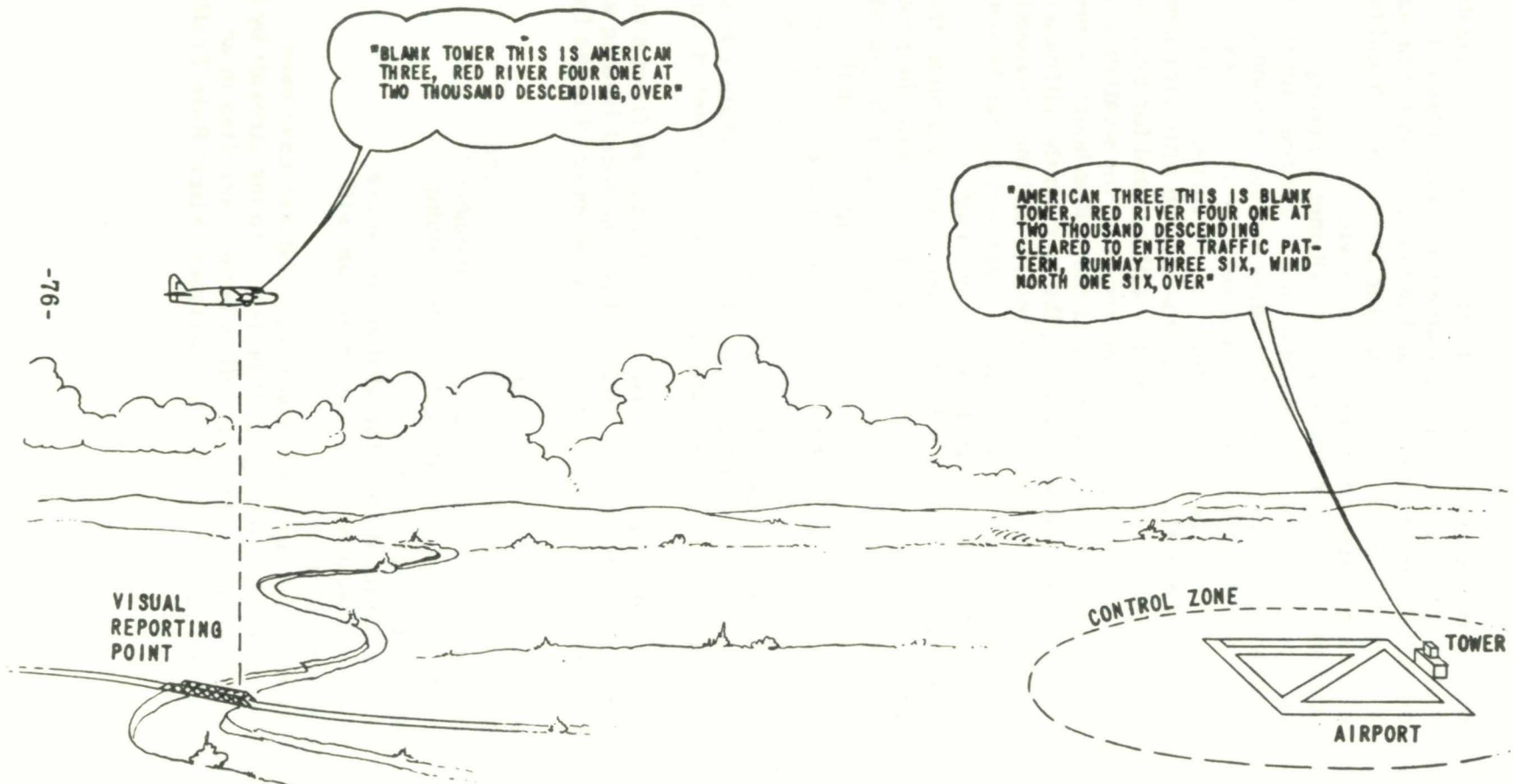


FIGURE 10. Report Over a Visual Reporting Point, and Clearance To Enter Traffic Pattern.

3.96 Visual Reporting Zone:

3.960 It shall be the responsibility of all airport traffic controllers to be fully apprised concerning exact locations of prominent landmarks which may be used by pilots as visual reporting points upon entering a reporting zone of 15 miles radius surrounding the airport.

3.97 Reporting Information Concerning Aircraft in Difficulty, Aircraft Accidents and Known Hazardous Conditions of Flight:

3.970 Whenever information becomes available to an airport traffic controller concerning aircraft in difficulty, an aircraft accident or known conditions which are or may be hazardous to aircraft operations, such information shall be reported immediately to the air route traffic control center within whose control area the tower is located, to the airway communications station at the same location as the tower and to the local military offices if appropriate. The control tower shall render every possible assistance to the aircraft involved.

3.9700 In the event military aircraft are reported to be in difficulty, the airport traffic controller will also notify the local operations office and such other local military offices as the commanding officer may specify.

* 3.971 Local Airport Emergency Procedures. Appropriate written operations instructions covering in detail local airport emergency procedures shall be prepared by competent authority. These instructions shall clearly define the duties of airport traffic control personnel during emergency conditions, such as the invoking of emergency procedures for an aircraft accident on the landing area, and shall be prepared in collaboration with a representative of the agency which operates the airport (airport manager or commanding officer, or both).

3.972 Reporting Imminent and Unexpected Weather Changes. An airport traffic controller shall assist the local Weather Bureau observer by calling to his attention:

- (1) Any differences between the actual weather conditions as observed from the tower and those indicated by the current report, and
- (2) Imminent changes in the weather whenever, because of their unexpectedness, there is some likelihood that they may not be observed immediately by the regular Weather Bureau personnel.

3.973 Dissemination of Weather Information Observed by Airport Traffic Control Tower Personnel. Airport traffic control tower personnel may transmit to pilots and air route traffic control centers, without prior reference to the U. S. or Service Weather Bureau, elements of weather information which can be directly observed in the control tower by means of instruments, such as wind direction, wind velocity, and altimeter settings.

3.9730 The airport traffic control tower personnel may not transmit any observed elements of weather information requiring judgment of the observer as to value, such as ceiling, amount of cloudiness and visibility unless such weather report has either been composed or verified by the U.S. or Service Weather Bureau,

or unless the controller is acting as an official weather observer and is properly certificated for the elements being reported.

3.9731 Airport traffic control tower personnel may advise an air route traffic control center of observed weather information simultaneously with advising the Weather Bureau by means of conference on the interphone circuit.

3.9732 The airport traffic controller may advise the appropriate center or pilots of observed weather in general terms, such as "thunderstorm east of the field," "large breaks in the overcast," "visibility is lowering to the west," or any other such general statements which do not give actual values of the elements. In such cases the U. S. or Service Weather Bureau station shall also be advised of such information.

3.9733 Airport traffic control tower personnel shall secure weather information, for use in responding to requests from pilots, from the nearest Weather Bureau station or from official weather reports. In no case shall one tower request distant weather information from a distant tower via long line interphone for transmission to pilots when such information is available from an official source at the location desiring the information.

3.9734 In order that the best possible visibility reports may be given to pilots in the vicinity of an airport, visibility observations will be taken from the control tower during periods when the visibility is less than 3 miles. Such observations will be taken by Weather Bureau personnel when available, and by control tower personnel when Weather Bureau personnel are not available. Stations where airway communications station personnel make airway observations will be considered as stations where Weather Bureau personnel are not available for assignment to the tower.

3.97340 Control tower personnel who make official visibility observations must be properly certificated by the Weather Bureau.

3.97341 Whenever the visibility is reduced to less than 3 miles and this is first noted by control tower personnel, the Weather Bureau shall be notified immediately by interphone or other appropriate means.

3.97342 The Weather Bureau, upon notification or observation of a visibility of less than 3 miles, will assign an observer to the control tower if sufficient personnel are available. In the event that Weather Bureau personnel are not available, the Weather Bureau will notify the control tower to assume the duty of taking visibility observations.

3.97343 When the visibility has risen to 3 miles or more and indications are that it will remain 3 miles or more for an appreciable period, visibility observations shall revert to the Weather Bureau Office. The Weather Bureau Office shall be so notified by the Weather Bureau observer in the tower or the airport traffic controller.

* 3.97344 Visibility observations by tower personnel are considered official by the Weather Bureau as soon as the observation is recorded in the tower. Therefore, "single element" observations (visibility) may be transmitted to pilots of aircraft whenever such information is necessary in connection with aircraft arrivals or departures. These "single element" observations must also be transmitted to the local Weather Bureau.

3.97345 A record shall be maintained in the control tower of all visibility observations made from the control tower including the times of such observations. Each time observational duties are transferred from the Weather Bureau to the control tower or returned, or transferred from one observer to another in the control tower, the time and the initials of the observers involved shall be recorded in the control tower.

3.974 Reporting Failure or Irregularity of Operation of Equipment. The airport traffic controller on duty shall immediately report any failure or irregularity of operation of any apparatus, light or other device, used in controlling airport traffic as directed by competent authority.

3.9740 Competent authority shall be responsible for the issuance, through the adjacent communications station, of a suitable notice to airmen relative to any failure or irregularity of equipment which affects the operation of the airport traffic control tower.

3.975 Maintaining File of Permanent Records of Tower Transmissions. A file of permanent records of control tower radio transmissions shall be maintained where permanent-type recorders are furnished for this purpose. Completed records shall be filed chronologically and indexed for easy reference. Records may be disposed of only as prescribed by the operating agency.

3.976 Maintaining Traffic Tabulation with Mechanical Traffic Counters. Mechanical counters are normally used to record the number of local aircraft operations. However, where sufficient counters are provided, a tabulation of other types of operation may be so maintained.

4. APPROACH CONTROL PROCEDURES

4.0 GENERAL

* 4.00 Approach control service is normally provided by airport traffic control towers. Such service may be provided by a center and in some cases, where local requirements dictate, responsibility for providing approach control service may be delegated to a separate unit such as a military IFR control room. In such cases these units, for purposes of these procedures, shall be considered in the same light as a tower to which approach control authority is delegated, and any special procedures necessary shall be incorporated in a center/approach control letter of agreement.

4.01 Operational Requirements: The operational requirements for implementing approach control are:

- (a) An adequate approach facility for instrument approach and holding purposes with established instrument approach procedures.
- (b) One or more of the radio channels available in the tower for direct communication with the pilot.

* 4.02 Responsibility: The control of IFR traffic shall be effected by centers and approach control facilities as follows:

(a) The center shall provide separation between all aircraft operating on IFR flight plans within the control area, except that approach control shall provide separation between:

- (1) arriving aircraft under approach control jurisdiction;
- (2) departing aircraft not requiring en route separation from each other, and between departures and all other aircraft under approach control jurisdiction.

* 4.020 The transfer of control of aircraft from one facility to the other shall normally be accomplished only after all possible conflicts with other known IFR traffic, under the transferring facility's jurisdiction, have been eliminated.

* 4.021 The center shall clear arriving aircraft to the appropriate holding point, including holding information and the expected approach time in such clearances. Such aircraft shall normally be released to approach control at a time altitude, or fix preceding the clearance limit. The number of aircraft to be released to approach control shall be determined by joint center/approach control agreement. This number shall not exceed the optimum number which can be handled efficiently by approach control considering the maintenance of a minimum landing interval.

* 4.022 At a location where adequate secondary fixes are available as holding points, the number of aircraft to be held at the approach fix shall be determined by joint center/approach control agreement. The number of aircraft held at the approach fix will depend upon the flying time between the secondary fix/s and the approach fix. The longer the flying time, the greater should be the number of aircraft held at the approach fix in order to avoid gaps in the approach sequence.

* 4.023 Where secondary fixes are utilized as holding points (in addition to the approach fix) the center shall clear arriving aircraft to the approach fix until that stack is filled. Thereafter, succeeding aircraft shall ordinarily be cleared to the secondary fixes beginning with the altitude level which is 1,000 feet above the highest altitude in use at the approach fix. Where the secondary fix/s are of sufficient distance from the approach fix to permit simultaneous holding at the same altitude, the minimum holding altitude at the secondary fix/s should be determined by joint center/approach control agreement. Normally, procedures should not be employed which would require an aircraft to climb when being moved from a secondary fix to the approach fix.

4.03 Take-off Limitations: An approach controller may, at his discretion authorize take-off with less than the separation standards specified in Section 2 under the following conditions:

- (a) When the arrival is sighted by the controller; or
- (b) Until the arrival, making a straight-in approach to the airport, reports leaving a holding fix located not less than four miles from the airport;
- (c) When the arrival, making a contact approach, reports over a visual reporting point not less than four miles from the airport; or
- (d) When the arrival, in radar contact and positively identified, is observed to be not less than two miles from the airport.

4.1 Communications Procedures:

4.10 Holding:

* 4.100 Under approach control procedures, aircraft will be cleared by the center to a holding fix with appropriate holding information. Clearances to hold "UNTIL FURTHER ADVISED BY (name of) APPROACH CONTROL ON (frequency)" may be

included so that the pilot will know on which frequency he will receive further clearances. The pilot is expected to establish communication with the approach controller when he arrives over the specified holding point, unless an earlier time is specified in his clearance.

4.11 Communications Contacts:

4.110 The following communications contacts are expected of the pilot after his release to approach control:

- (a) Report to approach control the time and altitude of reaching the holding fix or point to which cleared.
- (b) Report when vacating any previously assigned altitude level for a newly assigned level.
- (c) Report when leaving any assigned holding fix or point.
- (d) Advise Approach Control when visual reference to the ground is established.
- (e) Report when an approach has been missed and request further clearance.

4.12 Communications Channels:

4.120 When the voice feature of the radio range is being used for approach control communications and the pilot desires to listen to the navigational feature while executing an instrument approach, he may filter out the voice channel during his final approach. If the controller wishes to contact the pilot during this period, the attention signal of the range will be operated to indicate to the pilot that a message follows.

4.121 Pilots should maintain communication by listening on the approach control frequency until cleared to change to the local control frequency (278 kc or equivalent), or to the appropriate ground control frequency. (Note : VHF equipped aircraft may be permitted to remain on the approach control frequency until landed, if the traffic load permits).

4.122 Clearances to departing aircraft (taxi clearances, wind direction and velocity, time check, altimeter setting, runway number, air traffic control clearance, etc.) but not including take-off clearances, will normally be issued by the tower on the appropriate ground control frequency (121.9 or 121.7 mc). For take-off clearance the pilot will normally communicate with the tower on the appropriate airborne VHF frequency.

4.2 Basic Control Procedures:

4.20 General

4.200 A radio fix (ILS outer marker, approach control fan marker, etc) located in the terminal area may be utilized as a holding fix. Aircraft are stacked vertically at successive 1000 foot levels, the lowest holding level being at least 1000 feet above the terrain.

4.201 Arriving aircraft will be cleared by the appropriate center to hold at an assigned altitude at a holding fix serving the terminal area. Thereafter, the control tower concerned will issue clearances to the pilots involved, provided the aircraft have been released to approach control.

4.202 In the event the holding fix is not received and the pilot has not received clearance for final approach, the last assigned altitude will be maintained to the radio range station and pilot should request further clearance.

4.203 When the reported ceiling is below the initial approach altitude authorized over the radio navigation facility at the point of intended letdown, the reported ceiling and visibility shall be included by the tower in the initial transmission to the aircraft and revised as necessary.

4.3 Approach Procedures - Vertical Separation

4.30 General

4.300 These approach procedures are designed to increase the frequency of arrivals and are applicable to locations provided with a fan marker, H facility, or other fix properly located along the final approach course to an airport. The aircraft are held at the fan marker or other suitable fix, and are provided with 1000 feet vertical separation in the stack. The lowest holding altitude permissible at the holding fix shall normally be utilized as the base of the stack.

4.301 Vertical separation is maintained throughout the approach sequence. Standard vertical separation is provided all aircraft until an approach is commenced. A combination of longitudinal and vertical separation is provided aircraft after leaving the holding fix inbound on approach. The longitudinal separation is dependent upon the time interval being applied between successive approaches. The vertical separation is dependent upon the difference in lowest holding altitude and the final approach altitude.

4.31 Application

4.310 Each pilot in the approach sequence shall be given advance notice as to the time he should leave the holding marker on approach to the airport. The pilot should then arrange his flight path so as to leave the marker exactly at the designated time. Departure should be made at the designated time without further clearance from the tower, maintaining the last assigned altitude.

4.311 The first aircraft will leave the holding fix at the time designated, and will commence descent when cleared for a straight-in approach to the airport. Normally, the clearance to land will be issued at the time aircraft report contact or are sighted by the tower.

4.312 The second aircraft will be instructed to descend to the altitude previously held by the first aircraft after the first aircraft has reported vacating that altitude and leaving the fix inbound.

4.313 The second aircraft will be instructed to leave the holding fix at a specified time (determined by the shortest time interval between approaches the controller considers practicable) and to maintain the last assigned altitude. This aircraft will then be cleared for an approach (descent) when the preceding aircraft is sighted by the tower and reasonable assurance exists that a normal landing can be made. In some instances, approach clearance may be issued a minute or two after the aircraft has departed from the holding fix.

4.314 The aircraft at the lowest holding altitude need not be held at the marker until the preceding aircraft is in sight, but should be given a departure time which will allow the pilot to proceed toward the range station (maintaining his altitude) and still be able to make a normal descent to the airport after approach clearance is received. This procedure will shorten the time interval between successive approaches.

4.315 If clearance for approach is not received in sufficient time to permit normal descent, the last assigned altitude should be maintained to the range station and further clearance requested.

4.316 Determination of the time interval to be used between successive aircraft making final approach is dependent on the speed of the aircraft, prevailing weather conditions and distance from the holding fix to the airport. If the aircraft will arrive over the range station on instruments, an additional minute may be added to the minimum time interval to allow the pilot one minute of level flight prior to crossing the range station. If weather conditions are such that the pilot is liable to encounter difficulty in completing his landing, however, the time interval is increased sufficiently to allow the first aircraft to land before the second aircraft is cleared for approach.

4.317 Succeeding aircraft will be cleared to descend when the next lowest altitude level has been reported vacated.

4.32 Missed Approaches:

4.320 In the event of missed approach, the pilot should follow the missed approach procedure, climbing to missed approach altitude on the appropriate course and request further clearance. (Succeeding aircraft of the sequence which have departed from the approach control fan marker would under these circumstances be required to maintain their assigned altitudes and hold between the range station and the holding fix). The center shall be immediately advised of the missed approach and subsequent action coordinated between the tower and center.

4.33 Examples of Phraseologies - Approach Procedures with Altitude Separation.

4.330 Clearance to Holding Fix - Clearance of aircraft to a holding fix (Edgewood) by an air route traffic control center for approach control purposes would be given in the following manner:

"CESSNA ONE TWO THREE FOUR CLEARED TO EDGEWOOD, MAINTAIN THREE THOUSAND, HOLD WEST OF EDGEWOOD UNTIL ADVISED BY SMITHVILLE APPROACH CONTROL ONE ONE ONE EIGHT POINT THREE MEGACYCLES. EXPECT APPROACH CLEARANCE AT ONE SIX ONE TWO."

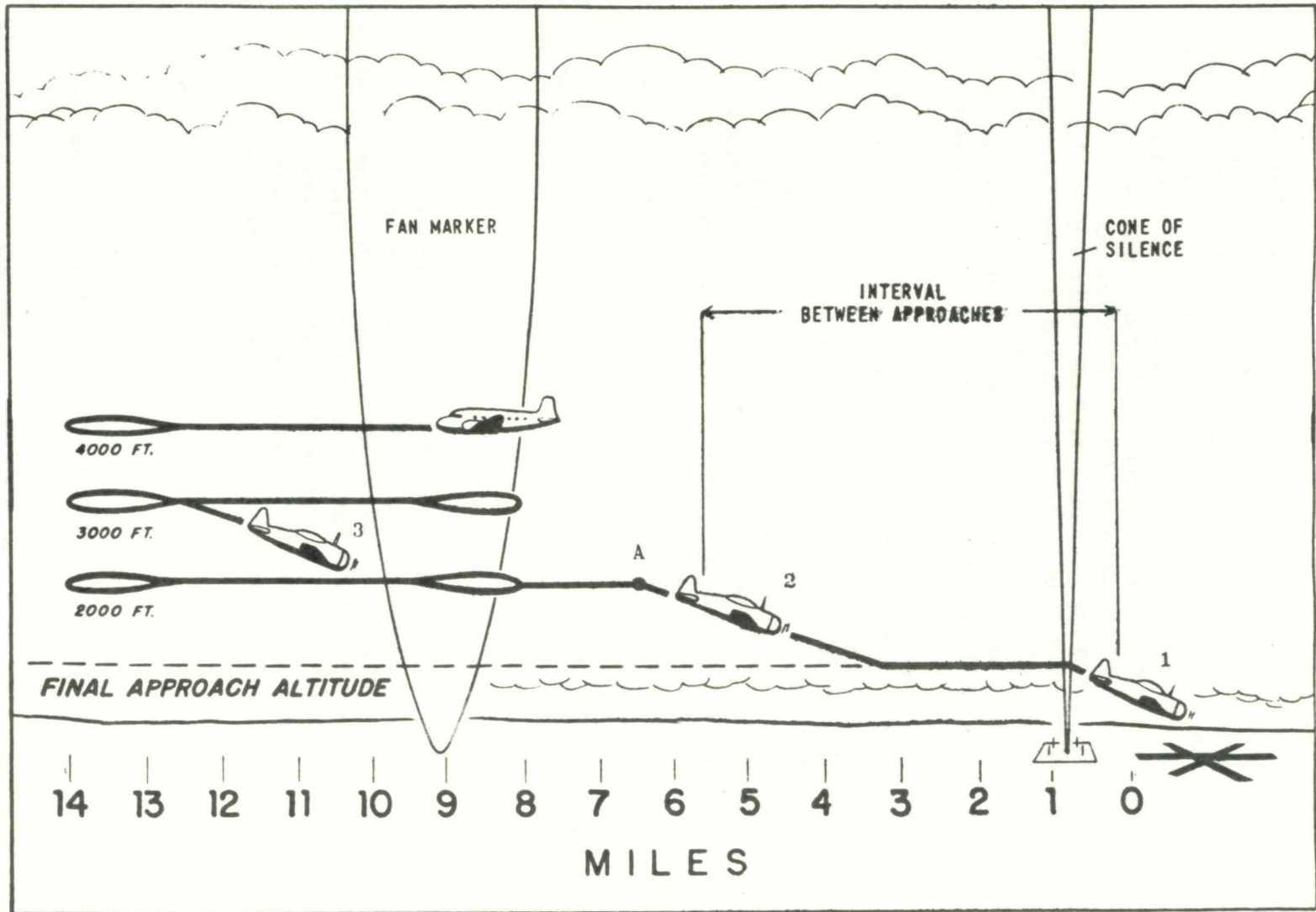


FIGURE 11. Approach Procedures - Vertical Separation. The above diagram shows an aircraft holding at 4000; #3 leaving 3000 as instructed when #2 reported leaving 2000; #2 has left fan marker at designated time maintaining 2000 until approach clearance received (Point A) where descent was started; #1 has been sighted, enabling the approach controller to clear #2.

4.331 The pilot would report his arrival over the holding fix to the approach controller in the tower as follows:

"SMITHVILLE APPROACH CONTROL THIS IS CESSNA ONE TWO THREE FOUR, OVER EDGEWOOD ONE FIVE FIVE SEVEN AT THREE THOUSAND, OVER."

4.332 The approach controller would acknowledge over the appropriate frequency, giving current ceiling and visibility (if required), altimeter setting, time check and further clearance as necessary.

4.34 Example of Control Problem:

* 4.340 Assume that three aircraft, Navy 1615 at 2000 (#1), Air Force 1234 at 3000 (#2), and Beechcraft 5678 at 4000 (#3), have arrived at the holding fix (Edgewood) and have reported to the approach controller. Final approach altitude is 1000 feet. Clearances and reports would be as follows.

<u>Time</u>	<u>Identification</u>	<u>Clearances or Reports</u>
16:00	Approach Control	Navy 1615 cleared for a straight-in approach to airport Runway 36, wind north 8.
16:02	Navy 1615 (#1)	Leaving Edgewood and 2000 at 02.
16:02	Approach Control	Air Force 1234 descend to 2000 immediately, maintain 2000, depart Edgewood inbound at 16:07.
16:02	Air Force 1234 (#2)	Leaving 3000.
16:03	Approach Control	Beechcraft 5678 descend to 3000 immediately, maintain 3000, depart Edgewood inbound at 16:12.
16:03	Beechcraft 5678 (#3)	Leaving 4000.
16:07	Air Force 1234	Leaving Edgewood at 07. Maintaining 2000.
16:08		(Navy 1615 is sighted by tower).

<u>Time</u>	<u>Identification</u>	<u>Clearances or Reports</u>
16:08	Approach Control	Air Force 1234, cleared for a straight-in approach to airport. Runway 36, wind north 8.
16:09	Air Force 1234	Leaving 2000.
16:09	Approach Control	Beechcraft 5678 descend to 2000 immediately, maintain 2000.
16:09	Beechcraft 5678	Leaving 3000.
16:12	Beechcraft 5678	Leaving Edgewood at 12, maintaining 2000.
16:13		(Air Force 1234 is sighted by tower and cleared to land)
16:13	Approach Control	Beechcraft 5678, cleared for straight-in approach to airport, runway 36, wind north 8.
16:13	Beechcraft	Leaving 2000.
16:18		(Beechcraft 5678 sighted by tower and cleared to land)

NOTE: In the above example, although each aircraft required six minutes to proceed from the marker to the airport (in sight of tower), the interval between successive approaches was only five minutes. The aircraft at the lowest holding altitude need not be held at the marker until the preceding aircraft is in sight.

4.4 Approach Procedures - Longitudinal Separation

4.40 Utilization of "Timed Approaches"

4.401 A fan marker located on the approach course of the radio range, the ILS outer marker/compass locator, or other fixes on the approach course may be utilized as a holding fix for timed approaches.

4.402 Time separation during the approach shall not be used, and vertical separation shall be provided unless:

- (a) Satisfactory communication is established and maintained between aircraft and the approach controller; and,
- (b) Alternate missed approach procedures are available, or in lieu thereof, a sliding scale of ceiling and visibility combinations is established by Air Traffic Control for each location, below which timed approach procedures shall not be employed due to the probability of missed approaches; and,
- (c) Regular or alternate missed approach procedures do not involve reversal of course.

4.403 The application of timed approach procedures necessitates accurate timing by pilots; therefore, each pilot in the approach sequence shall, prior to descent to the lowest holding altitude, be given a time check and the time to leave the fix inbound on his approach.

4.41 Normal Control Procedures

4.410 The first aircraft will leave the holding fix at the time designated and will commence descent for a straight-in approach to the airport.

4.411 The second aircraft will be given a time check and cleared to descend to the altitude previously held by the first aircraft after the first aircraft has reported vacating that altitude, and be instructed to leave the holding fix INBOUND at a specified time (determined by the shortest time interval between approaches considered practicable). The second aircraft should not be held at the fix until the landing of the first aircraft is assured if adequate separation will exist during the approach.

4.412 The third and succeeding aircraft in the sequence will be descended to the next level when preceding aircraft have reported vacating the lower altitudes.

4.413 The time interval to be used between successive approaches shall be determined by the approach controller and is dependent upon the speed of the aircraft, existing weather conditions, the distance from the holding fix to the airport and type of approach. Under optimum conditions a two-minute interval is the absolute minimum; this interval being increased as necessary in poorer weather conditions; or because of high speed aircraft following slower speed aircraft.

4.414 It should be understood that the utilization of Timed Approach Procedures to expedite straight-in approaches from a holding fix shall not compromise the arrival sequence of other aircraft which will execute a different type of instrument approach. For example, the timed approach sequence at an ILS outer marker must be interrupted to permit an aircraft holding at the range station to commence a range approach in the established arrival sequence.

4.42 Missed Approaches

4.420 Locations where alternate missed approach procedures are NOT available. Strict adherence to the sliding scale minimums referred to in paragraph 4.402 should preclude the possibility of missed approaches. However,

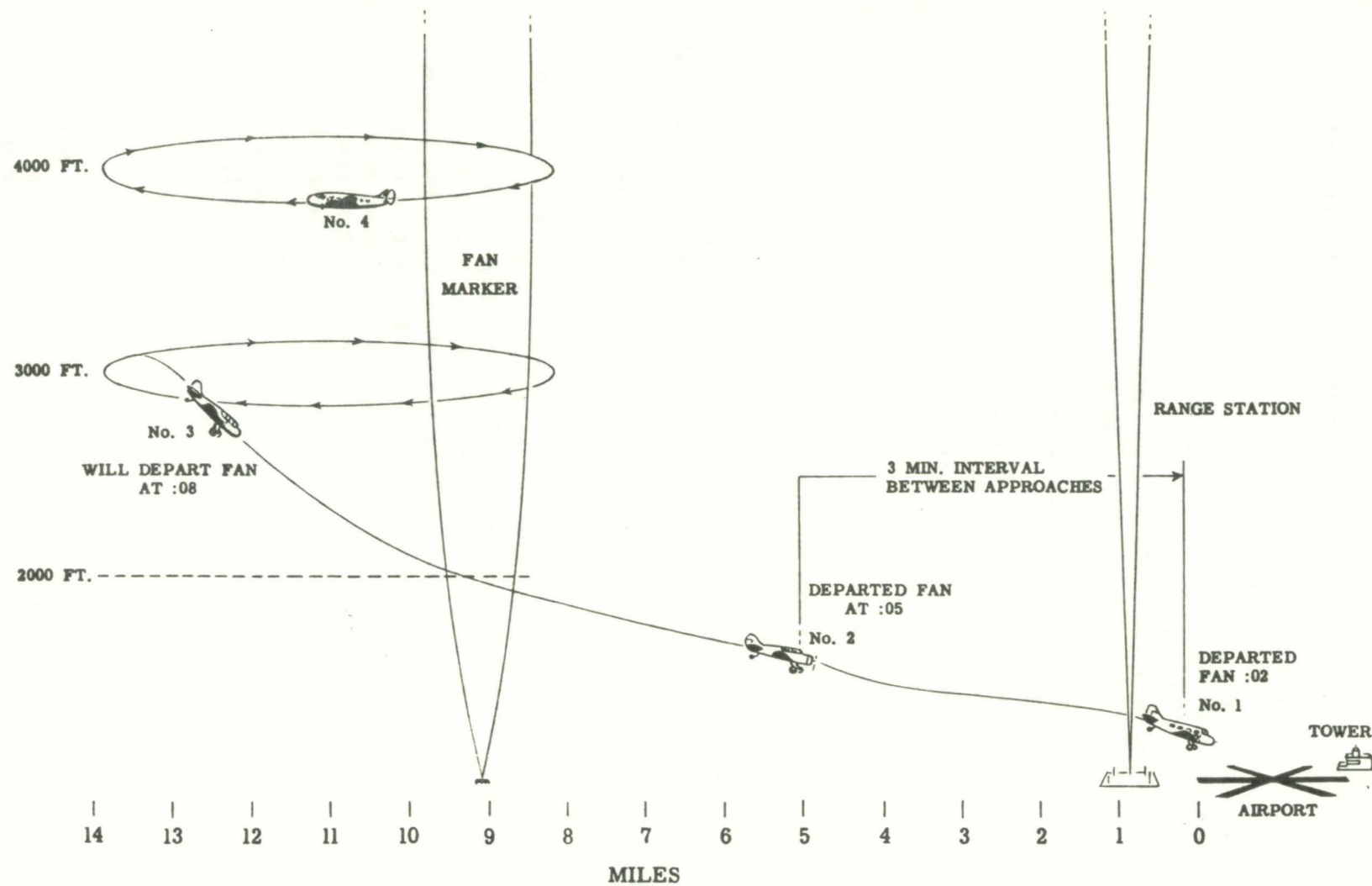


FIGURE 12. Approach Procedures - "Timed Approaches". The above diagram illustrates the application of time separation principles to an approach sequence. Using an interval of three minutes between successive approaches, the controller has cleared the Nos. 1, 2, and 3 aircraft to leave the marker inbound on approach at three-minute intervals. After aircraft in the approach sequence depart the holding fix inbound, no altitude separation is provided, longitudinal separation being utilized.

when weather conditions approach the minimums established for timed approaches, the interval between successive aircraft should be increased sufficiently to insure that the third aircraft in the sequence (at the second holding level) will not be given an approach clearance and descended to the lowest holding altitude until the landing of No. 1 is assured. This is necessary since the second aircraft must be returned to the holding fix in the event the first aircraft misses the approach.

4.421 Locations where alternate missed approach procedures ARE available. When weather conditions are such that the possibility of missed approaches exists, the approach clearance to alternate aircraft in the sequence shall specify the ALTERNATE missed approach procedure. In the event an aircraft misses an approach, the succeeding aircraft may be permitted to continue its approach, if already inbound from the holding fix. All other aircraft should then be held at their assigned altitudes at the fix until the first two are no longer a factor.

4.43 Example of Control Problem and Phraseologies

4.430 Assume that three aircraft, Navy 1615 at 2000 (#1), Air Force 1234 at 3000 (#2), and Beechcraft 5678 at 4000 (#3) have arrived at the holding fix (Edgewood) and have reported to the approach controller. Lowest holding altitude is 2000 feet; interval three minutes. Clearances and reports would be as follows:

<u>Time</u>	<u>Identification</u>	<u>Clearances or Reports</u>
16:00	Approach Control	Navy 1615 cleared for Edgewood approach and straight-in landing, runway 36 wind north 8.
16:02	Navy 1615 (#1)	Leaving Edgewood and 2000 at 02
16:02	Approach Control	Air Force 1234, the time is now 16:02*, cleared for Edgewood approach descend to 2000 immediately, depart Edgewood inbound at 16:05.
16:02	Air Force 1234 (#2)	Leaving 3000
16:03	Approach Control	Beechcraft 5678, the time is now 16:03, descend to 3000 immediately
16:03	Beechcraft 5678 (#3)	Leaving 4000.

*Time check omitted if previously given

<u>Time</u>	<u>Identification</u>	<u>Clearances or Reports</u>
16:05	Air Force 1234	Leaving Edgewood and 2000 at 05
16:06	Approach Control	Beechcraft 5678 cleared for Edgewood approach descend to 2000 immediately depart Edgewood inbound at 16:08.
16:06	Beechcraft 5678	Leaving 3000.
16:07 1/2		(Navy 1615 is sighted by tower)
16:08	Beechcraft 5678	Leaving Edgewood and 2000 at 08
16:11		(Air Force 1234 is sighted by tower and cleared to land.)
16:14		(Beechcraft 5678 sighted by tower and cleared to land)

- NOTE: 1) Altimeter setting, weather, etc , omitted from example for brevity.
- 2) In the above example, although each aircraft required six minutes to proceed from the marker to the airport (in sight of tower), the interval between successive approaches was only three minutes .

5. PROCEDURES FOR ALERTING SEARCH AND RESCUE FACILITIES

5.00 Introduction. The purpose of including these procedures in this manual is to ensure standard search and rescue alerting procedures on the part of Air Traffic Control. Air traffic control facilities do not have either direct or indirect control of rescue facilities. Therefore, it is necessary to specify air traffic control functions, responsibilities and procedures for alerting such facilities.

5.000 General The center, by virtue of the information it possesses regarding movements of aircraft, shall serve as the central point for the co-ordination of flight data and dissemination of aircraft movement information regarding air traffic within flight advisory areas .

5.0001 Search and Rescue: Search and rescue information shall be provided by Air Traffic Control to assist the associated air rescue agency by advising of aircraft believed, or known to be in need of rescue assistance by supplying pertinent information in relation to last known position, estimated present position, radius of possible action, position of other aircraft along the route of flight, and by acting as clearing agency for assembling other necessary data.

5.01 Safety Center: A safety center, where established, shall consist of an air route traffic control center and a rescue co-ordination center. The air route traffic control center administers air traffic control within the limits of its responsibilities, whereas the rescue co-ordination center will administer the search and rescue service. When not adjoining or when necessary, the air route traffic control center and the rescue co-ordination center must be connected by telephone, interphone, teletype, or by other means of direct communication.

5.02 Alerting of Organized Search and Rescue Service: Where an organized Search and Rescue Service is in operation within a control area or flight advisory area, the notification regarding aircraft in distress shall be forwarded to the appropriate Rescue Agency by Air Traffic Control.

In flight advisory areas, where there is no air traffic control service established, similar action will be taken by the agency responsible for providing flight information service.

Each air route traffic control center shall establish a co-ordinated plan, with the established rescue co-ordination center serving the control area of that center, to provide for the effective execution of responsibilities and procedures outlined below:

- (1) When assistance to aircraft in distress is required, other than that provided by a flight information service, the rescue co-ordination center will be responsible for providing that assistance.
- (2) When it is determined that an aircraft is in distress, the center having this information will be responsible for immediately notifying the appropriate rescue co-ordination center. In the event of an aircraft in distress being handled by airport traffic control or approach control, it will be the responsibility of such control to notify the air route traffic control center which will in turn notify the rescue co-ordination center. This shall not prevent airport traffic control or approach control from alerting local search and rescue agencies or notifying the rescue co-ordination center direct when the airport traffic control or approach control is not located within a control area.
- (3) When an aircraft that is believed to be in distress is under the operational control of an operating agency, the air route traffic control center having this information will advise such operating agency and obtain concurrence that the aircraft is actually in need of assistance prior to notifying the rescue co-ordination center. However, if it is determined that an aircraft is actually in distress, such rescue co-ordination center may be advised before notifying the operating agency.

5.03 Alerting Procedures.

5.0300 For purposes of alerting the rescue co-ordination center, Air Traffic Control will consider aircraft to be in distress under the following circumstances:

- (1) When information is received that an aircraft has definitely made a forced landing or is about to do so.
- (2) When information is received which indicates that the operating efficiency of an aircraft has been impaired to the extent that a forced landing is likely.
- (3) When overdue as defined for the particular route or region concerned.

5.0301 Alerting Information: The following information is to be included in the alerting report to the rescue co-ordination center:

- (1) Agency and person calling.
- (2) Flight plan of aircraft and colour if known.
- (3) Time last transmission received, by whom and frequency used.
- (4) Last position report and how determined.
- (5) Number of persons aboard.
- (6) Time fuel expected to be exhausted.
- (7) Whether or not two-way communication is available.
- (8) Any action taken by reporting office.
- (9) Other pertinent remarks.

5.0302 Plotting Aircraft in Distress: When an aircraft is in distress, the air route traffic control center shall plot the flight on a chart, utilizing previously reported positions and other available information. The probable future positions of the aircraft should be projected thereon as well as the radio direction finding fixes, if available. Positions of other known aircraft operating in the vicinity of the aircraft in distress and their probable future positions should also be plotted. Taking into consideration the known fuel supply, a maximum radius of action from the last known position shall also be plotted. All known information is to be forwarded immediately to the rescue co-ordination center.





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