7031.3

7/2/65

AIRWAY PLANNING STANDARD NUMBER TWO -
AIR ROUTE TRAFFIC CONTROL

AN FAA HANDBOOK

FEDERAL AVIATION AGENCY
Washington, D. C.

NOTICE TO HANDBOOK USERS

UPON RECEIPT OF A HANDBOOK CHANGE.

1. Check to be sure you have the preceding change - check for gaps in change numbers.

2. Examine transmitted materials, and note new or revised text enclosed in asterisks.

3. Follow instructions in the page control chart in the transmitting notice, for removing and inserting pages.

4. When you need to keep replaced pages, staple them to the change notice that directed their removal. Ordinarily, replaced pages will not be kept, except in master files.

5. Read the transmitting notice carefully; note items requiring immediate action.

PAGE AND PARAGRAPHS NUMBERING. The basic pages and paragraphs of this handbook are numbered in straight sequence. Tables of contents and appendix pages are numbered in straight sequences. When it is necessary to insert new pages or paragraphs, the new pages or paragraphs will be numbered by "dash" numbers. For example, a paragraph (or page) to be inserted between 26 and 27 will be designated as 26-1 and 26-2, etc. In some cases, two dash numbers will be used (e.g., 26-10, 26-11, 26-12, etc.) because of a large number of insertions.

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THE ONLY GOOD HANDBOOK IS AN UP-TO-DATE HANDBOOK

RECORD OF CHANGES 7031.3

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CHANGE NO.	INITIAL	DATE	CHANGE NO.	INITIAL	DATE	CHANGE NO.	INITIAL	DATE	CHANGE NO.	INITIAL	DATE
1	[illegible]	4/18/66	35			69			103		
2	[illegible]	11/18/66	36			70			104		
3			37			71			105		
4		13 Sept 71	38			72			106		
5		4/2/74	39			73			107		
6			40			74			108		
7			41			75			109		
8			42			76			110		
9			43			77			111		
10			44			78			112		
11			45			79			113		
12			46			80			114		
13			47			81			115		
14			48			82			116		
15			49			83			117		
16			50			84			118		
17			51			85			119		
18			52			86			120		
19			53			87			121		
20			54			88			122		
21			55			89			123		
22			56			90			124		
23			57			91			125		
24			58			92			126		
25			59			93			127		
26			60			94			128		
27			61			95			129		
28			62			96			130		
29			63			97			131		
30			64			98			132		
31			65			99			133		
32			66			100			134		
33			67			101			135		
34			68			102			136		

ORDER

FEDERAL AVIATION AGENCY
Washington, D. C.

7031.3

7/2/65

SUBJ: AIRWAY PLANNING STANDARD NUMBER TWO -- AIR ROUTE TRAFFIC CONTROL

1. PURPOSE. This order transmits the handbook on the indicated subject.

2. CANCELLATIONS. AT P 7031.2 dated September 1960 and AT P 7031.2 CH 1.

D. D. Thomas

D. D. Thomas
Deputy Administrator

Distribution: AT 7031; FAT-0, minus FAT-4,7 (2 cys); FAT-4,7 (1 cy); FIA-0 (1 cy); selected user groups

TABLE OF CONTENTS

1. GENERAL.

a. The Federal Aviation Act of 1958 empowers the Administrator to regulate the use of navigable airspace in the interest of safety of aircraft and efficient use of such airspace. To discharge this responsibility, the FAA designates controlled airspace within established categories, provides air navigation facilities, communications, radar, and other components of the en route air traffic control system serving qualified communities. This handbook contains criteria for establishing the various components of the system.

b. Since 1951, the FAA and its predecessor organizations have used the establishment criteria published in the airway planning standards as the primary means of allocating air navigation facilities and air traffic control services. The result has been an orderly distribution of facilities and services at locations where they benefit the greatest number of users for the least number of dollars consistent with safety and operational efficiency.

c. The existing National Airspace System satisfies essentially all of the current needs of communities now receiving en route services. The criteria in this handbook are oriented to adjustments as indicated by growth or reduction in air traffic activity. The criteria do not cover all situations that may arise because of the complex nature of the functions involved. Each situation will require individual evaluation to determine if the need justifies the cost.

2. POLICY. The FAA shall establish, operate and maintain en route facilities and air traffic services when justified by safety considerations and operational requirements in accordance with the following policy:

a. Cost/Benefit. Since the Agency must provide en route facilities and air traffic control services within defined budgetary limitations, all components of the system shall be allocated where the greatest benefits will be derived from the funds expended.

b. Establishment and Discontinuance of En Route Facilities and Air Traffic Control Services.

(1) Establishment. Communities or routes qualify for new or additional en route facilities when:

(a) The criteria specified herein are met for three consecutive FAA annual counts. (An FAA annual count is a fiscal year or calendar year annual activity summary. Where actual traffic counts are not available, adequately documented FAA estimates may be used), or

(b) It is recommended by a regional director as being necessary to satisfy an operational requirement and is economically justified by a cost/benefit study.

(c) The recommendation of the regional director is concurred in by the Administrator.

(d) A review of the basis for original justification of the project shall be made prior to the start of surveys or construction of a new or additional facility. Changes or expected changes in eligibility factors, such as discontinuance of air carrier service, closing of a military base, new airport plans, etc., shall be reported to the Washington Office with recommendation for disposition of the project.

(2) Discontinuance. An en route facility whose activity level is at the discontinuance criteria specified herein, or factors other than activity level on which it may have been justified are eliminated or changed significantly, becomes a candidate for decommissioning. If the activity level remains at or goes below the discontinuance criteria level for three consecutive FAA annual counts, the facility will be decommissioned unless its retention can be specifically justified.

c. Communications and Radar Coverage. Direct communications between pilots and controllers are required and radar coverage is desired in all positive control areas.

d. Military Facilities. No FAA facility shall be established where an existing military facility satisfies operational requirements. FAA acquisition, operation or use of military facilities will be covered by arrangements and letters of agreement between DOD and FAA.

e. Dualization of VOR/VORTAC Facilities. The basic VOR/VORTAC shall comprise a single VOR transmitter, single TACAN beacon, ancillary equipment and dual monitors. Exceptions may be justified at locations that qualify in accordance with the following criteria:

(c) the facility is identified by the military as having a specific military requirement for dual TACAN equipment, or

(d) an unmanned facility is at such a remote location that time to restore it to service would be operationally unacceptable.

(2) Dual VOR transmitters and dual VOR monitors shall be provided when:

(a) an en route FAA VOR/VORTAC is not provided backup from adjacent VOR/VORTAC facilities by substitute routing, or

(b) an unmanned facility is at such a remote location that time to restore it to service would exceed three hours, or

* (c) Withdrawn - CHG 5

(d) the facility is a high traffic density en route or terminal area (large or medium hub) VOR, or *

(e) the facility is located in critical terrain, or

(f) the facility is located where an alternate VOR airway provided by an adjacent VOR becomes saturated upon failure of the primary VOR.

(3) For existing facilities at which the installed equipment exceeds the basic criteria, no equipment will be removed unless justified by an operational and benefit/cost analysis.

3. CRITERIA.

a. En Route Facilities and Services. The National Airspace System comprises the complex of air navigation and communication facilities, radar, designated airspace, air traffic control services and procedures that are required for the safe and expeditious flow of air traffic. This handbook specifies the criteria for the establishment of those facilities and services that are primarily required for operation in the en route portion of the system, that is, between terminal areas. It is recognized that because of the necessarily integrated nature of the National Airspace System a facility may serve both en route and terminal functions. For example, the air route traffic control centers (ARTCC) which are the hard core of en route air traffic control, provide air traffic service at many non-FAA tower airports with instrument approach procedures. Similarly, many instrument approach procedures are based on a VOR/VORTAC facility whose primary function is to provide en route navigation capability. Application of the criteria and cost/benefit factors should therefore consider ancillary as well as primary functions and the total cost, in terms of FAA resources, required to

provide an air traffic control service.

b. VOR/VORTACS.

(1) Background. The VOR/VORTAC facilities comprise the U. S. primary system for short range navigation. Existing airways and existing and programmed VOR/VORTACs satisfy most current and foreseeable requirements within the conterminous United States. VOR/VORTAC requirements outside the conterminous United States and additions to or deletions from the presently approved master plan should be relatively few in numbers and will be justified on an individual basis.

(2) Establishment. A community served by an airport that meets one or more of the criteria listed below becomes a candidate for IFR navigation capability between the airport and en route structure when:

(a) It has 200 or more annual instrument approaches.

(b) It has 1,825 or more scheduled annual passenger originations.

(c) It has an active military base which requires en route facilities to accomplish the assigned mission and/or to provide safety.

En route navigational facilities required to serve qualified communities or routes shall be provided as follows:

(d) Existing VOR/VORTACs shall be used whenever possible.

(e) Existing TVORs may be redesignated as VORs if such action will eliminate the establishment of new facilities or the relocation of other existing facilities.

(f) Existing facilities shall be considered for relocation if such action does not have serious adverse effect on other communities or routes served by the facility.

(g) New facilities may be programmed when actions prescribed in (d), (e) and (f) are not practical.

* (3) Discontinuance. A VOR/VORTAC providing navigation capability* between an airport and the airway structure is a candidate for decommissioning when the airport:

(a) Has less than 100 annual instrument approaches and 1,095 scheduled annual passenger originations, or

(b) A military base is deactivated or assigned a new mission eliminating the need for en route service and other activity levels fail to meet the criteria for retention, and

(c) Discontinuance of the VOR/VORTAC will not adversely affect the continuity or efficiency of the en route system.

* An en route navigational facility is a candidate for decommissioning when there is no longer an IFR or a VFR requirement for the navigational capability provided by the facility.

(a) The VFR requirement is considered as satisfied and the facility may be discontinued if there is navigational guidance available from other facilities at and above 3500 feet above ground level along the routes or flyways normally used by VFR aircraft.

(b) If there is no navigational guidance above 3500 feet, possible retention of the aid for VFR purposes shall be based upon an estimate of the effect the deletion would have on the flow and safety of VFR air traffic. Consideration shall be given to the numbers of based aircraft in the vicinity, the number of VFR flight plans and VFR radio contacts generated in the area and the nature of the surrounding terrain.

(c) If retained for VFR purposes a VORTAC could normally be downgraded to a VOR or a TVOR. If DME is required the TACAN portion could be modified to or replaced with a single channel DME. *

c. Air/Ground Channels and Radar Facilities.

(1) Remote Center Air/Ground (RCAG) Sites.

(a) Background. RCAG sites are established to provide direct communications between pilots and air traffic controllers. These facilities expedite the flow of air traffic and enhance safety by eliminating the need to relay messages through a third party and errors in communications which may result through the relay process.

(b) Establishment. An RCAG site may be considered for establishment provided that the direct air/ground communication requirement cannot be satisfied by providing additional channels in existing FAA facilities, or by appropriate agreement in existing military facilities.

(c) Discontinuance. An RCAG site shall be discontinued when no longer supported by a valid operational requirement.

(2) Extended and Long Range RCAGs. These facilities will be established only in a relatively few locations where an individual staff study clearly indicates a favorable cost benefit relationship.

(3) En Route Radar Coverage.

(a) Background. Long Range Radar (LRR) provides the controller with a visual presentation of his traffic and results in higher utilization of the airspace by permitting reduced separation minima to be employed when traffic is under radar control. Secondary surveillance radar is an integral part of the en route radar system. Its basic function is to supplement LRR by transmitting interrogating signals to transponder-equipped aircraft to facilitate radar identification. Essentially all en route radar coverage requirements within the conterminous United States are satisfied by existing or planned radar facilities. Additions to the present en route radar system should be relatively few in numbers and will be justified on an individual basis, in accordance with the following criteria.

(b) Establishment.

1 Airways and Routes. The present en route system provides radar coverage of nearly all airway and route segments with 60 or more IFR peak day flights. This capability will permit the establishment of positive control airways where appropriate. The specific altitudes at which radar coverage is required will vary with the horizontal distribution of traffic on the airways or routes involved and may in some instances be as low as the minimum en route altitude.

2 Area Positive Control (APC) Airspace. Normally, radar coverage is required where APC is implemented.

3 Terminal Area Extended. Continuous radar coverage is required to provide radar handoff capability between en route and terminal radar facilities with 50,000 or more annual instrument operations.

(c) Discontinuance. En route radar facilities will be discontinued only when their function can be equally or better provided by more economical alternative facilities.

d. Airway Beacon Lights.

(1) Background. The existing net of highly reliable and accurate electronic navigation aids and the almost exclusive reliance on radio for air navigation have drastically reduced the requirement for airway beacon lights.

(2) Establishment. No new airway beacon lights shall be established.

(3) Discontinuance. All airway beacon lights shall be decommissioned unless, on an individual basis, it can be shown that the discontinuance of a beacon will result in an unusual or exceptional hazard to flight safety. The retention of an airway beacon light must be justified individually on the basis of the unique safety contribution or operational benefit provided by that light, considering among other things, terrain characteristics, weather conditions, alternate facilities, and the volume and type of aeronautical activity being conducted in the vicinity of the beacon. The retention of a light must also be personally approved by the appropriate regional director.

e. Direction Finder (DF) Facilities.

(1) Background. The objective of the FAA's direction finder program is to provide the maximum DF coverage of the highest use airspace that can be achieved within the resources of the program.

(2) Establishment. DF facilities will normally be installed in all hard core FAA Flight Service Stations (FSS) except when:

(a) Adequate DF coverage of the area served by the FSS is being provided by an adjacent FAA or military facility.

(b) Installation of the DF facility in either a Combined Station/Tower (CS/T) or FAA nonradar air traffic control tower will provide coverage of higher use airspace than would be provided by an FSS.

(c) An Airport Surveillance Radar (ASR) may be used to provide DF service in the area of coverage of an adjacent FSS when it may be accomplished without undue disruption of its air traffic control functions. The DF facility scheduled for that FSS may be reassigned to another location that will increase the DF coverage of high use airspace.

(3) Discontinuance. DF facilities will be discontinued when their function can be equally or better provided by more economical alternative facilities. A DF facility may be relocated when an individual study indicates that the DF coverage in the proposed location will provide service to higher use airspace, commensurate with the cost of relocating the facility.

f. Intermediate Fields.

(1) Background. Intermediate fields were established along airways during the early days of commercial aviation when aircraft were less reliable and there existed little or no capability to continue a flight if unfavorable weather conditions were encountered. These fields served a useful purpose by providing safe landing areas for en route aircraft that were frequently unable to continue to their intended destinations during the period when alternate airports were less numerous. The present system of airports eliminates the requirement for these facilities.

(2) Establishment. There is no longer a requirement for intermediate fields and none shall be established.

(3) Discontinuance. All intermediate fields shall be decommissioned unless, on an individual basis, it can be shown that the discontinuance will result in an unusual or exceptional hazard to flight safety. The retention must be justified on the basis of a unique safety contribution or operational benefit, considering among other things, terrain characteristics, weather conditions, alternate facilities and the volume and type of aeronautical activity being conducted in the vicinity. The retention of an intermediate field must also be personally approved by the appropriate regional director.

* g. LF/MF Radio Facilities. *

(1) Background. The network of LF/MF radio range and nondirectional radio beacon facilities provided the primary means of radio navigation prior to the adoption and development of the VOR/VORTAC system. The VOR/VORTAC facility is significantly more flexible in its use as a radio navigation aid than the four-course LF/MF facilities.

(2) Establishment. No additional LF/MF radio ranges will be established.

(3) Discontinuance. It is Agency policy to decommission LF/MF radio range and nondirectional radio beacon facilities. Exceptions may be made if the facilities are required for IFR navigation, by ICAO commitment or for transcribed weather broadcast in accordance with the area weather plan. Exceptions may also be made if public comment substantiates a public need for the facility. *

As a general rule, those LF/MF facilities that are retained will be converted to nondirectional radio beacons. Exceptions may be considered in Alaska where a radio range is an integral part of a low altitude airway structure.

h. Transcribed Weather Broadcasts (TWEB).

(1) Background. A requirement exists to provide transcribed weather broadcasts on low/medium frequency facilities within the conterminous United States. Nondirectional homing beacons (conversions of discontinued LF/MF radio ranges) strategically located will provide adequate geographic coverage. Selected FSSs may have personnel assigned to perform the transcribed weather broadcasts. One station may serve several TWEB outlets when it is financially advantageous to the FAA.

(2) Establishment. Expansion of TWEB service to areas not being served under the present area weather coverage plan will be determined on an individual site basis.

(3) Discontinuance. Transcribed weather broadcasts on low/medium frequency facilities will be discontinued when:

(a) An equal or better, more economical facility for disseminating required aviation weather information becomes available, or

(b) It is determined that the aeronautical activity within a TWEB service area is insufficient to justify the cost of providing the service.

i. Air Traffic Control

(1) Background. ARTCCs provide air traffic control service at terminal locations without approach control having an approved instrument approach procedure.

(2) Establishment. Air traffic control service may be furnished at terminal locations at which an instrument approach procedure is proposed provided such service can be furnished within existing FAA resources. The provision of air traffic control service at locations requiring additional FAA resources, i.e., landlines, communication facilities and/or manpower must be justified by a staff study to ensure that the cost per instrument approach is commensurate with the cost of the additional resources required.

(3) Discontinuance. Air traffic control service at a terminal location that was established within existing FAA resources may be retained as long as the annual instrument approach activity is commensurate with the cost of maintaining the public instrument approach procedure. Service at locations that required additional resources will be discontinued when their cost is no longer commensurate with the instrument approach activity.

4. OTHER AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC) EQUIPMENTS.

a. Cardatype Equipment.

(1) Background. The function of the Cardatype is to ease the workload of flight progress strip preparation and to serve as an introduction to automation through use of a semiautomatic printing device. The Cardatype lends itself to the preparation and calculation of strips for flights following standardized or commonly used routes, and mass military movements such as Strategic Air Command (SAC) missions.

(2) Establishment. The criteria governing installation of Cardatype equipment are as follows:

(a) One System.

1 A facility qualifies for the installation of a single Cardatype system when its activities indicate a machine operation time of 5 hours and 30 minutes or more, or

2 A facility processes a minimum of 150 flights and has at least 4 hours and 30 minutes of machine time.

(b) Two Systems. A second system may be requested after the initial system is operational a minimum of six months and either of the following conditions is satisfied:

1 The applicable flight plan processing workload equals or exceeds 11 hours and 30 minutes of a machine operation time, or

2 A minimum of 300 flights are processed and the machine operation time equals or exceeds 9 hours.

(c) Additional Systems. Systems in excess of two will be considered only in extreme cases upon submission of a justifiable request.

(d) Computation of Machine Operation Time. The machine operating time to be applied to the above criteria shall be computed in the following manner:

1 Establish the number of card decks which are, or, in the case of new installations, would be kept on file for use in the Cardatype operation. This will establish the number of standardized or commonly used routes for which Cardatype equipment can be used.

2 Determine the average number of fix postings (cards) contained within these decks. This is represented by P in the formula.

3 Determine the average time in seconds required to print one strip. This time varies from facility to facility depending upon the amount of information printed, whether all strips are fully calculated, whether only plus times are used, or whether the arithmetic unit is by-passed entirely. This is represented by T in the formula. The national average of 18.4 seconds shall be used as a guide by non-Cardatype equipped centers. (Maximum time allowable for formula computation purposes shall not exceed 20 seconds per strip.)

4 Determine the number of flight plans processed by the Cardatype system(s), or the number which could and would be handled, for a consecutive eight-hour period. The period chosen, known as the prime shift time, should reflect an average daily activity count and be representative of the flight plan processing workload normally encountered during the busiest eight hour flight plan processing period within the ARTCC concerned. This number is represented by N in the formula.

5 Apply the formula - $\frac{P \times T \times N}{3600} = H$

Where:

P = Fix postings as determined by 2 above.

T = Time, in seconds, to process an average flight progress strip as determined by 3 above.

N = Number of aircraft handled during an eight-hour (prime shift) period as determined by 4 above.

3600 = Number of seconds in an hour.

H = Hours of actual machine operation.

6 The value of H may be increased and appropriate number of minutes according to the amount of time the Cardatype system is used during the prime shift period to print strips required for airspace reservations, training problems, and similar operational applications. This increase in time shall not exceed 30 minutes.

(3) Discontinuance. Cardatype units will be removed whenever a center's Cardatype machine operation time decreases 20 percent or more below the qualifying criteria or when electronic data processing equipment is installed in the facility. ★

Summary of En Route Air Traffic Control Criteria

	Establishment	Discontinuance
VOR/VORTAC Facilities Par. 3b	Airport serving community has: 1. 200 annual instrument approaches, or 2. 1,825 scheduled annual passenger originations, or 3. an active military base requiring en route facilities.	Airport serving community has: 1. less than 100 annual instrument approaches and 1,095 scheduled annual passenger originations, or 2. military base deactivated or assigned new mission not requiring en route facilities, and 3. discontinuance of facility will not adversely effect en route system.
RCAG Sites Par. 3c(1)	Requirement for direct air/ground communication cannot be satisfied by existing FAA communication facilities.	When valid operational requirement no longer exists.
Extended and Long Range RCAGs Par. 3c(2)	Individual staff study.	None.
Long Range Radar Par. 3c(3)(b)	1. All airways and routes with 60 or more IFR peak day flights. 2. Normally, all area positive control airspace. 3. Transition areas between en route and terminal radar facilities with 50,000 or more annual instrument operations.	When function can be equally or better provided by more economical alternative facilities.
Airway Beacon Lights Par. 3d	None to be established.	All to be decommissioned except when retention justified on an individual basis and personally approved by regional director.

Summary of En Route Air Traffic Control Criteria (Cont'd.)

	Establishment	Discontinuance
Direction Finder Facilities Par. 3e	In all hard core FSSs except when: 1. adequate DF coverage is being provided by adjacent FAA or military facility, 2. higher use airspace coverage would be provided from a CS/T or FAA air traffic control tower, 3. DF service could be provided by an airport surveillance radar without undue disruption of its ATC functions.	When function can be equally or better provided by more economical alternative facilities. A DF facility may be relocated when the new location will provide coverage of higher use airspace.
Intermediate Fields Par. 3f	None to be established.	All to be decommissioned except when retention justified on an individual basis and personally approved by the regional director.
LF/MF Radio Ranges Par. 3g	None to be established.	All to be decommissioned except when retention is justified for IFR navigation in Alaska, mountainous areas of the U. S. or on long over-water routes.
Transcribed Weather Broadcast Par. 3h	Expansion to areas not served by present area weather coverage plan only by justification on an individual site basis.	An equal or better, more economical facility becomes available, or aeronautical activity within a TWEB service area does not justify the cost of the service.

Summary of En Route Air Traffic Control Criteria (Cont'd.)

	Establishment	Discontinuance
Air Traffic Control	At terminal locations where an instrument approach procedure can be implemented within existing FAA resources. An individual staff study is required at locations requiring additional FAA resources.	At locations established within existing FAA resources when instrument approach activity is not commensurate with cost of maintaining the instrument approach procedure. At locations that required additional FAA resources, when the instrument approach activity is not commensurate with the cost of the additional resources.