UNITED STATES GOVERNMENT SPECIFICATIONS

WORLD AERONAUTICAL CHARTS
OPERATIONAL NAVIGATION CHARTS
1:1,000,000 Scale

EDITION 3.0
DECEMBER 2005

Prepared by the Interagency Air Cartographic Committee
(IACC)

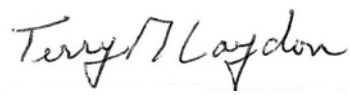
United States Government Specifications
for the
WORLD AERONAUTICAL/OPERATIONAL NAVIGATION CHART

Edition 3.0
December 2005

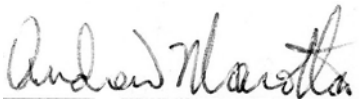
These specifications have been developed by the Interagency Air Cartographic Committee (IACC), composed of representatives of the Department of Defense and the Federal Aviation Administration, for use in the preparation of the United States Government World Aeronautical/Operational Navigation charts for the conterminous U.S., Alaska, and Gulf of Mexico/Caribbean Area. These specifications shall be complied with, without deviation, until such time as they are amended by formal IACC action.

Changes to these specifications will be provided when necessitated by new requirements or through development action of the IACC.

Questions of interpretation that arise in the use of these specifications shall be referred to the Chair, Interagency Air Cartographic Committee.



FAA/National Aeronautical Charting Group



DoD/NGA/OMS

FAA/Aeronautical Information Services

DoD/NGA/PV

Edition 3.0 includes:

a. RD 490 - Revised NAVAID Weather Broadcast Symbol

b. RD 517 - Non-Federal Control Towers

c. RD 518 - SUAS Controlling Agency Frequency on Tabs

d. RD 527 - NIMA (NGA) Barcodes

e. RD 540 - Broadcast Stations

f. RD 543 - Deleting Seaplane Base Symbology

g. RD 558 - Airport Identifiers on WACs

h. EC 99-02 Permanent Laser Light Demonstrations

i. EC 99-03 Disclaimer Note

j. EC 00-06 CTAF and UNICOM Frequencies

k. EC 00-08 Canadian Chart Note

l. EC 00-09 Removal of Sectional/TAC Reference

m. EC 00-10 Outside U.S. Airspace Note

n. EC 01-12 Remove Horizontal Datum Note in Margin

o. EC 02-03 NAS After Airport Name

p. EC 03-01 Legend Changes

q. EC 04-02 Current DoD (NGA) Flight Publications

r. EC 04-03 Portable Lights

s. EC 04-04 Airport Identifiers Outside the NAS

t. EC 04-09 SUAS Tab

AMENDMENT OF SPECIFICATIONS

1. PROCEDURE

a. Recommendations for amendments to specifications from the Department of Defense shall be directed to:

National Geospatial-Intelligence Agency (NGA)
12310 Sunrise Valley Drive
Reston, VA 20191

b. Recommendations for amendments to specifications from the Federal Aviation Administration shall be directed to:

Federal Aviation Administration, ATA-100
800 Independence Avenue, S.W.
Washington, D.C. 20591

2. AMENDMENT SYSTEM

a. Change to the specifications will be issued in the form of a new Edition version.

b. A new Edition version will be identified by the specification title/number, version number and effective date, and will be consecutively numbered, i.e., Edition 3.1, 3.2, etc. They will be effective as dated and will remain in force until revised by a subsequent Edition version or a new Edition of the specifications.

c. Revisions, deletions, and/or additions will be side-marked along the right side of the page.

d. Specification number and date will be indicated in the upper left corner of each page.

CHAPTER 1

GENERAL

CHAPTER 2

LAYOUT AND FORMAT

CHAPTER 3

CONTENT

CHAPTER 4

REPRODUCTION

CHAPTER 1

GENERAL

1.1. PURPOSE AND SCOPE

These specifications provide basic criteria and guidance for the production (compilation and color separation) and reproduction of the 1:1,000,000 scale World Aeronautical/Operational Navigation charts

Although specifications by their very nature tend to be a concrete expression of design, there are features (particularly the selection and density of detail) which are sufficiently abstract as to preclude mathematical analysis. In these instances when a specification cannot be measured, certain use criteria or design guidelines have been included to supplement the judgement of the individual cartographer. An attempt has been made, however, to minimize the amount of interpretation necessary in following these specifications.

1.2. REQUIREMENTS

1.2.1. General

1.2.1.1. The series of 1:1,000,000 scale World Aeronautical/Operational Navigation charts are the primary navigational reference media used by pilots operating under Visual Flight Rules utilizing the ground environment as the primary aid to navigation. The series also provides an intermediate scale translation of cultural and terrain features that will satisfy the enroute VISUAL and RADAR navigation requirements of pilots flying medium and low altitude-high speed operations.

1.2.1.2. The series of 1:1,000.000 scale charts shall satisfy both civil and military user requirements. The divergent user requirements are best satisfied by producing these charts using two formats with variations in the content of aeronautical detail. The military chart format shall utilize a maximum press size sheet with printing on one side only; the civil, a front/back printing. Both charts will have identical areas of coverage.

1.2.1.3. The successful execution of a medium or low altitude mission depends entirely upon visual and radar identification of ground features and a rapid visual association with their chart counterpart. Under low altitude conditions the apparent movement of the ground is rapid and causes blurring. The angular velocity of ground features as they sweep beneath the nose of the aircraft provides little time for recognition. Depth of vision is restricted because of the increased effect of perspective resulting from the closeness of aircraft to the terrain. Ground fog, haze and other factors affecting the visibility can further combine to reduce depth of vision.

In addition, the span of vision is restricted because of the necessity of "picking up" checkpoint features on or near the horizon directly ahead of the aircraft and making positive visual identification as the ground objects rapidly approach at increasing angular velocities. The pilot must have a preconceived mental image of each successive checkpoint feature to facilitate recognition at first glance. He must have an appreciation of the design and basic character of these checkpoints and know when (in seconds of time) and where (relative to the nose of the aircraft) they will be overflown. Therefore, the selection and portrayal of ground features should be based upon the requirement for rapid visual recognition of significant chart detail as seen from a low perspective angle.

1.2.1.4. As visual cross referencing is precluded by the critical time factor, some means other than conventional signs and symbols is required to afford the navigator a preconceived mental image of OUTSTANDING checkpoints. For this purpose, three dimensional perspective drawings, referred to in these specifications as "Pictorial Symbols", have been developed.

1.2.2. Quality and Accuracy

1.2.2.1. The medium and low altitude use of these charts, and the critical character of such missions emphasize the need for graphics of the highest degree of accuracy. Final copy shall conform to the best accepted standards of practice with respect to clear, uniform, opaque lines, symbols and type as illustrated in the Symbols Appendix. .

1.2.2.2. Care must be exercised in the plotting and interpretation of the detail to be applied to the chart. The center and orientation of a symbol shall normally correspond with the center and orientation of the feature presented. All line features such as roads, railroads, power transmission lines and streams shall be plotted in their true positions and shall retain, wherever scale permits, the variations of alignment which actually exist. Roads, railroads, streams, levees, and similar features lying parallel to and close to each other may require an exception to this rule. An exaggeration of the area covered may be necessary to show these features by their proper symbols. The displacement should be distributed evenly with the true center of the parallel features, taken collectively, held wherever possible and with the contours adjusted to the symbols. Displacement due to symbolization and adjustments between sources shall be held to a minimum.

1.2.2.3. Every effort should be made to match adjoining charts. In attempting to match adjacent charts, however, no errors of position shall be introduced nor shall any factual errors be made in an attempt to tie to adjoining charts. Position and detail of whichever of the adjoining charts is evaluated as being more reliable shall be retained.

1.2.2.4. The graticule layout shall be accurate to within ± 0.02 inch, overall diagonal measurement.

1.2.2.5. Exact registration between color separation drawings is required.

1.2.3. Colors Colors for printing the various component parts of this chart series shall basically consist of the following: Black, Blues, Browns, Buff, Green, Magenta, Yellows, Grays, and Reddish Brown. Detailed specifics of color separation will be found in **Chapter 3**, Content. Detailed color specifications will be found in **Chapter 4**, Reproduction.

1.2.4. Title

1.2.4.1. The title of these series of charts shall be:

Civil – World Aeronautical Chart (WAC)

Military – Operational Navigation Chart (ONC)

1.2.4.2. Individual charts of this series will not be named. Identification shall consist of series title (and/or code) and chart number.

1.2.4.3. Locality designation shall consist of ocean, country (countries listed alphabetically if more than one) and island group names. The locality designation shall be positioned as shown on the style sheets. (Military Format)

1.2.5. Scale The scale should be 1:1,000,000.

1.2.6. Projection

1.2.6.1. All charts in this series (between 0° and 80°) shall be produced on the Lambert Conformal Conic Projection, based on standard parallels 5° 20' apart.

STANDARD PARALLELS, CONVERGENCE FACTOR, PROJECTION LIMITS

Standard Parallels			Convergence Factor	Projection Limits		
1°20'	and	6°40'	.06979	0°	-	8°
9°20'	and	14°40'	.20799	8°	-	16°
17°20'	and	22°40'	.34215	16°	-	24°
25°20'	and	30°40'	.46965	24°	-	32°
33°20'	and	38°40'	.58800	32°	-	40°
41°20'	and	46°40'	.69491	40°	-	48°
49°20'	and	54°40'	.78830	48°	-	56°
57°20'	and	62°40'	.86634	56°	-	64°
65°20'	and	70°40'	.92752	64°	-	72°
73°20'	and	78°40'	.97065	72°	-	80°

1.2.6.2. References: United States Air Force Projection Tables for the Lambert Conformal Conic Projection on 8° Latitude Bands.

1.2.7. Area of Coverage

1.2.7.1. The area of coverage for these series of charts shall be the conterminous United States and Mexico, Central America, Caribbean Area, and Alaska as indicated on **Appendix 2** and **Appendix 3**.

1.2.7.2. The extent of overlap provided on the extended coverage charts shall be, to the extent possible, consistent with the area to be charted and the sheet size, illustrated on the Style Sheets.

1.2.7.3. The limits of each chart are defined by the following corner coordinates. Minor deviations from these coordinates, as necessary in establishing each individual chart limits to effect the precise coverage of the chart, may be made upon prior approval of the IACC.

CORNER COORDINATES – UNITED STATES/MEXICO/CARIBBEAN AREA

WAC/ONC	SW	NW	SE	NE
F-16	40°00'N 125°00'W	48°55'N 126°18'W	40°00'N 108°58'W	48°55'N 107°38'W
F-17	40°00'N 109°00'W	48°55'N 110°18'W	40°00'N 92°58'W	48°55'N 91°38'W

WAC/ONC	SW	NW	SE	NE
F-18	40°00'N 93°00'W	48°08'N 94°10'W	40°00'N 76°56'W	48°07'N 75°48'W
F-19	40°00'N 77°00'W	48°09'N 78°10'W	40°00'N 60°57'W	48°08'N 59°48'W
G-18	31°19'N 125°00'W	40°10'N 125°45'W	31°19'N 110°55'W	40°10'N 110°05'W
G-19	31°05'N 114°00'W	40°10'N 114°45'W	31°05'N 99°56'W	40°08'N 99°05'W
G-20	32°00'N 100°00'W	40°10'N 100°46'W	32°00'N 85°52'W	40°09'N 85°05'W
G-21	32°00'N 86°00'W	40°11'N 86°46'W	32°00'N 71°52'W	40°09'N 71°05'W
H-22	24°00'N 121°00'W	32°03'N 121°28'W	22°48'N 108°41'W	32°02'N 108°08'W
H-23	24°00'N 109°00'W	32°12'N 109°29'W	24°00'N 96°37'W	32°12'N 96°07'W
H-24	24°00'N 97°00'W	32°13'N 97°29'W	24°00'N 84°37'W	32°11'N 84°07'W
H-25	24°00'N 85°00'W	32°13'N 85°29'W	24°00'N 72°37'W	32°11'N 72°07'W
J-24	16°00'N 109°00'W	24°10'N 110°50'W	15°30'N 96°48'W	24°12'N 96°28'W
J-25	15°30'N	24°14'N	16°00'N	24°13'N

WAC/ONC	SW	NW	SE	NE
	97°00'W	97°19'W	84°48'W	84°28'W
J-26	16°00'N	24°10'N	16°00'N	24°12'N
	85°00'W	85°20'W	72°47'W	72°28'W
J-27	16°00'N	24°13'N	16°00'N	24°13'N
	73°00'W	73°19'W	60°47'W	60°28'W
K-25	08°00'N	16°12'N	08°00'N	15°12'N
	94°00'W	94°11'W	81°54'W	81°43'W
K-26	08°00'N	16°12'N	08°00'N	16°12'N
	82°00'W	82°11'W	69°54'M	69°43'W
K-27	08°00'N	16°12'N	08°00'N	16°13'N
	70°00'W	70°11'W	57°55'W	57°44'W

CORNER COORDINATES - ALASKA

WAC/ONC	SW	NW	SE	NE
C-8	64°00'N	71°48'N	64°00'N	71°46'N
	175°00'E	171°25'E	157°58'W	152°37'W
C-9	64°00'N	71°43'N	64°00'N	71°40'N
	158°00'W	162°45'W	131°30'W	126°02'W
D-10	56°00'N	64°08'N	56°00'N	63°57'N
	176°00'E	175°00'E	162°00'W	158°58'W
D-11	56°00'N	64°22'N	56°00'N	64°21'N
	162°00'W	165°03'W	140°46'W	137°37'W
D-12	56°00'N	63°56'N	56°00'N	63°54'N
	141°00'W	143°50'W	119°46'W	116°48'W

WAC/ONC	SW	NW	SE	NE
E-12	49°30'N 171°52'E	54°03'N 171°00'E	49°25'N 170°35'W	53°55'N 169°38'W
E-13	51°30'N 171°40'W	56°06'N 172°48'W	51°30'N 152°10'W	56°06'N 151°06'W
E-15	48°00'N 141°00'W	56°12'N 141°30'W	48°00'N 122°53'W	56°06'N 121°04'W

1.2.8. Symbolization

1.2.8.1. Symbolization of the final reproduction copy shall be in accordance with the Symbols Appendix included within this specification herein referred to as **Appendix 1**.

1.2.8.2. The symbols contained in **Appendix 1** have been developed for use in the production of U.S. Government Aeronautical Charts and Publications.

1.2.8.3. The configuration of the symbols contained in **Appendix 1** shall be adhered to. The size and line weights specified and/or indicated therein should also be adhered to but may be varied when absolutely necessary.

1.2.9. Type Styles

1.2.9.1. It is recognized that a variance occurs between different composition mediums, such as Fotosetter, Photon, Monotype, and Foundry settings. However, type styles specified within these specifications shall be as stated, or their equivalent, as may be determined by the manufactures' nomenclature. Equivalent shall be such as to equal the height, width, and line weight of the specified style of type.

1.2.9.2. Type styles and sizes specified herein are those employed within the Type Sample Catalog For Maps and Charts, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service.

1.2.9.3. The use of capital letters is intended, unless shown otherwise in **Appendix 1**, Style Sheets or stated as "C/L" (caps and lower case).

1.3. SPECIFICATIONS APPENDICES AND REFERENCES

1.3.1. Appendices

1.3.1.1. Symbols **Appendix 1**

1.3.1.2. Chart Index, United States **Appendix 2**

1.3.1.3. Chart Index, Alaska **Appendix 3**

1.3.1.4. Style Sheet - Military Format, Normal & Extended Coverage **Appendix 4** &

1.3.1.5. Style Sheet - Civil Format, Normal Coverage **Appendix 5**

1.3.1.6. Style Sheet - Civil Format, Extended Coverage **Appendix 6**

1.3.1.7. Special Use Airspace Tab **Appendix7**

1.3.2. References

1.3.2.1. Type Sample Catalog For Maps and Charts, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service.

1.3.2.2. U.S. Government Paper Specification Standard published by the Joint Committee on Printing (JCP).

1.3.2.3. Standard Printing Color (SPC) Catalog for Mapping, Charting, and Geodetic Data (MC&G).

1.3.2.4. Standard Printing Screen (SPS) Catalog for Mapping, Charting, and Geodetic Data (MC&G).

1.3.2.5. Reproduction Supplement for five-color printing of Visual Aeronautical Charts - Civil Format.

CHAPTER 2

LAYOUT AND FORMAT

2.1. GENERAL

This series of charts shall be produced utilizing two formats, a civil and a military. The area of coverage and detail for each chart shall be identical, with variation in the content of aeronautical detail. The GEOREF, vegetation (woods) and relative tints are required on the military format only. Layer tints are shown only on the civil format.

The same compilation used in the preparation of the maximum press size military edition (ONC) shall also be used in producing the civil (WAC) front/back printing.

2.1.1. Civil The civil format chart shall be separated horizontally in reproduction and printed backed-up, head to foot. When printed, this chart shall be uniformly accordion folded in an easterly and westerly direction (vertically) to ten folds and eleven panels (or eleven folds and twelve panels) and folded in half horizontally. Margins will be on the west and south borders of the chart. (See civil format style sheets.)

2.1.2. Military The military format chart shall be printed on a maximum press size sheet with printing on one side only. (See Military Format Style Sheets.)

2.2. SIZE AND DIMENSIONS

The maximum press size sheet (Military Format) shall be 41 5/8 by 57 1/2 inches trimmed. Folded size shall be 10 1/2 by 14 7/16 inches.

The front/back sheet (Civil Format) shall be 20 5/8 by 55 or 20 5/8 by 59 1/2 inches trimmed. Folded size shall be 5 by 10 5/16 inches.

Size and dimensions of the formats used in this series shall be as indicated on the appropriate Style Sheets.

2.3. CHART AREA

2.3.1. General The layout and format of individual charts shall conform to the Style Sheets utilizing the partial margin format, i.e., chart detail along the northern and eastern sides of each charts shall extend to the trim edge (bleeding edge) of the paper. On the civil editions:

2.3.1.1. The back shall have a bleeding edge to the north and east. The front shall have a bleeding edge to the north, east and south.

2.3.1.2. The south edge of the front is common with the north edge of the back.

2.3.1.3. The basic compilation shall use a guideline to represent this common edge, and all type shall be completely above or below this line, on the same side as the feature to which it refers.

2.3.2. Normal Coverage Refer to **Appendix 2** (Military) and **Appendix 3** (Civil) for normal coverage (image area) by this series. The compilation detail is limited on the west by a neatline parallel to the sheet edge; on the south margin by a parallel of latitude.

2.3.3. Extended Coverage Refer to **Appendix 4** (Military) and **Appendix 6** (Civil) for extended coverage (image area) by this series. The compilation detail is limited on the west by a neat line parallel to the sheet edge.

2.3.3.1. The south margin of charts G-18 (CG-18)and G-19 (CG-19) is limited by a neatline perpendicular to the central meridian of the charted area and parallel to the north trim line (bleeding edge).

2.3.3.2. The south margin of charts F-16 (CF-16) and F-7 (CF-17) is limited by a parallel of latitude.

2.3.4. Chart Detail Chart detail shall be shown in the north and east overlap areas and shall be extended .10 inch beyond the trim line to assure a bleeding edge. The chart detail shall not extend beyond the south and west limits of the chart, except where necessary.

CHAPTER 3

CONTENT

3.1. COMPILATION

3.1.1. General When compiling local areas, features may be encountered that are unique to the area and are not specifically covered in these specifications. Similarly, local conditions will exist which cannot be symbolized and should be handled by appropriate descriptive notes. In most cases, the features will be sufficiently similar to those discussed to permit application of the standard symbol or minor modifications thereto.

3.1.2. Detail Selection and Density

3.1.2.1. Rigid rules to satisfy requirements in the selection and density of chart detail cannot be formulated in view of the multiple requirements. For this reason, the finished product may not necessarily represent an optimal portrayal of chart detail; however, the selection of criteria detailed herein should suffice to serve as general guidance in achieving the best overall balance and relativity of the chart features portrayed.

3.1.2.2. Discretion must be used in determining the quantity and selection of detail to be shown. Unnecessary information and indiscriminate selection of features is not advisable in congested areas and shall be avoided. However, all essential information required must still be retained, especially OUTSTANDING features for use as checkpoints.

3.1.2.3. The following basic rules governing the selection of detail should be followed:

3.1.2.3.1. A FIRM REQUIREMENT EXISTS to provide MAXIMUM DENSITY of ground features significant in VISUAL and RADAR low level-high speed navigation without impairing chart legibility.

3.1.2.3.2. Features selected for portrayal in one area may well be inappropriate in another area. In areas of sparse or moderate culture, the lesser chart features assume extreme importance because of their checkpoint value. In congested areas, these same features would not be seen by the low level, high speed pilot and normally should not be shown.

3.1.2.3.3. Significant recognizable topographic features relating to or aiding in the identification of airports or unique areas, specifically requested and validated by operational users, shall be shown.

3.1.2.3.4. Cultural features that are so unique and outstanding that they provide instantaneous orientation of the chart to the ground shall be shown short of overcongestion.

3.1.2.3.5. The visual outline of a populated place, in itself, is not necessarily of landmark significance. Checkpoint features in the near vicinity are required to ensure positive identification.

3.1.2.3.6. Roads and railroads alone are not necessarily significant to the low altitude-high speed pilot. Their identification value can be ensured only by the innclusion of related features in the immediate vicinity which distinguishes one from the other.

3.1.2.3.7. Care should be used in making the selection in congested areas to ensure a proper balance throughout the chart. Reduction of detail will affect the whole chart and should be graduated from highest density to lowest density to give comparable value to details included throughout the chart. When reducing chart congestion, the order of elimination shall be as follows:

Canal names, minor geographic names and small town names

Trails

Secondary roads (lacking identifying characteristics)

Single-line streams

Miscellaneous cultural features lacking visual or radar return value

Descriptive words used to clarify symbols

3.1.2.3.8. More specific criteria is furnished further on in these specifications under the paragraph heading designated for each chart feature.

3.1.2.3.9. In order to effectively determine the types and density of checkpoints that require emphasis, the researcher and compiler must closely follow the selection and density criteria contained in these specifications. In addition, they must have a basic understanding of low altitude radar and visual flight (particularly at speeds of 400 knots) and the related navigational problems.

3.1.3. Pictorialization of Checkpoint Features

3.1.3.1. Pictorial checkpoints are specifically designed to meet the need of the low altitude-high speed pilot. The basic requirement is to afford the low altitude airman a preconceived mental image of OUTSTANDING checkpoint features that will serve as a medium for instantaneous orientation of the chart to the ground.

3.1.3.2. Features selected for pictorial symbolization should be items that have radar as well as visual significance. FEATURES SHALL BE SELF-IDENTIFYING TO FACILITATE IMMEDIATE RECOGNITION. Indiscriminate portrayal and selection can only cause confusion and possibly compromise the pilot's mission. Features considered for pictorialization should include prominent buildings, factories/complexes, towns and miscellaneous features.

3.1.3.3. Selection and identification of isolated features should be done with extreme care.

3.1.3.4. Selection and density is largely controlled by the following considerations:

3.1.3.4.1. Density of Cultural Detail. Moderate to dense areas of cultural detail generally tend to combine with other detail to create suitable checkpoints. Therefore, the greatest need for pictorialized landmarks is in sparsely populated areas. A related consideration involves the operational need to plan low altitude routes to avoid built-up areas.

3.1.3.4.2. Area Considerations. Features selected for portrayal in one area may be inappropriate for portrayal in another area. Such determinations should be based on critical area analysis. Features like outdoor (drive-in) theaters, churches, etc., cannot be considered in the selection of pictorial symbols unless each is a unique or prominent vertical checkpoint.

3.1.3.4.3. Complementary Values. Pictorial symbols are applied effectively when they supplement or complement basic cultural and natural features. This ensures positive identification. The basic concept is not to re-create a set of ground patterns or to give the total picture by the pictorial symbol pattern, but rather to enhance the identification value of terrain characteristics by the addition of a unique feature that completes the picture and ensures identification. The pictoralized feature is meant to provide immediate recognition of a man-made feature where checkpoints, due to the nature of the terrain, are lacking. IT MUST BE EMPHASIZED: INDISCRIMINATE AND TOO FREQUENT APPLICATION OF PICTORIAL SYMBOLS CAN ONLY NEGATE THE INTENDED PURPOSE.

3.1.3.4.4. Relative Values. Features should be selected for pictorial portrayal based on their relative value as checkpoints considering size (vertical dimension and mass), configuration, and infrequency of appearance in the area. Uniqueness and infrequency in the area cannot be over-emphasized. For example, within a series of small towns each containing a church, nothing is gained by portraying each town with a pictorialized church. Conversely, the relationship of each town to the other in the series, together with the drainage, road, and railroad pattern, would constitute a variety of much more desirable checkpoints. Therefore, when selecting a feature for pictorialization, distinctiveness and vertical mass is of utmost importance. If the feature is duplicated within a radius of 35-50 miles, it may not satisfy the criteria for uniqueness in the area.

3.1.3.4.5. The final determination of the need for pictorially symbolized checkpoints must be based on the controlling and interrelated factors described below:

3.1.3.4.5.1. The availability of adequate source material to support pictorialization.

3.1.3.4.5.2. The need for pictorial portrayal based on the tactical and strategic importance of certain areas with potential requirements for operating at critical low altitudes.

3.1.3.4.5.3. The need for pictorial symbols considering the availability and characteristics of other checkpoints in the area.

3.1.3.4.5.4. The determination based on broad area studies in advance of production, as to which method (pictorial or conventional symbolization) more adequately satisfies operational use requirements in a particular area, a particular chart, or a portion of a chart.

3.1.3.5. Extreme care must be taken to position the pictorial symbol so that no doubt exists as to its true position. When necessary, a fine leader line from the pictorial symbol may be used to pinpoint true position; however, this practice should be kept to a minimum.

3.1.3.5.1. Vertically symmetrical symbols shall be oriented so that the vertical dimension is perpendicular to the parallels of latitude.

3.1.3.5.2. Elongated symbols such as bridges, dams, etc., shall be oriented along the actual line of position.

3.1.3.6. After a feature has been selected for portrayal, great care must be taken to ensure that the pictorial symbol captures the visual character of that feature. Also, significant features may be

found to be unique to particular geographic areas. Development of suitable symbols should be initiated to satisfy the requirements.

3.2. NAMES AND LABELING

3.2.1. General

3.2.1.1. Names are required for planning, briefing, and relating to other charts and publications.

3.2.1.2. The application of place and feature names to aeronautical charts is controlled by policies established by the U.S. Board on Geographic Names. In general, proper names of places or features are spelled in the conventional English.

3.2.1.3. Extreme care should be exercised in naming chart features. Use of technical, cartographic and/or geographic terms shall be avoided for a language that is readily understood by the airman. For example, the word "karst" alone has little or no meaning to the average user, nor is its definition readily available. Appropriate, common-language descriptive terms shall be used such as "sink-holes", "distorted surface area", "area of distinctive terrain", etc., whichever most adequately describes the condition. The word "karst" (in parentheses) may be positioned below or following the descriptive text.

3.2.1.4. PUNCTUATION MARKS shall not be used within the body of the chart.

3.2.1.5. The Symbols Appendix and the Style Sheets combined provide guidelines for type size and style, composition and positioning.

3.2.2. Names Selection

3.2.2.1. Names shall be selected on the basis of importance. It is extremely important that care be exercised to keep the chart free of unnecessary congestion.

3.2.2.2. The following basic rules govern the selection of names:

3.2.2.2.1. Features validly selected for the naming in one area may be inappropriate for naming in another area. In areas of sparse or moderate culture, the lesser chart features assume extreme importance because they pinpoint landmarks and should be named provided they can be positioned without obscuring detail pertinent to the primary use.

3.2.2.2.2. The features portrayed must be clear and legible. THEY MUST NOT BE OBSCURED BY NAMES WHICH ARE OF RELATIVELY LESS IMPORTANCE IN OPERATIONAL USE.

3.2.2.2.3. Names of aeronautical facilities are more important than the names of other chart features.

3.2.2.2.4. Topographic names have little significance in this series of charts. Only a few of the most significant topographic features on the chart shall be named.

3.2.2.2.5. WHEN THERE IS DOUBT AS TO THE VALUE OF A NAME IT SHOULD BE OMITTED.

3.2.2.2.6. In the selection of names, all base and aeronautical detail is CRITICAL and shall not be obscured by names.

3.2.2.2.7. Villages shall not be named in congested areas of the chart.

3.2.2.3. Hydrographic Features

3.2.2.3.1. In most cases, names shall be shown for the following features:

3.2.2.3.1.1. Oceans

3.2.2.3.1.2. Seas

3.2.2.3.1.3. Bays

3.2.2.3.1.4. Gulfs

3.2.2.3.1.5. Sounds

3.2.2.3.1.6. Large inlets

3.2.2.3.1.7. Large estuaries

3.2.2.3.1.8. Large channels and canals

3.2.2.3.1.9. Large double-line streams

3.2.2.3.2. Names shall be shown for the following features where they do not cause congestion or overprint more pertinent chart detail.

3.2.2.3.2.1. Smaller inlets, estuaries, channels and canals.

3.2.2.3.2.2. Single line streams of considerable length.

3.2.2.3.2.3. Springs, wells and water holes (in arid areas only).

3.2.2.4. Relief

Only names for relief features of major significance are required, such as well-known mountain ranges, peaks, capes, and peninsulas.

3.2.2.5. Culture

3.2.2.5.1. Populated Places

3.2.2.5.1.1. All populated places in Categories 1 and 2 shall be named short of congestion. Selection should be based on relative importance (size) for Category 2 populated places.

3.2.2.5.1.2. Populated places in Category 3 shall be named only:

3.2.2.5.1.2.1. In areas of sparse chart detail.

3.2.2.5.1.2.2. In areas lacking populated places of a higher classification.

3.2.2.5.1.3. Towns in close proximity to airports should be named, regardless of size.

3.2.2.5.1.4. Important isolated towns that are unnamed may be labeled "village" to avoid the possibility of the symbol being overlooked. Such labeling shall be kept to a minimum.

3.2.2.5.2. Roads. Roads shall not be named.

3.2.2.5.3. Railroads. Railroad names (either in full or abbreviated) are not required.

3.2.2.5.4. Miscellaneous Cultural Features. Miscellaneous cultural features shall be named only when they are the most significant feature in a local area.

3.2.3. Descriptive Notes Notes are a means of furnishing pertinent data related to the chart area. These notes may identify a symbol, describe an area or a unique feature; be a note of caution; detail some valuable or unique aspect or activity of an area; or be instructions the pilot should follow such as an altitude, frequency or bearing and distance to/from a NAVAID. Size and style of a note may vary according to the importance of the activity being described.

3.2.4. Basic Principles of Type Placement

3.2.4.1. Names shall be positioned so there is no ambiguity as to which feature is identified.

3.2.4.2. In the selection of a type size for a feature, proper judgement must be exercised to obtain a graduation in size which will be in proportion to the relative importance of the feature. Careful consideration must be given to both the importance of chart detail and the name of the feature.

3.2.4.3. Generally, chart detail should take precedence over names of secondary features such as villages, small ponds, streams, etc.

3.2.4.4. Avoid positioning type over and in alignment with linear features since this affects the continuity of a feature and legibility of the type. If type must overprint base detail, it is preferable that it be positioned to cross a linear feature.

3.2.4.5. Normally, all type shall be positioned so that the wording may be read from left to right and from the bottom of the sheet, and shall be positioned to provide a minimum of conflict with the chart detail.

3.2.4.6. Type for large islands and bodies of water shall be positioned within the outlines in the approximate center of their respective features. When the feature is not large enough to accommodate the type, type shall be positioned alongside the feature.

3.2.4.7. Type for large double-line streams shall be positioned within the shorelines when space permits. Names of all double-line streams shall be shown in type sizes adjusted to their relative

importance within the chart. Decisions as to the use of caps or caps and lower case shall be tempered with judgement of cartographic appropriateness.

3.2.4.8. Names of populated places and other non-linear features shall be positioned parallel to lines of latitude.

3.2.4.9. Type for linear features, such as roads, streams, canals, etc., shall normally appear on the upper side, following the general direction and curvature of the feature. It will be necessary to repeat type in labeling long features.

3.2.4.10. Names of extensive topographic features, such as valleys, mountain ranges, plateaus, canyons, etc., shall be extended across the center of such features in a smooth curve.

3.2.4.11. Type for capes and points should preferably appear in the open water areas aligned horizontally with the latitude parallel and slightly above or below the feature. The type shall be kept clear of the shoreline.

3.2.4.12. To indicate the elevation for a small island where the island name has been placed in open water areas, the spots may be omitted and the value centered under the island name.

3.2.4.13. The sovereign or mother country of an island or colony shall be carried in parentheses to the right of or below the name of the island or colony.

3.3. MARGIN INFORMATION

3.3.1. Military Format Margin information, type size and style and placement of data shall be shown in accordance with that depicted on the appropriate Style Sheets.

3.3.2. Civil Format

3.3.2.1. Margin information shall be shown in blue color, unless otherwise noted.

3.3.2.2. Front Side (North Chart).

The following data shall be positioned in the extreme left panel of what will be referred to as the front or title panel of the charts. This panel shall serve as the outside "fold" or title panel on all charts when completely folded.

3.3.2.2.1. Legend data.

3.3.2.2.2. Title Panel.

3.3.2.2.3. A black note referencing the horizontal datum shall be positioned below the projection reference in the title panel in 6 pt. Helvetica Condensed Bold C/L and 7 pt. Helvetica Condensed Bold Figures.

Horizontal Datum: North American Datum of 1983 (World Geodetic System1984)

3.3.2.2.4. Bar Code. The NGA bar code and the National Stock Number shall be positioned at the bottom of the title panel.

FAA Product ID: SLV
NSN 7641014100156
NIMA REF. NO. SECXXLASVEGAS
EFF. DATE 03247

3.3.2.3. Reverse **S**ide (**S**outh Chart).

The following data shall be positioned in the extreme left panel and/or in the margin area along the bottom of the chart. (**Appendix 4** and **Appendix 5**).

3.3.2.3.1. A boxed note indicating corrections and comments shall be shown within the margin area. This note may be shown on the Front Side (North Chart) if insufficient margin area exists on the Reverse Side (South Chart).

REPORTING CHART ERRORS

You are requested to inform us of chart errors and/or additions that come to your attention while using this chart. Telephone toll free at (800)626-3677, or E-mail to "9-AMC-Aerochart@faa.gov". Postage paid correction cards are available at authorized chart sales agents. Where delineation of data is required such information should be indicated clearly and accurately on a current chart (a replacement copy will be returned). Mail to: FAA, National Aeronautical Charting Office, AVN-510, SSMC4, Sta. #2335, 1305 East West Hwy., Silver Spring, MD 20910-3281.

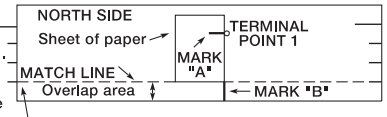
3.3.2.3.2. Bar Scale. A linear bar scale extending the full length of the image area of the chart shall be shown on the black plate, providing kilometers, nautical Miles, and statute miles.

3.3.2.3.3. Plotting Instructions. A note, as illustrated, providing instructions for plotting direct routes on the north/south, backed-up chart shall be shown normally directly beneath the cut line.

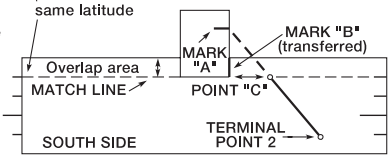
PLOTTING DIRECT ROUTE ON NORTH/SOUTH SIDE

There are approximately two minutes of latitude overlap between the north and south sides of each sectional/WAC chart. To plot a course line from one side to the other, the user must first draw two "match lines" that are common to both sides. On the north side connect the tick marks of the most southern minute of latitude and on the south side connect the marks of the most northern minutes of latitude. These "match lines" must have the same latitude on both the north and south sides.

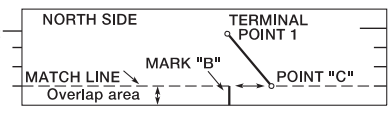
Step No. 1
On the side of the chart having a terminal point nearer the match line, place a sheet of paper (or chart) so that one edge corresponds to the match line while another edge intersects Terminal Point 1. Make a mark on the edge of the paper at Terminal Point 1 (Mark "A" as illustrated) and also another mark on the chart extending from match line to the edge of the chart (Mark "B" as illustrated).



Step No. 2
Roll the chart over and transfer Mark "B" from the north side to the south side, extending the mark to the match line. Align the sheet of paper to the match line with the corner of the sheet at the transferred Mark "B". With a straight edge draw a line from Terminal Point 2 to Mark "A" to intersect the match line forming Point "C".



Step No. 3
Turn chart over and transfer Point "C" from the south side to the north side. (This can be done by measuring the distance from Mark "B" to Point "C" along the match line from the south side). With a straight edge draw a line from Point "C" to Terminal Point 1. This line is the continuation of the direct route drawn on the south side.



3.3.2.3.4. Airport Tower Communications

3.3.2.3.4.1. A columnized tabulation of all tower-controlled airports that appear on the respective chart shall be shown alphabetically by airport name. The type of military facility, e.g., NAS, AAF, AFB, DND, etc., shall be shown after the facility name.

3.3.2.3.4.2. Airport name shall be supplemented with the tower operating hours, primary VHF and UHF local control frequencies, primary VHF and UHF ground control frequencies and Automatic Terminal Information Service (ATIS) frequencies when available. Frequencies shall be listed in ascending order. An asterisk shall follow the part-time tower frequency remoted to the collocated full-time FSS for use as Local Airport Advisory (LAA) during hours the tower is closed. Airport Surveillance Radar (ASR) and/or Precision Approach Radar (PAR) shall be shown when available.

3.3.2.3.5. Special Use Airspace. A tabulation of Special Use Airspace to include Alert, Prohibited, Restricted, and Warning Areas, and a tabulation of Military Operations Areas (MOA) that appear on the chart shall be shown, listed numerically or alphabetically by number or name, and supplemented with altitude, time of use and the controlling agency/, and its frequency, when available. The controlling agency will be shown when the contact facility and frequency data is unavailable. The MOA tabulation will be shown in magenta. Restricted and Advisory Areas for other countries shall be tabulated separately. See Appendices for tabulation example.

3.3.2.3.6. Chart Name. The name of the chart, e.g., CG-21, shall be shown in the extreme left and right lower corners of the chart.

3.3.2.3.7. The following note shall appear on all charts that include Canadian and Mexican territory.

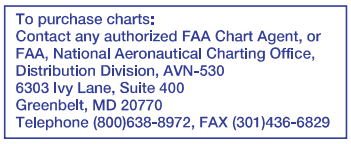
Entire United States portion of this chart is within the Defense Area.

3.3.2.3.8. The following note shall be positioned in an open water area on all charts depicting airspace assignments beyond the territorial limits of the United States.

FAA air traffic service outside U.S. airspace is provided in accordance with Article 12 and Annex 11 of ICAO Convention. ICAO Convention not applicable to state aircraft but compliance with ICAO standards and practices is encouraged.

3.3.2.3.9. The following note, in black, shall appear on all charts above the left end of the Bar Scale where possible.

3.3.2.3.10. A boxed note shall appear on all charts informing the chart user where charts may be purchased.



3.4. COLOR SEPARATION Color separation of the various component parts of the chart shall consist principally of the following. Detailed specifications of color will be found in **Chapter 4**, Reproduction.

3.4.1. Black, Culture Separation

3.4.1.1. Boundary lines and names

3.4.1.2. Populated places (symbols and outline)

3.4.1.3. Spot elevation symbols and values

3.4.1.4. Railroads and related features

3.4.1.5. Roads and associated type (Civil Format)

3.4.1.6. Pipelines

3.4.1.7. Symbols for water, gas and oil tanks and wells (other than water)

3.4.1.8. Certain features of coastal hydrography including descriptive type

3.4.1.8.1. Sea walls

3.4.1.8.2. Man-made shorelines

3.4.1.9. Mountain Pass symbol

3.4.1.10. Graticule and values

3.4.1.11. Base margin notes, legend and scales

3.4.1.12. Other symbolized miscellaneous cultural features excluding roads

3.4.1.13. Pictorial symbols and corresponding geographical location symbols

3.4.1.14. Pictorial vertical obstruction symbols of outstanding visual significance

3.4.1.15. Power transmission lines (Civil Format)

3.4.1.16. Names of populated places and cultural features including descriptive type

3.4.1.17. Isolated rocks (bare and awash) symbols

3.4.1.18. Wreck symbols

3.4.1.19. Descriptive labeling for "tundra", "muskeg"

3.4.1.20. Descriptive labeling and symbol for peat cuttings

3.4.1.21. Descriptive labeling for sand dunes, when necessary

3.4.1.22. Unreliable relief notes

3.4.1.23. Names of countries, states, islands, peninsulas, capes, etc. [See para. **3.4.3.3.**]

3.4.1.24. Sand areas and moraine (Civil Format)

3.4.1.25. Foreshore flats (Civil Format)

3.4.2. Blue, Drainage Separation

3.4.2.1. Hydrographic features (perennial and non-perennial) except for certain features of coastal hydrography detailed in **3.4.1.8.**

3.4.2.2. Hydrographic names including descriptive type

3.4.2.3. Lake and stream elevations

3.4.2.4. The following miscellaneous hydrographic features:

3.4.2.4.1. Wet sand areas within and adjacent to desert areas

3.4.2.4.2. Stipple fill of non-perennial features

3.4.2.4.3. Reefs (rocky and coral)

3.4.2.4.4. Ice peaks and ice cliffs

3.4.2.4.5. Fish ponds and hatcheries

3.4.2.5. Open water

3.4.2.6. Inland open water

3.4.2.7. GEOREF (separate drawing for Military Format only)

3.4.2.8. Shoreline vignette (Civil Format)

3.4.3. Gray, Contour Separation

3.4.3.1. Contour lines and values

3.4.3.2. Miscellaneous relief features (hachures, levees, strip mines tailings to scale, etc.)

3.4.3.3. Topographic names (separate drawing) (See para. **3.4.1.23.**)

3.4.3.4. Distorted surface areas (lava)

3.4.3.5. Descriptive terms pertaining to pack ice, polar ice, and shelf ice

3.4.4. Red Brown or Brown, Road Separation (Military Format)

3.4.4.1. Roads and descriptive type pertaining thereto

3.4.4.2. Boundary overprint

3.4.4.3. Sand areas and moraine

3.4.4.4. Foreshore flats

3.4.5. Gray, Ice Separation

3.4.5.1. Shelf ice and polar ice pack

3.4.5.2. Pack ice pattern

3.4.5.3. Shaded relief (separate drawing)

3.4.6. Yellow, City Tint (Civil Format) Outlined cities and those symbolized by a square (category 1 and 2).

3.4.7. Blue, Aeronautical

3.4.7.1. Aeronautical symbols and descriptive type pertaining thereto.

3.4.7.2. Conventional inverted "V" obstruction symbol and elevations pertaining thereto (Civil Format) "Eiffel" tower obstruction symbols and elevations pertaining thereto (Military Format).

3.4.7.3. Aeronautical names

3.4.7.4. Aeronautical margin notes

3.4.7.5. Isogonic information (Military Format)

3.4.7.6. Elevations for pictorial vertical obstruction symbols of outstanding visual significance.

3.4.7.7. Maximum Elevation Figures (MEF)

3.4.7.8. World Area Code reference in body of chart and Interchart Relationship diagram (Military Format).

3.4.8. Green, Terrain Tints (Military Format)

3.4.8.1. Level area and valley accentuation

3.4.8.2. Low Relief

3.4.9. Buff, Terrain Tints (Military Format)

3.4.9.1. Moderate Relief

3.4.9.2. High Relief

3.4.10. Magenta (Civil Format Only)

3.4.10.1. LF/MF radio aids to navigation

3.4.10.2. Selected airports

3.4.10.3. Compass rosettes

3.4.10.4. Colored airways

3.4.10.5. Isogonic lines and values

3.4.10.6. Military operations areas

3.4.10.7. Boundary overprint

3.4.11. Green, Relief (Civil Format) Gradient (Layer) Tint

3.4.12. Buff, Relief (Civil Format) Gradient (Layer) Tint

3.4.13. Brown, Relief Gradient (Layer) Tint

3.4.14. Green, Relief (Military Format) Vegetation

3.5. PROJECTION

3.5.1. General

3.5.1.1. The geographic limiting parallels and meridians of the chart shall be shown and graduated regardless of value.

3.5.1.2. Graduation tick marks shall extend away from Greenwich and the Equator. That is, the short tick marks shall be on the west side of the lines of west longitude and on the east side of the lines of east longitude. At 180° longitude, tick marks shall be equidistant on both sides of the line.

3.5.2. Graticule Layout Lines of latitude and longitude, .007 inch line weight, shall extend .10" beyond the trim line of the east and north sides of the chart to .07" beyond the geographic limits on the west and south side of the chart.

3.5.3. Line Spacing Latitude and Longitude lines shall be spaced at 1° intervals.

3.5.4. Tick Intervals, Line Weights and Length The line weight for the projection and ticks is .007". The length of the ticks are: one minute tick is .045"; five minute tick is .065"; and, ten minute cross tick is .100" each side.

3.5.5. Graticule Values Values of all parallels and meridians shall be shown in the margins. Values shall be shown .10" inside the trim line on the north and east sides of the chart and .10" outside of the geographic limits on the south and west sides of the chart. Values shall be shown using 16 pt. Photura Book type.

3.6. CULTURE

3.6.1. Railroads

3.6.1.1. General

3.6.1.1.1. Transportation lines and related features are valuable navigational checkpoints. They are used to pinpoint position by relationship of pattern formed with other features or by a unique characteristic of their own.

3.6.1.1.2. In level areas, primary railroads tend to run in straight lines directly to a terminus and can be extremely valuable as navigation aids.

3.6.1.1.3. Railroads and related features shall be shown in conformance with the Symbols Appendix.

3.6.1.2. Density and Selection

3.6.1.2.1. All main line railroads shall be shown except where elimination is necessary in congested areas. All other railroads shall be portrayed compatible with the scale of the chart and operational requirements for a legible chart. Railroads alone may not be readily discernible in low altitude navigation. They may assume added significance in the accentuation of adjacent or associated cultural features which otherwise might have little or no checkpoint value.

3.6.1.2.2. In areas of sparse detail with little or no landmark value, all railroads shall be shown.

3.6.1.2.3. In areas of very dense cultural detail, those operating railroads which would cause undue congestion and thus negate operational requirements for a legible chart, shall not normally be shown. Generally, this shall include those railroads which:

3.6.1.2.3.1. Lend little or no visual significance to the overall pattern.

3.6.1.2.3.2. Are considered unimportant in regard to visual prominence.

3.6.1.2.3.3. Are unimportant in regard to continuity, terminals and checkpoint value.

3.6.1.2.4. Railroads shall be omitted within outlined or symbolized populated areas.

3.6.1.3. Single and Multiple Track Railroads

3.6.1.3.1. A distinction in symbolization shall be made between single track railroads and those of more than one track (double and multiple track).

3.6.1.3.2. Where the number of tracks of a railroad exceed two, the information shall be shown by labeling added parallel to the railroad symbol at appropriate intervals, e.g., “4 tracks”.

3.6.1.3.3. Sidings which are closely parallel to a main line shall, if shown, be symbolized as sidings and shall not be counted in determining double or multiple track lines.

3.6.1.3.4. Electrified railroads shall be indicated with the word "electric" added parallel to the symbol.

3.6.1.4. Railroads in Juxtaposition.

This is defined as two railroads with different ownership which run closely parallel to one another. When this condition occurs, each shall receive its normal symbolization, but the condition shall be emphasized by staggering the cross ties of the parallel symbols.

3.6.1.5. Non-operating Railroads

3.6.1.5.1. Railroads that are abandoned, destroyed or under construction shall be shown in the absence of more prominent landmarks. Any part of a destroyed railroad, a railroad under repair or a railroad under construction which is sufficiently finished to be in use, shall be regarded as in operation.

3.6.1.5.2. Proposed railroads shall not be shown.

3.6.1.6. Dismantled Railroads

3.6.1.6.1. If the right of way of a dismantled railroad in being used as a road, it shall be symbolized only by the proper road symbol.

3.6.1.6.2. If there is no road but the feature is of sufficient prominence and importance to serve as a landmark, it shall be symbolized by the trail symbol. If space permits, labeling shall be added parallel to the trail symbol reading, "Dismantled Railroad".

3.6.1.7. Railroads, Approximate Alignment.

The label "approximate alignment" shall be spaced to indicate the extent of approximate alignment.

3.6.1.8. **Tramways, Etc.** Tramways and similar light load-bearing railways shall not be shown except when considered significant as checkpoints in areas of sparse or moderate detail.

3.6.1.9. Spur Tracks and Sidings

3.6.1.9.1. Spur tracks and sidings shall be shown as scale and density of detail permit. In congested and "tinted" developed areas, spurs and sidings shall be omitted.

3.6.1.9.2. Normally, spur tracks and sidings shall be symbolized the same as the main track railroad. Where sidings are short, the cross ties may be omitted and if necessary the sidings may be slightly exaggerated in length.

3.6.1.9.3. When the distance between the main track and a parallel siding is too small to plot to scale, the symbol shall be reduced in weight and the space between exaggerated to .01”.

3.6.1.9.4. Spur tracks and sidings shall be shown as entering the main line in a smooth curve.

3.6.1.10. Railroad Yards

3.6.1.10.1. Railroad yards (freight, marshalling, etc.) shall be shown whenever they are considered significant in low level flight. In areas of dense culture the smaller and less prominent marshalling yards may be omitted.

3.6.1.10.2. The correct shape of the yards shall be retained insofar as it is practicable. No attempt should be made to show all tracks. Only the limiting tracks shall be plotted.

3.6.1.10.3. When necessary, because of space limitations, railroad yards may be shown by a .04" solid square as indicated in the Symbols Appendix.

3.6.1.10.4. Railroad yards or marshalling yards shall be labeled when symbolization is not adequate identification.

3.6.1.11. Railroad Stations

3.6.1.11.1. Railroad stations shall be shown in areas of sparse culture. If a railroad station appears with a group of buildings, the buildings and stations shall be indicated by the proper populated place symbol. In areas where railroads are the principal means of transportation, railroad stations assume greater importance and consequently more shall be shown.

3.6.1.11.2. When information is available, an isolated railroad station may be positioned in its correct relation to the railroad track. A slight exaggeration in scale is permissible to achieve this.

3.6.1.11.3. When the correct location of a railroad station is unknown, it shall be shown centered on the railroad symbol.

3.6.1.11.4. Railroad stations, including those centered on the track shall be labeled "station" or with proper name, if known.

3.6.1.11.5. Flag stops, halts and similar stops (not portrayed as buildings) shall be omitted.

3.6.2. Roads

3.6.2.1. General

3.6.2.1.1. Highways, roads, tracks, trails, and related features are valuable navigational checkpoints. They are used to pinpoint position, by relationship of pattern formed with other features, or by a unique characteristic of their own.

3.6.2.1.2. In level areas, primary roads tend to run in straight lines directly to a terminus and can be extremely valuable navigation aids.

3.6.2.1.3. Roads and related features shall be shown in conformance with the Symbols Appendix.

3.6.2.2. Density and Selection

3.6.2.2.1. The number of roads shown in an area depends on the number of significant checkpoints available. Roads are shown for radar and visual value and for orientation and pinpointing aids.

3.6.2.2.2. In heavily populated areas, roads shall be selected which, in conjunction with other cultural and natural features, form a distinct configuration providing significant checkpoint identification.

3.6.2.2.3. In open areas containing few checkpoints, the road pattern assumes a greater importance and additional roads shall be selected when their relationship with other roads serve as a visual checkpoint or as an aid in identifying a checkpoint.

3.6.2.2.4. Roads portrayed should normally terminate at a populated place or road intersection.

3.6.2.2.5. Trails should normally be shown only in areas where few roads exist and the trails are prominent enough to be seen from the air.

3.6.2.2.6. All roads shall be omitted within outlined and symbolized populated places.

3.6.2.3. Classification

3.6.2.3.1. On this chart series, road classification shall be based on the following criteria:

3.6.2.3.1.1. Category 1 (Dual-lane divided highways) Hard-surfaced, all-weather roads separated by a median between the two directions of travel.

3.6.2.3.1.2. Category 2 (other roads)

3.6.2.3.1.2.1. Primary roads. Hard-surfaced, all-weather roads two or more lanes in width maintained for automobile traffic.

3.6.2.3.1.2.2. Secondary roads. All other roads maintained for automobile traffic.

3.6.2.3.1.3. Category 3 (tracks and trails) Not maintained for automobile traffic.

3.6.2.3.2. In areas where adequate data for classification determination is available and a primary network (based on surface and width) exists, roads shall be classified on the basis of width and visual and/or radar significance from the air.

3.6.2.3.3. In areas where adequate data for classification determination in the form of maps, photos or intelligence is not available, roads shall be classified from the best logical interpretation - that is, an interpretation should be made based on a tie-in with adjacent areas and on logical strategic importance as indicated by terrain conditions and cultural areas serviced.

3.6.2.4. Dual-Lane Divided Highways (Category 1).

Dual-lane divided highways shall always be shown. These are interpreted as primary roads separated by a median between the two directions of travel, such as the Interstate System.

3.6.2.5. Other Roads (Category 2)

3.6.2.5.1. All primary roads shall be shown short of over congestion. When it is necessary to make a selection of primary roads in areas of dense cultural detail, those primary roads which form a distinct configuration or provide a significant checkpoint in conjunction with distinctive natural or cultural detail in the immediate vicinity shall be retained.

3.6.2.5.2. Secondary roads shall be shown when they do not cause clutter. Selection of roads should be based on those which form a distinct configuration, or provide significant checkpoint identification in conjunction with distinctive natural or cultural detail in the immediate vicinity.

3.6.2.6. Tracks and Trails (Category 3)

3.6.2.6.1. No distinction in symbolization shall be made between tracks and trails. Tracks and trails are considered to be subordinate routes suitable only as cart tracks and foot paths.

3.6.2.6.2. Tracks and trails shall be shown in areas where few roads exist and only when they are easily recognizable from the air.

3.6.2.6.3. Winter trails shall be labeled "winter trails".

3.6.2.7. Roads, Under Construction

3.6.2.7.1. Roads under construction are defined as roads on which actual construction work has been initiated.

3.6.2.7.2. The appropriate road symbol shall be dashed to indicate extent of construction and labeled "under construction".

3.6.2.8. Roads, Under Repair.

Roads under repair shall be considered as completed roads.

3.6.2.9. Roads, Proposed.

Proposed roads shall not be shown.

3.6.2.10. Road Markers.

Road markers are not required.

3.6.3. Related Features (to railroads and roads)

3.6.3.1. Bridges and Viaducts

3.6.3.1.1. General

3.6.3.1.1.1. A FIRM REQUIREMENT EXISTS TO PORTRAY DISTINCTIVE BRIDGES AND VIADUCTS BY SELF-IDENTIFYING PICTORIAL SYMBOLS WHEREVER POSSIBLE. Pictorial symbolization is of considerably more value in radar navigation than conventional symbolization.

3.6.3.1.1.2. Prominent and distinctive bridges and viaducts meeting the pictorialization selection criteria shall be indicated with the appropriate pictorial symbol.

3.6.3.1.1.3. The lesser bridges and viaducts selected for portrayal shall be shown with conventional symbols.

3.6.3.1.2. The following criteria is established for conventional treatment:

3.6.3.1.2.1. Where feasible, in uncongested areas, all bridges and viaducts at least 500 feet long shall be shown. Length may be slightly exaggerated in order to retain a minimum distance of 0.05" between abutment ticks.

3.6.3.1.2.2. Railroads cross ties shall be omitted on bridges and viaducts and within .25” of the abutment ticks at the ends of the symbol.

3.6.3.1.2.3. Stream symbols shall not be broken for the bridge or viaduct symbol; roads or railroads passing under shall be broken .02” from the symbol on both sides.

3.6.3.1.2.4. When a bridge is used to carry both a road and a railroad whether on the same or different level, the feature shall be shown by the road bridge symbol with the railroad drawn up to the bridge end.

3.6.3.1.2.5. Footbridges shall not be shown.

3.6.3.2. Overpasses, Underpasses

3.6.3.2.1. Overpasses and underpasses, unless extremely significant, shall be shown with the conventional symbol.

3.6.3.2.2. These shall be shown wherever possible, especially in areas of sparse culture.

3.6.3.2.3. Within urban or congested areas no attempt should be made to show other than those for the most significant roads. Excessive breaking of the continuity of important road systems shall be avoided.

3.6.3.2.4. Significant cloverleaf traffic interchanges shall be shown. Those that cannot be plotted to scale (or shown adequately with a slight exaggeration of scale) shall be symbolized with a .08" square and diagonals, both .007" lineweight. One of the diagonals shall be broken .02” on each side of the other diagonal. Entry and exit roads shall be omitted within a symbol.

3.6.3.2.5. Entry and exit roads shall be omitted within the symbol.

3.6.3.3. Causeways

3.6.3.3.1. Causeways shall not be specifically symbolized. The road or railroads carried shall be shown in the normal manner.

3.6.3.3.2. The shoreline shall not be plotted along the causeway to augment the symbol, unless the distance between the two shorelines, when plotted to scale, exceeds the width of the symbol and the road or railroad.

3.6.3.4. Tunnels, Roads and Railroads

3.6.3.4.1. Tunnels for roads and railroads, if possible, shall be shown wherever they exist.

3.6.3.4.2. In conventional cartographic treatment, tunnels less than .05" in length shall be exaggerated and shown as .05" long between tunnel entrance ticks. Longer tunnels shall be plotted true to scale.

3.6.3.5. Ferries

3.6.3.5.1. Ferries, if depicted, shall be shown by the conventional symbol.

3.6.3.5.2. They shall be shown only in areas of sparse detail.

3.6.3.5.3. A ferry shall be regarded as such only where it is an established feature regularly in operation for transporting traffic between two points on opposite sides of a stream or across open water.

3.6.3.5.4. Ferries across single-line streams shall be indicated merely by labeling. Across double line streams less than .10" in width, ferries shall be indicated by labeling and breaking the crossing symbol at the shorelines. Across wider double line bodies of water, ferries shall be indicated in the same manner with a fine dashed line indicating the approximate route of the ferry.

3.6.3.6. Fords

3.6.3.6.1. When fords for roads are shown they shall be represented by the conventional symbol.

3.6.3.6.2. They shall be shown only in areas of sparse detail.

3.6.3.6.3. Fords across single line streams shall be indicated by labeling.

3.6.4. Populated Places and Buildings

3.6.4.1. General

3.6.4.1.1. Cities are valuable navigational checkpoints since they are prominent and frequently can be rapidly and positively identified because of some unique element(s) which differentiates it from others in the area. The shape of a city is distorted by perspective. The short period of time an aircraft may be over a city makes it almost impossible for identification on that basis alone. Portraying a city by visual outline does not necessarily pinpoint it as a significant checkpoint for radar or visual navigation. At a scale of 1:1,000,000 the smaller cities

appear to have the same general outline. What is required, in addition to the visual outline, is the inclusion of cultural and natural features within or in the near vicinity which distinguishes the city from others. The general location within a city where there is a vertical build-up is extremely significant. This element provides the important properties of a good checkpoint: prominence, uniqueness and visibility from a distance, which in effect means time for identification. Furthermore, the relative simplicity of this characteristic lends itself to prior study and facilitates immediate association.

3.6.4.1.2. Classification of a city by population is of little significance in itself. The significance lies in a city's vertical build-up, mass design and its association with related features in close proximity. Large buildings are significant for their landmark value in differentiating otherwise similar cities or towns. When isolated, they are good checkpoints because of unique appearance or their location relative to other features. Vertical dimension, mass and design are significant factors which enable these features to be seen form the air.

3.6.4.1.3. It must be emphasized that small towns and villages assume extreme importance in this series of charts. A pre-flight course is plotted along the route of least habitation in order to avoid detection. Omission of towns and villages could conceivably compromise the mission through ground observer detection, and could also disorient the pilot or navigator - especially in the absence of other cultural detail or checkpoints.

3.6.4.1.4. Populated places and buildings shall be shown in conformance with the Symbol Appendix.

3.6.4.2. Density and Selection

3.6.4.2.1. When information is available, cities shall be selected on a basis of area covered, visibility from the air, strategic importance and population. Cities of prime importance should be selected first, those of second importance next and so on. Towns and villages of lesser importance should be added to give a comparable representation of the area. When towns are of equal importance, those at highway junctions or at railroad centers should be given preference. Do not attempt to distribute cities, towns and villages over the chart evenly, as closer grouping in certain areas will give a more complete picture of more densely populated sections.

3.6.4.2.2. In areas where the majority of cities are of sufficient size to warrant portrayal by their actual outline, the need for portrayal of villages is considerably lessened. Conversely, where few outlined cities occur, the need to portray small cities and villages increases proportionately.

3.6.4.3. Classification and Type Size and Style

3.6.4.3.1. Populated places shall be classified in accordance with three (3) categories. When population statistics are available, the categories will represent three (3) ranges of population figures; each range varying with the area concerned. The three categories of population breakdown will vary with the region being charted. An EXAMPLE of population breakdown for Northeastern U.S. follows:

Category 1 - Large cities, population more than 250,000.

Category 2 - Cities and large towns, population 25,000 to 250, 000

Category 3 - Towns and villages, population less than 25,000

3.6.4.3.2. When population figures are not available, populated places are classified by three (3) categories of primary economic strategic importance. The relative importance of populated places shall be determined from a regional aspect. An example follows:

Category 1 - Populated places of primary importance.

Category 2 - Populated places of secondary or relatively minor importance.

Category 3 - Populated places of least importance.

3.6.4.3.3. Type sizes and styles will be portrayed as shown in the Symbols Appendix.

3.6.4.4. City Outlines

3.6.4.4.1. The outline (called the visual outline) shall reflect the physical shape of a developed area as viewed by the air observer. The visual outline need not conform to a political boundary nor need it necessarily represent the extent of a building development. However, it should include those permanent features which are an integral part of a developed area such as: street pattern, buildings, industrial installations, resort structures, and fringe housing developments. Additional elements which may be considered as contributing to the visual pattern are: cemeteries, outlying buildings, parks and gardens, estates, and other features which contribute to the developed area. These elements (when included) must be of a reasonably permanent nature, must be contiguous to the developed area, must be all-seasonal in nature, and when viewed from the air must reflect a marked distinction from the surrounding terrain. Normally, garden plots shall not be included as limits of a visual outline since they do not meet the qualifications of being all-seasonal in nature when viewed from the air. If, however, the gardens around a developed area do present a marked distinction from the surrounding terrain, a permanent feature (as a road, fence, hedgerow, etc.) within the garden area may be considered as a limit of the visual outline. In the absence of a permanent feature the garden areas shall not be included.

3.6.4.4.2. Populated places that are equal in area to .06” square or larger shall be shown by outline. Cities or towns which are slightly less than .06” square may be shown by outline if the outline area, because of unique shape, has landmark value or if the use of symbols might cause clutter in densely populated areas.

3.6.4.4.3. The city outline shall be broken whenever it coincides with a shoreline of an open water area or a double line stream dividing a city area. In addition, that portion of a city coincident with a railroad, road, or stream shall be omitted.

3.6.4.4.4. Towns that merge shall be shown by a line delineating the entire built-up area.

3.6.4.4.5. The visual outline of populated places shall be shown with a .006" lineweight.

3.6.4.4.6. Openings within city areas shall be shown when they are equivalent to a square .10" at 1:500,000 scale.

3.6.4.5. City Symbols

3.6.4.5.1. City, town or village symbols shall be used when source data for an outline is not available, or when the actual area is less than a .06" square. When the symbol falls partially into a water area, the portion in the water shall be omitted and the shoreline shall serve as the limits. Size of symbols shall be as follows:

3.6.4.5.1.1. Category 1 - .10” square

3.6.4.5.1.2. Category 2 - .07” square

3.6.4.5.1.3. Category 3 - .04” square

3.6.4.5.2. Lineweight of symbols shall be .006”.

3.6.4.6. Tint Requirements

3.6.4.6.1. All outlined cities and towns (Category 1 and 2) shall contain tint.

3.6.4.6.2. Symbolized Category 1 and 2 cities (towns) shall contain tint.

3.6.4.6.3. Symbolized Category 3 villages shall not contain tint.

3.6.4.7. Landmark Buildings

3.6.4.7.1. Outstanding buildings and factory complexes shall be depicted by the appropriate pictorial symbol when the selection criteria is met.

3.6.4.7.2. Remaining landmark buildings selected for portrayal shall be indicated with conventional symbolization detailed below:

3.6.4.7.2.1. Landmark buildings shall normally be identified by an appropriate label. Exceptions are buildings which cannot be more specifically identified. The located object symbol without a label shall be identified as a building (bldg).

3.6.4.7.2.2. Isolated ruins which serve as landmarks shall be shown by symbol and labeled "ruin" or "ruins" as applicable.

3.6.4.8. Populat**ed** Places in Ruins

3.6.4.8.1. Ruined, destroyed and partially destroyed populated places shall not be specifically symbolized nor shall the extent of ruins or destruction be indicated. Such places shall be depicted (when practicable) as they existed prior to destruction, and shall be routinely symbolized in accordance with the prescribed method of portrayal.

3.6.4.8.2. The symbolized places shall be augmented by explanatory labeling enclosed in parentheses and positioned below the place name; such as (ruined), (destroyed), and (partially destroyed),etc. The term "partially destroyed" shall be interpreted to mean destruction which comprises less than 75% of the developed area.

3.6.5. Boundaries

3.6.5.1. General

3.6.5.1.1. Boundaries which are recognized or accepted by the U.S. Government and which reflect the current situation shall be shown.

3.6.5.1.2. Boundaries shall be shown in their entirety except along streams where portions may be omitted provided continuity is retained.

3.6.5.1.3. The following boundaries are required on this series of charts:

3.6.5.1.3.1. International

3.6.5.1.3.2. State and Provincial

3.6.5.1.3.3. US/Russia Maritime Boundary

3.6.5.1.3.4. Date Line

3.6.5.2. International Boundaries

3.6.5.2.1. All International Boundaries shall be shown, symbolized with the standard symbol, .012" lineweight.

3.6.5.2.2. All International Boundaries shall be overprinted with a continuous magenta screened line .04" wide, unless coincident with an ADIZ and then the ADIZ shall be shown.

3.6.5.3. State and Provincial Boundaries.

State and Provincial Boundaries shall be shown in the United States, Canada and Mexico.

3.6.5.4. US/Russia Maritime Boundary

3.6.5.4.1. The US/Russia Maritime Boundary line shall be shown.

3.6.5.4.2. In instances where the Maritime Boundary symbol coincides with the Date Line symbol, the Date Line symbol shall be omitted.

3.6.5.5. International Date Line

3.6.5.5.1. The Date Line shall be shown and labeled "INTERNATIONAL DATE LINE" on all charts where it applies.

3.6.5.5.2. The label "Monday" and "Sunday", properly oriented shall be placed adjacent to the line, at least once, on the chart.

3.6.5.6. Treatment of Special Cases

3.6.5.6.1. Boundaries along streams need to be continuous. Only those portions required for continuity and clarification shall be shown.

3.6.5.6.2. Established boundaries in open water areas shall be shown by the appropriate boundary symbol and labels.

3.6.5.6.3. When a boundary coincides with the neatline or projection line, it shall be shown in its entirety, centered on the neatline or projection.

3.6.5.7. Country and Sovereignty Designation on Charts that Contain No Boundaries

When a chart falls entirely within a sovereign country or a state or province within the country, the locality designation in the margin will suffice for identification.

3.6.5.8. Identification of Administrative Divisions

3.6.5.8.1. Appropriate locality names shall be shown along each international, state, and province boundary shown.

3.6.5.8.2. When the subdivision boundary is too short or does not appear on a particular chart, the state, province, etc., name shall be shown along the international boundary in conjunction with the country names. Example: "North Dakota United States".

3.6.6. Miscellaneous Cultural Features

3.6.6.1. General

3.6.6.1.1. THIS SECTION COVERS THE CULTURAL FEATURES TO BE SHOWN WHICH HAVE NOT BEEN PREVIOUSLY DISCUSSED. It includes those features which are prominent or are readily identifiable because of size, location, distinctive shape or have particular value in strategic and tactical operations.

3.6.6.1.2. Miscellaneous cultural features may be shown by any one of four methods detailed below:

3.6.6.1.2.1. Pictorial Symbols OUTSTANDING miscellaneous cultural features meeting the selection criteria shall be pictorialized. In general, features selected for pictorial portrayal shall include prominent buildings, factories, factory complexes, bridges, dams, towers, tanks, and related miscellaneous features. Pictorial symbols are reserved for those checkpoints that are so unique or outstanding that they serve as a medium for instantaneous orientation of the chart to the ground. Features shall be self-identifying to facilitate immediate recognition. Indiscriminate selection can only cause confusion and possibly compromise the pilot’s mission.

3.6.6.1.2.2. Conventional Symbols. Miscellaneous cultural features (those not selected for pictorialization) shall receive conventional treatment as illustrated in the Symbols Appendix. In areas of sparse to moderate detail, a maximum number of conventionally symbolized cultural features shall be shown. They are also required in the vicinity of populated places when they serve as an aid in identification of populated places.

3.6.6.1.2.3. Located Object Symbols. Those miscellaneous cultural features for which standardized symbols are lacking shall be portrayed with the appropriate located object symbol (solid square or circle) and identifying type; e.g., "mill", "water", "castle", etc.

3.6.6.1.2.4. Obstruction Symbols

3.6.6.2. Mining Features

3.6.6.2.1. Mining features such as open pit mines, quarries, strip mines, tailings, etc., shall be shown in the absence of more prominent landmark features. Where two or three mines are situated close together, a single symbol shall be sufficient to indicate them all.

3.6.6.2.2. Small strip mines, mine dumps and tailings that cannot be portrayed to scale, as illustrated by pictorial symbols, shall be shown by the square located object symbol and appropriate label.

3.6.6.2.3. Mining features considered too small significance may be omitted.

3.6.6.3. Telecommunication and Power Transmission Lines (T-Lines)

3.6.6.3.1. Telecommunication and power transmission lines shall be shown on the black plate as symbolized in the Symbols Appendix. Refer to **Chapter 3**, paragraphs **3.10.5.5.**1.3. and **3.11.5.5.**

3.6.6.4. Pipelines

3.6.6.4.1. Pipelines for gas, oil, etc., whether above or below ground shall be shown where their location or right of way may be visible from the air. They shall be omitted in developed areas.

3.6.6.4.2. It is extremely important that elevated portions of pipelines across valleys and canyons be shown because of the hazard presented to low level flight.

3.6.6.4.3. No effort should be made to show pipelines as continuous features; only landmark portions need be shown.

3.6.6.4.4. Aqueducts or pipelines which carry water shall be shown as specified in **3.7.7.**

3.6.6.5. Dams and Similar Features

3.6.6.5.1. Dams shall be shown except for the smaller dams in congested areas built across single line streams and without an impounded reservoir.

3.6.6.5.2. No distinction shall be made between masonry dams and earth dams or dams constructed of other materials.

3.6.6.5.3. When exaggeration in length is necessary to show a small dam, the symbol shall be drawn .05" long. Shorelines coincident with the dam symbol shall be omitted.

3.6.6.5.4. When a dam is used to carry a road, the feature shall be shown by the dam symbol with the road drawn to the end of the dam.

3.6.6.5.5. Important or landmark passable locks shall be shown.

3.6.6.5.6. A weir, when used to dam water, shall be shown by a dam symbol. When used to trap fish in rivers or tidal waters or divert water, a weir shall be symbolized similarly to breakwater or jetty. In congested areas weirs and jetties may be omitted.

3.6.6.6. Harbor Structures

3.6.6.6.1. Prominent piers, breakwaters, wharfs and quays which project into the open water area from the shoreline shall be shown conforming as nearly as possible to actual shape of the object and labeled appropriately.

3.6.6.6.2. The coastline shall be omitted where it coincides with the sea wall symbol.

3.6.6.7. Lookout Towers

3.6.6.7.1. Lookout towers which extend more than 200 feet above surrounding areas shall always be shown as obstructions.

3.6.6.7.2. When the height of the tower is not known, or is known to be 200 feet or less, it shall be shown with the conventional symbol as indicated in the Symbols Appendix. When air marked, the identification shall be included.

3.6.6.8. Forts

All forts of landmark importance shall be shown by the appropriate located object symbol and identified.

3.6.6.9. Stadiums, Outdoor Theaters, Race Tracks, Athletic Fields

Prominent features in this category shall be shown.

3.6.6.10. Ruins

Isolated ruins shall be shown by symbol and labeled "ruins" or "ruins" as applicable. They shall be shown only when extensive and have significance as landmarks.

3.6.6.11. Unusual Landmark Areas

Cases may exist in regions of sparse culture generally void of landmarks, where an area is so different in nature of appearance from the surrounding terrain that it serves as an outstanding landmark. Where treatment and symbolization have not been elsewhere presented, such areas shall be outlined by a dashed line and labeled appropriately to explain the nature of the area. Examples might be: areas of stunted growth in deserts, areas of dark soil surrounded extensively by light soil, or vice versa, or cultivated areas located in primarily uncultivated areas.

3.6.6.12. Landmark Objects

Landmark objects which cannot be shown to actual scale and which are not otherwise symbolized shall be indicated by the round or square located object symbol, whichever best indicates proper shape, and labeled appropriately.

3.6.6.13. Aerial Cableways, Ski Lifts, Conveyor Belts and Similar Features

3.6.6.13.1. Only those that may fall in the obstruction category or have visual significance from the air shall be shown.

3.6.6.13.2. Included in this category are linear features other than railroads whose function is the transportation of people or materials.

3.6.6.14. Cemeteries

Those of landmark importance shall be shown by the appropriate landmark symbol and label.

3.6.6.15. House of Religious Worship

Houses of religious worship shall be shown when they have landmark value, especially those with a distinctive character.

3.6.6.16. Structures other than Buildings

Structures of landmark importance other than buildings shall be indicated with appropriate identification.

3.6.6.17. Wells **(**other than **w**ater**)**

3.6.6.17.1. Operational wells drilled for gas, oil or minerals shall be shown. Abandoned wells shall be shown if they have landmark value in sparse cultural areas.

3.6.6.17.2. Individual wells shall be shown wherever possible; labeling appropriately, identifying the type of well shall augment the symbol as: "oil", "gas", "salt", etc.

3.6.6.17.3. Where wells exist in groups or cover a common area and are too dense to show individually, it shall be sufficient to show a representative number over the area covered. Appropriate labeling shall be applied as: "oil wells", "gas well", etc.

3.6.6.18. Water Wells

Wells drilled for water shall be treated as directed in **3.7.14.**

3.6.6.19. Tanks **(**Oil, Gas, Water, etc.**)**

3.6.6.19.1. Tanks used for the storage of oil, gas, water, or other liquids shall be shown wherever they exist as landmark features in areas of sparse culture. They shall also be shown in other areas providing their portrayal does not conflict with the portrayal of other more prominent cultural features.

3.6.6.19.2. Tanks shall be shown with the tank symbol augmented with an appropriate label such as "oil", "gas", "water", etc.

3.6.6.19.3. Where tanks exist in groups or cover a common area and are too dense to show individually, it shall suffice to show a representative number over the area covered. Appropriate labeling shall be applied as "oil", "gas", "water", etc.

3.6.6.19.4. The symbol and label for wells, other than water, shall be shown on the culture plate. (Wells drilled for water shall be shown on the drainage plate).

3.6.6.20. Reservoirs **(**other than **w**ater**)**

3.6.6.20.1. Open reservoirs used for the storage of asphalt, oil or other liquids except water shall be shown with the located object symbol and appropriate label.

3.6.6.20.2. Instructions for reservoirs containing water are covered in **3.7.4.**

3.6.6.21. Silos

Silos shall be shown when they serve as landmarks. These shall be portrayed with the located object symbol and label "silo".

3.6.6.21.1. Grain elevators are particularly significant for low altitude pilotage operations because of their excellent landmark value and shall be shown to the maximum extent possible with the located object symbol and appropriate label.

3.7. HYDROGRAPHY

3.7.1. General

3.7.1.1. This section on hydrography includes drainage features, coastal hydrography and permanent snow and ice areas.

3.7.1.2. The term drainage encompasses all features, both natural and man-made, of which water is a constituent part. The permanent or temporary nature of the water within the feature establishes its classification within its type as PERENNIAL OR NON-PERENNIAL. A feature is normally PERENNIAL when it contains water throughout the major part of each year. If it contains water for a lesser period it is considered NON-PERENNIAL. This latter category includes all features that may normally be found classified as either intermittent or dry.

3.7.1.3. Areas will be encountered containing features which are either too numerous or too small to show to scale. Wells, springs and pinpoint ponds fall in this category. No attempt should be made to show all of these features. Instead, a representative pattern of the symbols shall be added to cover the area, augmented where appropriate by a descriptive note such as: "numerous small lakes", etc.

3.7.1.4. Isolated small lakes and ponds too small to plot to scale shall be omitted.

3.7.1.5. No special symbolization is required for streams, lakes and ponds which are frozen or partially filled with ice.

3.7.1.6. Water Surface Elevations

3.7.1.6.1. Elevations of the larger lakes in the area shall be shown when this information is available. This should normally include all lakes that are four miles by six miles or larger and may include smaller lakes in order to retain a representative pattern of water surface elevations in an area void of large lakes.

3.7.1.6.2. Stream elevations shall be shown in level areas that are inadequately portrayed by elevation or contour data. Elevations shall be shown only on the major drains in an area and these should be no closer than 50 mile intervals.

3.7.1.7. Hydrographic symbols shall be shown in conformance with the Symbols Appendix.

3.7.1.8. Water vignette (civil format only) is required along the shorelines around isolated islands of 0.10" or smaller location in open water, subject to cartographic judgement and discretion.

3.7.1.9. Two tones of blue will be used to distinguish water areas identified as "Open Water" and "Inland Open Water".

3.7.1.9.1. Open Water is defined as the limits (shorelines) of all coastal features at mean high water for oceans, seas and associated waters such as bays, gulfs, sounds, fords, large estuaries, etc. Exceptionally large lakes such as the Great Lakes, Great Bear Lake, Great Slave Lake, etc., will be considered as "Open Water" features.

3.7.1.9.2. Inland Open Water is defined as all other bodies of open water.

3.7.1.9.3. The Open Water tone will be extended inland as far as deemed necessary to adjoin the Inland Open Water tone (Generally where drainage lines coalesce to a width of .10" – approximate).

3.7.2. Shorelines

3.7.2.1. In tidal waters, shorelines shall be delineated as the outline of natural coastal features at mean high water except for mangrove, nipa and coastal marsh. In inland waters, shorelines shall be mapped to correspond to the normal stage of water. This may differ from shorelines appearing on aerial photography which may have been flown during periods of flood or drought. The shoreline at normal state is usually marked by a line of permanent land vegetation.

3.7.2.2. The shoreline of mangrove, nipa and coastal marsh shall be the outline of the features at the hydrographic (low water) datum. The shoreline of mangrove, nipa and coastal marsh shall be shown as unsurveyed (indefinite).

3.7.2.3. When an island is too small to show actual shape, it shall be shown by a solid dot. Where several islands tend to coalesce, only the most prominent shall be shown. The smaller (pinpoint) islands which coalesce with other islands or the coastline shall be omitted.

3.7.2.4. A distinction shall be made in symbolization between perennial, non-perennial (intermittent or dry), fluctuating, unsurveyed, indefinite or man-made shorelines. See Symbols Appendix.

3.7.3. Lakes

3.7.3.1. Perennial Lakes

3.7.3.1.1. The shoreline of a perennial lake or pond shall be mapped to correspond to the normal stage of water as evidenced by reliable source data or other information.

3.7.3.1.2. All perennial lakes and reservoirs which can be shown by an outline and tint at this scale shall normally be shown. In areas where lakes are a major characteristic of the landscape such as in Canada, it is permissible to omit the less prominent, provided a representative pattern of the drainage features is retained.

3.7.3.1.3. In areas where isolated groups of lakes or reservoirs occur which are significant because of their uniqueness in the area, as many as possible shall be shown including lakes or reservoirs symbolized as pinpoints.

3.7.3.1.4. Where marsh or other vegetation grows down to and into an inland (non-tidal) body of water, it is sometimes difficult or impossible to establish the actual shoreline. In such cases, the shoreline shall be delineated as unsurveyed.

3.7.3.1.5. Salt lakes shall be symbolized the same as other lakes. They shall not be identified by the label "salt".

3.7.3.2. Non-Perennial Lakes and Ponds

3.7.3.2.1. This category includes all features normally classified as "dry", 'intermittent", or "sebkha". No distinction shall be made in symbolization.

3.7.3.2.2. Non-perennial lakes and ponds shall not be augmented with a descriptive label indicating its nature such as "dry", "sebkha", etc. However, if considered important the proper name shall be shown if available.

3.7.3.2.3. Lakes and ponds which are permanently drained under land reclamation projects shall not be treated with the non-perennial symbol; instead they shall be shown as depressions or other appropriate relief features or omitted entirely if unimportant.

3.7.4. Reservoirs and Pools

3.7.4.1. The shoreline of reservoirs shall be the line that represents the water surface at the normal stages of the lake as controlled by the spillway of the dam.

3.7.4.2. Areas surrounding reservoirs, flooded by the use of movable dam crests or flash board, shall be regarded as land subject to inundation, (See **3.7.13.**)

3.7.4.3. The term "reservoir" shall not be used to label reservoirs with natural shorelines, unless it is used in conjunction with a proper name.

3.7.4.4. Reservoirs and pools which are too small to be shown by actual outline may be shown by the located object symbol and labeled "reservoir".

3.7.4.5. Special symbolization is required for dams that are "under construction".

3.7.4.6. When a dam is reported under construction and the height of the spillway is known, the back-up area shall be outlined by the unsurveyed shoreline symbol and labeled appropriately.

3.7.4.7. When exact limits are unknown, the features shall be symbolized by an unsurveyed shoreline and labeled "Probable extent of reservoir". All chart detail and tint shall be retained.

3.7.5. Streams

3.7.5.1. Perennial Streams

3.7.5.1.1. Perennial streams shall be shown, scale permitting. In well watered areas, it is permissible to omit the shorter and less prominent branches. Wherever perennial drainage is heavy, their importance becomes minor and only those whose size or configuration makes

them valuable as landmarks shall be shown. In arid areas it is important to include as much of the drainage pattern as possible.

3.7.5.1.2. Extended drains should be cut back slightly when the points of origin of two or more are in close proximity and direction of flow could be misinterpreted.

3.7.5.1.3. Streams measuring .015" in overall width shall be shown as double line streams. Streams less than .015" overall width shall be shown as single-line streams. A gradual taper shall be shown and shall be in proportion to the number, length and distribution of tributaries, except where large scale source material indicates variance in width at reproduction scale.

3.7.5.2. Non-Perennial Streams

3.7.5.2.1. This category includes all features classified in such descriptive terms as "dry", "intermittent", "dry wash", "dry riverbed", "wadi", "gulch", and "arroyo". NO DISTINCTION BETWEEN THEM SHALL BE MADE IN SYMBOLIZATION.

3.7.5.2.2. In arid areas non-perennial streams shall be shown wherever they exist, scale permitting.

3.7.5.2.3. Non-perennial streams which in flood measure .05" or more in width shall be shown by the double line symbol and dot fill. Non-perennial streams less than .05" in width shall be shown by the single line symbol.

3.7.5.3. Seasonally Fluctuati**ng** Drainage

3.7.5.3.1. Broad streams offer a perplexing problem since periodic fluctuation cause their widths to vary considerably.

3.7.5.3.2. The limits (high-water stage) shall be outlined with the unsurveyed shoreline symbol and a dot fill. The normal channel of streams within the outline shall be shown with the appropriate perennial/non-perennial symbol.

3.7.5.3.3. In certain areas, the overflow area is confined within high banks which are distinctive and extremely significant as landmarks. In these isolated instances, the solid line perennial shoreline symbol shall be used to delineate the limits of the overflow area in lieu of the unsurveyed shoreline symbol.

3.7.5.4. Disappearing Streams

Underground portions of streams shall not be shown but the points of disappearance and reappearance shall be symbolized.

3.7.5.5. Fanned-Out Streams

3.7.5.5.1. Streams that fan-out and disappear in sandy areas shall be shown.

3.7.5.5.2. An arrow shall be added at the end of disappearing streams to indicate the approximate point of disappearance and direction of flow.

3.7.5.6. Sand Deposits

Sand deposits in and along river beds shall be shown when information is available.

3.7.5.7. Wet Sand Areas

Areas of wet sand shall be shown when they are landmark significant or necessary to preserve the characteristic pattern of an area, especially within and adjacent to a desert area.

3.7.5.8. Deltas

In mapping deltas, all double lines and main flow distributaries shall be shown. Single-line distributaries shall be added to present the characteristic pattern of the delta.

3.7.6. Falls and Rapids Falls and rapids shall be shown in uncongested areas when they have landmark value. Major falls and rapids shall always be shown. Label when necessary for clarity.

3.7.7. Aqueducts

3.7.7.1. No distinction in symbolization shall be made between aqueducts and pipelines carrying water. Only the prominent trunk lines shall be shown; small feeder lines to houses or small villages shall generally be omitted. Only the most prominent shall be named.

3.7.7.2. Aqueducts that are abandoned, under construction or underground shall be specially symbolized.

3.7.7.3. Tunnels and tunnel outlets or shafts shall be indicated wherever this information is available.

3.7.7.4. It is a common practice in aqueduct construction to build a conduit of brick or concrete on or near the surface of the ground and to cover this structure with an earth fill which resembles a levee in cross section. The levee-like features shall not be indicated. The buried aqueduct shall be indicated by a dashed line. However, if a trail or road exists on top of fill, the dashed line shall not be shown. Instead, the proper symbol shall be used to show the traveled way and the presence of the buried feature indicated by parallel labeling, reading: "underground aqueduct".

3.7.7.5. Where a pipeline or aqueduct is elevated or overpasses another feature, winged ticks shall be added to the symbol to indicate the elevated part. Where misinterpretation would other-

wise result, the overpassed feature shall be broken at the point of intersection of the overpassing feature.

3.7.7.6. Kanats (qanat, karex underground irrigation systems with air vents) shall be shown in areas of the chart lacking more prominent detail.

3.7.8. Flumes, Penstocks and Similar Features

3.7.8.1. Flumes, penstocks and similar features shall be shown when they are significant as landmarks in low level, high speed flight.

3.7.8.2. No distinction shall be made in symbolization between flumes, penstocks and similar features except that the nature of the feature shall be indicated by labeling, added parallel to the symbol. If the feature is shorter, its nature is obvious; labeling may be omitted.

3.7.9. Canals and Ditches

3.7.9.1. Major canals shall be shown. Minor canals and ditches shall be omitted except where they form a distinctive pattern or are uncommon to an area.

3.7.9.2. In areas where the canals and ditches are too numerous to delineate, the area shall be labeled "numerous canals and ditches."

3.7.10. Artificial Bodies of Water Features such as salt pans and salt evaporators shall be shown where they are significant as landmarks.

3.7.11. Swamps and Marshes

3.7.11.1. Normally, all marshes and swamps which are equivalent to or exceed an area .5” square shall be shown. Conversely, clearings in such areas of less than equivalent size shall be omitted.

3.7.11.2. No distinction shall be made between freshwater and saltwater marshes.

3.7.11.3. Land subject to inundation shall not be regarded as marsh land (See **3.7.13.**)

3.7.11.4. Marshes occurring within the limits of inland bodies of water shall be shown by the marsh symbol in the open water.

3.7.11.5. Coastal marsh occurring in tidal waters differs from ordinary marsh in that it covers and uncovers with the tide. For purposes of mapping, it shall be regarded as a land feature rather than a water feature even though it physically falls within the foreshore area. It shall be treated as ordinary marsh with the shoreline defining its seaside limits.

3.7.11.6. Mangrove and nipa shall be shown with the swamp symbol and appropriately labeled.

3.7.11.7. Peat bogs shall be symbolized the same as swamps and marshes except that they shall be labeled "peat bog".

3.7.11.8. Swamps and marshes occurring in the permafrost areas of the world shall not be shown with the swamp symbol. The nature of the terrain shall merely be indicated by labeling; i.e., "tundra".

3.7.12. Rice Fields and Cranberry Bogs Rice fields, cranberry bogs and "similar flooded areas" shall be shown only when they are unique or distinctive features in areas void of landmark detail.

3.7.13. Land Subject to Inundation Areas that have become permanently and distinctively marked due to frequent inundation by floods shall be shown by the flood marked symbol. Areas of general floods and overflows or those that are so vast that they have no significance shall not be shown.

3.7.14. Springs, Wells, Waterholes Springs, wells, and waterholes shall be shown only in arid or exceptionally open country. The symbol may be shown with name if available. They shall not be labeled as "spring", etc.

3.7.15. Desert Areas Drainage features assume unusual importance in desert areas. Many features rarely contain water but due to their characteristic appearance serve as outstanding landmarks. There follows a brief summary of the features most likely to be encountered.

3.7.15.1. Wadis – A wadi is a natural channel or bed of a watercourse which is dry except in the rainy season. It is similar in appearance to a dry wash or dry riverbed.

3.7.15.2. Sebkas – A sebkha is a natural depression whose bed may be covered with sand or mud. It is often salt encrusted and marshy after a rain. Depending upon the degree of wetness, it may contain more or less scattered marsh-like growths. In aerial photography, sebkhas show up very clearly as depression areas (with a definite outline) darker than the surrounding sand.

3.7.15.3. Dry Lakes – Dry lakes occurring in desert areas normally include "alkali spots" and "salt wastes".

3.7.16. Permanent Snow and Ice Areas

3.7.16.1. Glaciers

3.7.16.1.1. Glaciers are difficult or impossible to contour accurately, nor would a high degree of accuracy be warranted since they usually are slowly but constantly changing in shape.

3.7.16.1.2. Glaciers shall be indicated with a fine dashed line.

3.7.16.1.3. The delineating line shall be omitted at the heads of glaciers where they meet snowfields or ice fields. Where the glacier extends into ice or open water areas the delineating line shall replace the shoreline.

3.7.16.1.4. Shaded relief shall be shown when information is available.

3.7.16.1.5. All tints shall be omitted in the area.

3.7.16.2. Snowfield, Ice Fields and Ice Caps

Large snowfields, ice fields and ice caps shall be completely void of interior flow lining.

3.7.16.3. Glacial moraines shall be shown when they have definite landmark value.

3.7.16.4. Contours in permanent snow and ice areas shall be shown as approximate and shall be portrayed only when adequate contour information exists.

3.7.16.5. Prominent ice peaks shall be indicated by hachuring. An ice peak is a pinnacle rising above the surrounding area perpetually covered with snow or ice.

3.7.16.6. Ice cliffs that are prominent landmark features shall be shown.

3.7.16.7. Shelf ice is defined as a solid, thick glacial ice formation extending into the sea from the land but attached thereto. It may be afloat or aground. It is one source of most sea ice features which are formed by "calving" from the shelf ice.

3.7.16.8. Pack ice is a large area of floating ice driven closely together. It is made up of icebergs and fragments broken away from the shelf ice. Pack ice does not stand as high as shelf ice, nor is it solid. It is normally penetrable by ice cutters.

3.7.16.9. The polar ice pack is permanent ice. Although there may be some shifting, it is relatively stable.

3.7.16.10. The interior of the shelf ice and pack ice areas shall be labeled "shelf ice" or "pack ice " as often as necessary for clarity. The outer limits of the pack ice shall be labeled "Approximate maximum limits of pack ice" with the date (month of observation). When the limits are unknown, the general limits of the known information shall be labeled "limits of available shelf (pack) ice formation". The limits of the polar ice pack shall also be appropriately labeled, with date if available and if important as an index to reliability.

3.7.16.11. Crevasses shall be shown only when they are large enough to plot to scale. Crevasses shall be delineated with a .008" line (centered) and cross-hatched with parallel .006" lineweight, .02" apart.

3.7.17. Coastal Hydrography

3.7.17.1. General

3.7.17.1.1. The term "coastal hydrography" includes all natural and relatively permanent cultural features on the seaward side of the shoreline which affect the navigability of the area.

3.7.17.1.2. Coastal hydrography shall include foreshore and offshore features and notes as directed in the following paragraphs. When omission is necessary because of congestion, items selected should be those most significant from a landmark standpoint.

3.7.17.1.3. Foreshore. The foreshore is defined as being that area between the high water shoreline and the low water shoreline or any area along the coast that covers at high tide and uncovers at low tide. The extent of the foreshore area will depend upon the amount of tidal fluctuation and the slope of the shore. In nontidal waters, the horizontal extent of the foreshore area is too small to plot even on a large scale chart.

3.7.17.1.4. Offshore. The offshore area is defined as being that zone which extends from the low water mark to an indefinite distance seaward or that area which never uncovers.

3.7.17.1.5. Descriptive notes should be added only when they convey pertinent information to the user or when required to clarify situations which otherwise would be confusing or liable to misinterpretation.

3.7.17.1.6. Careful consideration must be given to the placement of lettering, especially notes. Clarity is highly important and there must be no question as to which feature is being labeled.

3.7.17.2. Foreshore Flats

Tidal flats (flats that cover and uncover with the tide) shall be shown when they are large enough to plot to scale.

3.7.17.3. Sand Bars

Sand bars are found in rivers, at river mouths or in inland waters. Those that have significance as landmarks shall be shown.

3.7.17.4. Reefs, Coral and Ledges

Reefs are interpreted as any area of coral or rock that is awash at low tide. If the area of a reef or ledge is small or is generally submerged, the reef symbol shall be omitted and the rock symbol shall be used to symbolize actual protrusions.

3.7.17.5. Rocks, Bare or Awash

Rocks, bare or awash, shall be individually symbolized. In congested areas, only the most prominent shall be shown. Very large rocks which are above mean water may be shown as islands. The elevation of prominent rocks shall be shown whenever this information is of sufficient importance.

3.7.17.6. Sunken Rocks

A rock which is submerged at the sounding datum shall not be shown by the rock symbol. An isolated area of numerous submerged rocks which is visible from the air may be portrayed as an unusual underwater feature. (See **3.7.17.8.**)

3.7.17.7. Wrecks

Exposed or stranded wrecks having any portion of the hull exposed at the low water datum shall be shown if prominent enough at aid pilotage. Symbol shall be positioned to indicated direction and position of wreck. Sunken wrecks shall not be shown.

3.7.17.8. Unusual Hydrographic Features

As a rule, objects below the surface of the water shall not be shown. In exceptional cases, a dashed line shall be used to delineate unusual submerged features such as shoals and reefs which are visible from the air. The use of this symbol is recommended for large water expanses where they are often the only distinguishable features. Each such feature shall be appropriately labeled. Extensive reefs below the low water datum may be shown for unusual underwater features.

3.7.17.9. Maritime Limits

The maritime limits of features below the water line such as cable areas, anchorage, swept areas, dredge dumps, etc., shall not be shown.

3.7.17.10. Depth Curves, Bottom Characteristics, Danger Line

Depth curves, bottom characteristics and danger lines are not required in this series of charts.

3.7.18. Fish Ponds and Hatcheries Fish ponds and hatcheries are not required.

3.8. RELIEF

3.8.1. General

3.8.1.1. Basic relief is depicted by use of: (a) contours, (b) spot elevations, (c) shaded relief, and (d) gradient (layer) tints (Civil Format).

3.8.1.2. Related uses of elevation data furnished by contours are:

3.8.1.2.1. To determine the probability of receiving radar information based on line of site consideration.

3.8.1.2.2. The knowledge that certain areas of no radar return (normally interpreted as water returns) are the result of land form shadows. For example, the navigator may plan to use a major built-up area as a checkpoint, however, intervening terrain may prevent recognizable radar returns.

3.8.1.3. Contours have significance for a low level, high speed navigation during both the pre-flight planning and enroute navigational phases. The function of the contour differs with each:

3.8.1.3.1. In pre-flight planning, the major concern is to determine a mission profile based on minimum clearance of terrain and man-made objects. The contour interval should express significant changes in the elevations at regular intervals.

3.8.1.3.2. For the enroute phase, precise navigation is of primary concern.

3.8.1.4. Relief shall be shown in conformance with the Symbols Appendix.

3.8.2. General

3.8.3. Contours

3.8.3.1. General

3.8.3.1.1. The principles detailed herein apply equally to "contours" and "approximate contours". Wherever the term contour is used it shall be interpreted to read "contour" or "approximate contour".

3.8.3.1.2. Basis for contour system consists of: BASIC CONTOURS, INTERMEDIATE CONTOURS AND AUXILIARY CONTOURS. A definition of each as used in the specifications follows:

3.8.3.1.2.1. Basic contours are the fundamental contour framework at 1000 foot intervals.

3.8.3.1.2.2. Intermediate contours (required on Military Format only) are lines which are shown in between the basic contours to portray form, degree of slope and elevation not shown by the basic contours.

3.8.3.1.2.3. Auxiliary contours (required on Military Format only) are lines used to portray configuration and relative significance of additional unique land forms not shown by the selected intermediate contour interval.

3.8.3.1.3. A contour will be classified as reliable (accurate) when it is evaluated to be accurate to one-half a contour interval or better.

3.8.3.1.4. A contour will be classified approximate when it does not fulfill the accuracy standard specified for a reliable contour. An approximate contour may be either basic or intermediate.

3.8.3.1.5. Contours which coincide with the datum plane shall be designated as "sea level" or by "0" when space is limited. Contours which fall below the datum plane shall be designated with their values prefixed by a minus sign.

3.8.3.1.6. Small depressions, not adequately portrayed by shaded relief, shall be portrayed by depression contours. Depressions, too small to portray to scale, shall be exaggerated slightly when considered significant in low altitude operations.

3.8.3.2. Contour Symbolization (See Symbols Appendix)

3.8.3.2.1. Reliable Contours

3.8.3.2.1.1. Basic – a solid line, .006" lineweight.*

3.8.3.2.1.2. Intermediate – a solid line, .004" lineweight.

3.8.3.2.1.3. Auxiliary – a broken line, approximately .15" dash, .02" space, .004" lineweight.**

3.8.3.2.2. Approximate Contours

3.8.3.2.2.1. Basic – a broken line, approximately .30" dash, .02" space .006" lineweight.*

3.8.3.2.2.2. Intermediate – a broken line, approximately .30" dash, .02" space, .004" lineweight.

3.8.3.2.2.3. Auxiliary – a broken line, approximately .15" dash, .02" space, .004" lineweight.**

* In areas of "contour tightness" the weight of the basic contours may be dropped as low as .004".

** Note that no distinction is made between "Reliable Auxiliaries" and "Approximate Auxiliaries".

3.8.3.3. Contour Values

3.8.3.3.1. Contour values, denoting the elevation above sea level, shall be inserted in basic contours, intermediates and auxiliaries as often as necessary to afford instantaneous readability and value identifications.

3.8.3.3.2. Numbers shall be portrayed in a systematic, step-like pattern, positioned on the northwest side of relief formations, wherever practical, to improve legibility. Each formation should have its own set of contour numbers.

3.8.3.3.3. Values shall always be added to all basic contours except in those extreme situations where physical limitations are imposed. Normally, intermediate contours shall be labeled at all elevation levels on the chart except in those areas where the addition of contour numbers might tend to create undue congestion. However, it is of extreme importance that intermediate contours be adequately labeled in those areas where dropped intermediates necessitate the addition of numbers to the retained intermediates, to facilitate the interpretation of elevation levels between basic contours. Auxiliary contours shall be labeled when space permits or adequately expressed in the legend, whichever is more feasible.

3.8.3.4. Basic Criteria

3.8.3.4.1. Basic Contours

3.8.3.4.1.1. Basic contours shall be drawn continuously throughout the chart even though they coalesce. (The existence of unusual relief features in certain areas may require an exception to this rule).

3.8.3.4.1.2. Normally, change in interval should only occur at the limits of the geographic area of immediate concern in order to maintain match and continuity.

3.8.3.4.1.3. A "skipped interval" on the same chart is objectionable and should be avoided as much as possible. An indiscriminate use of contours may well serve to distort topographic formations and convey an erroneous impression to the user when there is a change in the basic interval.

3.8.3.4.1.4. Distance between contours should become progressively smaller from the flats to apex of hills or mountains. This factor should be kept in mind when there is a change in the contour interval.

3.8.3.4.2. Intermediate Contours (Military Format)

3.8.3.4.2.1. Normally, the selected interval should be retained throughout the chart at all elevation levels, being dropped when the lines tend to coalesce.

3.8.3.4.2.2. In view of scale limitations and under certain aspects of terrain conditions, it may not be feasible to always maintain a constant interval on the chart. In these instances intermediate contours may be dropped when:

3.8.3.4.2.2.1. The distance between basic contours is uniform.

3.8.3.4.2.2.2. The slope is both steep and uniform.

3.8.3.4.2.2.3. The space between basic contours is too small to adequately portray intermediates.

3.8.3.4.2.3. Entry and re-entry of "dropped contours" should be at those points where they align and split the interval of the retained contours.

3.8.3.4.2.4. Normally, intermediate contours shall be retained (space permitting) where:

3.8.3.4.2.4.1. They cross double-line drainage features.

3.8.3.4.2.4.2. They are needed to clearly define the positions of significant changes in slope.

3.8.3.4.2.4.3. A uniform interpretation cannot be made.

3.8.3.4.2.5. The most effective treatment is one that accomplishes a change in interval at the sheet edge and possibly over several sheets in order to maintain match and continuity.

3.8.3.4.3. Auxiliary Contours (Military Format)

3.8.3.4.3.1. Auxiliary contours shall be used only when they are necessary to portray unique ground forms not adequately portrayed by the selected intermediate contour interval.

3.8.3.4.3.2. An important consideration in the use of auxiliary contours is the possible radar return value of localized, unique land forms that cannot be adequately expressed with the selected interval. Auxiliaries in the level areas and at the top of major elevated masses are an aid in the visual and radar identification of significant land forms. These two extremes (flats and tops) are significant at low altitude because of land form contrast with the horizon.

3.8.3.4.3.3. Auxiliary contours need not be continuous. However, consideration should be given to the maintenance of continuity in relation to the expressed contour interval.

3.8.3.4.3.4. Auxiliary contours need not be shown in the exact position when severe physical limitations are encountered. A slight to moderate displacement may be necessary to maintain the configuration of a specific relief feature or of a series of low-flying connected ground forms.

3.8.3.4.3.5. An indiscriminate use of auxiliary contours is not implied in these specifications. It must be emphasized that auxiliary contours shall be shown only when required to depict small terrain features considered to have significant landmark or radar return value in low altitude missions.

3.8.3.5. Contour Interval

Geographic area studies are a necessity prior to compilation. These studies are intended primarily to determine the contour interval and limits of the required terrain characteristics. Tints are to be employed in order to establish a homogeneous product within the prescribed area of work.

3.8.3.5.1. Basic Contours

3.8.3.5.1.1. The basic contour interval shall be 1000 feet. This interval shall be retained throughout the chart at all elevation levels wherever possible.

3.8.3.5.1.2. However, in areas of high elevations and in deep ravines, it becomes physically impossible to maintain this interval. In these instances it may be necessary to increase the interval to multiples of 1,000 feet, tempered by the considerations indicated in these Specifications.

3.8.3.5.2. Intermediate Contours (Military Format)

3.8.3.5.2.1. Intermediate contours shall be shown at intervals of 250 feet or multiples thereof.

3.8.3.5.2.2. Selection is dependent upon the nature of the terrain.

3.8.3.5.3. Auxiliary Contours (Military Format only)

3.8.3.5.3.1. Auxiliary contours shall be portrayed in intervals of 50, 100 or 125/150 feet, whichever most adequately portrays the smaller relief features required for portrayal.

3.8.3.5.3.2. Auxiliaries have specific applications in extensive areas of relatively low relief (with elevations of approximately 250 feet and under) and in extensive areas where minor significant graduations of terrain cannot be properly represented by the selected intermediate contour interval.

3.8.3.6. Legend Note

A note shall be added in the legend explaining the basic contour interval with intermediates and / or auxiliaries tailored to the relief information depicted on the individual chart.

3.8.3.7. The Unit of Measurement

The foot shall be the basic unit it measurement of relief.

3.8.4. Relative Relief Tint (Military Format)

3.8.4.1. General

3.8.4.1.1. Tints are required in areas of reliable relief. Areas of unreliable relief, unsurveyed areas and areas covered by permanent ice and snow shall be void of all tints.

3.8.4.1.2. Altitude tints, judiciously selected to express the major land form categories, will afford the user an immediate appreciation of the whole terrain picture, not only for low altitude visual use but especially for low altitude radar missions.

3.8.4.1.3. Studies of broad geographic areas are a necessity prior to compilation. These studies are intended primarily to determine the limits of the tints in order to establish a homogenous product (continuity of match between adjoining sheets) within a prescribed area of work.

3.8.4.2. Terrain Characteristic Tints

Utilized to define and accentuate overall elevation levels. The four tints required are defined and described below:

3.8.4.2.1. Low Relief Tint (Screened Green). Normally extends from sea level to a level which best encompasses or limits broad areas of rolling and relatively hilly terrain.

3.8.4.2.2. Moderate Relief Tint (Screened Buff). Normally represents the major mountain mass (including high plateaus and valleys) and extends from the upper limits of the Low Relief Tint to a level delineating the extreme peaks and ridges of a formation.

3.8.4.2.3. High Relief Tint (Solid Buff). Represents the extreme high areas of a mountain range and extends from the upper limit of the Moderate Relief Tint to the maximum elevation.

3.8.4.2.4. Level Areas and Valley Accentuation (Solid Green). Represents relative level areas to delineate and separate the relatively flat from the sloping areas and extends along the major drainage systems, narrow valleys, depressions and similar small level areas occurring in the hilly and mountainous areas of the chart. (The valley accent feature retains a severe break with the terrain tints in order to achieve the required emphasis). When the navigator detects hill returns characteristic of rolling terrain in this radar scope, the chart should reflect this condition either through the application of shaded relief and/or the absence of the level area green. IT IS NOT INTENDED THE LEVEL AREA GREEN BE USED TO CLASSIFY AREAS THAT WILL SUPPORT LOW LEVEL FLIGHT, BUT RATHER SHOW THE TRUE NATURE AND CHARACTER OF THE TERRAIN. A relatively level area is interpreted as being a general area that is flat or level in relation to the surrounding terrain, or an area that is an inclined plane of less than 4° slope.

3.8.4.3. Considerations in Selection of Terrain Characteristics Tints

3.8.4.3.1. The selection of the line separating the Low Relief Tint from the Moderate Relief Tint shall be on an area basis, tempered by regional considerations to the extent that the same limiting line will be retained for several charts in a formation but a higher level may be selected as plains areas reach higher elevations. The Low Relief Tint defines the plains, foothills and low mountains. The Moderate Relief Tint defines the higher mountain mass with the exclusion of critical highs.

3.8.4.3.2. The High Relief Tint, selected on an area basis, accentuates the highest peaks of a formation. (Charts covering only those areas below the critical peaks will not carry High Relief Tint). The tint may include several peaks of a formation, which are of equal elevation, but should be selected so that the largest covers an area of at least .5” square or equivalent. Separate mountain masses that differ considerably in elevation will have the lower limits at different levels. In some instances, it may be necessary that one chart will have a High Relief Tint for two separate mountain masses at different levels within the chart. Generally, the High Relief Tint indicates the highest peaks of a mountain mass.

3.8.4.4. Tint Diagrams

3.8.4.4.1. A Relief Diagram, representing terrain characteristic tints, shall be portrayed in the Relief Legend in the margin of the chart. (See Style Sheets for basic diagram).

3.8.4.4.2. The explanatory text shall contain a statement to the effect that areas of unreliable relief are void of tint.

3.8.4.4.3. Care should be taken to ensure that the Relief Diagram contains the identical color (or combination of colors and screens) employed in the body of the chart.

3.8.4.4.4. The Style Sheets represent a sample portrayal only.

3.8.5. Elevations

3.8.5.1. General

3.8.5.1.1. An adequate pattern of spot elevations should be distributed throughout the various elevation levels, specifically including the highest points in each area and significant lower points. Elevations which are not considered significant shall normally be omitted. In addition, surface elevations of such hydrographic features as lakes, ponds and inland seas are required. Spot elevations shall not be shown indiscriminately on sides of slopes, or in those areas where they cannot be readily identified with a topographic or cultural feature.

3.8.5.1.2. Where an island is too small to show a spot elevation, the elevation value shall be centered under the island name, or if the island name is not shown, just outside the island limits.

3.8.5.1.3. The basic unit measurement and the highest elevation on the chart shall be indicated in the margin with a note, positioned where indicated on the Style Sheet. Note shall read as follows:

HIGHEST TERRAIN elevation is (or is under) ----* feet
located at ---------*---------

*Insert correct value and geographic coordinates.
(Civil Format Only)

The highest terrain elevation shall be shown in the margin at the top of the highest tint band (indicated on the Military Style Sheets).

3.8.5.2. Spot Elevations

3.8.5.2.1. Spot elevations shall be symbolized with the "dot" or "x" symbol. Normally, spot elevations shall be shown for:

3.8.5.2.1.1. The highest spot on the chart.

3.8.5.2.1.2. The highest spot in the area which controls the determination of the maximum elevation figure. (In relatively flat terrain, spot elevations shall be shown based on cartographic judgement and discretion).

3.8.5.2.1.3. Very significant or distinctive highs of mountain ranges or major relief. (Determinations as to what constitutes significant or distinctive highs are matters of cartographic judgement and discretion).

3.8.5.2.2. Interpolated and/or manufactured elevations (regardless of the method of determination) shall be symbolized by the "dot" symbol when they meet the accuracy requirement specified in 3.8.4.3. below, otherwise the "x" symbol shall be used.

3.8.5.2.3. ± elevations shall not be shown.

3.8.5.3. Accuracy Criteria

Spot elevations symbolized by a dot indicate accurate position and elevation within 100 feet. Those symbolized by the "x" symbol indicate accurate position and a vertical error greater than 100 feet.

3.8.5.4. Symbolization

3.8.5.4.1. Accurate Elevations – solid dot, .025" diameter.

3.8.5.4.2. Approximate Elevations – "x" .050" overall, .005" line weight.

3.8.5.4.3. Approximate or doubtful locations – omission of the point locator (dot or "x").

3.8.5.4.4. Spot elevations shall be symbolized as indicated in 3.8.4.4.1. and 3.8.4.4.2. above using a larger size type for the highest elevation value on a chart and in the general area (See Symbols Appendix).

3.8.5.4.5. Use the spot elevation negative to make a migrated positive hold-out mask. Limit the hold-out area to .010" from the edge of the elevation figure. This mask will be used for holding out shaded relief (provide a halo effect around elevation values). It will also be used to hold out contours on the military version when contour line weights exceed .006".

3.8.5.5. Notes

3.8.5.5.1. Accurate elevations ("dot" symbol) shall be defined in the Relief Legend. The note shall read as follows:

Maximum vertical error 100 feet x0000

3.8.5.5.2. Accuracy of approximate elevations ("x" symbol) shall be expressed in the Relief Legend in general terms to indicate gross vertical reliability. Note shall be TAILORED to the individual chart. The following is an indication of the general nature of the type notes required:

3.8.5.5.2.1. Questionable Elevations x0000

(Vertical accuracy generally unreliable)

3.8.5.5.2.2. Questionable Elevations x00000

(Vertical accuracy extremely unreliable in mountainous areas)

3.8.5.5.2.3. Questionable Elevations x0000

(Maximum possible vertical error undetermined)

3.8.5.5.2.4. Approximate Elevations x00000

(Vertical error varies from approximately 100 to 500 feet)

3.8.5.5.2.5. Approximate Elevations x00000

(Maximum possible vertical error 250 feet)

3.8.5.5.3. In addition, a note reading as follows shall be added to the Legend: "Doubtful locations are indicated by omission of the point locator (dot or "X")."

3.8.5.5.4. The determination between expressing possible gross error by "generalized text" or as a "vertical dimension in feet" is necessarily dependent upon adequacy and reliability of available source material. The latter method is preferred and is especially applicable with large scale source material compiled by photogrammetric methods or other means utilizing high order field control.

3.8.5.6. Interpolated Elevations

When verified spot elevations are not available, values may be interpolated using either or both methods described below, depending on reliability and scale:

3.8.5.6.1. Elevations may be manufactured by using the value of the next higher contour on largest scale source material available. If contours on basic source are in meters, the value of the next higher contour in meters is to be used. The results are then converted to feet and raised to the following 100; i.e., 1831 to 1900, 1695 to 1700, 1705 to 1800.

3.8.5.6.2. Other approved methods for approximating elevations may be used as an alternate approach provided they have an accuracy approximately equal to or greater than the above.

3.8.6. Unreliable Relief

3.8.6.1. Form lines shall not be used.

3.8.6.2. Hachures shall not be shown unless specifically requested.

3.8.6.2.1. Hachures merely serve to accentuate the prominent relief features which occur in the area. They are not intended to present a complete picture of the terrain.

3.8.6.2.2. In delineating hachures, only ridge lines and peaks need to be shown.

3.8.6.2.3. Hachures may be used in areas of reliable relief to supplement contours.

3.8.6.2.4. Weight, gauges and design cannot be strictly prescribed herein.

3.8.6.3. Within the unreliable relief area, pictorial relief shall be used to portray prominent relief features (See 3.8.6. below).

3.8.6.4. Where both relief and planimetric data are unavailable, the area shall be void of tint and labeled "Unsurveyed". Lettering shall be positioned to indicate the extent of the unsurveyed area.

3.8.6.5. Spot elevations, where available, shall be added in accordance with 3.8.4. above.

3.8.6.6. Labeling Areas of Unreliable Relief

Where relief information is unreliable (not adequate for the portrayal of contours), the land area (devoid of all tints) shall be appropriately labeled. The note "Relief data incomplete" shall be cen-

tered in the area and/or the note "Limits of reliable relief information" shall be positioned adjacent to the limits of reliable relief coverage.

3.8.7. Terrain Portrayal (Shaded Relief)

3.8.7.1. The overprinting of contours with the halftones of the terrain portrayal shadings precludes interpretation of the contours. Therefore, a very singular responsibility for the accuracy and effectiveness of the portrayal rests with the expertise of the Terrain Specialists who interpret and render the originals. For this reason, expertise of interpretation and rendition are part of these specifications.

3.8.7.2. Since the halftone shadings are combined with other features and are printed in black (Civil Format), certain technical standards and reproduction technologies are in order to ensure that the reproducible halftones are compatible to these overall chart specifications. These standards are as follows:

3.8.7.2.1. Terrain renderings shall be made by shading and highlighting on a stable plastic cartographic sheeting which is grey coated to read approximately 30% tone on a standard type densitometer.

3.8.7.2.2. Shading shall be done with plastic type pencil which fuses well to the plastic sheeting and provides clean sharp detail and soft shadowing.

3.8.7.2.3. Shadowing shall be plastically rendered in graduated tones so that a three dimensional effect is obtained. Small areas of solid tones may be used to accentuate ridges and peaks or to dramatize other prominent features.

3.8.7.2.4. Highlighting shall also be plastically rendered to enhance the three dimensional effect. The plastic shall be scraped completely clean of its coating where sharpest highlights occur and shall be free of any coating in large level areas such as valley floors or coastal plains.

3.8.7.3. The terrain portrayals shall be rendered in such a manner that all significant terrain features are displayed. This not only includes high relief, which casts shadows, but also includes low relief, which reflects light. Small, low-lying forms may be slightly exaggerated if considered significant as landmarks or pertinent to the low-altitude pilot.

3.8.7.4. On certain charts, specifically those comprised entirely of relatively level or gently rolling terrain, shaded relief rendition normally will fail to effectively accentuate the basic relief por-

trayal expressed by contours. In these instances, the shaded relief may be omitted from the body of the chart.

3.8.7.5. Consideration should be given to improving the relationship between contours, shaded relief and spot elevations in order to provide the necessary degree of correlation.

3.8.7.6. Miscellaneous terrain features such as escarpments, bluffs, depressions, levees, volcanoes, fault scarps, etc., may sometimes be more effectively expressed in shaded relief rather than by standard symbolization.

3.8.8. Area Relief Features Normally, the following "Area Relief Features" which are not indicated by contouring shall be shown by appropriate symbolization wherever such areas are considered important to area identifications:

3.8.8.1. Distorted surface areas such as rocky areas, stratified rock outcrop and lava

3.8.8.2. Lava flows

3.8.8.3. Sand or gravel areas

3.8.8.4. Sand ridges

3.8.8.5. Sand dunes

3.8.8.6. Strip mines, mine dumps and tailings (to scale)

3.8.9. Miscellaneous Relief Features

3.8.9.1. Craters

Prominent volcanoes and craters shall be shown, especially in areas of sparse culture. In absence of lava flow, descriptive note "crater" shall be carried.

3.8.9.2. Mountain Passes

Those of prominence shall be shown by symbol and elevation.

3.8.9.3. Eskers

Eskers, when prominent, shall be shown in the same manner as levees and labeled "eskers".

3.8.9.4. Escarpments, Bluffs, Cliffs, Depressions, Etc.

These features shall be shown wherever possible in view of their extreme importance in radar scope presentations either on the shaded relief drawing or by standard symbol. When specified by appropriate authority, a descriptive note such as "RAPIDLY RISING TERRAIN" shall be carried to further emphasize the area.

3.8.9.5. Levees

Prominent levees shall be shown by symbol and shall be named or labeled when clarification is necessary.

3.8.10. Gradient (Layer) Tints (Civil Format)

3.8.10.1. Gradient (layer) tints are required in areas of reliable relief. Areas of unreliable relief, unsurveyed areas and areas covered by permanent ice and snow shall be devoid of all tints.

3.8.10.2. Gradient (layer) tints shall be shown for the intervals listed below:

Below Sea Level	5000' – 7000'
0' – 1000'	7000' – 9000'
1000' – 2000'	9000' – 12000'
2000' – 3000'	12000' – Up
3000' – 4000'	

3.8.10.3. Gradient (layer) tints shall be broken for open water areas, dry or intermittent lakes, glaciers, and urban area tints.

3.8.10.4. A diagram representing the intervals of the gradient (layer) tints, shall generally be portrayed in the title panel of the chart. (See Style Sheet for basic diagram).

3.8.10.4.1. The explanatory text shall contain a statement to the effect that areas of unreliable relief are void of tint.

3.8.10.4.2. Care should be taken to ensure that the tint diagram contains the identical color (or combination of colors and screens) employed in the body of the chart.

3.8.10.4.3. The Style Sheets represent a sample portrayal only.

3.9. WORLD GEOGRAPHIC REFERENCE SYSTEM, MILITARY FORMAT

3.9.1. General

3.9.1.1. The World Geographic Reference System (GEOREF) shall be applied to the military format Operational Navigation Charts (ONC) only.

3.9.1.2. Description of GEOREF

3.9.1.3. The GEOREF is based on normal longitude and latitude lines and values. Basically, this system defines the unit geographic area in which a specific point lies. It is read to the right and up in all cases. The point of origin is the 180th meridian and the South Pole. It extends to the right or eastward from the 180th meridian, 360 degrees to the 180th meridian, and upward or northward from the South Pole, 180 degrees, to the North Pole. The GEOREF divides the earth's surface into quadrangles of longitude and latitude with a simple, brief, systematic code that gives positive identification to each quadrangle. The system and identification code is as follows:

3.9.1.3.1. There are 24 longitude zones of 15 degrees each. To the right or eastward from the 180th meridian, these zones are lettered A through Z, omitting the letters I and O. There are 12 bands of latitude of 15 degrees each. Upward or northward from the South Pole, these bands are lettered from A through M, omitting the letter I. This combination divides the earth's surface into 288 basic 15 degree quadrangles, each identified by two letters, the first letter being that of the longitudinal zone and the second letter that of the latitude band.

3.9.1.3.2. Each basic 15 degree quadrangle is divided into 15 lettered units eastward and 15 lettered degree units northward. These one degree quadrangles are lettered from A through Q, omitting the letters I and O. Thus, four letters will positively identify any single degree quadrangle in the world, the first two letters being the reference of the 15 degree quadrangle obtained as detailed above, the third letter being that of the 1 degree longitudinal zone, and the fourth letter that of the one degree latitude band.

3.9.1.3.3. Each degree quadrangle is divided into 60 numbered GEOREF "minute" units eastward and 60 numbered GEOREF "minute" units northward. Thus four letters and four figures, reading to the right and up in all cases, will positively identify a one minute quadrangle anywhere in the world, and will locate a point within approximately one nautical mile. In referencing on charts in the Western Hemisphere, the GEOREF "minute" units are equal to 60 minutes minus the number of minutes of west longitude, as the GEOREF numeration is eastward from the 180th meridian. In referencing on charts south of the equator, in both the Eastern and Western Hemispheres, the GEOREF "minute" units are equal to 60 minutes minus the number of minutes of South latitude, as the GEOREF numeration is northward from the South Pole. In referencing on charts in the Eastern Hemisphere, the GEOREF "minute" units are equal to the minutes of east longitude. Also, in referencing on charts north of the equator, in both the Eastern and Western Hemispheres, the GEOREF "minute" units are equal to the minutes of north latitude.

3.9.2. Minimum Requirements

3.9.2.1. Divisions between basic 15 degrees quadrangles.

3.9.2.2. Letter designators of 15 degree quadrangles.

3.9.2.3. Letter designators of 1 degree quadrangles.

3.9.2.4. Ten minute unit values.

3.9.2.5. Grid reference box.

3.9.3. Portrayal

3.9.3.1. Refer to the Military Style Sheets in addition to the instructions that follow for GEOREF portrayal. Divisions between the 15 degree quadrangles shall be indicated by overprinting the appropriate line of longitude or latitude with a solid blue line, .02" line weight.

3.9.3.2. Type placement

3.9.3.2.1. The Basic 15° Quadrangle Letter designators of basic 15 degree quadrangles shall be shown outside of the geographic limits in each corner of the chart. Whenever more than one 15 degree quadrangle falls within the geographic limits and the north and east overlap areas, the letter designators of the 15 degree quadrangles shall be shown in the margin on each side of the dividing quadrangle line. Quadrangles falling outside of the south or west geographic limits of the chart shall not be identified. Whenever the southwest corner of a basic 15 degree quadrangle is included on a chart, letter designators shall be positioned within the chart area in the southwest corner of the quadrangle, 0.1" above the delimiting longitude and latitude lines. Type may be repositioned slightly when necessary to clear other detail but in no case shall letter designators be positioned outside of the quadrangle to which they refer.

3.9.3.2.2. The 1° Quadrangle

3.9.3.2.2.1. Within the chart area and the north and east overlap areas letter designators of 1 degree quadrangles shall be shown in the southwest corner of the quadrangle, positioned 0.1” above the delimiting longitude and latitude lines. When necessary, because of limited available space, letter designators may be omitted from overlap areas. Letter designators of 1 degree quadrangles shall be omitted in areas outside the south and west geographic limits unless chart detail has been extended into these areas.

3.9.3.2.2.2. Exceptions to uniform placement of 1 degree letter designators are described below:

3.9.3.2.2.2.1. When such positioning would result in obscuring base or aeronautical information, letter designators shall be positioned in a clear space as close to the specified positions as practicable. However, in no case shall they be positioned outside the quadrangle to which they refer.

3.9.3.2.2.2.2. When the Southwest corner of a basic 15 degree quadrangle is included on a chart, letter designators shall follow the letter designators of the basic 15 degree quadrangle.

3.9.3.2.2.3. Letters identifying the full degree lines of longitude and latitude shall be shown adjacent to those longitude and latitude values which appear in the margin. Eastward identifying letters shall be positioned just to the right of, and aligned with, full degree longitude values. Northward identifying letters shall be centered just above latitude values.

3.9.3.2.3. Ten Minute Unit Values. Ten (10) minute unit values northward shall be shown just outside the lines of longitude which establish the east and west geographic limits of the chart. In addition, each northward ten (10) minute unit shall be labeled just to the right of the central meridian. Exception to this rule is when the central meridian is not graduated with tick marks. When this condition occurs, each northward ten (10) minute unit shall be labeled to the right of the first graduated line of longitude to the east of the central meridian. On those charts between 68° N and 68° S latitudes, ten (10) minute unit values eastward shall be shown just outside the lines of latitude which establish the north and south geographic limits of the chart. In addition, each eastward ten (10) minute unit shall be labeled just below the central line of latitude. On those charts between 68° N and 72° N latitude, twenty (20) minute unit values eastward, i.e. "20" and "40" shall be shown just outside the lines of latitude which establish the north and south geographic limits of the chart. In addition, each eastward twenty (20) minute unit shall be labeled just below the central line of latitude. GEOREF minute unit values shall be positioned 0.1 inch from the projection lines. However, when such positioning would result in obscuring base or aeronautical information, a value may be repositioned slightly in order to clear or, if necessary, it may be omitted entirely.

3.9.3.3. The GEOREF reference box, with sample point, shall be as indicated on the Military Style Sheets. Sample reference point shall not be tailored to each chart.

3.10. AERONAUTICAL INFORMATION, CIVIL FORMAT

3.10.1. General

3.10.1.1. Aeronautical information portrayed is limited to that normally used during VFR flight.

3.10.1.2. Visual reference data essential to the purpose of the chart must not be obscured by the aeronautical overprint, while vital aeronautical information must also be readable. Each symbol shall be clearly evident and visible.

3.10.1.3. Aeronautical information shall be plotted at its true geographic position whenever possible. Should it become necessary to displace aeronautical symbols to improve readability in congested areas, give preference to the accurate plotting of NAVAIDs. Where two or more NAVAIDs cannot be accurately plotted because of proximity, give preference to NAVAIDs having airway functions. When a facility cannot be placed in the correct position relative to the surrounding base detail, revise the base detail while maintaining the correct relative locations.

3.10.1.4. Identify radials with the magnetic outbound value from the NAVAID. Identify LF/MF bearings with the magnetic inbound value to the NAVAID.

3.10.1.5. Bearings and radials shall be depicted by three digit figures and degree signs; e.g., 001°, 012°, 123°. Place the numbers so as to preclude the possibility of pilots misreading the values. This is especially critical with the numbers which may be read upside down; e.g., 161, for 191, 090 for 060, etc.

3.10.1.6. Boxes encompassing data shall be of a size consistent with the data contained therein. Avoid unnecessary enlargement of the boxes by allowing data positioned on and breaking the lines (top or bottom) of the boxes to extend beyond the limits of the boxes.

3.10.1.7. Textual data shall be positioned relative to true north.

3.10.1.8. Identifications and data notes shall be positioned adjacent to or as near symbols as possible unless this results in obliteration of other detail.

3.10.1.9. A sense of proportion, balance and artistic value is essential in preparing a chart representing the ultimate in readability and user appeal. Therefore, rules concerning type placement must be flexible and unconfining. The cartographer must evaluate portrayal techniques for each

area before making the decision on type placement. When there is equal congestion surrounding a facility, the preferred type location is to the NE, thence counterclockwise around the symbol.

3.10.1.10. Dotted leader lines may be used when necessary for clarity of detail or to effect the correct relationship between type and symbols.

3.10.1.11. Operational notes, e.g., hours of operation shall be shown in local time. 0000 shall be used to denote the beginning of the day and 2400 the end of the day.

3.10.1.12. Avoid placing symbol and textual identifications, including airway identification data, along or on the folds, so as maintain the symbol and its identification within the same chart panel.

3.10.1.13. Aeronautical information shall be shown in blue unless otherwise indicated to be shown in magenta. Normally, all LF/MF information shall be shown in magenta.

3.10.2. Airports

3.10.2.1. Only airports published in the National Flight Data Digest (NFDD) shall be charted.

3.10.2.1.1. Subject to the above restriction, airports within the following criteria shall be charted:

3.10.2.1.1.1. Public use airports (e.g. stolports, gliderports, etc.)

3.10.2.1.1.2. Military airports without charting restrictions

3.10.2.1.1.3. Abandoned airports with landmark value

3.10.2.1.1.4. Non-public use airports having emergency or landmark value

3.10.2.1.1.5. Heliports open to the public, and not associated with an existing airport and selected U.S. Forest Service Heliports

(Note: Airports of lesser importance may be omitted in congested areas and where other airports with better facilities are nearby).

3.10.2.2. Airports (landplane and seaplane) shall be plotted to true geographic position unless they conflict with a NAVAID at the same location. In such cases, the airport shall be displaced from or superimposed upon the NAVAID. In displacing, the positional relationship between the airport and the NAVAID shall be retained. When depicting a seaplane airport, the eye of the anchor symbol should be as close to the docking area as possible, with the remainder of the symbol in the water. Orientation of the symbol is not crucial.

3.10.2.3. Airports shall be symbolized in accordance with the symbols appendix and classified by the following criteria:

3.10.2.3.1. Landplane or seaplane

3.10.2.3.2. Civil, military or civil-military

3.10.2.3.3. Services available – To qualify as an airport with "Service available", the minimum requirements are that gasoline be readily available and the field tended at least during the normal working hours of each day. Normal working hours are 10:00 AM to 4:00 PM local time, Monday through Friday. Military airports do not advertise services.

3.10.2.3.4. Airports with at least one 1,500 feet long hard-surfaced runway shall be shown by a pattern. Runways may be exaggerated as necessary to clearly portray the pattern. Only hard-surfaced runways shall be shown. As the runway patterns are intended primarily for visual reference, hard-surfaced runways which are closed but retain the appearance of runways shall be included. Non-directional radio beacon symbols which cover an airport or part of a runway shall be broken.

3.10.2.3.5. All other airports with and without services.

3.10.2.4. Airports shall be identified by the designated airport name. Military airports shall include the abbreviated letters AFB, NAS, AAF, NAAS, NAF, MCAS, DND, etc., as part of the name.

3.10.2.4.1. When the airport name is same name as a NAVAID or adjacent city or town and no misinterpretation will result, the NAVAID or adjacent city or town name can suffice for the airport name.

3.10.2.4.2. Parts of long airport names ("airport", "field", "municipal", etc.) and the first names of persons shall be omitted unless needed to distinguish an airport from another with a similar name.

3.10.2.4.3. The type "(Pvt)" shall be shown at non-military private fields, positioned above or immediately after the airport name.

3.10.2.5. Airport names shall be supported by the following coded data, positioned as indicated in the Symbols Appendix. Substitute a dash for the elevation, lighting, or runway length when not shown.

3.10.2.5.1. Flight Service Stations (FSS) located on an airport shall be indicated by the letters "FSS" positioned above the airport name.

3.10.2.5.2. Indicate control towers, both federal and non-federal, by adding the letters "CT" with the primary VHF local control tower frequency after the airport name. A star following the frequency indicates part-time operation. Hours of operation shall be shown in the tabulation in the margin.

3.10.2.5.3. Automatic Terminal Information Service shall be shown by the letters "ATIS", with the primary arrival VHF/UHF frequency/ies, following the tower frequency.

3.10.2.5.4. The elevation of an airport is the highest point of the usable portion of the landing areas based on the most reliable information available. The elevation, in feet above mean sea level, shall be positioned immediately below the airport name. Show sea level elevations as "00". When elevation is below sea level a minus sign shall precede the figure.

3.10.2.5.5. Runway lighting is a system of lights defining the usable runway surface. Lighting symbolization indicates availability of runway lighting at military and public use airports and shall be shown below the airport name following the elevation. Lighting in operation sunset to sunrise shall be indicated by the letter "L". Lighting with limitations such as: available on request (by radio call, letter, phone, telegram, FAX), part-time lighting, or pilot/airport-controlled lighting shall be shown by an asterisk (*) preceding the letter "L". Portable lighting and temporary lighting shall be considered as an absence of runway lighting, i.e., not avail-

able. When runway lighting is not available, a short dash shall be shown. Availability of runway lights at private airports will not be shown; a short dash in lieu of the letter "L" will be shown.

3.10.2.5.6. Runway length is the length of the longest active runway (pavement, end to end), including displaced thresholds, but excluding overruns. The runway length shall be positioned below the airport name following lighting. Runway length shall be shown to the nearest 100 feet using 70 as the division point; e.g., 59 shall be used to indicate a runway of 5,870 feet.

3.10.2.5.7. Aeronautical Advisory Stations (UNICOM) shall be indicated by the letter "U" positioned immediately after the runway length.

3.10.2.5.8. Nonradar VFR Advisory Service shall be shown at locations where Automatic Terminal Information Service (ATIS) is not available full-time and the frequency is other than the primary CT frequency; e.g., "VFR Advsy 120.1".

3.10.2.5.9. Airports of entry shall be identified by the words "Airport of Entry" below the airport elevation, lighting and runway information.

3.10.2.5.10. Airports shall be identified by name. Public use, joint civil-military, and military airports shall include the three/four character alpha-numeric FAA identifier immediately after the name in parenthesis. The number 0 or 0 will be identified as Ø or Ø in order to differentiate from the letter "O". Airports outside the NAS will be charted with ICAO identifiers. When the ICAO identifier does not exist for an airport, the State-designated identifier will be used.

3.10.2.6. Airports with air traffic control towers shall be shown in blue. All other airports shall be shown in magenta. Associated data shall be shown in the same color as the airport symbol.

3.10.2.7. Airports for which a special air traffic rule are designated in FAR Part 93 shall be indicated by placing a box (.006" lineweight) around the airport name.

3.10.2.8. Heliports shall be shown with name, elevation and tower frequency (if applicable). USFS heliports shall be identified by the type "USFS". "Emerg Only" shall be shown beneath the elevation.UNICOM symbol, if applicable, shall be shown as indicated in paragraph 3.10.2.5.7. above.

3.10.3. Radio Aids to Navigation (NAVAID)

3.10.3.1. General

3.10.3.1.1. Operational and commissioned LF/MF and VHF/UHF NAVAIDs (except UHF nondirectional radio beacons) shall be shown as illustrated in the Symbols Appendix.

3.10.3.1.1.1. NAVAID data shall be boxed.

3.10.3.1.1.2. Arrangement of NAVAID data within the box shall be in the following sequence: NAME, FREQUENCY/IES, and/or CHANNEL NUMBER (if applicable), IDENTIFICATION LETTERS and MORSE CODE. The NAVAID name shall be centered above the frequency, channel number, identification letters and morse code within the identification box.

3.10.3.1.1.3. NAVAIDs operating less than continuous or on request, shall be indicated by the placement of a small five-point star to the left of the frequency, within the identification box.

3.10.3.1.2. A NAVAID "without voice" shall be indicated by underlining the frequency of the NAVAID.

3.10.3.1.3. When multiple NAVAIDs have the same name with different frequencies, channel number, or identification letters and no misinterpretation shall result, the name of the NAVAID shall be indicated once within the identification box. VHF/UHF NAVAID names and identification boxes shall take precedence in same name NAVAID situations. The frequency only (or the frequency, identification and morse code when different from the same name NAVAID) shall be positioned below the associated VHF/UHF NAVAID identification within a common identification box.

3.10.3.1.3.1. Leader lines may be shown for clarity of information. If necessary, leader lines from combined NAVAID identifications may be individually portrayed.

3.10.3.1.3.2. Separate boxes may be used where, because of distance between NAVAIDs or chart congestion, it is impractical to use a combined box. Choice of separate or combined boxes shall be made on the basis of economy of space and clear identification of the NAVAIDs.

3.10.3.1.4. A NAVAID collocated on an airport will be plotted to its true geographic position and depicted by a .04” circle. The NAVAID type, e. g., VOR, VORTAC, etc., shall be positioned on and breaking the top line of the identification box.

3.10.3.1.5. Compass roses, as illustrated in the Symbols Appendix, shall be shown centered on all VHF NAVAIDs, short of over congestion.

3.10.3.1.5.1. Compass roses shall be properly oriented to the slaved magnetic variation of record forthe NAVAID.

3.10.3.1.5.2. Where two or more compass roses overlap, the overlapping portions of one or more roses may be omitted.

3.10.3.1.5.3. Airway radials shall normally be shown approximately ¼ inch outside the compass rose but may be placed farther out or within the compass rose to relieve congestion around the compass rose.

3.10.3.1.5.4. Sizes of compass roses may be adjusted as necessary to avoid overprinting other important data, e. g., Class C airspace boundaries.

3.10.3.1.5.5. A compass rosette, as illustrated in the Symbols Appendix, may be shown in areas having few NAVAIDs. These compass rosettes shall not be associated with a NAVAID and shall be shown in magenta. They shall be oriented to the local magnetic variation (i. e., isogonic).

3.10.3.1.6. FSS A/G voice communications frequencies remoted to VHF NAVAIDs (i. e., RCOs) shall be indicated above the top line of the NAVAID identification box.

3.10.3.1.6.1. The name of the FSS providing the voice communication shall be shown parallel to and below the bottom line of the boxes.

3.10.3.1.6.2. "L" shaped brackets (lineweight .010") shall be positioned 1/20" to the right and left of the FSS name. When the name of the FSS is longer than the box, the bottom line of box may be extended left/right. Lineweight for the shaped bracket shall be .010"

3.10.3.1.6.3. The color of the brackets and type shall be the same as the box.

3.10.3.1.7. NAVAID's for "VFR Use Only" shall be so identified on the chart, outside and adjacent to the identification box.

3.10.3.1.8. An automated weather broadcast service associated with a NAVAID shall be depicted using one or more icons. A Transcribed Weather Broadcast (TWEB) will be indicated with a negative type “T” in a circle, i.e.,  . A Hazardous Inflight Weather Advisory Service (HIWAS) recording will be indicated with a negative type “H” in a circle, i.e.,  . Automated Surface Observing Station (ASOS) and Automated Weather Observing Station (AWOS) broadcasts will be indicated with a negative type “A” in a circle, i.e.,  . These icons will be placed in the upper right corner inside the NAVAID box, as indicated in the Symbols Appendix. The icon will be the same color as the associated NAVAID. If two NAVAIDs share a common frequency box and both have weather broadcasts, the color will indicate which broadcast service is associated with which NAVAID.

3.10.3.2. VHF Omnidirectional Radio Range Stations (VOR)

3.10.3.2.1. VHF omnidirectional radio range stations (VOR) shall be shown as illustrated in the Symbols Appendix.

3.10.3.2.2. VORs shall be identified by name, frequency, identification letters and morse code.

3.10.3.2.3. VORs with TACAN DME shall be shown with the symbol illustrated in the Symbols Appendix around and encompassing the VOR symbol.

3.10.3.2.4. VOR stations with a frequency protection classification of (T) shall normally be shown without a compass rose; however, in open areas not served by other VORs, the compass rose may be shown.

3.10.3.2.5. Selected VORs and/or compass roses may be omitted in congested areas. Give preference to those serving enroute functions or located in areas not served by other VORs.

3.10.3.3. VHF Omnidirectional Radio Range – Tactical Air Navigation (VORTAC)

3.10.3.3.1. VORTACs shall be shown as illustrated in the Symbols Appendix.

3.10.3.3.2. VORTACs shall be identified by name, VOR frequency, TACAN channel number, identification letters and morse code.

3.10.3.4. Nondirectional Radiobeacons (NDB)

3.10.3.4.1. NDBs shall be shown as illustrated in the Symbols Appendix, in magenta.

3.10.3.4.2. NDBs shall be identified by name, frequency, identification letters and morse code. When DME is available at a NDB, the paired VHF frequency will be shown in parentheses following the DME/TACAN channel.

3.10.3.4.3. The NDB center symbol (circle and dot) shall be deleted when used in conjunction with marker beacons and airports.

3.10.3.4.4. Selected low-powered NDBs without voice (MHW facilities) may be omitted in congested areas.

3.10.3.5. ILS Components (Compass Locator Beacons)

ILS compass locator beacons shall be shown only when used in the designation of airways. If shown, they shall be symbolized and identified in the same manner as NDBs. However, when located in congested areas, compass locator beacons may be shown with only the circle and dot symbol and identified with the letters "LOM".

3.10.3.6. ILS Components (Localizers)

3.10.3.6.1. Localizers shall be shown only when used in the designation of airways.

3.10.3.6.2. Only that portion actually used shall be shown and identified. The localizer shall be symbolized as indicated in the Symbols Appendix and identified by name, frequency, identification or call letters and morse code in blue. The identification letters will be preceded by the letter "I" and a short dash.

3.10.3.7. Broadcasting Stations (Commercial)

3.10.3.7.1. Commercial broadcasting stations shall be shown in areas where adequate NAVAIDs are lacking, or when specifically requested by proper authority. Normally, not more than three stations shall be shown within a 100 nautical mile radius of an LF/MF NAVAID. Selected high-powered stations along each coast may be shown to assist arriving and departing aircraft.

3.10.3.7.2. Select stations based on the following guidelines:

3.10.3.7.2.1. Commercial broadcast stations shall be shown when specifically requested by proper authority.

3.10.3.7.2.2. In sparse areas, a comparatively larger number of stations should be shown, even though operating characteristics may not be the most desirable. Particular attention should be given to those located near airports.

3.10.3.7.2.3. Stations operating 14 or more hours a day are preferable.

3.10.3.7.2.4. The antennae array (directional or non-directional) must be considered as the service area provided by stations utilizing directional antennae is limited.

3.10.3.7.3. Broadcast station transmitting antennae shall be symbolized and identified in accordance with the Symbols Appendix. Leader lines shall be shown extending from the boxed frequency and call letters to and touching the symbol.

3.10.3.8. Flight Service Stations (FSS)

3.10.3.8.1. All flight service stations (FSS), except those with the same name as a NAVAID, or designated as an RCO, shall be shown, symbolized, and identified by name and identification letters, enclosed within a heavy line (.030") identification box.

3.10.3.8.1.1. FSSs with same name as a NAVAID, but with a different identifier, shall be shown independently of the NAVAID, i. e., separate identification box with name and identifier.

3.10.3.8.1.2. Part time FSSs shall be annotated with hours of operation.

3.10.3.8.2. NAVAIDs having the same name as the FSS, and not designated as a remote communications outlet (RCO), shall be considered as the FSS. The NAVAID identification box will be augmented with the heavy line.

3.10.3.8.3. FSS outlets (RCO) not associated with a NAVAID shall be shown as illustrated in the Symbols Appendix and identified by name and the letters "RCO" within an identification box.

3.10.3.8.4. FSS A/G voice communications frequencies available at the FSS, or at a communications outlet, shall be shown positioned above the top line of the FSS identification box.

3.10.3.8.4.1. The FSS common simplex frequency (122.2) shall not be included at the FSS, but shall be shown when available at an RCO.

3.10.3.8.4.2. UHF FSS A/G frequency 255.4 and the emergency frequencies 121.5 and 243.0 shall be included in this listing.

3.10.3.8.5. International FSS (IFSS) frequencies and the station name and identifier letters shall be enclosed in a .015" line weight box positioned offshore in the general area of the station.

3.10.3.9. Air Force Stations (AFS)/Long Range RADAR Stations (LRRS)

Air Force Station (AFS) and Long Range RADAR Station (LRRS) aero communication facilities shall be shown as illustrated in the symbols appendix.

3.10.4. <u>Airspace Information</u>

3.10.4.1. Class B Airspace

3.10.4.1.1. Class B airspace shall be shown by an outline of the area. A note referencing the appropriate VFR Terminal Area chart (TAC) and/or Canadian VFR terminal area chart (VTA) shall be shown.

3.10.4.1.2. Outlines of the area shall be continuous .060" blue lines screened 45%/45°/200L centered on the boundary lines.

3.10.4.2. Class C Airspace

3.10.4.2.1. Class C airspace shall be shown by a continuous magenta .060" line, screened 45%/45°/200L.

3.10.4.2.2. Only the perimeter, normally a 10 nautical mile circle centered on the airport shall be shown.

3.10.4.2.3. A boxed note referencing the Sectional chart or the Terminal Area chart shall be placed adjacent to the area in solid magenta 6 to 8 point type.

3.10.4.2.4. A boxed note with the Class C name shall be placed adjacent to the area in solid magenta.

3.10.4.2.5. Class C airspace identified in the legal description as operating less than continuous, shall be shown with the following note:

See NOTAMs/Directory
for Class C eff hrs

3.10.4.3. Class E Airspace

3.10.4.3.1. Boundaries of offshore control areas shall be shown as illustrated in the Symbols Appendix and identified by name. Identification shall be positioned within the area, adjacent to and parallel to the symbol.

ATLANTIC LOW CONTROL AREA

3.10.4.3.2. Additional offshore control areas shall be symbolized, as illustrated in the Symbols Appendix and shall be identified by the name. Identification shall be positioned immediately within and parallel to the limits of the areas.

CONTROL AREA 1148L

3.10.4.4. Canadian/Mexican**/Outside U.S.** Airspace

3.10.4.4.1. Canadian airspace shall be depicted as illustrated in the Symbols Appendix. The following boxed notes, in blue, shall be charted near the border and in the margin area of the chart:

AIRSPACE CLASSIFICATION (SEE CANADA FLIGHT SUPPLEMENT) AND
OPERATIONAL REQUIREMENTS (SEE DOD AREA PLANNING AP/1)
MAY DIFFER BETWEEN CANADA AND UNITED STATES

NOTE: REFER TO CURRENT CANADIAN
CHARTS AND FLIGHT INFORMATION
PUBLICATIONS FOR INFORMATION
WITHIN CANADIAN AIRSPACE

3.10.4.4.2. Mexican airspace shall be depicted as directed by the National Geospatial-Intelligence Agency (NGA). The following boxed note, in blue, shall be charted near the border and in the margin area of the chart:

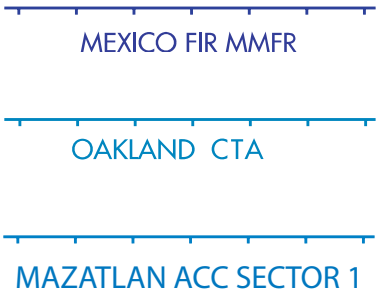
AIRSPACE CLASSIFICATION/OPERATIONAL REQUIREMENTS
MAY DIFFER BETWEEN MEXICO AND UNITED STATES
(SEE DOD AREA PLANNING AP/1)

3.10.4.4.3. Airspace outside of the U.S., other than in 3.10.4.4.1. above, shall be depicted as directed by the National Geospatial-Intelligence Agency (NGA). The following boxed note, in blue, shall be depicted in non-U.S. airspace , if applicable, and in the margin area of the chart:

NOTE: REFER TO CURRENT DOD (NGA)
FLIGHT INFORMATION PUBLICATIONS FOR
INFORMATION OUTSIDE OF U.S. AIRSPACE

3.10.4.5. Flight Information Region (FIR)**/Control Area (CTA)/Area Control Center (ACC)**

3.10.4.5.1. FIRs/CTAs/ACCs shall be identified by name and positioned within the area, adjacent to and parallel to the boundary, as indicated below. FIRs will also have an identifier shown. Boundaries of FIRs/CTAs/ACCs shall be shown as indicated below and in the Symbols Appendix.



3.10.4.5.2. When FIRs adjoin one another, show alternating "ticks" on both sides of the common delimiting line.

3.10.4.5.3. ACCs will be depicted as provided by NGA.

3.10.4.6. Air Defense Identification Zones (ADIZ, CADIZ, etc.)

3.10.4.6.1. ADIZs shall be shown as illustrated in the Symbols Appendix. The continuous line indicates the limits of the area with the dots within the area.

3.10.4.6.2. When an international boundary, projection line, or other linear feature, coincides with the limits of the ADIZ, the linear feature symbol shall suffice for the delimiting line of the ADIZ.

3.10.4.6.3. When a FIR boundary coincides with the limits of the ADIZ, the ADIZ symbol, without the line, shall be positioned adjacent to and in conjunction with the FIR boundary symbol.

3.10.4.6.4. ADIZs and defense areas shall be identified adjacent to and parallel to the symbol within the respective areas.

3.10.4.6.5. ADIZs shall be identified at sufficient intervals to facilitate identification by users.

3.10.4.6.6. Defense areas shall be identified by name only outside the ADIZ boundary symbol.

3.10.4.7. Airways and Airways Data (Class E)

3.10.4.7.1. Airways (Class E)

3.10.4.7.1.1. All Class E airways shall be shown by an airway center strip as illustrated in the Symbols Appendix. The term airways in these specifications applies to this center strip. VOR airways, both direct and alternate, are shown in blue; LF/MF airways (colored airways) are shown in magenta.

3.10.4.7.1.2. VOR airways shall normally be shown to the outside edge of the compass rose but may be extended within ; e. g., when two VOR's are very close and the airway could not otherwise be shown.

3.10.4.7.2. Airway Data

3.10.4.7.2.1. Position airway data (identification and radial values) on the airway centerline; however, data may be displaced to avoid overprinting.

3.10.4.7.2.2. VOR airway identifiers shall be a “V” and a number, in blue. When two or more VOR airways are designated over the same airspace, all identifiers shall be shown on one line in numerical order, eliminating repetition of the V, e. g., V10-132-280. When space is limited, the identifiers may be stacked.

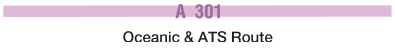
3.10.4.7.2.3. Identifiers for VOR airways shall be shown on the outbound radial from the NAVAID positioned on the airway centerline, normally positioned immediately outside the compass rose.

3.10.4.7.2.4. Colored airway identifiers shall be an identifying color letter (i. e., G, green; A, amber; R, red; or B, blue) and number, in magenta. When two or more colored airways are designated over the same airspace, all identifiers shall be shown on one line with the primary airway designationidentifier (G, A, R, or B) first. When space is limited, the identifiers may be stacked.

3.10.4.8. Miscellaneous Air Routes

3.10.4.8.1. Other routes such as Air Traffic Service (ATS), Oceanic, Bahama, Atlantic, and Gulf Routes shall be shown in areas identified by FAA as illustrated in the Symbols Appendix. LF/MF routes shall be depicted within ¼" of the NAVAID. VOR routes shall normally be shown to the outside edge of the compass rose but may be extended within where necessary. These routes shall be supplemented with the appropriate route identifications. VOR routes shall be identified with the outbound bearing from the NAVAID. The bearing shall normally be positioned immediately outside and adjoining the compass rose.

3.10.4.8.1.1. Oceanic and ATS routes shall be identified by the appropriate designator, as follows:



Oceanic & ATS Route

3.10.4.8.1.2. Bahama Routes shall be shown with the prefix "BR" preceding the route number, as follows:

Bahama Route

3.10.4.8.1.3. Atlantic Routes shall be shown with the prefix "AR" preceding the route number, as follows:

Atlantic Route

3.10.4.8.1.4. Gulf Routes shall be identified by the name and appropriate route number, as follows:

Gulf Route

3.10.4.8.1.5. LF/MF routes shall be portrayed and identified in magenta. VHF/UHF routes shall be portrayed and identified in blue.

3.10.4.8.2. Class G routes shall be illustrated as shown below and in the Symbols Appendix:

Class G Route

3.10.4.9. Special Use Airspace (SUA)

3.10.4.9.1. SUA (e. g., prohibited, restricted, danger, alert, military operations areas, and warning areas) shall be shown in their entirety, even when areas overlap or are designated within other areas (except as noted below). SUA with floors of 18,000 feet MSL or above shall not be shown (except as noted below). SUA with floors of 18,000 feet MSL or above shall not shown (except on the Hawaiian Islands Sectional Chart which has no upper limit). Military Operations Areas (MOAs) shall be shown in magenta.

3.10.4.9.2. SUA shall be portrayed by the symbol illustrated in the Symbols Appendix. Should an area be too small to portray the specified band, the band may be proportionately reduced in size.

3.10.4.9.3. SUA shall be identified by number and type: e.g., R-6401 , positioned either in or immediately outside and adjacent to the area. The type of area shall also be spelled out e. g., RESTRICTED, when space permits. Alert areas shall also indicate the type of activity conducted.

3.10.4.9.4. When SUA areas are not shown due to congestion, a note shall indicate which SUA is not shown. When exclusions cannot be adequately portrayed, they will be incorporated into the SUA tabulations.

3.10.4.10. Special Air Traffic Rules/Airport Traffic Patterns (FAR Part 93) and Fixed Wing Special VFR Operations Prohibited (FAR Part 91)

3.10.4.10.1. Airports with a special air traffic rule designated in FAR Part 93 shall be indicated by placing a box (.006" lineweight) around the airport name.

Special traffic pattern areas described in FAR Part 93 and requested by the FAA shall be shown by the line pattern illustrated in the Symbols Appendix, positioned in a NE/SW direction within a .015" delimiting line.

3.10.4.10.1.1. The line pattern shall normally be .10" wide but it may be proportionately reduced if the area is too small for the specified band.

3.10.4.10.1.2. An appropriate boxed note shall be shown adjacent to the area. Box line weight shall be .006".

3.10.4.10.2. Airports where fixed wing special visual flight rules operations are prohibited (FAR Part 91) shall show the notation "NO SVFR" immediately above the airport name.

3.10.4.11. Mode C Airspace

When the lateral limits of Mode C required airspace are not otherwise shown (i.e., by a Class B airspace 30 NM arc around a primary airport, or by Class C airspace symbol) the limits shall be shown by a solid magenta .025" line labeled "MODE C". The legend shall refer the user to FAR 91.215/Aeronautical Information Manual (AIM) for details. The Mode C symbol shall stop at the U.S. International Boundary.

3.10.4.12. Special Airspace Areas

3.10.4.12.1. When designated by the FAA, the limits of special airspace areas over national park areas shall be shown, as illustrated in the Symbols Appendix, in blue screen 60%/30°/120L. Appropriate boxed operational notes may be shown.

3.10.4.12.2. Because of the unique nature of these areas, data shown may include any information deemed important to flight safety.

3.10.4.13. High Energy Radiation Areas

3.10.4.13.1. Areas of high energy radiation designated by the FAA shall be shown by the symbol illustrated in the Symbols Appendix.

3.10.4.13.2. Boxed notes, in blue, shall identify the area and provide the affected altitudes and/or other pertinent information.

3.10.5. Navigational and Procedural Information

3.10.5.1. Lines of Equal Magnetic Variation (Isogonic Lines)

3.10.5.1.1. Isogonic lines shall be shown extending through the charted area at intervals of no less than 1° and symbolized as illustrated in the Symbols Appendix by a generalized smooth curve, in magenta.

3.10.5.1.2. When the total isogonic difference on the chart is large, the isogonic interval between the lines should be increased proportionately. Line spacing closer than approximately five inches should be avoided. A minimum of two (2) isogonic lines shall be shown on each chart except when the value of the magnetic variation is the same over all areas of the chart. In this case, the isogonic lines shall be omitted and the variation value shown by a note. Intervals on adjoining charts shall be consistent except that intermediate lines may be used to portray unusual patterns.

3.10.5.1.3. The value of each isogonic line (e.g., 6°E) shall be shown centered on the line at the ends of each line with at least one dash between the margin and the value. The value shall read with the line and shall normally appear at least once in each fold of the chart.

3.10.5.1.4. Isogonic data shall be based on the five (5) year epoch.

3.10.5.2. Aeronautical Lights

Air navigation lights, on or adjacent to a public or military use airport, operating continuously throughout the hours of darkness shall be shown as indicated in the Symbols Appendix. When they are located at an airport, the symbol shall normally be shown in a break in the top of the airport symbol. The light symbol shall be portrayed in its true location (within scale limitation) for an airports with hard surface runways. When the location of the light is not known, it shall be positioned arbitrarily on the north limits.

3.10.5.3. Marine Navigation Lights

A selection of marine navigation lights may be shown subject to the following criteria:

3.10.5.3.1. Only lights operating year round and maintained by the United States Coast Guard, or appropriate authority in foreign waters, shall be shown.

3.10.5.3.2. Range of lights, including any sectors, must be 10 NM or more.

3.10.5.3.3. Lights must be omnidirectional; i. e., range lights, directional lights, or lights obscured in any sector will not be shown.

3.10.5.3.4. Sources for marine lights are the Coast Guard Local Notice to Mariners, The National Geospatial-Intelligence Agency Notice to Mariners, the Coast Guard Light list and appropriate foreign publications.

3.10.5.4. Visual Ground Signs

Shall be shown as illustrated in the Symbols Appendix.

3.10.5.5. Obstructions

3.10.5.5.1. Cultural features (other than horizontal) extending more than 200 feet above the surrounding terrain (300 feet or more above the surrounding terrain in built-up areas – yellow tint) are "vertical obstructions".

3.10.5.5.1.1. Obstruction symbols shall normally be shown for obstructions such as TV or radio towers more than 200 feet above the terrain (300 feet or more in built up areas (yellow tint)). A group obstruction symbol shall be shown when two or more obstructions are in close proximity. The highest MSL value will be shown. The highest AGL value will be shown only if it corresponds to the highest MSL value. Minor obstructions which are not in critical locations may be omitted in congested areas.

3.10.5.5.1.2. Examples of features over 200 feet AGL (300 feet or more in yellow tint - built up areas) considered hazardous to low level flight are tanks, factories, lookout towers, and smokestacks.

3.10.5.5.1.3. Horizontal cultural features (e. g., T-lines, pipelines, and aerial cables) shall be charted as described in **3.6.6.3.**

3.10.5.5.2. Obstructions 200 feet or less in height AGL (less than 300 feet AGL in built up areas) should also be shown if the location is critical and space permits; for example, if the location on the ground is much higher than the surrounding terrain or very near an airport. Determinations as to what constitutes critical locations are matters of cartographic judgment and discretion.

3.10.5.5.3. Vertical obstructions which have outstanding visual significance as checkpoints may be represented with pictorial symbols. The symbols are shown in black with the required elevation data in aeronautical blue.

3.10.5.5.4. Vertical obstructions not having sufficient visual significance to meet the requirements for pictorialization shall be represented with the inverted "V" symbol. The obstruction may be labeled; e. g., "smokestack", "tank", etc., (do not label towers).

3.10.5.5.5. The height of the structure above ground level, as well as the elevation of the top of the obstruction above sea level, shall be shown when known or when it can be reliably estimated. Elevation values shall be positioned alongside (to the right when possible) of the obstruction symbol, one above the other. The height above ground level (AGL) shall be shown in parentheses below the height above sea level (MSL) of the top of the obstruction. Deviations from this positioning are permissible when necessary to avoid registration problems or undue congestion. In congested areas where confusion could result from the interpretation of multiple obstruction values, the above ground level (AGL) value may be omitted.

3.10.5.5.6. Obstructions shall be portrayed compatible with the scale of the chart. However, portrayal of all obstructions within the immediate vicinity of city complexes will, in many instances, severely impair chart readability. Use the following general rules to control the selection and density of obstruction information in or near populated places:

3.10.5.5.6.1. Only the highest obstructions in each of the four quadrants shall be selected for portrayal.

3.10.5.5.6.2. In yellow tint built-up areas, only obstructions extending 300 feet or more above terrain shall be shown. Features less than 300 feet will not be shown unless the location is critical (near an airport or on ground higher than surrounding terrain).

3.10.5.5.6.3. The elevation of the top of the obstruction above sea level shall always be shown when it is known or when it can be reliably estimated for:

3.10.5.5.6.3.1. The most critical obstructions in each of the four quadrants.

3.10.5.5.6.3.2. All other obstructions that can accommodate the type without creating undue congestion.

3.10.5.5.7. Obstructions shall be shown with a pictorial symbol or the conventional inverted "V" symbol.

3.10.5.5.7.1. Obstructions up to 999' AGL shall be shown by the conventional inverted "V" symbol illustrated in the Symbols Appendix.

3.10.5.5.7.2. Obstructions 1000' AGL and higher shall be shown by the elongated inverted "V" symbol illustrated in the Symbols Appendix.

3.10.5.5.8. Pictorial symbols for vertical obstructions of outstanding visual significance shall be shown in black with the elevation data in blue.

3.10.5.5.9. The conventional inverted "V" obstruction symbol, including the elevation data, shall be shown in blue.

3.10.5.5.10. Obstructions under construction shall be indicated by the letters "UC" positioned immediately adjacent to the symbol. If available, the eventual height (AGL) of the obstruction shall be shown, in parenthesis; e. g. (757) UC. The letters "UC" may also be used to indicate obstructions reported with unverified position and elevation.

3.10.5.5.11. Obstructions with high intensity obstruction lights (i. e., strobes) shall be shown by the obstruction symbol with the lighting type staffs attached, as illustrated in the Symbols Appendix.

3.10.5.6. Maximum Elevation Figures (MEF)

3.10.5.6.1. MEFs are required over all land masses (including areas of unreliable relief) and open water areas containing man made constructions (e. g., oil rigs).

3.10.5.6.2. Because of differences in criteria for charting obstacles on WACs as opposed to sectional charts, the following steps shall be taken:

3.10.5.6.2.1. Determine the highest MEF of the four quadrangles bounded by ticked lines of graticule on the sectional chart corresponding to the quadrangle on the WAC. This figure will be the MEF for that quadrangle on the WAC.

3.10.5.6.2.2. For areas not covered by sectional charts use the same procedures used for sectional/TPC charts.

3.10.5.6.3. The MEF represents the highest possible elevation of both terrain and vertical obstructions (towers, trees, etc.) bounded by ticked lines of graticule. MEF's will be shown by 1,000 foot digits and smaller 100 foot digits. The last two digits of the number are not shown. MEF's shall be shown as illustrated in the Symbols Appendix, centered in the area bounded by ticked lines of graticule.

3.10.5.6.3.1.

3.10.5.6.3.2.

3.10.5.6.4. In areas of unreliable relief a note spaced across the area is used (instead of individual MEFs in each quadrangle) in 9 to 36 pt. Helvetica Condensed Bold type, e.g.,

MAXIMUM ELEVATION FIGURES ARE
BELIEVED NOT TO EXCEED 7600 FEET.

3.10.5.6.4.1. The note will be positioned in such a manner as to imply a general condition.

3.10.5.6.4.2. More than one note may be necessary where terrain characteristics vary considerably.

3.10.5.6.5. If it is obvious that an area of reliable relief in the quadrangle represents the highest elevation, that value shall be applied. For example: the quadrangle containing Mt. Everest also contains an area of unreliable relief. Since the summit of Mt. Everest is obviously the highest point in the quadrangle, the MEF shown would not be affected by the unreliable relief area.

3.10.5.6.6. When calculating MEFs, increase them only to the point that it is assured that they represent the minimum clearance altitude based on the source material. Use the following procedure to calculate MEFs:

3.10.5.6.6.1. When a manmade obstruction is more than 200 feet above the highest terrain within the area bounded by ticked lines of graticule:

3.10.5.6.6.1.1. Determine the elevation of the top of the obstruction (above mean sea level).

3.10.5.6.6.1.2. Add the possible vertical error of the source material to the above figure (100 feet or ½ the contour interval when interval on source exceeds 200 feet).

3.10.5.6.6.1.3. Round the resultant figure up to the next higher hundred foot level and this final figure is the MEF.

Example:

Elevation of obstruction top	**=2424**
(above mean sea level)	
Possible vertical error	**+250**
(contour interval on source is 500')	**2674**
Raise to the next higher 100' level	**2700**

Maximum Elevation Figure 2^{7}

3.10.5.6.6.2. When a natural terrain feature (spot elevation, manufactured elevation or contour) or natural vertical obstruction (trees) is the controlling figure within the area bounded by ticked lines of graticule:

3.10.5.6.6.2.1. Determine the elevation of the feature.

3.10.5.6.6.2.2. Add the possible vertical error of the source material to the above figure (100 feet or ½ the contour interval when interval on source exceeds 200 feet).

3.10.5.6.6.2.3. Add a 200 foot allowance for natural or manmade obstructions which are not portrayed because they are below the minimum height at which the chart specification requireds their portrayal by an obstruction symbol.

3.10.5.6.6.2.4. Round the resultant figure up to the next higher hundredfoot level and this final figure is the MEF.

Example:

Highest terrain elevation	**=3450**
Allowance for uncharted obstructions	**200**
Possible vertical error	**+100**
	3750
Raise to the next higher 100' level	**3800**
Maximum Elevation Figure	3^{8}

3.10.5.6.7. Maximum elevation figures shall be shown in overlap areas. In those areas consisting of less than a full quadrangle, the MEF value shall be shown except where the area is too small to accommodate the MEF type. Quadrangles on overlapping and adjoining charts shall contain identical MEF values.

3.10.5.6.8. An explanatory boxed note shall be shown in the margin as part of the legend and shall read as follows:

ATTENTION

THIS CHART CONTAINS MAXIMUM ELEVATION FIGURES (MEF).
The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. The MEF is based on information available concerning the highest known feature in each quadrangle, including terrain and obstructions (trees, towers, antennas,etc.).

Example: 12,500 feet ..... 12^{5}

3.10.5.6.8.1. The sentence relating to unreliable relief in the boxed note should be deleted when the condition does not exist on a chart.

3.11. AERONAUTICAL INFORMATION, MILITARY FORMAT

3.11.1. General

3.11.1.1. The aeronautical information portrayed on the military format charts is intended to serve only as an adjunct to visual flight. It is limited to that stable type aeronautical information not normally subject to frequent change.

3.11.1.2. Visual reference data essential to the purpose of the chart must not be obscured by the aeronautical overprint. Each symbol shall be clearly evident and visible upon the chart.

3.11.1.3. All aeronautical information shown shall be plotted to indicate its true geographical position whenever possible. When a facility, plotted by an accurately determined geographic position, is not in the correct relative position to the surrounding base detail, the culture, drainage, or relief feature shall be revised, as required, to portray the correct relative locations. Should it become necessary to displace aeronautical symbols from true geographical positions, to improve readability in congested areas, preference shall be given to the accurate plotting of radio aids to navigation. In displacing, the relative positions of the radio aids to navigation shall be maintained.

3.11.1.4. All boxes specified to be shown around or encompassing specific data, shall be of a size consistent with the informational data contained therein. Items of information specified to be positioned on and breaking the top line of identification boxes shall be aligned with the line so as to have such type extending beyond the upper limits of the identification boxes. The alignment of the type in this manner will preclude the unnecessary enlargement of the boxes, in keeping with that specified above.

3.11.1.5. All textual or type data shall be positioned relative to true north.

3.11.1.6. The placement of names, identifications, and data boxes plays an extremely important part in the overall acceptable design of a flight information chart. A definite sense of proportion, balance, and artistic values are essential in preparing a chart that represents the ultimate in readability and user appeal. Therefore, rules and standards concerning type placement must, of necessity, be flexible an unconfining. It remains, finally, the responsibility of the detail design specialist to evaluate the portrayal technique for each particular area before making the final decision in regard to permanent type placement. As a rule of thumb only, to be considered when there appears to be equal congestion surrounding a facility site, the preferred type location is to be NE, thence counterclockwise around the symbol.

3.11.1.7. Leader lines may be used for data, when necessary for clarity of detail or to effect the correct relationship between type and symbolization.

3.11.2. Airports

3.11.2.1. Airports (landplane) shall be plotted to true geographic position.

3.11.2.2. Major Airports (with miniature pattern)

3.11.2.2.1. Airports with hard surface runways of 3,000 feet or more in length shall be shown by circle and runway pattern as illustrated in the Symbols Appendix.

3.11.2.2.2. Circle and runway pattern shall be centered on the actual location. (The diameter of the circle shall represent 6,000 feet at 1:500,000 scale and is used as a gauge by the pilot in determining the approximate length of runways).

3.11.2.2.3. Identification data shall consist of name and elevation only.

3.11.2.2.4. Base data (excluding drainage and contours) falling within the circle symbol shall be omitted in order to provide a legible picture of the runway pattern.

3.11.2.2.5. As the runway patterns are intended primarily for visual reference, hard surface runways which are closed but which still exist and retain the appearance of runways shall be included in the charted pattern.

3.11.2.3. Major Airports (Runway pattern not available)

3.11.2.3.1. Airports with hard surface runways of 3000 feet or more whose pattern is unknown shall be show by the circle symbol illustrated in the Symbols Appendix.

3.11.2.3.2. Identification shall consist of name, elevation and length of longest runway to the nearest hundred feet.

3.11.2.4. Minor Airports

3.11.2.4.1. Airports with loose surface runways, or hard surface runways less than 3,000 feet in length, shall be shown by the circle symbol illustrated in the Symbols Appendix.

3.11.2.4.2. Identification data shall consist of the name, elevation, and longest runway to the nearest hundred feet.

3.11.2.5. Seaplane Stations/Anchorages

Seaplane stations/anchorages are not required to be shown on this series of charts.

3.11.2.6. Inactive Airports

3.11.2.6.1. Airports that are not usable or are closed or abandoned, but are still readily identifiable from the air, shall be shown in the same manner as active airports except that the annotation 'ABANDONED", "CLOSED", or "NOT USABLE", whichever is applicable, shall be place immediately above the airports name. As required, terminology such as "POSITION APPROXIMATE" or "EXISTENCE REPORTED" may also be used.

3.11.2.7. Selection

3.11.2.7.1. Judgment and discretion should be applied in portraying airports in congested areas based on:

3.11.2.7.1.1. The number and significance of airports in the area.

3.11.2.7.1.2. Availability of other checkpoints in the area.

3.11.2.7.2. All major airports (Civil, Army, Navy, Air Force) shall be shown.

3.11.2.7.3. If congestion results from plotting the position of airports, omissions may be made in the following order:

3.11.2.7.3.1. Abandoned, closed, or unusable airports

3.11.2.7.3.2. Landing areas

3.11.2.7.3.3. Minor airports (other than military)

3.11.2.7.3.4. Minor airports (military)

3.11.2.8. Airports shall be identified by the designated airport name. In the case of military airports, the abbreviated letters AFB, NAS, AAF, NAF, MCAS, etc., shall appear as part of the name.

3.11.2.8.1. Duplication shall be avoided whenever possible. When the airport name is the same name as the radio aid to navigation or adjacent city or town and no misinterpretation will result, the radio aid to navigation or adjacent city or town name may suffice for the airport name.

3.11.2.8.2. Parts of long airport names ("Airport", "Field", "Municipal", etc.) as well as the first names of persons shall commonly be omitted unless needed to distinguish an airport from another of similar name.

3.11.2.8.3. In addition, names of minor airports may be omitted in:

3.11.2.8.3.1. Areas where airports are numerous.

3.11.2.8.3.2. Congested areas of the chart.

3.11.2.9. Military bases with significant built-up areas, requiring a city tint, shall be identified using 8 point News Gothic Condensed type (caps).

Examples: WALKER AFB, HOLLOMAN AFB.

3.11.3. Radio Aids to Navigation

3.11.3.1. General

3.11.3.1.1. Operational and commissioned radio aids to navigation shall be symbolized as illustrated in the Symbols Appendix with the following exception. When a radio aid to navigation is located within or upon airport symbol,

3.11.3.1.1.1. The radio facility symbol shall not be shown.

3.11.3.1.1.2. The radio aid to navigation identification box shall be connected to the airport by a lead line.

3.11.3.1.1.3. The top of the identification box shall be broken for placement of the type of facility abbreviation.

3.11.3.1.2. The following radio aids to navigation do not require breaking the top line of the identification box to show the type facility abbreviation when not located on or within an airport symbol: VHF OMNI RANGE(VOR); VORTAC; TACAN; VOR with DME; and RADIO BEACON (NDB). Their distinctive symbols are considered as adequate identification (for type of facility) in the body of the chart with the name of the facility enclosed in the identification box.

3.11.3.1.3. Broadcast stations shall be identified by frequency and call letters only. The station frequency shall be enclosed in a rectangular box, the top line of which shall be broken for the station call letters.

3.11.3.1.4. Leader lines shall be shown from all boxed data extending from the center of the box ends to and touching the appropriate radio aid to navigation symbol indicating without question the appropriate facility.

3.11.3.1.5. Compass roses, as illustrated in the Symbols Appendix, shall be centered on and encompassing all VOR, VORTAC facilities.

3.11.3.1.5.1. Compass roses shall be oriented to magnetic north.

3.11.3.1.5.2. Frequency and code shall not be shown.

3.11.3.1.5.3. The size of the compass rose shall be varied wherever necessary to clear pertinent chart detail or in the interest of chart readability; however, it is required that a standard one-inch circle be used wherever possible. Size shall not be smaller than 0.68 inch or larger than 2.0 inch diameter. In congested areas, if necessary, the size of the VOR circle may be increased beyond 2.0 inch diameter in order to retain legibility. However, this practice shall be kept to a minimum.

3.11.3.1.6. If congestion arises from the application of these radio facilities, those of lesser significance may be omitted.

3.11.3.1.7. Radio beacons that overlie or cover only part of an airport depicted by pattern, shall be broken to clear the entire pattern.

3.11.3.2. The following radio aids to navigation shall be shown:

3.11.3.2.1. VHF Omnidirectional Radio Range Stations (VOR)

3.11.3.2.2. Tactical Air Navigation (TACAN)

3.11.3.2.3. VHF Omnidirectional Radio Range – Tactical Air Navigation (VORTAC)

3.11.3.2.4. LF/MF Radio Range Stations

3.11.3.2.5. Consolan Stations

3.11.3.2.6. Nondirectional Radio Beacons (NDB)

3.11.3.2.7. Broadcasting Stations. Only those English language broadcast stations with 50,000 watts or more input shall be shown.

3.11.4. Airspace Information

3.11.4.1. Air Defense Identification Zones (ADIZ, CADIZ, etc.)

3.11.4.1.1. Air Defense Identification Zones shall be shown as illustrated in the Symbols Appendix.

3.11.4.1.2. When an international boundary, projection line, or other linear feature, coincides with the limits of the ADIZ, or is the dividing line between two zones, the linear features symbology shall suffice for the delimiting line of the ADIZ.

3.11.4.1.3. Air defense Identification Zones shall be identified and positioned adjacent and parallel to the symbol, within its respective area.

3.11.4.1.4. Identification of the ADIZ shall appear at sufficient intervals along the boundary to facilitate its accessibility by the user.

3.11.4.2. Special Use Airspace

3.11.4.2.1. All Prohibited, Restricted, Danger (in Canada), Warning and Alert areas that have been established for areas covered by DOD FLIPs shall be shown with the following exception:

3.11.4.2.1.1. Special Use Airspace activated only by NOTAM shall not be shown.

3.11.4.2.2. If congestion results from plotting all Special Use Airspace, omissions from the entire chart shall be made in the following order:

3.11.4.2.2.1. All Special Use Airspace that is activated for one day or less per week.

3.11.4.2.2.2. All Special Use Airspace that is activated for one month or less per year.

3.11.4.2.2.3. All Danger Areas.

3.11.4.2.3. All Special Use Airspace shall be identified by:

3.11.4.2.3.1. Country code (except areas under FAA jurisdiction)

3.11.4.2.3.2. Type of restriction (P,R,D,W,A)

3.11.4.2.3.3. Number

3.11.4.2.3.4. National designator (when one has been assigned) as listed in the Flight Planning Document.

3.11.4.2.4. A screen band (.10" wide) bounded by a .01" weight line shall indicate the limits of Special Use Airspaces. (See Symbols Appendix).

3.11.4.2.4.1. When a second Special Use Airspace enters into a common overlap with it, the solid line is reduced in width (.006" weight).

3.11.4.2.4.2. When a third Special Use Airspace enters the same common area, it is bounded by a dash line (.10" dash, .02" space) within the overlap.

3.11.4.2.4.3. If a fourth Special Use Airspace should enter the common area, it will be bounded only by the screen band.

3.11.4.2.4.4. When Special Use Airspace coincides with ADIZ or Buffer Zone Symbols, reduce the width of the Special Use Airspace limiting band to .06 inches.

3.11.4.2.4.5. Tint (screen) for Special Use Airspace will be broken for city outlines.

3.11.4.2.5. When certain required Special Use Airspace areas are not shown on a chart due to congestion, a note tailored to the situation shall be devised and shown in the chart margin to indicate which Special Use Airspace, normally portrayed, was not shown. This information shall be a part of the aeronautical legend (aero blue) and in appropriate type. An example of the type of note to be shown in the margin is:

"All Special Use Airspace is portrayed in the body of this chart with the following exception(s):

3.11.4.2.5.1. Those that are activated by NOTAM.

3.11.4.2.5.2. All Special Use Airspace that is activated for one day or less per week.

3.11.4.2.5.3. All Special Use Airspace that is activated for one month or less per year.

3.11.4.2.5.4. All Danger Areas.

3.11.4.2.6. Warning Notes

3.11.4.2.6.1. Warning notes shall be shown where required.

3.11.4.2.6.2. Add the following sentence to required warning notes on charts in the proximity of Warsaw Pact and Chinese Bloc borders.

"Consult NOTAMs and Flight Information Publications for the latest air information."

3.11.4.3. Buffer Zones

3.11.4.3.1. The following Buffer Zones shall be shown on affected charts of this series.

3.11.4.3.1.1. Alaskan Air Command Buffer Zone.

3.11.4.3.1.2. Asian Coastal Buffer Zone.

3.11.4.3.2. Buffer Zones shall be symbolized by a solid line, .010 inch in weight, delimiting the area. A 0.1 inch band of AP-98 screen in segments 1.0 inch along with a 0.5 inch space between segments shall be placed along the inside edge of the delimiting line.

3.11.4.3.3. Each Buffer Zone shall be labeled by using Century Expanded style type positioned parallel to the screen band within the area. Type size can vary with the size of the area from 6 pt. to 12 pt. type (caps). Whenever the Buffer Zone delimiting lines fall in an adjacent chart area, the Buffer Zone title shall be centered in its area on the chart.

3.11.4.3.4. Where the delimiting line coincides with the projection line, the delimiting line shall be omitted and the screen shall be placed along the inside edge of the projection line.

3.11.4.3.5. Buffer Zone symbol shall be broken in those instances where pertinent aeronautical data would be obliterated. Indiscriminate breaking of the Buffer Zone is not acceptable.

3.11.4.3.6. Chart legend shall contain Buffer Zone on all affected charts.

3.11.5. Navigational and Procedural Information

3.11.5.1. Magnetic Variation Data (Isogonic Data)

3.11.5.1.1. Isogonic lines shall be shown extending throughout the charted area normally at intervals of no less than 1 degree and symbolized as illustrated in the Symbols Appendix by a generalized smooth curve.

3.11.5.1.2. When the total isogonic difference on the chart is large, the isogonic interval between the lines should be increased proportionately. Generally, line spacing closer than approximately 5 inches should be avoided in order to avoid cluttering the chart with very detailed magnetic variation data for which operational requirements do not exist. A minimum of two (2) isogonic lines shall be shown on each chart except when the value of the magnetic variation is the same over all areas of the chart, in which event the isogonic lines shall be omitted and the variation value shown by magnetic variation note. Intervals on adjoining charts shall be consistent except that intermediate lines may be used to provide satisfactory portrayal of unusual variation patterns within the limitations specified.

3.11.5.1.3. Isogonic lines may be broken when they have a tendency to obscure or detract from more essential information.

3.11.5.1.4. The value of each isogonic line (i. e., 6°E) shall be shown centered on and breaking the line at the ends of each line with one dash between the margin and the value. In addition, the value shall normally appear at least once in each fold of the chart. The value shall read with the line.

3.11.5.1.5. Isogonic lines and values appearing on the chart shall be based on the five (5) year epoch chart.

3.11.5.1.6. A note showing the date of isogonic information and the annual rate of change shall be placed in the margin and shall read as follows:

LINES OF EQUAL MAGNETIC VARIATION FOR (year).

(Annual rate of change _____*_____.)

* Applicable value of increase or decrease.

3.11.5.1.7. When the magnetic variation is approximately the same over the entire chart, isogonic lines shall not be shown. The following note shall be shown:

MAGNETIC VARIATION FOR (year) IS APPROXIMATELY (value) OVER THE ENTIRE CHART.

(Annual rate of change (increase or decrease.))

3.11.5.1.8. "Magnetic unreliability notes" and local magnetic notes shall be shown when required.

3.11.5.2. Aeronautical Lights

All air navigation lights on or immediately adjacent to an airport that operate continuously throughout the hours of darkness shall be shown as indicated in the Symbols Appendix. When they are located at an airport the symbol shall normally be shown in a break in the top of the air-

port symbol, except that the light symbol shall be placed just outside the airport symbol in its true location, (within scale limitation) where the symbol for airports with hard-surface runways is used. When the location of the light is not known, it shall be positioned arbitrarily on the north limits.

3.11.5.3. Visual Ground Signs

Visual Ground Signs shall be shown as illustrated in the Symbols Appendix.

3.11.5.4. Obstructions

3.11.5.4.1. Cultural features (other than horizontal) extending more than 200 feet above the surrounding terrain (300 feet or more above the surrounding terrain in built-up areas – yellow tint) are "vertical obstructions".

3.11.5.4.1.1. Obstruction symbols shall normally be shown for obstructions such as TV or radio towers more than 200 feet above the terrain (300 feet or more in built up areas (yellow tint)). Where several obstructions occur close to one another only the values of the highest shall be shown with the group obstruction symbol. Minor obstructions which are not in critical locations may be omitted in congested areas.

3.11.5.4.1.2. Examples of features considered a hazard to low level flight are tanks, factories, lookout towers, smokestacks, and elevated features such as cables or pipelines crossing rivers or valleys. These are extremely important because of the hazard to low level flight and the vertical dimension which facilitates identification at a distance.

3.11.5.4.2. Vertical obstructions which have outstanding visual significance as checkpoints in accordance with the criteria established in **3.1.3.** shall be represented with pictorial symbols. The symbols are shown in black with the required elevation data in aeronautical blue color.

3.11.5.4.3. Vertical obstructions which do not have sufficient visual significance to meet the requirements for pictorialization shall be represented with the inverted "V" symbol. Both the symbol and required elevation data are shown in the aeronautical blue color. The nature of the obstruction shall be expressed by labeling; e. g., "smokestack", "tank", etc., (do not label towers).

3.11.5.4.3.1. As the location of an obstruction is equally, or often more critical than its height, all obstructions are shown by the same weight symbol. However, where the top of an obstruction is the highest elevation on a chart or the highest within ticked lines of latitude and longitude, the elevation figure shall be shown in larger type.

3.11.5.4.4. The height of the structure above ground level as well as the elevation of the top of the obstruction above sea level shall be shown when known or when it can be reliably estimated. Elevation values shall be positioned alongside (to the right) of the obstruction symbol, one above the other. (Elevation of the top of the obstruction above sea level shall be positioned above the height above ground value). The height above ground elevation shall be shown in parenthesis. Deviations from this positioning are permissible when necessary to avoid registration problems or undue congestion.

3.11.5.4.5. Obstructions shall be portrayed to a maximum, compatible with the scale of the chart. However, portrayal of all obstructions within the immediate vicinity of city complexes

will, in many instances, severely impair chart readability. Use the following general rules to control the selection and density of obstruction information in or near populated places:

3.11.5.4.5.1. Only the highest obstructions in each of the four quadrants shall be selected for portrayal.

3.11.5.4.5.2. The "elevation of the top of the obstruction above sea level" shall always be shown when it is known or when it can be reliably estimated.

3.11.5.4.5.3. The "height of the obstruction above ground level" shall also be shown when it can be reliably estimated for:

3.11.5.4.5.3.1. The most critical obstructions in each of the four quadrants.

3.11.5.4.5.3.2. All other obstructions that can accommodate the type without creating undue congestion.

3.11.5.4.6. Symbolization

3.11.5.4.6.1. Obstructions shall be shown with a pictorial symbol or the inverted "V" symbols.

3.11.5.4.6.1.1. Obstructions up to 999' AGL shall be shown by the conventional inverted "V" symbol illustrated in the Symbols Appendix.

3.11.5.4.6.1.2. Obstructions 1000' AGL and higher shall be shown by the elongated inverted "V symbol illustrated in the Symbols Appendix.

3.11.5.4.6.2. The pictorial symbol for vertical obstructions of outstanding visual significance shall be shown in the black color; the elevation data in the aeronautical blue color.

3.11.5.4.6.3. The conventional and elongated inverted "V" obstruction symbols, including the elevation data, shall be shown in the aeronautical blue color.

3.11.5.4.6.4. Obstructions under construction shall be indicated by the letters "UC", positioned immediately adjacent to the symbol. If available, the eventual height (AGL) of the obstruction shall be shown in parentheses, e. g., (UC 757).

3.11.5.5. Power Transmission Lines

3.11.5.5.1. Power transmission lines, because of their excellent radar return value, shall be shown on the chart to a density short of over-congestion. (Do not show within populated places).

3.11.5.5.2. Refer to the Symbols Appendix for portrayal. (Pictorial symbols, such as pylons, shall not be used).

3.11.5.5.3. Telephone and telegraph lines shall not be shown.

3.11.5.6. Maximum Elevation Figures (MEF)

3.11.5.6.1. Maximum elevation figure information is required over all land masses including areas of unreliable relief.

3.11.5.6.2. The maximum elevation figure represents the highest possible elevation including both terrain and other vertical obstructions (towers, trees, etc.) bounded by ticked lines of graticule. Maximum elevation figures will be shown by 1000 foot digits and smaller 100 foot digits. The last two digits of the number are not shown. Maximum elevation figures shall be shown centered in the area bounded by ticked lines of graticule.

3.11.5.6.2.1. 1,000 foot digits – 30 point Alternate Gothic No. 3

3.11.5.6.2.2. 100 foot digits – 18 point Alternate Gothic No. 3

3.11.5.6.3. Where areas of unreliable relief exist on a chart, a note spaced across the area is used instead of individual maximum elevation figures in each quadrangle in 9 to 36 pt. Helvetica Condensed Bold, e.g.,

MAXIMUM ELEVATION FIGURES ARE
BELIEVED NOT TO EXCEED 7600 FEET.

3.11.5.6.3.1. The note will be positioned in such a manner as to imply a general condition.

3.11.5.6.3.2. Use of more than one note may be necessary where terrain characteristics vary considerably in order to describe the various situations.

3.11.5.6.4. If it is obvious that the portion of quadrangle containing reliable relief represents the highest elevation, that value shall be applied. For example: the quadrangle containing Mt. Everest also contains an area of unreliable relief. Since the summit of Mt. Everest is obviously the highest point in the quadrangle, the maximum elevation figure shown will not be affected by the unreliable relief area.

3.11.5.6.5. In the determination of maximum elevation figures, extreme care should be exercised to increase such figures only to the point where it assured that they represent the minimum clearance altitude based on the existing elevation data shown on source material. The following procedure will be followed in the calculation of the maximum elevation figures.

3.11.5.6.5.1. When a man-made obstruction is 200' or more above the highest terrain within the area bounded by ticked lines of graticule:

3.11.5.6.5.1.1. Determine the elevation of the top of the obstruction (above mean sea level).

3.11.5.6.5.1.2. Add the possible vertical error of the source material to the above figure (100 feet or ½ the contour interval when interval on source exceeds 200 feet).

3.11.5.6.5.1.3. Round the resultant figure up to the next higher hundred foot level and this final figure is the MEF.

Example:

Elevation of obstacle top **=2574**

(above mean sea level)

Possible vertical error	**+100**
	2674
Raise to the following 100 foot level	**2700**
Maximum Elevation Figure	**27**

3.11.5.6.5.2. When a natural terrain feature (spot elevation, manufactured elevation or contour) or natural vertical obstruction (trees) is the controlling figure within the area bounded by ticked lines of graticule:

3.11.5.6.5.2.1. Determine the elevation of the top of the obstruction (above mean sea level).

3.11.5.6.5.2.2. Add the possible vertical error of the source material to the above figure (100 feet or ½ the contour interval when interval on source exceeds 200 feet).

3.11.5.6.5.2.3. Add a 200-foot allowance for natural or man-made obstructions which are not portrayed because they are below the minimum height at which the chart specification required their portrayal by an obstruction symbol.

3.11.5.6.5.2.4. Round the resultant figure up to the next higher hundred-foot level and this final figure is the MEF.

Example:

Highest terrain elevation	**=3450**
Allowance	**200**
Possible vertical error	**+100**
	3750
Raise to the following 100 foot level	**3800**
Maximum Elevation Figure	**38**

3.11.5.6.6. Maximum elevation figures shall be shown in overlap areas except where the area is too small to accommodate the MEF type.

3.11.5.6.7. An explanatory boxed note shall be shown in the margin as part of the legend and shall read as follows:

ATTENTION

THIS CHART CONTAINS MAXIMUM ELEVATION FIGURES (MEF).
The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. The MEF is based on information available concerning the highest known feature in each quadrangle, including terrain and obstructions (trees, towers, antennas,etc.).

Example: 12,500 feet 125

3.11.5.6.7.1. The last sentence relating to unreliable relief in the boxed note should be deleted when the condition does not exist on a chart.

3.11.5.6.7.2. Refer to the Style Sheets for type requirements and placement.

3.11.6. World Area Code Index The World Area Code Index shall be shown in accordance with the specifications indicated on the Military Style Sheets.

3.12. VEGETATION, MILITARY FORMAT

3.12.1. General

3.12.1.1. A stable, distinctive vegetation pattern is a valuable aid to low level navigation because it tends to remain unchanged and is prominent and significant. Association of the woods portrayal with its ground counterpart assists the pilot in general orientation. Relationship of vegetation to another chart feature aids in differentiating that feature from similar ones in the area.

3.12.1.2. The selection of charts on which vegetation should be shown shall be on an area basis and the following factors should be considered when determining whether or not vegetation is to be shown on the charts covering an area.

3.12.1.2.1. Permanency of the vegetation pattern.

3.12.1.2.2. Currency. Vegetation information must be of as late a date as other chart information.

3.12.1.2.3. Scale of source. Vegetation information must be taken from source of 1:500,000 or larger scale except where use of smaller scale sources is necessary to fill out any area.

3.12.2. Vegetation Features to be Shown Specifically, the following features shall be shown:

3.12.2.1. Woods

3.12.2.2. Orchards, plantations, vineyards

3.12.2.3. Tropical grass

3.12.2.4. Mangrove

3.12.2.5. Nipa

3.12.2.6. Tundra

3.12.3. Vegetation Features to be Omitted The following features shall normally be omitted; paragraph **3.12.4.** prescribes exceptions.

3.12.3.1. Any feature listed in paragraph **3.12.2.** whose area is less than the equivalent of .10 inch square.

3.12.3.2. Rows of trees and narrow strips of vegetation such as that bordering streams, roads, and fences.

3.12.3.3. Isolated trees.

3.12.3.4. Low hedges.

3.12.3.5. Non-perennial growths.

3.12.3.6. Scrub growths.

3.12.3.7. Grassland and uncultivated fields (excluding tropical grass).

3.12.3.8. Low growth as low brush or weeds.

3.12.3.9. Plantations or nurseries of low growth affording little or no concealment.

3.12.3.10. Any other vegetation growth which does not comply with the definitions for the features listed in paragraph **3.12.2.**

3.12.4. Criteria

3.12.4.1. The chart shall show all areas of prominent perennial vegetation which are the equivalent of .10 inch square, or larger. Conversely, clearings less than the equivalent of .10 inch square shall not be shown. There are many cases in which small areas of vegetation (less than the equivalent of .10 inch square) are interspersed within larger areas of another type of vegetation. In such cases the smaller areas shall be included and symbolized the same as the large areas. Normally, areas of vegetation smaller than the equivalent of .10 inch square shall be omitted. Exceptions shall be made on charts containing little vegetation. In such cases, small clumps of vegetation shall be shown if they serve as landmarks, even if a slight exaggeration in scale is necessary. When the vegetation selected for its landmark value cannot be symbolized, the outline shall be annotated.

3.12.4.2. In areas where woods cover the entire land area of the chart except for a few scattered clearings, the clearings that do exist become more important as checkpoints. When this condition occurs and clearings have definite limits and appear in isolated patches, only the clearings with appropriate labeling shall be delineated. A note shall be added reading: "Land area covered by forest".

3.12.4.3. Vegetation need not necessarily be continuous; clear space may appear between individual plants. While no absolute rule can be applied due to peculiarities of locality, an area of

scattered growth having approximately 20% to 35% canopy cover shall generally be considered of sufficient density to be shown.

3.12.4.4. Areas of vegetation shall be shown true to their shape insofar as the scale will permit. Exaggeration shall be held to a minimum and used especially to show clearings for fire breaks and powerlines.

3.12.4.5. Wooded marshes require no special treatment. The vegetation shall be symbolized in its prescribed manner with the marsh treated as a drainage feature symbolized in the manner prescribed for marshes.

3.12.5. Portrayal

3.12.5.1. Symbol AP-42 in NGA's Standard Printing Screen (SPS) Catalog, Section IV, Area Patterns, shall be used over areas of vegetation (woods) on the ONC.

3.12.5.2. The woods symbol (AP-42) shall be broken for dual lane (divided) highways.

3.12.5.3. Vegetation portrayal shall be omitted from:

3.12.5.3.1. The area between dual lane (divided) highways

3.12.5.3.2. Tinted cities

3.12.5.3.3. Towns

3.12.5.3.4. Airfields

3.12.5.3.5. Open water areas

CHAPTER 4

REPRODUCTION

4.1. GENERAL

Reproduction of charts in these series shall be by lithography. The final copy shall conform to the best lithographic standards with respect to clearness of copy, conformance to colors specified and accuracy of registration.

Copy furnished shall be final opaque negatives suitable for plate making. A composite proof will be supplied as a guide for checking registration.

Copy shall be appropriately identified by chart name/number, edition number, plate identity and screening requirements.

Color blocks, when used, shall be outside the trim line.

Half-tone negatives shall be prepared with the uniform screen angles in order to reduce moire effect to minimum.

A chart back-up is not required on the military version.

Individual chart features required on each color separation plate are indicated in **Chapter 3**, paragraph 4 Color separation.

4.2. PAPER REQUIREMENTS Charts shall be printed on JCP E-40 map paper (44 lbs. – White – Chemical Wood Map – Lithograph Finish).

4.3. PRINTING COLORS AND SCREENS The producing agency shall match the Department of Defense, Geospatial - Intelligence Agency (NGA), or the Department of Commerce, National Ocean Service (NOS) colors and screens specified.

4.3.1. Screens

4.3.1.1. All NOS screen angles are measured in degrees, starting with zero at 3 o'clock and progressing counterclockwise.

4.3.1.2. All NGA screen angles are measured in degrees, starting with zero at 12 o'clock and progressing clockwise.

4.3.2. Plates, Screens, and Colors

	PLATE	TONE	**NGA** SPC NO.	COLOR	NOS
(1)	Culture	Solid	58600	Black	0001
(2)	Drainage	Solid	48253	Blue	0350

	PLATE	TONE	**NGA** SPC NO.	COLOR	NOS
(3)	Drainage Type & Land Subject to Inundation	45%-Biangle-200L		Blue	0350
(4)	Light Blue Water Tint	120/10%/60°	-----	Blue	0350
(5)	Water Vignette	120 Line Vignette 90°	-----	Blue	0350
	Water vignette (civil format only) is required along the shorelines around isolated islands of 0.01" or smaller located in open water. Water vignette is prepared at full scale. No reductions or enlargements are required.				
(6)	Open Water	21%-120D-60°	48253	Blue	----
(7)	Inland Open Water	15%-30°-120L 54%-120D-45°	----- 48253	Blue Blue	0350* ----
(8)	Contours	17%/Triangle/120L 54%-240D-30°/60°	----- 58600	Black Black	0001 ----
(9)	Topographic Names and Contour Values	45%/Biangle/200L 54%-240D-30°/60°	----- 58600	Black Black	0001 ----
(10)	Distorted Surface Area	45%/Biangle/200L 54%-240D-30°/60°	----- 58600	Black Black	0001 ----
(11)	Roads	60%-Biangle/200L Solid	----- 61121	Black Red-Brown	0001 ----
(12)	Sand	Solid Solid	----- 61121	Black Red-Brown	0001 ----
(13)	Boundary Overprint	45%/75°/120L 54%-120D-15°	----- 61121	Magenta Red-Brown	0430 ----

	PLATE	**TONE**	**NGA** SPC NO.	**COLOR**	**NOS**
(14)	City Tint	Solid	-----	Yellow	0100
		54%-120D-45°	95151	Violet	----
(15)	Polar-Shelf Ice Ice Pack	5%/90°/120L	-----	BlackGray	0001
		21%-120D-30°	57103		----

* The Inland Open Water screen is printed over top the lighter blue water tint. (Civil Format)

(16)	Ice Pack	Pattern 5%/90°/	-----	BlackGray	0001
		120LAP-40 &AP-40 &	57103		----
		21%-120D-30°			
(17)	Shaded Relief (beginning	120 line	-----	Black	0001
	at the 500' contour level)	120D-Halftone 90°	57103	Gray	----

Specially prepared halftone terrain portrayals which meet the following criteria: Shaded slopes contain plastic gradation so that the top 1/3 of a slope prints no more than 90%, the intermediate 1/3 of the slope prints an average of 50%, and the lower 1/3 of the slope tapers to 0-3% in level valley floors. A minimal area of solids at peaks and ridge tops and cliff or canyon sides can be tolerated. The halftone dots in valley floors and other level or nearly level areas with grad es of less than 3% are "dropped out" and do not print.

(18)	Vegetation (Woods) (Woods pattern AP-42 prints in level areas only)	Solid	56235	Green	----
(19)	Grids	Solid	48253	Blue	----
(20)	Aeronautical Data				
	(a) Military Format	Solid	46531	Blue	----
	Special Use Airspace	31%-120D-15°	46351	Blue	----

PLATE	**TONE**	**NGA** SPC NO.	**COLOR**	**NOS**
(b) Civil Format – VHF/ UHF	Solid	-----	Blue	0350
1 Airways	120L/22%/30°	-----	Blue	0350
2 Airspace	120L/ Halftone/30°	-----	Blue	0350
(c) Civil Format – LF/MF	Solid	-----	Magenta	0430
1 Airways	120L/22%/30°	-----	Magenta	0430
2 Airspace	120L/Halftone/30°	-----	Magenta	0430

(21) Gradient Layer Tints

(a) Military Format

Level Area Relief	Solid	55607	Green	----
Low Relief	42%-120-60°	55607	Green	----
Moderate Relief	54%120D-45°	57437	Buff	----
High Relief	Solid	57437	Buff	----

(b) Civil Format

Below Sea Level	15%/60°/12OL	----	Blue	0350
	20%/15°/12OL	----	Yellow	0100
Green 1	10%/60°/12OL	----	Blue	0350
(0' to 1000')	20%/15°/12OL	----	Yellow	0100

PLATE	TONE	NGA SPC NO.	COLOR	NOS
Green 2	15%/60°/12OL	----	Blue	0350
(1000' to 2000')	25%/15°/12OL	----	Yellow	0100
Buff 1	10%/15°/12OL	----	Yellow	0100
(2000' to 3000')	5%/30°/12OL	----	Brown	0502
Buff 2	25%/15°/12OL	----	Yellow	0100
(3000' to 5000')	15%/30°/12OL	----	Brown	0502
Brown 3	25%/15°/12OL	----	Yellow	0100
(5000' to 7000')	35%/30°/12OL	----	Brown	0502
Brown 4 (7000' to 9000')	60%/30°/12OL	----	Brown	0502
Brown 5 (9000' & up)	Solid	-----	Brown	0502
Brown 6 (Over 12000')	12%/60°/120L (over Solid Brown 5)	-----	Blue	0350

Printed copy shall retain the tones of the original drawing to the maximum extent practicable. Half-tone negative is controlled by shooting the tonal guide blocks at 3-5% of tone for the lightest tones, 30-40% of tone for middle tone, and 50-85% of tone for the deepest tones. When shaded relief is omitted from the body of the chart, an overall tone, over the land area (beginning at the 500' contour level), shall be accomplished by using a 120L/5%/90° interposing screen with the open window negative when processing the printing plates. A holdout mask [See **Chapter 3 3.8.4.4.5.**] will be used to holdout shaded relief from spot elevations.

4.4. BINDERY INSTRUCTIONS, (Military Format)

4.4.1. Trimming Chart, when trimmed, shall measure 41-5/8" x 57-1/2", with margins as indicated on the Military Style Sheets. An exact trimming of the north and east margins is required in accordance with trim marks.

4.4.2. Folding Upon request, finish copy shall be folded in 3 vertical folds and 3 horizontal accordion folds, with the face (lower left corner of chart) on the outside so that chart number and currency data are visible. Folded size shall be approximately 10-1/2" by 14-7/16"

4.4.3. Wrapping All wrapping shall be in accordance with military policy.

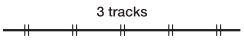
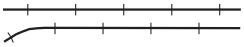
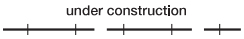
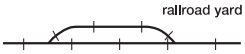
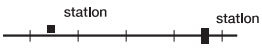
4.5. BINDERY INSTRUCTIONS, (Civil Format)

4.5.1. Trimming Chart, when trimmed, shall measure 20-5/8" x 55" or 20-5/8” x 59” max. An exact bleed trimming of the south and east margins on the face side is required in accordance with trim marks. The south trim of the face chart must register along the trimmed edge with the north margin of the back chart.

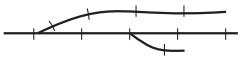
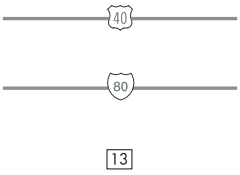
4.5.2. Folding Charts shall be folded in 11 vertical panels and one horizontal fold, with the legends on the outside panels. Folded size shall be approximately 5" x 10-5/16".

APPENDIX 1 SYMBOLS APPENDIX

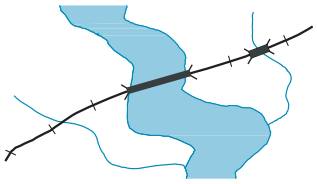
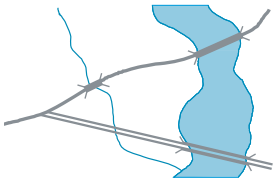
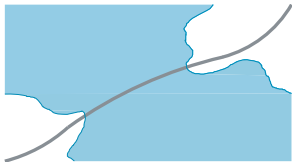
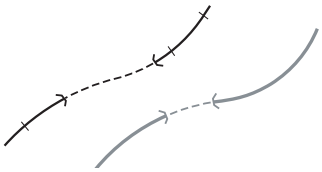
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
RAILROADS *All gauges* Single Track	 .012" line, crossties .06" long .006" lineweight at .25" intervals. Through cities .008" lineweight without crossties	 .010" line, crossties .06" long, .006" lineweight at .4" intervals
Double Track	 .012" line, crossties .06" long, .006" lineweight spaced .02" apart at .25" intervals. Through Cities .008" lineweight without crossties	 .010" line crossties .06" long, .006" lineweight spaced .02" apart at .4" intervals
More Than Two Tracks *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 Label double track symbol appropriately.	SAME
Electric *Label: 5.5 pt Helvetica 65 Medium (l.c.)*		SAME
RAILROADS IN JUXTAPOSITION *Separate rail lines which are closely parallel.*		SAME
RAILROAD - NON-OPERATING, ABANDONED, DESTROYED, OR UNDER CONSTRUCTION *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)*	 .06" space between segments	SAME
RAILROAD YARDS Limiting Tracks - To Scale *Label: 5.5 pt Helvetica 65 Medium (l.c.)*		SAME
Location Only *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .04" square	SAME
RAILROAD STATIONS *Label or name required when symbol is centered or adjacent to railroad.* *Name or Label : 5.5 pt Helvetica 65 Medium (l.c.)*	 .04" square adjacent to track .04" by .08" rectangle centered on track when location is not known	SAME

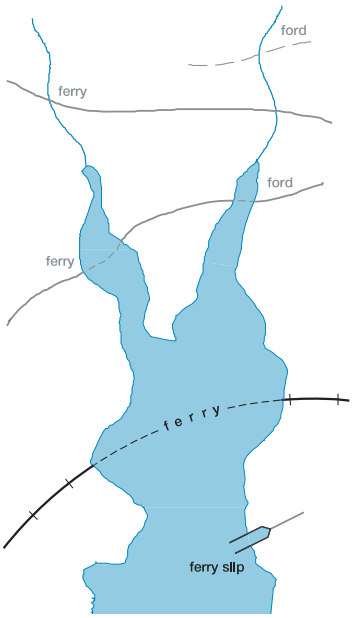
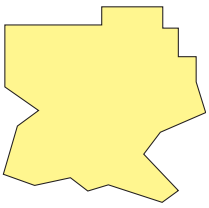
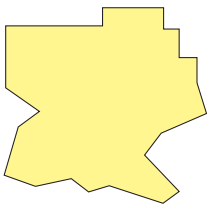
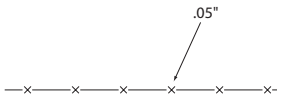
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
RAILROAD SIDINGS AND SHORT SPURS		SAME
ROADS Category 1 Dual Lane Divided Highways	 .012" line, .036" overall	 .008" lines, .010" apart, .026" overall
Category 2 Other Roads Primary	 .018" line	 .010" line
Secondary	 .010" line	SAME
Category 3 Tracks and Trails *Provides symbolization for dismantled railroad when combined with label "dismantled railroad."* *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .010" line, .16" dash, .015" space	SAME
ROAD MARKERS U.S. route no. *Label: 6 pt Trade Gothic Condensed* Interstate route no. *Label: 5 pt Helvetica 65 Medium* Air Marked Identification label *Label: 6 pt Futura Medium*		N/A
ROAD NAMES *Label: 4.5 pt Helvetica 65 Medium (Caps)*		
ROADS - UNDER CONSTRUCTION *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 Appropriate road symbol dashed- .13" dash, .02" space	SAME

PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
BRIDGES AND VIADUCTS Railroad		SAME
Road		SAME
OVERPASSES AND UNDERPASSES	 .02" space on each side	SAME
CAUSEWAYS	 Appropriate road or railroad symbol	SAME
TUNNELS - ROAD AND RAILROAD *Omit dashes when symbol is less than .10" in length*	 .010" line, .04" dash, .02" space	SAME

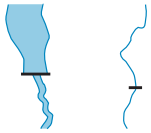
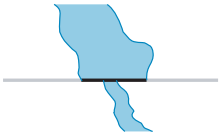
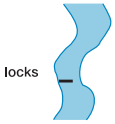
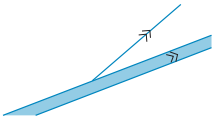
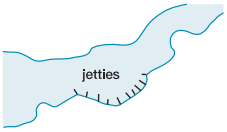
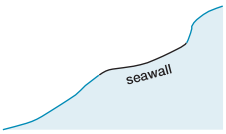
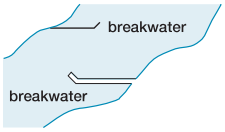
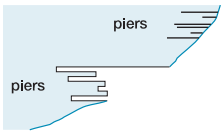
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
FERRIES, FERRY SLIPS AND FORDS *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)*	 .006" line, .04" dash, .02" space ferry slips: .008" line	SAME
POPULATED PLACES OUTLINED Large Cities Category 1	 .006" line	 .006" line. .10 inch square
POPULATED PLACES OUTLINED Cities and Large Towns Category 2	 .06" square, .006" line	 .07" square , .006" line
POPULATED PLACES Towns and Villages Category 3	 .05" diameter , .006" line	 .04" square , .006" line
PROMINENT FENCES	 .005" line, .20" dash, .05" space	SAME

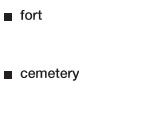
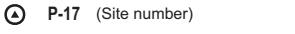
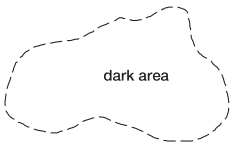
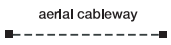
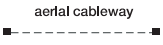
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
BOUNDARIES *Interval between dashes/dots may be increased where symbol coincides with other linear symbols.* International	.012" line, .3" dash, .05" space, .10" dash overprint .04" wide	SAME
State and Provincial	.015" line, .3" dash, .05" space, .10" dash	SAME
US/RUSSIA Maritime Boundary	RUSSIA UNITED STATES .02" line, .20" dash, .06" space, .12" cross tick	SAME
Date Line	INTERNATIONAL (Monday) DATE LINE (Sunday) .02" line, .25" dash, .15" space Date on East side of line one (1) day earlier	SAME
Time Zone	PST +8 (+7DT) = UTC MST +7 (+6DT) = UTC Screened .015" dot, .015" space, 17% triangle	NOT SHOWN
MINES AND QUARRIES Shaft Mines and Quarries		SAME
POWER TRANSMISSION & TELE-COMMUNICATION LINES	.008" line (Shown in Blue on Military Format)	.010" line, .04" dash, .02" space, .03" dot
PIPELINES *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	pipeline .006" line	SAME
Underground *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	underground pipeline .006" line, .10" dash, .02" space	SAME

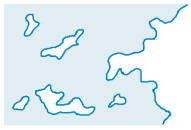
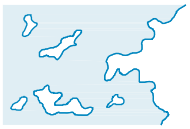
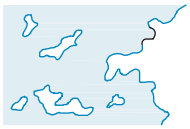
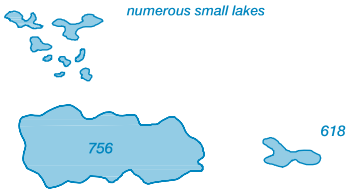
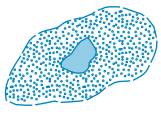
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
DAMS	 .015" line, .05" minimum length	SAME
DAM CARRYING ROAD	 Use appropriate road symbol	SAME
PASSABLE LOCKS *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .015" line; label	SAME
SMALL LOCKS	 .005" line, .04" minimum length at 45° angle- Point up-stream	SAME
WEIRS AND JETTIES *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)*	 .008" line, to scale and shape	SAME
SEAWALLS *Label: 5.5 pt to 7 pt Helvetica 65 Medium (l.c.)*	 .008" line	SAME
BREAKWATERS *Label: 5.5 pt to 7 pt Helvetica 65 Medium (l.c.)*	 .008" line, plotted length and shape. To scale: .005" line	SAME
PIERS, WHARFS, QUAYS, ETC. *Label appropriately: 5.5 pt to 7 pt Helvetica 65 Medium (l.c.)*	 .008" line, plotted length and shape. To scale: .005" line	SAME

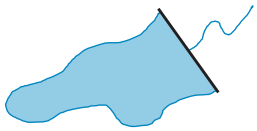
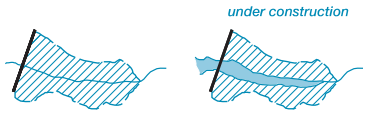
PART 1: TOPOGRAPHICAL INFORMATION

CULTURE	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
MISCELLANEOUS CULTURE FEATURES *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)* church, monument, aerial cableway, athletic field, outdoor theater, school, shrine, silo, fort, cemetery	 .04" square	SAME
OUTDOOR THEATER		SAME
WELLS Other Than Water *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .005" line, .04" diameter	SAME
RACE TRACKS		SAME
LOOKOUT TOWERS *Air marked identification* *Label: Site number: 6 pt Helvetica Condensed Bold (Caps & figs);* *Elevation no: 6 pt Helvetica 66 Medium Italic (figs)*		
LANDMARK AREAS *Label appropriately: 5.5 pt to 9 pt Helvetica 65 Medium (l.c.)*	 .005" line, .04" dash, .02" space	SAME
TANKS *Label: 5.5 pt Helvetica 65 Medium (l.c.)* water gas oil	 .04" diameter	SAME
COAST GUARD STATION *Label: 6 pt Helvetica Condensed Bold (Caps)*	 orient bar along shoreline	NOT SHOWN
AERIAL CABLEWAYS, CONVEYORS, ETC. *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)*	 Dashes: .010" line, .04" long, .02" space Terminals: .04" square	 .005" line, .04" dash, .02"space Terminals: .04" square

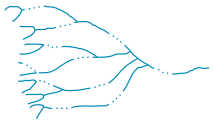
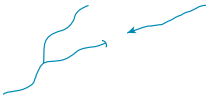
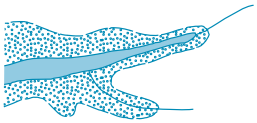
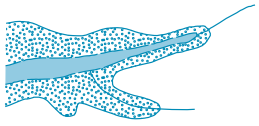
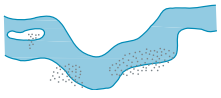
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
OPEN WATER		SAME
INLAND WATER		SAME
SHORELINES Definite	 .007" line	SAME
Fluctuating	 .007" line, .04" dash, .02" space	SAME
Unsurveyed *Indefinite*	 .007" line, .12" dash, .015" space	SAME
Man-made	 .008" line To scale .005" line	SAME
LAKES Label as required Perennial *When too numerous to show individual lakes, show representative pattern and descriptive note. Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line	SAME
Non-Perennial *(dry, intermittent, etc.) Illustration includes small perennial lake*	 .007" line, .12" dash, .015" space	SAME

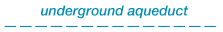
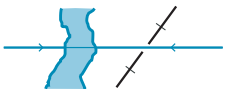
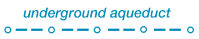
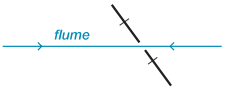
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
RESERVOIRS Natural Shorelines *(to scale)*		SAME
Man-Made Shorelines *(to scale)* *Label when necessary for clarity:* *5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line	SAME
Too small to show to scale *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .04" square	SAME
Under Construction *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 NO. 66 line pattern (LP-15 screen) oriented at 45° angle from upper right to lower left. Shoreline .007" , .12" dash, .015" space	SAME

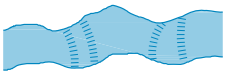
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
STREAMS Perennial	 SINGLE LINE STREAM: Normal line weight .007" line, tapering to .004" at source with maximum .015" at point of conversion with double line stream DOUBLE LINE STREAM: .007" line each side. Where accentuation of drainage for a specific chart series is required tapering shall be in accordance with specific instructions for the series	
Non-Perennial	 Double line .007", .12" dash, .015" space	Single line .007" line, .20" dash, three dots in a 10" space
Fanned Out *Alluvial fan*	 .007" line, .20" dash, three dots in .10" space	SAME
Braided	 .007" line	SAME
Disappearing	 .007" line	SAME
Seasonally Fluctuating *with undefined limits*	 .007", .12" dash, .015" space	SAME
with maximum bank limits, prominent and constant	 .007" line	SAME
Sand Deposits In and Along Riverbeds		SAME
WET SAND AREAS *Within and adjacent to desert areas*		SAME

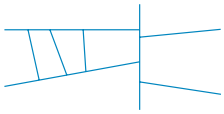
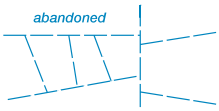
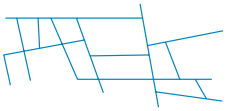
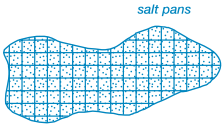
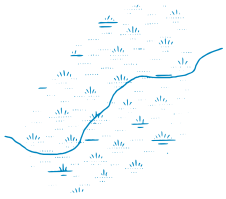
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
AQUEDUCTS *Label as required: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .012" line	SAME
Abandoned or Under Construction	 .012" line, .12" dash, .02" space	SAME
Underground	 .012" line, .06" dash, .02 space	SAME
Suspended or Elevated	 .012" line. Supports: .007" line, .028" long at 45° angles	SAME
Tunnels	 .007" line, .06" dash, .02" space. Wing ticks: .007" line, .028" long at 45° angles. Dashes optional	SAME
Kanats *Underground aqueduct with air vents*	 .012" line, .06" dash, .02" space. Circle: .005" line, .04" diameter. Show vents in true position if known	SAME
FLUMES, PENSTOCKS AND SIMILAR FEATURES *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line	SAME
Elevated	 .007" line Supports: .007" line, .028" long at 45° angles. Break underpassing features .02" from each side.	SAME
Underground	 .007" line, .06" dash, .02" space	SAME

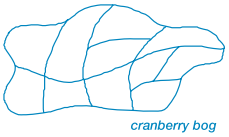
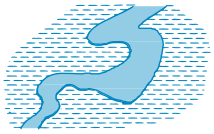
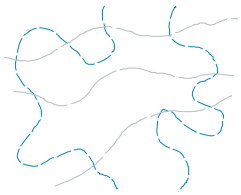
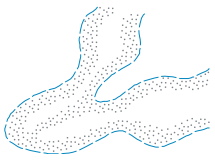
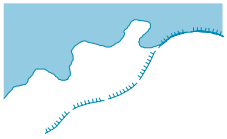
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
FALLS *Label when necessary for clarity:* *5.5 pt Helvetica 66 Medium Italic (l.c.)* Double Line Stream	 .005" line, .04" length, .02" space	SAME
Single Line Stream	 .007" line, .05" length	SAME
RAPIDS *Label when necessary for clarity:* *5.5 pt Helvetica 66 Medium Italic (l.c.)* Double Line Stream	 .005" line, .04" length, .02" space	SAME
Single Line Stream	 .007" line, .05" length, .03" space	SAME
CANALS *Label as required: 5.5 pt Helvetica 66 Medium Italic (Caps or l.c.)*	 .015" line	SAME
To Scale	 .007" line each side	SAME
Abandoned or Under Construction	 .015" line, .12" dash, .02" space	SAME
To Scale	 .007" line each side, .12" dash, .02" space	SAME

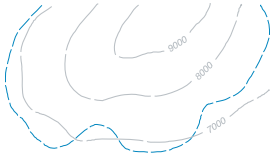
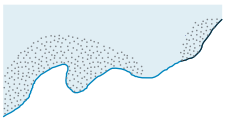
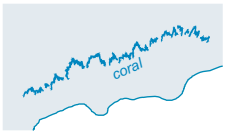
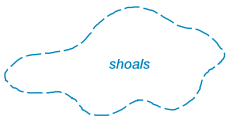
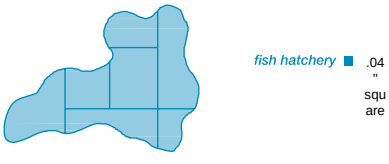
PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
SMALL CANALS AND DRAINAGE/IRRIGATION DITCHES Perennial	 .007" line	SAME
Non-Perennial	 .007" line, .20" dash, three (3) dots in .10" space	SAME
Abandoned or Ancient *Label appropriately:* *5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line, .12" dash, .02" space	SAME
Numerous *Representative pattern and/or descriptive note.*		SAME
Numerous *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	*numerous canals and ditches*	SAME
SALT EVAPORATORS AND SALT PANS MAN EXPLOITED *Pictorial pattern when from photography or equivalent source.* *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line, with No. 22 dot pattern (AP-41 at 45°) superimposed when pattern is arbitrary	SAME
SWAMPS, MARSHES AND BOGS		SAME
HUMMOCKS AND RIDGES	 .01" dot, .03" interval	SAME
MANGROVE AND NIPA *Label appropriately:* *5.5 pt Helvetica 66 Medium Italic (l.c.)*		SAME

PART 1: TOPOGRAPHICAL INFORMATION

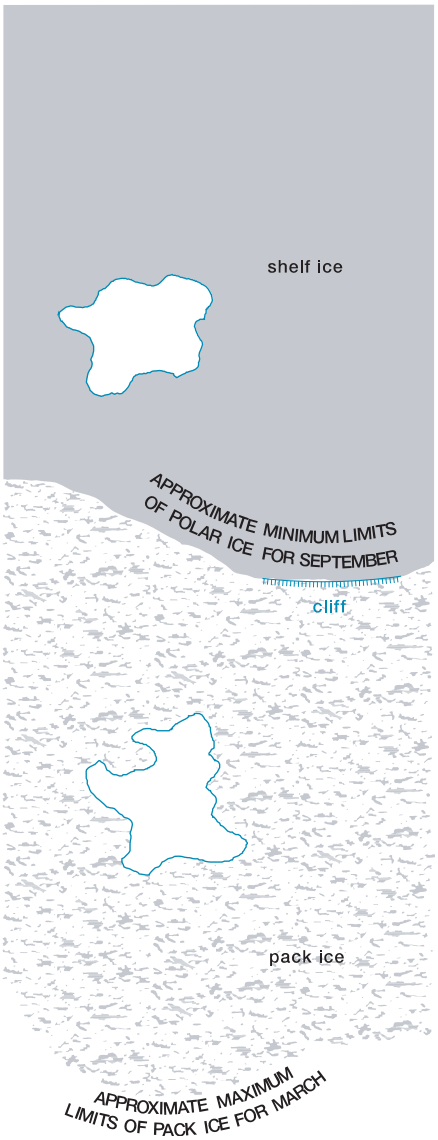
HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
PEAT BOGS *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*		SAME
TUNDRA *Label: 5.5 pt to 9 pt Helvetica 65 Medium (l.c.)*	tundra	SAME
CRANBERRY BOGS *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line	SAME
RICE PADDIES *Extensive areas indicated by label only.* *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*		SAME
LAND SUBJECT TO INUNDATION		SAME
SPRINGS, WELLS AND WATERHOLES	 .04" diameters DO NOT LABEL	SAME
GLACIERS	 Limits: .005" line, .08" dash, .015" space	SAME
Glacial Moraines		SAME
ICE CLIFFS	 .005" line. Dashes: .15" to .2" spaced .02" apart. Ticks: .02" long, .02" space	SAME

PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
SNOWFIELDS, ICE FIELDS, AND ICE CAPS	 Limits: .005" line, .08" dash, .015" space	SAME
ICE PEAKS	 .006" to .008" line; NW light source shading	SAME
FORESHORE FLATS *Tidal flats exposed at low tide*		SAME
ROCKS - ISOLATED *Bare or Awash*	Orient one line with latitude.	SAME
WRECKS *Exposed*	 Location to indicate direction and position of wreck when information available.	SAME
REEFS - ROCKY OR CORAL *Label appropriately: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line	SAME
MISCELLANEOUS UNDERWATER FEATURES NOT OTHERWISE SYMBOLIZED *Label: 5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line, .08" dash, .02" space	SAME
FISH PONDS AND HATCHERIES *To scale when possible* *Label when necessary for clarity:* *5.5 pt Helvetica 66 Medium Italic (l.c.)*	 .007" line Major divisions .007" lines Major divisions to scale: .005" lines	SAME

PART 1: TOPOGRAPHICAL INFORMATION

HYDROGRAPHY	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
ICE *Label appropriately*		
Permanent Polar Ice		
Pack Ice		



*7 pt Helvetica 65 Medium (Caps)

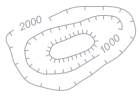
7 pt Helvetica 65 Medium (l.c.)

7 pt Helvetica 65 Medium (l.c.)

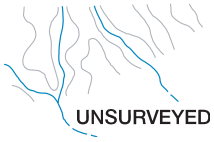
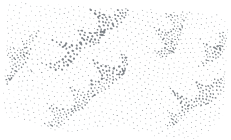
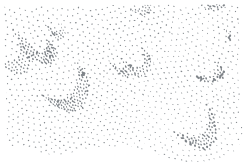
*7 pt Helvetica 65 Medium (Caps)

* Type size may be reduced to 6.5 pt or 5.5 pt for smaller areas

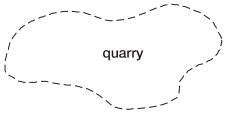
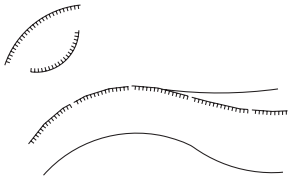
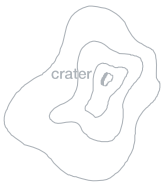
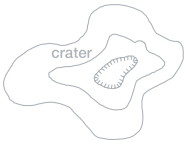
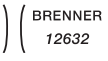
PART 1: TOPOGRAPHICAL INFORMATION

RELIEF	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
CONTOURS Basic	 .006" line	SAME
Intermediate	 .006" line	 .004" line
Auxiliary	 .006" line	 .004" line .15" dash .02" space
Approximate	Approximate Basic: .006" line, .30" dash, .02" space Approximate Intermediate: .006" line, .30" dash, .02" space Approximate Auxiliary: .006" line, .15" dash, .02" space	Approximate Basic: .006" line, .30" dash, .02" space Approximate Intermediate: .004" line, .30" dash, .02" space Approximate Auxiliary: .004" line, .15" dash, .02" space
Depression *Illustration includes mound within depression*	 Spurs: .02" long. Space: .02", .04", .08" and .15", as applicable	SAME
Values *Label: 4.5 pt Helvetica 66 Medium Italic*		SAME
SPOT ELEVATIONS Position Accurate	 .025" diameter dot	SAME
Position Accurate Elevation approximate	 .005" line, .05" overall	SAME
Position Approximate	 Center over approximate location Omit point indicator	SAME
Highest in general area	Symbolization (dot or "x") depends upon accuracy determination  .04" diameter dot	 .025" diameter dot
Highest on chart	Symbolization (dot or "x") depends upon accuracy determination  .04" diameter dot	SAME

PART 1: TOPOGRAPHICAL INFORMATION

RELIEF	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
HACHURING	 .006" to .008" lines. NW light source shading	SAME
UNCONTOURED AREAS *Label appropriately as required*	 **RELIEF DATA INCOMPLETE** No tint. The note "RELIEF DATA INCOMPLETE" (8 pt News Gothic Caps) shall be centered in the area, and/or "LIMITS OF RELIABLE RELIEF INFORMATION" (6 pt Trade Gothic Caps) shall be positioned adjacent to the limits of reliable relief coverage on the black plate.	SAME
UNSURVEYED AREAS *Label: 5.5 pt to 9 pt Helvetica 65 Medium (Caps)*	 UNSURVEYED	SAME
DISTORTED SURFACE AREAS *Label appropriately: 5.5 pt to 9 pt Helvetica 65 Medium (l.c.)*	 lava	SAME
LAVA FLOWS	 .006" line	SAME
SAND OR GRAVEL AREAS *Large and indefinite areas shall be indicated by label only*		SAME
SAND RIDGES *Large and indefinite areas shall be indicated by label only* To Scale		SAME
SAND DUNES *Large and indefinite areas shall be indicated by label only* To Scale		SAME
SHADED RELIEF		SAME

PART 1: TOPOGRAPHICAL INFORMATION

RELIEF	TAC-SECTIONAL/TPC 1:250,000-1:500,000	WAC/ONC 1:1,000,000
ROCK STRATA OUTCROP *When actual shape is known* *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .006" line	SAME
QUARRIES TO SCALE *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .005" line, .04" dash, .02" space.	SAME
STRIP MINES, MINE DUMPS AND TAIL-INGS *Label appropriately: 5.5 pt Helvetica 65 Medium (l.c.)* To Scale		SAME
		SAME
ESCARPMENTS, BLUFFS, CLIFFS, DEPRESSIONS, ETC.	 .006" line, .15" to .20" dash, spaced .02" apart. Spurs: .02" long. .02" space	SAME
LEVEES AND ESKERS *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .018" line.	SAME
CRATERS *Label: 5.5 pt Helvetica 65 Medium (l.c.)*	 .006" line, increased at NW for shaded effect	SAME
	 .006" line. Spurs .02" long. .02" space	SAME
MOUNTAIN PASSES *Label with name and elevation of pass.*		SAME

TYPE STYLES & SIZES

ITEM	TAC-SECTIONAL/TPC 1:250,000-1:500,000	TYPE SAMPLES	WAC/ONC 1:1,000,000	TYPE SAMPLES
CITIES AND TOWNS THREE CATEGORY BREAKDOWN				
1. Large Cities	9 pt New Century Schoolbook Roman	ST LOUIS	9 pt New Century Schoolbook Roman	ST LOUIS
2. Cities and Large Towns	6.5 pt Helvetica 65 Medium (Caps)	NASHVILLE	6.5 pt Helvetica 65 Medium (Caps)	NASHVILLE
3. Towns and villages	6.5 pt Helvetica 65 Medium (Caps and l.c.)	Frankfort	6.5 pt Helvetica 65 Medium (Caps and l.c.)	Frankfort
COUNTRY, STATE, AND PROVINCE NAMES				
Centered Over Area	8 pt to18 pt New Century SchoolBook Bold	**MEXICO**	8 pt to 18 pt New Century SchoolBook Bold	**MEXICO**
Along Boundaries	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	UNITED STATES (ARIZONA)	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	UNITED STATES (ARIZONA)
Under Island Names (Denoting Possessions)	5.5 pt to 24 pt Helvetica 65 Medium (Caps)	CANADA	5.5 pt to 24 pt Helvetica 65 Medium (Caps)	CANADA
DATE LINE	8 pt New Century SchoolBook Bold	**INTERNATIONAL DATE LINE**	8 pt New Century SchoolBook Bold	**INTERNATIONAL DATE LINE**
US/ RUSSIA MARITIME BOUNDARY	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	RUSSIA UNITED STATES	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	RUSSIA UNITED STATES
MOUNTAIN PEAKS	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	MOUNT SHASTA	5.5 pt to 7 pt Helvetica 65 Medium (Caps)	MOUNT SHASTA
MOUNTAIN RANGES AND RIDGES; DESERTS	8 pt to 36 pt Helvetica 65 Medium (Caps) (Spaced Proportionately)	J U R A M O U N T A I N S	8 pt to 36 pt Helvetica 65 Medium (Caps) (Spaced Proportionately)	J U R A M O U N T A I N S
MOUNTAIN PASSES	5.5 pt Helvetica 65 Medium (Caps)	BRENNER	5.5 pt Helvetica 65 Medium (Caps)	BRENNER
PASS ELEVATION	6 pt Helvetica 66 Medium Italic	*12632*	6 pt Helvetica 66 Medium Italic	*12632*
RESERVATIONS, NATIONAL FORESTS, PARKS, ETC.	5.5 pt to 36 pt Helvetica 65 Medium (Caps)	YELLOWSTONE	5.5 pt to 36 pt Helvetica 65 Medium (Caps)	YELLOWSTONE
ROAD NAMES	4.5 pt Helvetica 65 Medium (Caps)	LINCOLN HIGHWAY	4.5 pt Helvetica 65 Medium (Caps)	LINCOLN HIGHWAY
ELEVATIONS Elevation and Position Accurate	6 pt Helvetica 66 Medium Italic	*1412*	6 pt Helvetica 66 Medium Italic	*1412*
Position Accurate, Elevation Approximate	6 pt Helvetica 66 Medium Italic	*1412*	6 pt Helvetica 66 Medium Italic	*1412*
Approximate or Doubtful Location	6 pt Helvetica 66 Medium Italic	*1412*	6 pt Helvetica 66 Medium Italic	*1412*
Highest in General Area	7 pt Helvetica 66 Medium Italic	*12770*	7 pt Helvetica 66 Medium Italic	*12770*
Highest Elevation on the Chart	8 pt Helvetica 66 Medium Italic	*13770*	8 pt Helvetica 66 Medium Italic	*13770*

TYPE STYLES & SIZES

ITEM	TAC-SECTIONAL/TPC 1:250,000-1:500,000	TYPE SAMPLES	WAC/ONC 1:1,000,000	TYPE SAMPLES
1000' Maximum Elevation Figure (MEF)	24 pt Helvetica Condensed Bold	12	24 pt Helvetica Condensed Bold	12
100' Maximum Elevation Figure	18 pt Helvetica Condensed Bold	4	18 pt Helvetica Condensed Bold	4
Stream Elevation	5 pt Helvetica 66 Medium Italic	*670*	5 pt Helvetica 66 Medium Italic	*670*
Lake Elevation	6 pt Helvetica 66 Medium Italic	*520*	6 pt Helvetica 66 Medium Italic	*520*
CONTOUR VALUES	4.5 pt Helvetica 66 Medium Italic	*1000*	4.5 pt Helvetica 66 Medium Italic	*1000*
ISLANDS, ISLAND GROUPS, ARCHIPELAGOS, PENINSULAS POINTS AND CAPES	5.5 pt to 36 pt Helvetica 65 Medium (Caps or Caps & l.c.)	SEYCHELLES ISLANDS	5.5 pt to 36 pt Helvetica 65 Medium (Caps or Caps & l.c.)	SEYCHELLES ISLANDS
UNUSUAL LAND AREAS (rock outcrop, lava, light or dark areas, etc.)	5.5 pt to 9 pt Helvetica 65 Medium (l.c.) (Spaced Proportionately)	dark area	5.5 pt to 9 pt Helvetica 65 Medium (l.c.) (Spaced Proportionately)	dark area
MISCELLANEOUS CULTURAL FEATURES (towers, tanks, wharfs, fishing stakes, cable areas, etc.)	5.5 pt Helvetica 65 Medium (l.c.)	athletic field	5.5 pt Helvetica 65 Medium (l.c.)	athletic field
OCEANS, SEAS, GULFS, BAYS, SOUNDS, HARBORS, CHANNELS, STRAITS, RIVERS, LAKES, RESERVOIRS.	5.5 pt to 36 pt Helvetica 66 Medium Italic (Caps or Caps & l.c.)	*PACIFIC*	5.5 pt to 36 pt Helvetica 66 Medium Italic (Caps or Caps & l.c.)	*PACIFIC*
CANALS	5.5 pt to 7 pt Helvetica 66 Medium Italic (Caps or Caps & l.c.)	*ERIE*	5.5 pt to 7 pt Helvetica 66 Medium Italic (Caps or Caps & l.c.)	*ERIE*
HYDROGRAPHIC DESCRIPTIVE NOTES (falls, rapids, springs, wells, waterholes, etc.)	5.5 pt Helvetica 66 Medium Italic (l.c.)	*numerous wells*	5.5 pt Helvetica 66 Medium Italic (l.c.)	*numerous wells*
VARIOUS OFFSHORE AREA NOTES AND FEATURES	5.5 pt to 7 pt Helvetica 65 Medium (l.c.)	breakwater	5.5 pt to 7 pt Helvetica 65 Medium (l.c.)	breakwater
LABELING FOR ROADS AND RAILROADS (under construction, approximate alignment, etc.	5.5 pt Helvetica 65 Medium (l.c.)	railroad-under construction road-under construction	5.5 pt Helvetica 65 Medium (l.c.)	railroad-under construction road-under construction
LABELING FOR LOOKOUT TOWERS Air Marked Identification Label	6 pt Helvetica Condensed Bold (Caps & figs)	P-17	N/A	

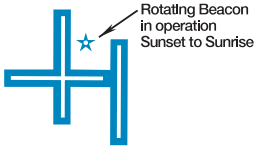
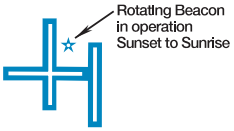
TYPE STYLES & SIZES

ITEM	TAC-SECTIONAL/TPC 1:250,000-1:500,000	TYPE SAMPLES	WAC/ONC 1:1,000,000	TYPE SAMPLES
LABELING FOR TRANSMISSION LINES	9 pt Helvetica 65 Medium (Caps)	CAUTION	N/A	
LABELING FOR FERRY	5.5 pt Helvetica 65 Medium (l.c.)	ferry	5.5 pt Helvetica 65 Medium (l.c.)	ferry
LABELING FOR FISH HATCHERY	5.5 pt Helvetica 66 Medium Italic (l.c.)	*fish hatchery*	5.5 pt Helvetica 66 Medium Italic (l.c.)	*fish hatchery*
DESIGNATED VFR CHECKPOINTS	6.5 pt Trade Gothic Bold (Caps)	 STATE CAPITOL	N/A	
LABELING FOR COAST GUARD STATION	6 pt Helvetica Condensed Bold (Caps)	CG	N/A	
TIME ZONE AND CONVERSION FACTOR	6 pt Helvetica 65 Medium (Caps & figs)	MST +7 (+6DT) = UTC	N/A	

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRPORTS	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
LANDPLANE-MILITARY *Refueling and repair facilities for normal traffic.* *All recognizeable runways, including some which may be closed, are shown for visual identification.* *Airports having control towers (CT) are shown in blue, all others in magenta.*	 	  PATTERN 20% reduction of 1:500,000
LANDPLANE-CIVIL *Refueling and repair facilities for normal traffic.*	  	  
SEAPLANE-CIVIL *Refueling and repair facilities for normal traffic.*		
LANDPLANE CIVIL-MILITARY *Refueling and repair facilities for normal traffic.*	 	 
LANDPLANE-EMERGENCY *No facilities or complete information is not available.* *Add appropriate notes as required:* *"closed, approximate position, existence unconfirmed".*	 PUBLIC USE - Limited attendance or no service available  RESTRICTED OR PRIVATE - Use only in emergency, or by specific authorization  UNVERIFIED - A landing area available but warranting more than ordinary precaution due to: (1) lack of current information on field conditions, and / or (2) available information indicates peculiar operating limitations.  ABANDONED - Depicted for landmark value or to prevent confusion with an adjacent usable landing area. (Normally at least 3000' paved)	   
SEAPLANE-EMERGENCY *No facilities or complete information is not available*		
HELIPORT *(Selected)*		

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRPORTS	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
ULTRALIGHT FLIGHT PARK *(Selected)*	Ⓕ	NOT SHOWN
AIRPORT DATA GROUPING	 FSS NO SVFR Ⓡ NAME (NAM) CT - 118.3 ★ Ⓒ ASOS/ AWOS 135.42 897 L 110 122.95 ← UNICOM RP 23,34 VFR Advsy 125.0	 FSS NO SVFR NAME (NAM) CT - 118.3 ★ ATIS 123.8 897 L 110 U Airport of Entry

FSS - Flight Service Station on field

NO SVFR - Airports where fixed wing special visual flight rules operations are prohibited (shown above airport name) F.A.R. 91

[ ] - Indicates F.A.R. 93 Special Air Traffic Rules and Airport Traffic Patterns

Ⓡ - Airport Surveillance Radar (Not shown on WAC)

(NAM) - Location Identifier (Not shown on WAC)

CT - 118.3 - Control Tower (CT) - primary frequency

★ - Star indicates operation part-time. See tower frequencies tabulation for hours of operation

Ⓒ - Indicates Common Traffic Advisory Frequencies (CTAF) (Not shown on WAC)

ATIS 123.8 - Automatic Terminal Information Service

ASOS/ AWOS 135.42 - Automated Surface Weather Observing Systems (Shown when full-time ATIS is not available) Some ASOS/AWOS facilities may not be located at airport. (Not shown on WAC)

897 - Elevation in feet

L - Lighting in operation Sunset to Sunrise

*L - Lighting limitations exist; refer to Airport/Facility Directory.

110 - Length of longest runway in hundreds of feet; usable length may be less.

UNICOM - Aeronautical advisory station ("U" only on WAC)

RP 23,34 - Runways with Right Traffic Patterns (public use) (Not shown on WAC)

RP★ - (See Airport/Facility Directory)

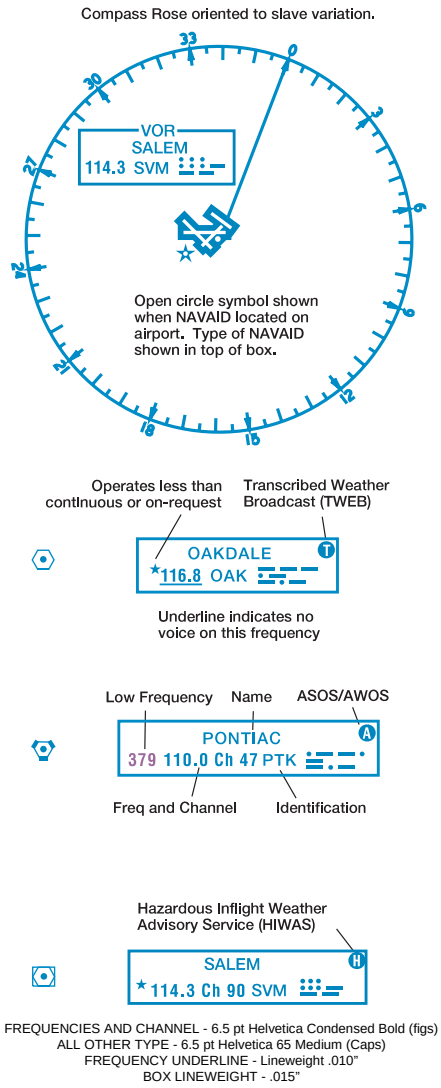
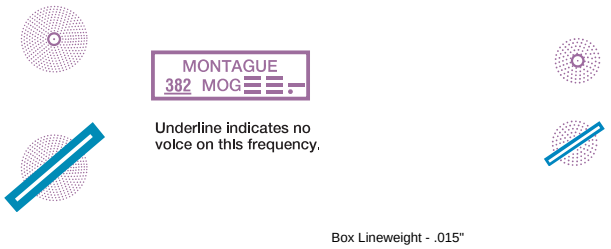
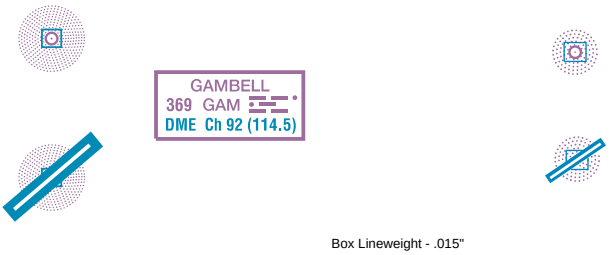
VFR Advsy 125.0 - VFR Advisory Service shown where ATIS is not available and frequency is other than primary CT frequency.

When lighting is not available, the respective character is replaced by a dash. All lighting codes refer to runway lights. Lighted runway may not be the longest or lighted full length.

TYPE STYLES AND SIZE

NAME - 6.5 pt Helvetica 65 Medium
CONTROL TOWER FREQUENCY - 7.5 pt Helvetica Condensed Bold (figs)
ATIS and AWOS FREQUENCIES - 7 pt Helvetica Condensed Bold (figs)
LENGTH OF RUNWAY - 6.5 pt Helvetica 65 Medium (Caps, lc & figs)
AIRPORT OF ENTRY - 6.5 pt Helvetica 65 Medium (Caps, lc)
ELEVATION - 5.5 pt Copperplate 31 AB Italic (figs)
LIGHTING - 6.5 pt Helvetica 65 Medium (Caps, figs)
UNICOM FREQUENCY - 5.5 pt Copperplate 31 AB Italic (figs)
VFR ADV FREQUENCY - 7.5 pt Helvetica Condensed Bold (figs)
OTHER DATA - 6.5 pt Helvetica 65 Medium (Caps, lc & figs)

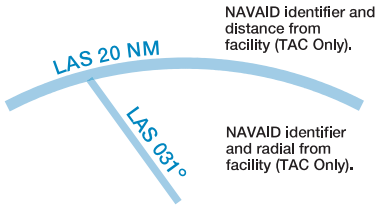
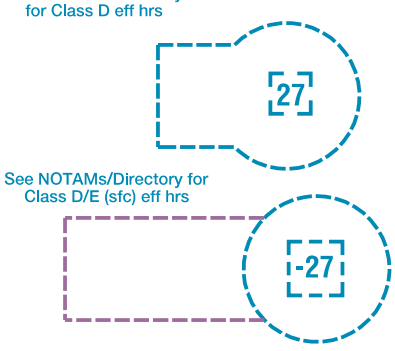
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

RADIO AIDS TO NAVIGATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
VHF OMNI-DIRECTIONAL RANGE (VOR) VOR VORTAC VOR-DME		
NON-DIRECTIONAL RADIOBEACON (NDB)		
NDB-DME		

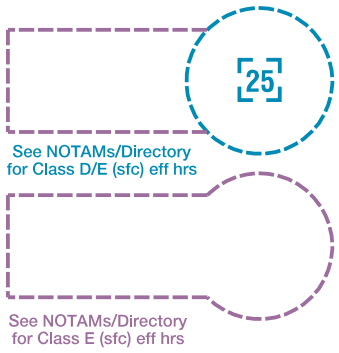
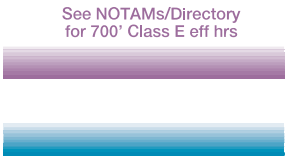
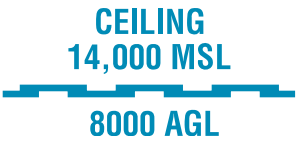
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

RADIO AIDS TO NAVIGATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
ILS COMPONENTS *Shown when component of airway system or used in the description of Class B airspace.*	Localizer ..... ⊙ LCZR OR ⊙ LOCALIZER 109.5 I-BED Locator Beacon..... ⊙ LOM OR LOM 388 DT (WAC Only) ILS-DME..... ⊙ SALT LAKE CITY DME ANT (I-BNT) Ch 52 (111.5)	
BROADCAST STATIONS (BS) *Shown when requested by proper authority or designated as a VFR Checkpoint.*	⊙ KFTM ⊙ BS KFTM 1400 FREQUENCY - 6.5 pt Helvetica Condensed Bold CALL LETTERS - 6.5 pt Helvetica 65 Medium (Caps) Box Lineweight - .006"	
FLIGHT SERVICE STATION (FSS) Heavy line box indicates Flight Service Station (FSS). Frequencies 121.5, 122.2, 243.0, and 255.4 (Canada - 121.5, 126.7, and 243.0) are normally available at all FSSs and are not shown above boxes. All other frequencies are shown. Frequencies transmit and receive except those followed by an R. R - receive only. PONTIAC PTK No NAVAID of the same name as FSS OR 122.1R IDAHO FALLS 109.0 Ch 27 IDA FSS oper 0500-2300 Boise FSS other times. NAVAID same name as FSS but not an RCO FSS Box Lineweight - .030" **REMOTE COMMUNICATIONS OUTLET (RCO)** Frequencies above thin line box are remoted to NAVAID site. Other frequencies at FSS providing voice communication may be available determined by altitude and terrain. Consult Airport / Facility Directory for complete information. Thin line box without frequencies and controlling FSS name indicates no FSS frequency available. 123.6 OLYMPIA RCO McCHORD 122.35 ST PAUL 108.6 STP MINNEAPOLIS 122.35 HUMPHREY 275 HPY MILES CITY FSS providing voice communication FREQUENCY AND CHANNEL - 6.5 pt Helvetica Condensed Bold ALL OTHER TYPE - 6.5 pt Helvetica 65 Medium (Caps & lc) FREQUENCY UNDERLINE - Lineweight .010" BRACKET - Lineweight .010" RCO Box Lineweight - .015"	
AIR FORCE STATION (AFS) **LONG RANGE RADAR STATION (LRRS)**	122.0 AFS 123.6 POINT BARROW 122.4 AFS 123.6 CAPE LEWISTON 206 LWS AFS at airport with NDB 122.4 LRRS 122.55 BARTER ISLAND 122.4 LRRS 123.6 CAPE LISBURNE 385 LUR LRRS at airport with NDB	
OFF AIRPORT AWOS/ASOS	⊙ SANDBERG ASOS 120.625	

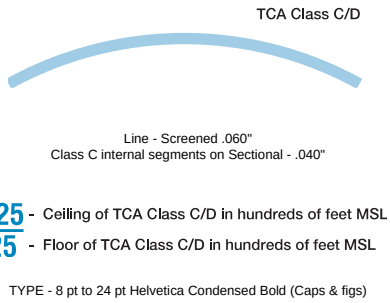
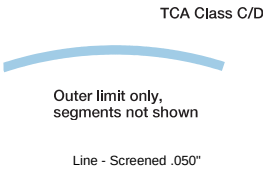
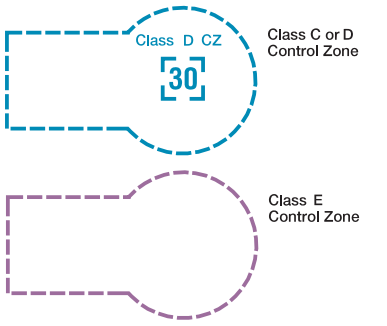
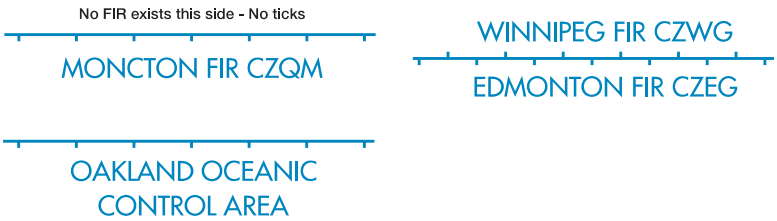
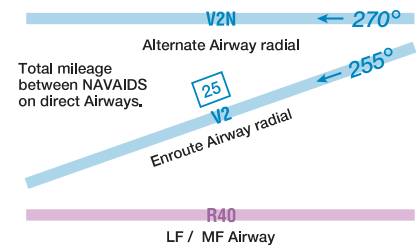
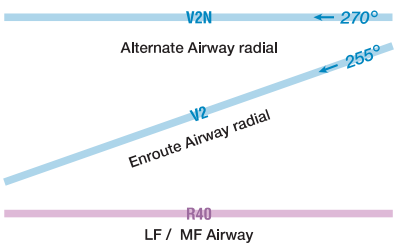
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
CLASS B AIRSPACE *Appropriate notes as required may be shown.* *Only the airspace effective below 18,000 feet MSL are shown.* *(Mode C see FAR 91.215/AIM)*	LAS VEGAS CLASS B  Line Screened - .060" Class B internal segments on Sectional -.040" TYPE - 9 pt Trade Gothic Bold (Caps) ARC AND RADIAL TYPE - 7 pt to 10 Helvetica 65 Medium (Caps & figs)	 FOR FLIGHTS AT AND BELOW 8000' MSL SEE KANSAS CITY VFR TERMINAL AREA CHART TYPE - 7 pt to 10 pt Copperplate Gothic 31 AB (Caps & figs) Box Lineweight - .030"
	80 - Ceiling of Class B in hundreds of feet MSL 40 - Floor of Class B in hundreds of feet MSL TYPE - 8 pt to 24 pt Helvetica Condensed Bold (Caps & figs). CTC LAS VEGAS APP ON 121.1 OR 257.8 (TAC only) TYPE - 7 pt to 10 pt Helvetica 65 Medium (Caps & figs) Box Lineweight - .030"	NOT SHOWN
CLASS C AIRSPACE *Appropriate notes as required may be shown.* *(Mode C see FAR 91.215/AIM)*	BURBANK CLASS C See NOTAMs/Directory for Class C eff hrs  Line Screened - .060" TYPE - 9 pt Trade Gothic Bold (Caps) PART-TIME TYPE - 6.5 pt Helvetica 65 Medium (Caps & l.c.)	BOISE CLASS C See NOTAMs/Directory for Class C eff hrs  FOR FLIGHTS AT OR BELOW 6600' MSL SEE PHOENIX VFR SECTIONAL CHART Line Screened - .050" TYPE - 6 pt to 8 pt Helvetica 65 Medium (Caps & figs) PART-TIME TYPE - 6.5 pt Helvetica 65 Medium (Caps & l.c.) Box Lineweight - .030"
	48 - Ceiling of Class C in hundreds of feet MSL 30 - Floor of Class C in hundreds of feet MSL TYPE - 8 pt to 24 pt Helvetica Condensed Bold (Caps & figs) CTC BURBANK APP WITHIN 20 NM ON 124.6 395.9 TYPE - 7 pt to 10 pt Helvetica 65 Medium (Caps & figs) Box Lineweight - .030"	NOT SHOWN
CLASS D AIRSPACE	See NOTAMs/Directory for Class D eff hrs  (A minus in front of the figure is used to indicate "from surface to but not including...") ALTITUDE IN HUNDREDS OF FEET MSL CEILING TYPE - 8 pt to 12 pt Helvetica Condensed Bold (figs) PART TIME TYPE - 6.5 pt Helvetica 65 Medium (Caps and l.c.) Lineweight - .020"	NOT SHOWN

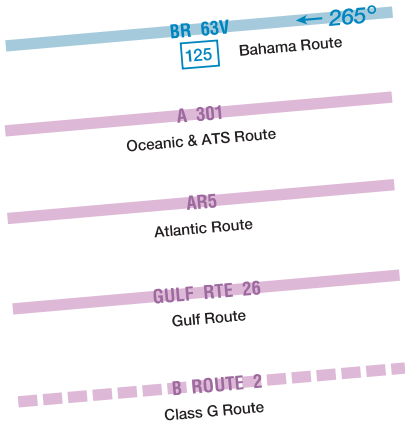
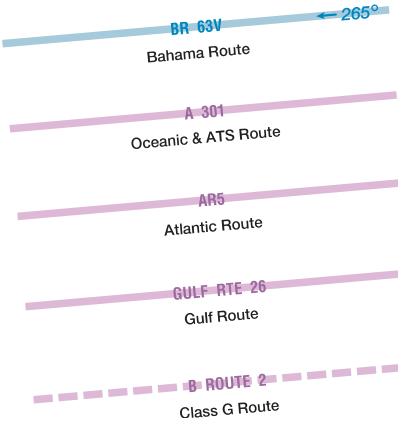
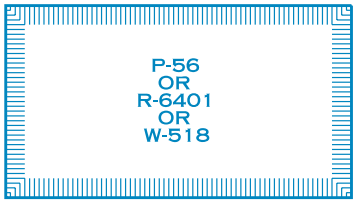
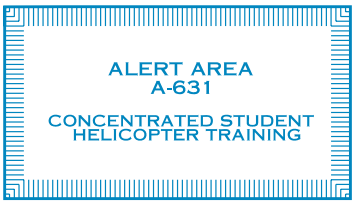
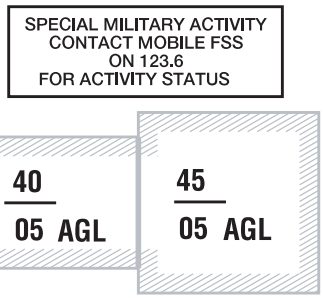
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
CLASS E AIRSPACE *The limits of Class E airspace shall be shown by narrow vignettes or by the dashed magenta symbol. Individual units of designated airspace are not necessarily shown, instead, the aggregate lateral and vertical limits shall be defined by the following:* *Airspace beginning at the surface designated around airports ...* *Airspace beginning at 700 feet AGL ...* *Airspace beginning at 1200 feet AGL or greater that abuts uncontrolled airspace (Class G) ...* *Differentiates floors of airspace greater than 700 feet above the surface...* *When the ceiling is less than 18,000 feet MSL, the value, prefixed by the word "ceiling", shall be shown along the limits.*	 CEILING TYPE - 8 pt to 12 pt Helvetica Condensed Bold (figs) PART TIME TYPE - 6.5 pt Helvetica 65 Medium (Caps and l.c.) Lineweight - .020"  Tint Width - .110"  TYPE - 6 pt to 18 pt Helvetica Condensed Bold (Caps & figs) AGL - Above Ground Level MSL - Mean Sea Level	NOT SHOWN
OFFSHORE CONTROL AREAS	  Lineweight - .035" Line length - .35" Line Overlap - .1" each side TYPE - 7 pt Copperplate Gothic 31 AB (Caps & figs) FLOOR & CEILING TYPE - 6 pt to 18 pt Alternate Gothic (Caps & figs)	  Lineweight - .015" TYPE - 7 pt Copperplate Gothic 31 AB (Caps & figs)

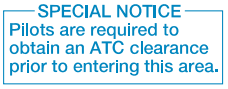
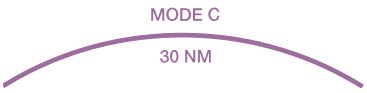
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
CANADIAN AIRSPACE *Individual units of designated Canadian airspace are not necessarily shown; instead, the aggregate lateral and vertical limits shall be portrayed as closely as possible to the comparable U.S. airspace.* *Appropriate notes as required may be shown.*		
		NOT SHOWN
FLIGHT INFORMATION REGIONS (FIR) AND /OR (CTA) OCEANIC CONTROL AREAS (OCA)		
AIR DEFENSE IDENTIFICATION ZONE (ADIZ) *Note. Delimiting line not shown when it coincides with International Boundary, projection lines or other linear features.*		TYPE - Size varies with size of area from 8 pt to 32 pt Copperplate Gothic 31 AB (Caps) Lineweight - .015" Dot Size - .025" Width of symbol - .10"
LOW ALTITUDE AIRWAYS VOR AND LF / MF (CLASS E AIRSPACE) *Low altitude Federal Airways are indicated by centerline.* *Only the controlled airspace effective below 18,000 feet MSL is shown.* *Only direct routes will be depicted with total mileages between NAVAIDS.*		

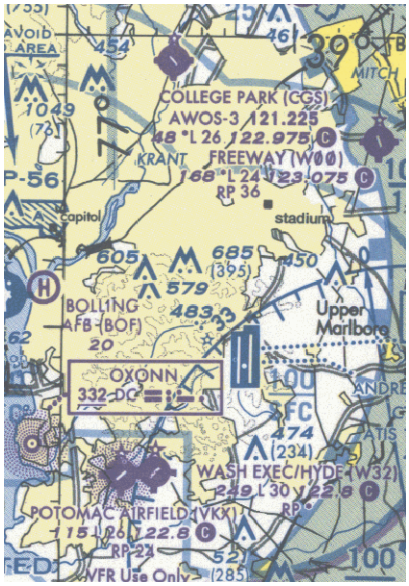
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
MISCELLANEOUS AIR ROUTES *Only direct routes will be depicted with total mileages between NAVAIDS.*	 BEARINGS - 9 pt Helvetica 66 Medium Italic (figs) AIRWAY DESIGNATIONS -7 pt Helvetica Condensed Black (Caps & figs) AIRWAY WIDTH - Screened .060" MILEAGE - 7 pt Helvetica Bold (figs) Lineweight of mileage box - .010"	 BEARINGS - 7 pt Helvetica 66 Medium Italic (figs) AIRWAY DESIGNATIONS - 6 pt Helvetica Condensed Black (Caps & figs) AIRWAY WIDTH - Screened .040"
SPECIAL USE AIRSPACE *Only the airspace effective below 18,000 feet MSL are shown.* *The type of area shall be spelled out in large areas if space permits.*	 PROHIBITED, RESTRICTED OR WARNING AREA  MILITARY OPERATIONS AREA (MOA)	 ALERT AREA TYPE - 5 to 14 pt Copperplate Gothic 31 AB (Caps & figs) Boundary Outline - .015" Width of Cross Hatching - .10" Lineweight of Cross Hatching - .007"
MILITARY TRAINING ROUTES (MTR)	 Center Line of Route - Screened .030" ROUTE DESIGNATIONS - 6 pt Copperplate Gothic 31 AB (Caps & figs)	NOT SHOWN
SPECIAL MILITARY ACTIVITY ROUTES (SMAR) *Boxed notes shown adjacent to route.*	 40 / 05 AGL — Ceiling of SMAR in hundreds of feet MSL; Floor of SMAR in hundreds of feet AGL TYPE - 10 pt to 24 pt Helvetica Condensed Bold (figs) Boundary Outline - .015" Width of Cross Hatching - .10" Segment Lineweight - .030"	NOT SHOWN

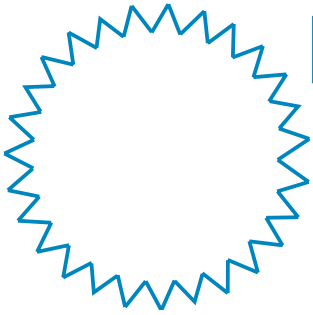
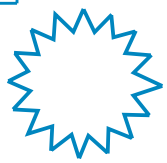
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
SPECIAL AIR TRAFFIC RULES / AIRPORT TRAFFIC PATTERNS (FAR 93) *Appropriate boxed note as required shown adjacent to area.*	 Boundary outline - .015" Width of cross hatching - .10"  TYPE - 7 pt Helvetica 65 Medium (Caps & lc Box Lineweight - .006"	
SPACE OPERATIONS AREAS (FAR 91.143)	 Boundary - .015" Area - Screened TYPE - 6 pt to 11 pt Helvetica 65 Medium (Caps)	NOT SHOWN
MODE C (FAR 91.215) *Appropriate notes as required may be shown.* *Additional MODE C requirements FAR 91 Appendix D.*	 Line - .025" TYPE - 7 pt to 9 pt Helvetica 65 Medium (Caps & figs)	
SPECIAL ACTIVITY AREAS Parachute Jumping Area *Frequency Label: 7 pt Helvetica Condensed Bold* Glider Operating Area Ultralight Activity Hang Glider Activity	   	NOT SHOWN
SPECIAL CONSERVATION AREAS National Park, Wildlife Refuge, Primitive and Wilderness Areas, Etc.	 TYPE - 4.5 pt Copperplate Gothic 31 AB (Caps)	NOT SHOWN

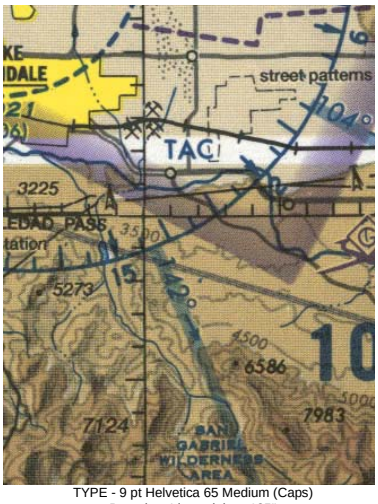
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
SPECIAL AIRSPACE AREAS *Appropriate notes as required may be shown*	 Lineweight - .030" Square - .10" Spacing - .25" Screened - 60%/30°/120L	
SPECIAL FEDERAL AVIATION REGULATIONS (SFAR) AREAS *Appropriate notes as required may be shown.*	SPECIAL FEDERAL AVIATION REGULATIONS (SFAR) 14 CFR Part 93, Subpart U and SFAR 50,2 - GRAND CANYON NATIONAL PARK SPECIAL FLIGHT RULES AREA. Special regulations apply to all aircraft operations below 18,000 feet MSL. TYPE - 7 pt to 20 pt Helvetica 65 Medium (Caps, l.c. and figs)	
SFAR AREA RELATING TO NATIONAL SECURITY *Example: Washington, DC* *Appropriate notes as required may be shown.*	 WASHINGTON, DC METROPOLITAN AREA SPECIAL FLIGHT RULES AREA IN EFFECT (See SFAR 94 description in chart border). TYPE - 7 pt Helvetica 65 Medium (Caps & figs)	NOT SHOWN
NATIONAL SECURITY AREA	 NOTICE FOR REASONS OF NATIONAL SECURITY PILOTS ARE REQUESTED TO AVOID FLIGHT BELOW 1200' MSL IN THIS AREA TYPE - 7 pt Helvetica 65 Medium (Caps & figs) Lineweight - Screened .060"	NOT SHOWN

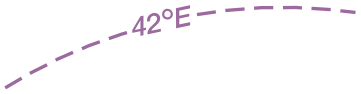
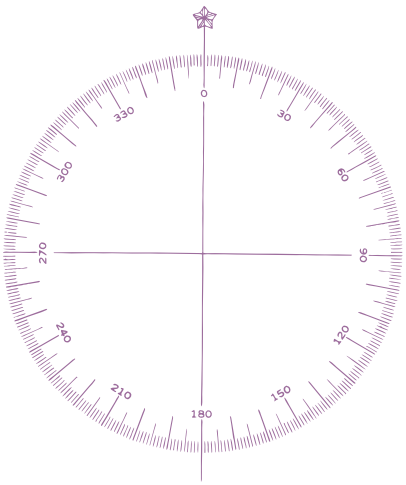
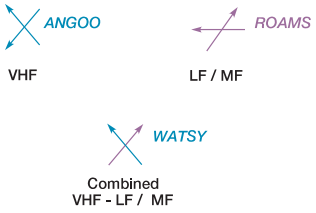
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

AIRSPACE INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
TEMPORARY FLIGHT RESTRICTION (TFR) RELATING TO NATIONAL SECURITY *Example: P-40 / R-4009* *Appropriate notes as required may be shown.*	 CAUTION P-40 AND R-4009 EXPANDED BY TEMPORARY FLIGHT RESTRICTION. CONTACT AFSS FOR LATEST STATUS AND NOTAMS TYPE - 7 pt Helvetica 65 Medium (Caps & figs)	NOT SHOWN
HIGH ENERGY RADIATION AREAS/ PERMANENT LASER LIGHT DEMONSTRATIONS *Appropriate notes as required may be shown.*	 HAZARDOUS LASER TRANSMISSIONS SFC to infinity See Airport Facility/Directory TYPE -7 pt to 11 pt Helvetica 65 Medium (Caps & figs) Lineweight - .020" Width of pattern - .15"	 WAC Type - 7 pt to 11 pt Helvetica 65 Medium (Caps & figs) Lineweight - .020" The inner portion of the symbol represents the limits
TERMINAL RADAR SERVICE AREA (TRSA) *Appropriate notes as required may be shown.*	PALM SPRINGS TRSA TYPE - 9 pt Trade Gothic Bold Line Screen - .060" 80/40 - Ceiling of TRSA in hundreds of feet MSL - Floor of TRSA In hundreds of feet MSL TYPE - 8 pt to 24 pt Helvetica Condensed Bold SEE TWR FREQ TAB TYPE - 7 pt to 9 pt Helvetica 65 Medium	NOT SHOWN

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

CHART LIMITS	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
OUTLINE OF TERMINAL AREA CHART ON THE SECTIONAL CHART	 TYPE - 9 pt Helvetica 65 Medium (Caps) Boundary Lineweight - .125" LOS ANGELES TERMINAL AREA Pilots are encouraged to use the Los Angeles VFR Terminal Area Chart for flights at or below 10,000' TYPE - Terminal Area Name 7 pt to 9 pt Helvetica 65 Medium (Caps) Text of note 7 pt to 9 pt Helvetica 65 Medium (Caps & l.c.) Box Lineweight - .030"	NOT SHOWN
OUTLINE OF INSET CHART ON THE SECTIONAL CHART	 TYPE - 9 pt Helvetica 65 Medium (Caps) Boundary Lineweight - .125" If inset chart is on a different chart: INDIANAPOLIS INSET See inset chart on the St. Louis Sectional for additional information If inset chart is on the same chart as outline: INDIANAPOLIS INSET See inset chart for additional detail TYPE - Inset Chart Name 7 pt to 9 pt Helvetica 65 Medium (Caps) Text of note 7 pt to 9 pt Helvetica 65 Medium (Caps & l.c.) Box Lineweight - .030"	NOT SHOWN

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

NAVIGATIONAL AND PROCEDURAL INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
ISOGONIC LINE & VALUE *Value will be placed in center of line and on each end, one dash from neatline. In addition, at least once in each fold.* *Isogonic lines and values shall be based on the five year epoch magenetic variation model.*	 VALUE - 11 pt Helvetica 66 Medium Italic Dashed Lineweight - .018"	 VALUE - 11 pt Helvetica 66 Medium Italic Dashed Lineweight - .012"
LOCAL MAGNETIC NOTES Unreliability Notes	Magnetic disturbance of as much as 78° exists at ground level and 10° or more at 3000 feet above ground level in this vicinity. TYPE - 7 pt Helvetica 65 Medium	
COMPASS ROSETTE *Shown only in areas void of VOR roses.* *Compass Rosette will be based on five year epoch magnetic variation model.*		
INTERSECTIONS *Named intersections used as reporting points.* *Arrows are directed toward facilities which establish intersection.*	 VHF LF / MF Combined VHF - LF / MF NAME - 6 pt Helvetica Bold Oblique (Caps)	NOT SHOWN

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

NAVIGATIONAL AND PROCEDURAL INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
AERONAUTICAL LIGHTS	Rotating or Oscillating Located at Aerodrome  In isolated location  Rotating Light with Flashing Code Identification Light  Rotating Light with Course Lights and Site Number  TYPE - 7 pt Copperplate Gothic 31 AB Flashing Light  TYPE - 6 pt Helvetica 65 Medium	Rotating or Oscillating Located at Aerodrome  In isolated location  Rotating Light with Flashing Code Identification Light  Rotating Light with Course Lights and Site Number  TYPE - 7 pt Copperplate Gothic 31 AB Flashing Light  TYPE - 6 pt Helvetica 65 Medium

PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

<table>
<tr><th>NAVIGATIONAL AND PROCEDURAL INFORMATION</th><th>TAC-SECTIONAL 1:250,000-1:500,000</th><th>WAC 1:1,000,000</th></tr>
<tr><td>

MARINE LIGHTS

Light Characteristics

R	Red
*W	White
G	Green
B	Blue
SEC	Sector
F	Fixed
Oc	Single Occulting
Oc (2)	Group Occulting
Oc (2+1)	Composite Group Occulting
Iso	Isophase
Fl	Flashing
Fl (2)	Group Flashing
Fl (2+1)	Composite Group Flashing
Q	Quick
IQ	Interrupted Quick
Mo (A)	Morse Code
FFl	Fixed and Flashing
Al	Alternating
Gp	Group
LFl	Long Flash
Q (3)	Group Quick Flashing
IQ	Interrupted Quick Flashing
VQ	Very Quick Flashing
VQ (3)	Group Very Quick Flashing
IVQ	Interrupted Very Quick Flashing
UQ	Ultra Quick Flashing
IUQ	Interrupted Ultra Quick Flashing

*Marine Lights are white unless otherwise noted. Alternating lights are red and white unless otherwise noted.

</td><td colspan="2">

Oc
R SEC

TYPE - 6 pt Helvetica 65 Medium

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<tr><td>

VISUAL GROUND SIGNS

Shore and Landmarkers

</td><td colspan="2">

A33

Arrow points to location of marker

M

Actual location of ground sign

TYPE - 8 pt Futura Book (Caps & figs)

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<tr><td>

VFR CHECKPOINTS

</td><td>

Pictorial  STATE CAPITOL

TYPE - 6.5 pt Trade Gothic Bold (Caps)
UNDERLINE - .010"

</td><td>NOT SHOWN</td></tr>
<tr><td>

VFR WAYPOINTS

Stand-alone

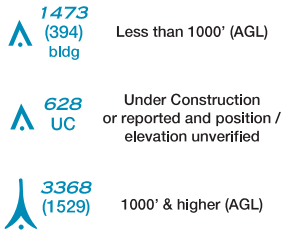
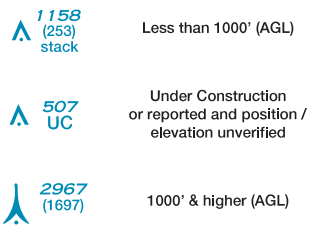
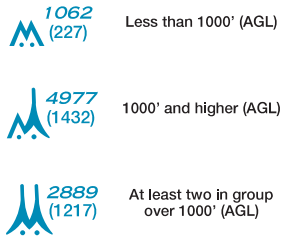
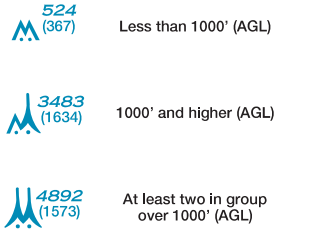
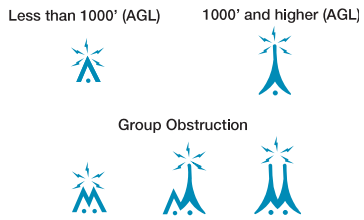
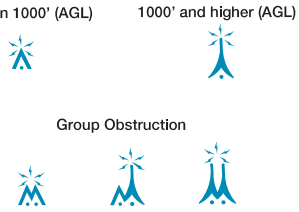
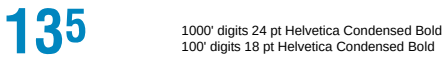
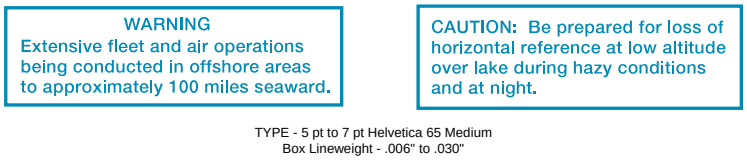
Collocated with VFR Checkpoint

</td><td>

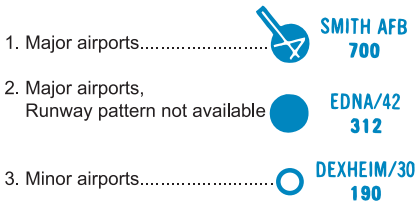
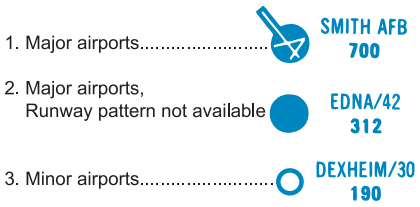
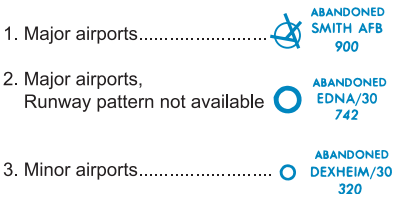
TYPE- 6.5 Helvetica Bold Oblique (Caps)

</td><td>NOT SHOWN</td></tr>
</table>

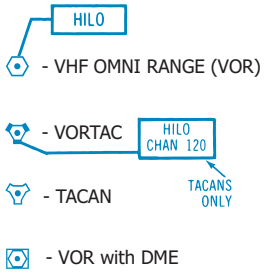
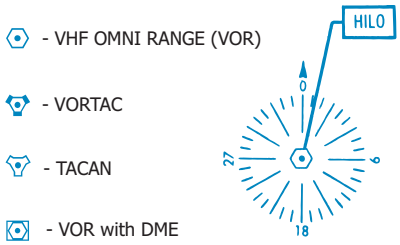
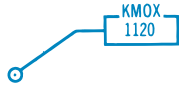
PART 2: AERONAUTICAL INFORMATION - CIVIL FORMAT

NAVIGATIONAL AND PROCEDURAL INFORMATION	TAC-SECTIONAL 1:250,000-1:500,000	WAC 1:1,000,000
OBSTRUCTION	 DESCRIPTIVE TYPE - 6 pt Helvetica 65 Medium MSL ELEVATION - 6.5 pt Copperplate 31 AB Italic AGL ELEVATION - 7 pt Helvetica 65 Medium UC - 6 pt Helvetica 65 Medium	 DESCRIPTIVE TYPE - 6 pt Helvetica 65 Medium MSL ELEVATION - 6 pt Copperplate 31 AB Italic AGL ELEVATION - 6 pt Helvetica 65 Medium UC - 6 pt Helvetica 65 Medium
GROUP OBSTRUCTION		
HIGH INTENSITY OBSTRUCTION LIGHTS *High intensity lights may operate part-time.*		
MAXIMUM ELEVATION FIGURE (MEF)		
WARNING, CAUTION NOTES *Used when specifc area is not demarcated.*	 TYPE - 5 pt to 7 pt Helvetica 65 Medium Box Lineweight - .006" to .030"	

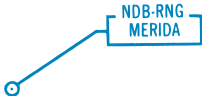
PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

AIRPORTS	TPC 1:500,000	ONC 1:1,000,000
LANDPLANE- MILITARY *Refueling and repair facilities for normal traffic.* *Name and statistical data*	 1. Diam. of circle .20" 2. Diam. of circle .20" 3. Outer diam. of circle .140" Lineweight .020" Runway width .016" When runway pattern extends beyond the circle, the runways will be outlined with a .016" lineweight. NAME - 8 pt News Gothic Condensed (Caps) LENGTH OF RUNWAY - 8 pt News Gothic Condensed ELEVATION - 7 pt Alternate Gothic No. 3	 1. Diam. of circle .144" Lineweight .008" 2. Diam. of circle .144" Lineweight .022" 3. Diam. of circle .09" Lineweight .018" Multiple Runways .014" lineweight Single Runway .017" lineweight NAME - 6 pt Techno Medium LENGTH OF RUNWAY -6 pt Techno Medium ELEVATION - 6 pt Techno Medium Italic
LANDPLANE-CIVIL *Refueling and repair facilities for normal traffic.* *Name and statistical data*	 1. Diam. of circle .20" 2. Diam. of circle .20" 3. Outer diam. of circle .140" Lineweight .020" Runway width .016" When runway pattern extends beyond the circle, the runways will be outlined with a .016" lineweight. NAME - 8 pt News Gothic Condensed (Caps) LENGTH OF RUNWAY - 8 pt News Gothic Condensed (Caps) ELEVATION - 7 pt Alternate Gothic No. 3	 1. Diam. of circle .144" Lineweight .008" 2. Diam. of circle .144" Lineweight .022" 3. Diam. of circle .09" Lineweight .018" Multiple Runways .014" lineweight Single Runway .017" lineweight NAME - 6 pt Techno Medium LENGTH OF RUNWAY -6 pt Techno Medium ELEVATION - 6 pt Techno Medium Italic
LANDPLANE - JOINT CIVIL AND MILITARY *Refueling And Repair Facilities For Normal Traffic.*	 1. Diam. of circle .20" 2. Diam. of circle .20" 3. Outer diam. of circle .140" Lineweight .020" Runway width .016" When runway pattern extends beyond the circle, the runways will be outlined with a .016" lineweight. NAME - 8 pt News Gothic Condensed LENGTH OF RUNWAY - 8 pt News Gothic Condensed ELEVATION - 7 pt Alternate Gothic No. 3	 1. Diam. of circle .144" Lineweight .008" 2. Diam. of circle .144" Lineweight .022" 3. Diam. of circle .09" Lineweight .018" Multiple Runways .014" lineweight Single Runway .017" lineweight NAME - 6 pt Techno Medium LENGTH OF RUNWAY -6 pt Techno Medium ELEVATION - 6 pt Techno Medium Italic
LANDPLANE - EMERGENCY *No facilities or complete information is not available.* *Add appropriate notes as required: abandoned, closed, approximate position, existence uncomfirmed.*	 1. Diam. of circle .20" 2. Diam. of circle .20" 3. Outer diam. of circle .140" Lineweight .020" Runway width .016" When runway pattern extends beyond the circle, the runways will be outlined with a .016" lineweight. NAME - 8 pt News Gothic Condensed (Caps) LENGTH OF RUNWAY - 8 pt News Gothic Condensed ELEVATION - 7 pt Alternate Gothic No. 3 NOTE - 7 pt News Gothic Condensed	 1. Diam. of circle .144" Lineweight .008" 2. Diam. of circle .144" Lineweight .022" 3. Diam. of circle .09" Lineweight .018" Multiple Runways .014" lineweight Single Runway .017" lineweight NAME - 6 pt Techno Medium LENGTH OF RUNWAY -6 pt Techno Medium ELEVATION - 6 pt Techno Medium Italic Note - 5pt Techno Medium

PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

RADIO AIDS TO NAVIGATION	TPC 1:500,000	ONC 1:1,000,000
OMNI-RANGE “VOR” “VORTAC” “TACAN”	 Use appropriate symbol with leader line to boxed name facility. Box and leader line .012” lineweight LABEL: 7 pt News Gothic Condensed (Caps)	 Use appropriate symbol with leader line to boxed name facility. Box and leader line .012” lineweight LABEL: 7 pt News Gothic Condensed (Caps) Compass Rose Symbol 1-24, RM-859
RADIO RANGE LF/MF	 Circle: .012” lineweight, .080” outer diameter Dot: .012” diameter Box and leader line .012” lineweight LABEL: 7 pt News Gothic Condensed (caps)	SAME
DIRECTION FINDERS (DF)		SAME
RADIO BEACON (NDB OR R BN)		SAME
CONSOLAN		SAME
MARINE RADIO BEACON (MNDB or MR Bn)		NOT SHOWN
BROADCAST STATIONS (BS)		SAME

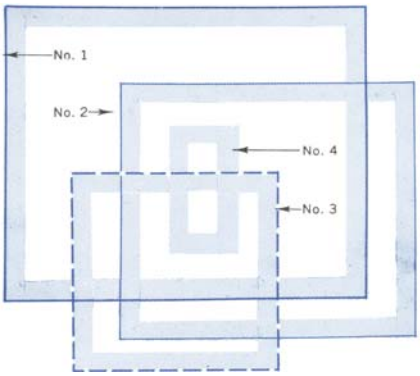
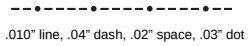
PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

RADIO AIDS TO NAVIGATION	TPC 1:500,000	ONC 1:1,000,000
OCEAN STATION VESSEL	NOT SHOWN	
MULTIPLE RADIO FACILITIES		SAME

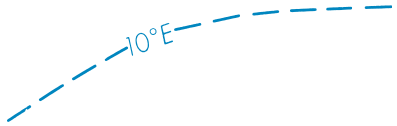
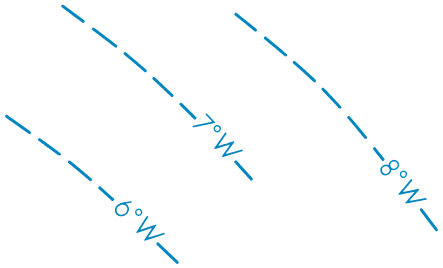
PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

AIRSPACE INFORMATION	TPC 1:500,000	ONC 1:1,000,000
AIR DEFENSE IDENTIFICATION ZONE (ADIZ)	 Lineweight .01” Width of band .10” AP-98 screen Type varies from 10 to 36 pt Formal Gothic Demi-Bold (Caps) Note: Delimiting line not shown when it coincides with International Boundary, projection lines or other linear features.	SAME
BUFFER ZONES	 Lineweight .01” Width of band .10” AP-98 screen, in segments 1” long with .5” space between segments Type varies from 6 pt to 12 pt Century Schoolbook (Caps)	SAME
PROHIBITED AREA *Flight of aircraft prohibited* *Label appropriately*	 Number indicates internationally recognized numerical identification. Lineweight .01” Width of band .10” 31%-120D-15° screen Type varies from 6 pt to 30 pt Formal Gothic Demi-Bold (Caps) Type varies with size of area	SAME
DANGER, RESTRICTED OR WARNING AREA *Invisible hazards to air navigation.* *Label appropriately*		SAME

PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

AIRSPACE INFORMATION	TPC 1:500,000	ONC 1:1,000,000
ALERT OR CAUTION AREA *Visible hazards to air navigation.* *Label appropriately*		SAME
OVERLAPPING AIRSPACES	 No. 1 The lineweight of the entire Special Use Airspace outline is a solid .01" line with a .10" wide screen band*. No. 2 When a second Special Use Airspace overlaps another, the lineweight of its entire outline is reduced to a solid .006" line with a .10" wide screenband. No. 3 When three Special Use Airspaces overlap the same common area, the entire outline of the third Special Use Airspace is dashed (.01" lineweight, .10" dash, .02" space) with a .10" wide screen band*. No. 4 When four Special Use Airspaces overlap the same common area, the entire limits of the fourth Special Use Airspace are bounded by only a .10" wide screen band*. * 31% - 120D-15° screen	SAME
WARNING NOTES *Used when specific area is not demarcated* *(supply city name or area location)*	**WARNING** **Aircraft infringing upon Non-Free Flying Territory may be fired on without warning. Consult NOTAMS and Flight Information Publications for the latest air information.** WARNING - 8 pt to 24 pt Alternate Gothic No. 3 (Caps) Body of Note - 8 pt to 24 pt Alternate Gothic No. 3 (Caps & Lc) Selection of type size is dependent upon area (available space). Box Lineweight - .01"	SAME
POWER TRANSMISSION LINES Catenaries	 .012 line	 .010" line, .04" dash, .02" space, .03" dot
	 .030" line	NOT SHOWN
SPECIAL CONSERVATION AREA	 5 to 12 pt Alternate Gothic #3 (Caps)	NOT SHOWN

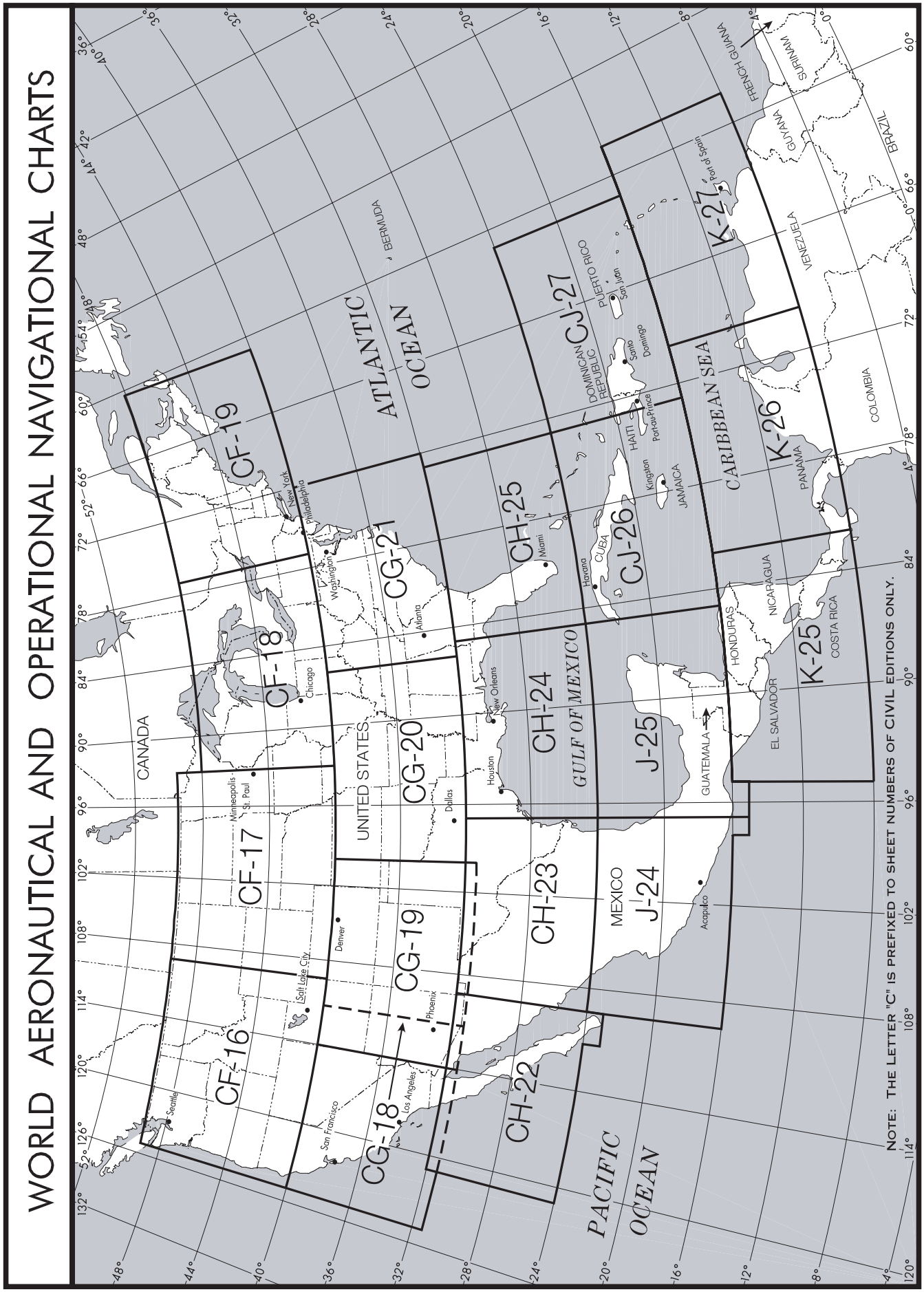
PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

NAVIGATIONAL AND PROCEDURAL INFORMATION	TPC 1:500,000	ONC 1:1,000,000
ISOGONIC LINE & VALUE *Values will be placed on each end, one dash from neatline, and at approximately 4" to 6" intervals along the line for lines that exceed 12".*	 .012" line .15" dash, .05" interval 12 pt Techno Bold italic	SAME
ISOGONIC LINE CUT BACK	 Cut back is the limited extension of an isogonic line from an overlapping chart. This is done in cases where the isogonic sequence has been changed due to the number of isogonic lines present in the area covered by the chart .	SAME
MAGNETIC UNRELIABILITY NOTE FOR NORTH POLAR AREA.	MAGNETIC NOTE Because of weak directive force and magnetic storms, the compass becomes increasingly unreliable approaching the magnetic pole from a distance of approximately 1000 MILES. SHOW ON ALL CHARTS FALLING WITHIN 1000 MILE RADIUS OF NORTH POLE MAGNETIC NOTE - 8 pt Techno Bold Italic (Caps) Body of Note - 8 pt Techno Bold Italic (Caps & l.c.) Box Lineweight - .01"	
LOCAL MAGNETIC NOTES	Magnetic disturbance of as much as 78° exists at ground level and 10° or more at 3000 feet above level in this vicinity. TYPE - 8 pt News Gothic Condensed (Caps & l.c.) Box lineweight - .006"	CAUTION Compass deviations of 10° to 15° reported to exist in this area CAUTION Variations of 8°W to 13°W reported to exist in this area CAUTION - 10 pt Techno Bold Italic (Caps) Body of Note - 10 pt Techno Bold Italic (Caps & l.c.)
ISOGONIC DATA NOTES *When the annual magnetic change is more than 12' algebraically, a note is added to the four quadrants of the chart.*	LINES OF EQUAL MAGNETIC VARIATION FOR 1975 Annual rate of change – no change 8 pt Techno Bold (Caps) 7 pt Techno Bold (Caps & l.c.)	SAME

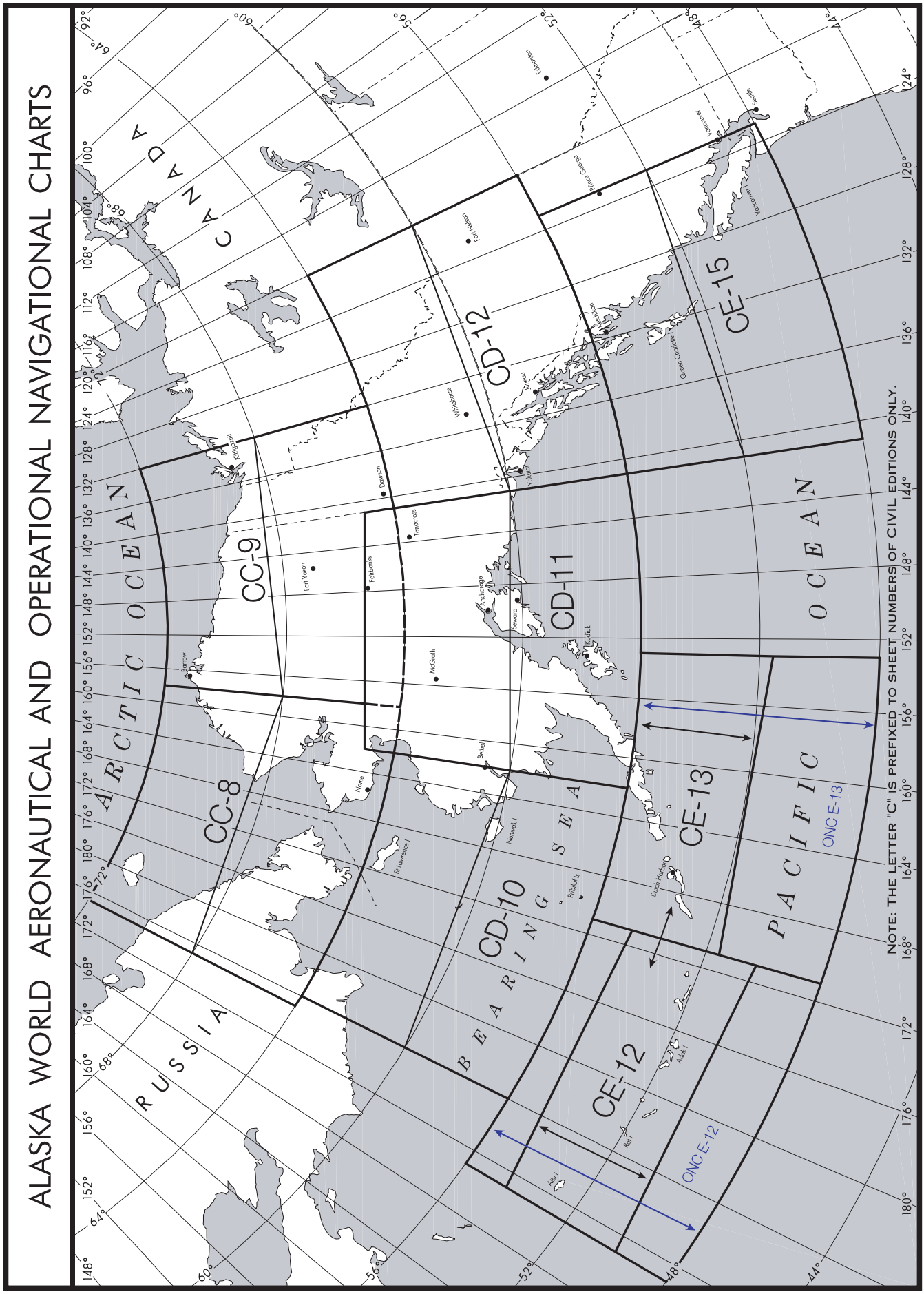
PART 3: AERONAUTICAL INFORMATION - MILITARY FORMAT

NAVIGATIONAL AND PRO-CEDURAL INFORMATION	TPC 1:500,000	ONC 1:1,000,000
AERONAUTICAL LIGHTS Rotating or Oscillating	 If located on aerodrome or within 1 mile of limits Symbol 1-20 RM-859  In isolated location Symbol 1-19 RM-859	 If located on aerodrome or within 1 mile of limits Symbol 1-20 RM-859  In isolated location Symbol 1-19 RM-859
Flashing Light	 If located on aerodrome or within 1 mile of limits  7 pt Techno Medium	 If located on aerodrome or within 1 mile of limits  7 pt Techno Medium
VISUAL GROUND SIGNS Shore and landmarkers	 Arrow points to location of marker 9 pt Techno Medium  Actual location of ground sign 9 pt Techno Medium	SAME
OBSTRUCTIONS	 MSL ELEVATION- 7 pt Techno Medium Italic AGL ELEVATION- 7 pt Techno Medium Type sizes shall be increased to 8 pt (Techno Medium Italic and Techno Medium) for the highest obstruction within each area bounded by ticked lines of the graticule.	SAME
GROUP OBSTRUCTION		SAME
MAXIMUM ELEVATION FIGURES	 100' Maximum Elevation Figures - 18 pt Alternate Gothic No. 3 1000' Maximum Elevation Figures - 30 pt Alternate Gothic No. 3	SAME

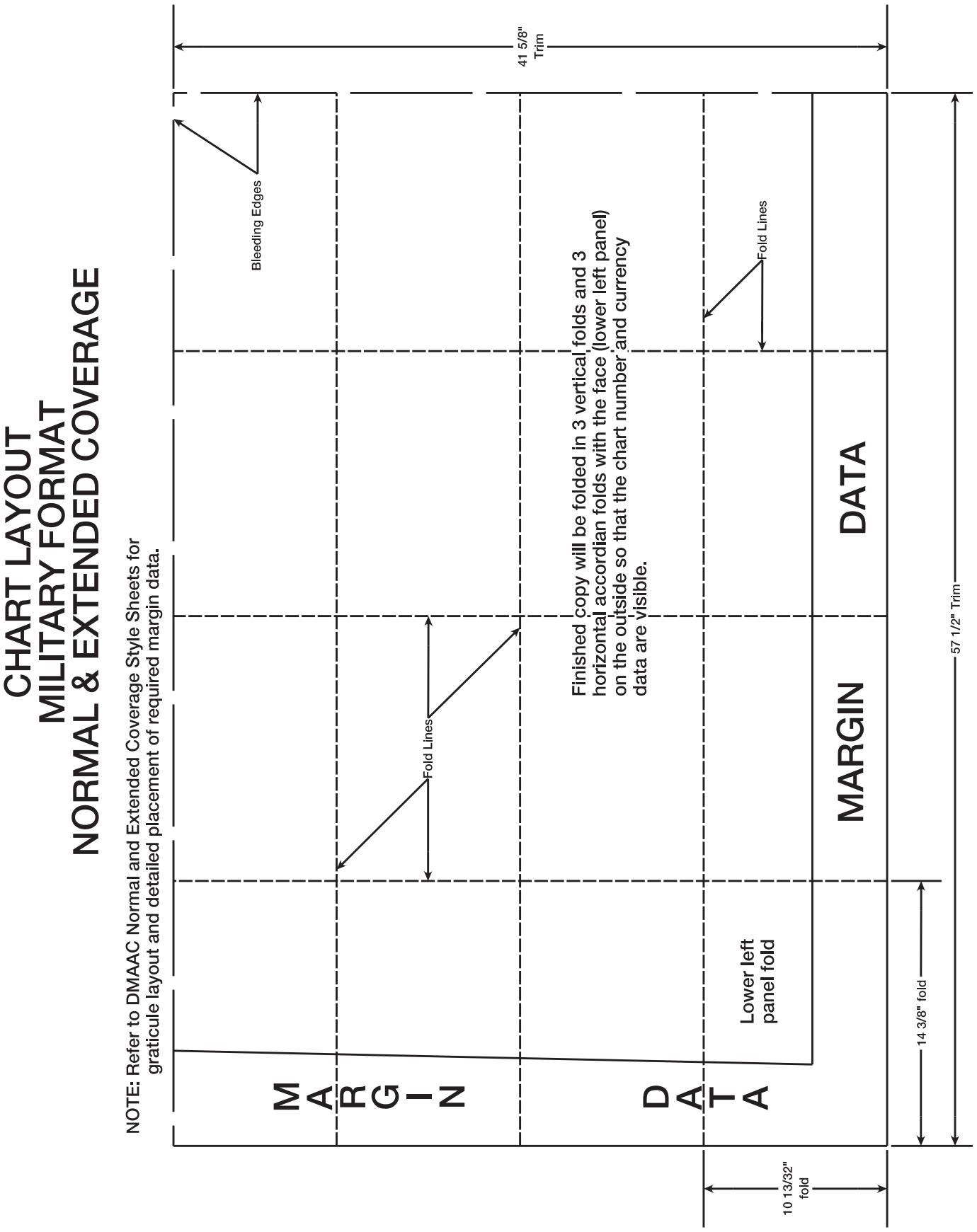
APPENDIX 2 CHART INDEX, UNITED STATES



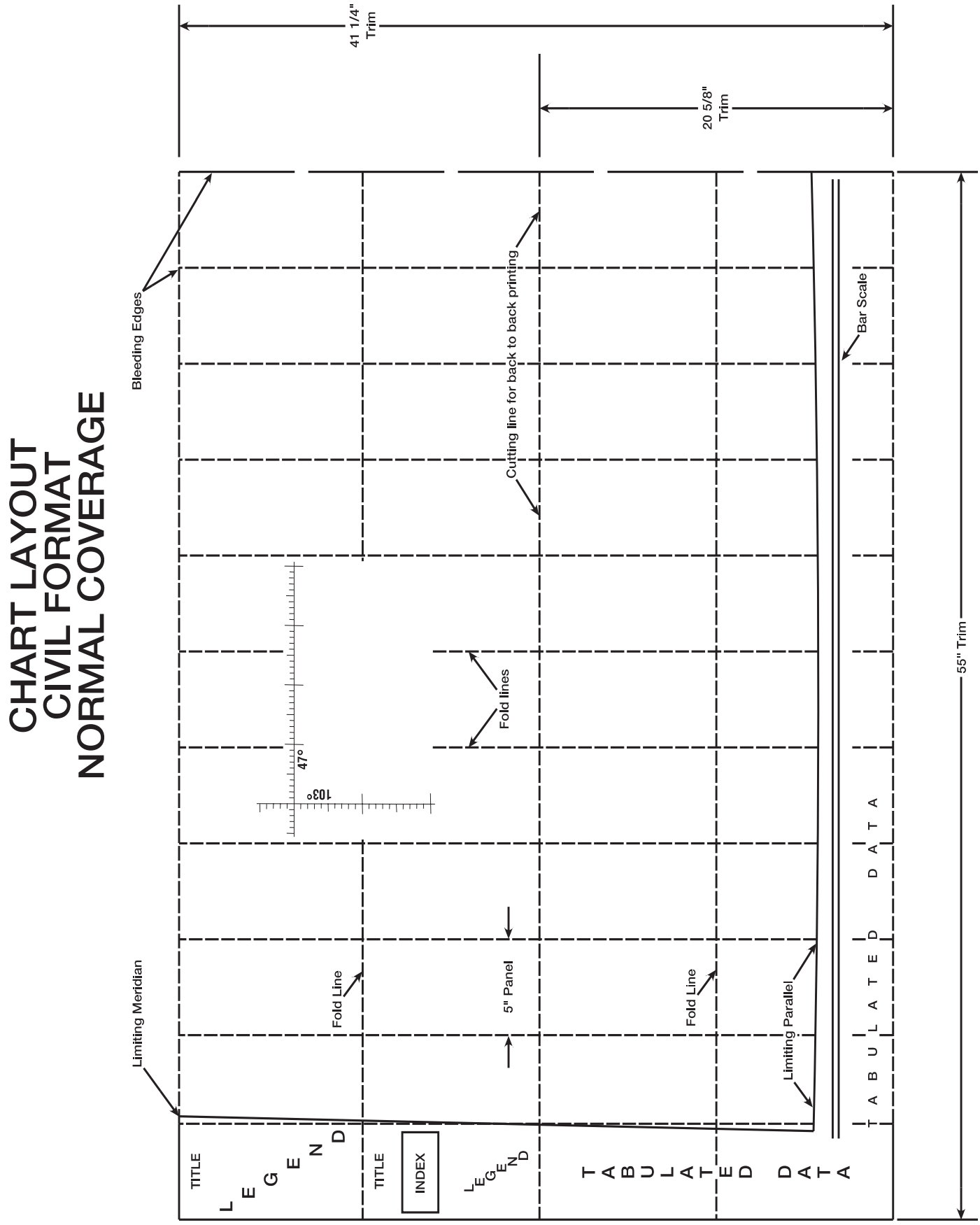
APPENDIX 3 CHART INDEX, ALASKA



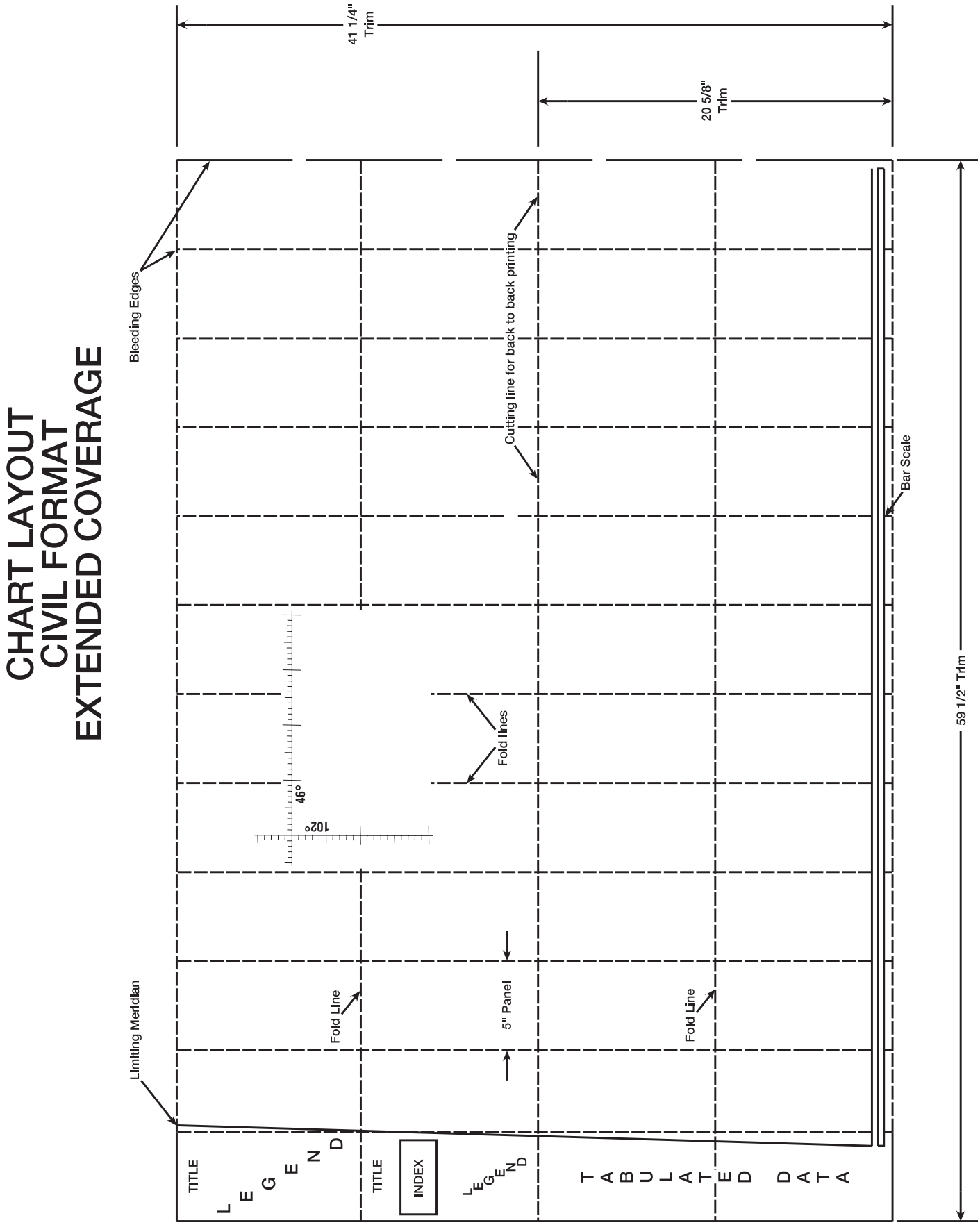
APPENDIX 4 STYLE SHEET - MILITARY FORMAT, NORMAL & EXTENDED COVERAGE



APPENDIX 5 STYLE SHEET - CIVIL FORMAT, NORMAL COVERAGE



APPENDIX 6 STYLE SHEET - CIVIL FORMAT, EXTENDED COVERAGE



APPENDIX 7 SPECIAL USE AIRSPACE TAB

SPECIAL USE AIRSPACE ON ANY VISUAL CHART

Unless otherwise noted altitudes are MSL and in feet. Time is local.
NO A/G - No air to ground communications. Contact nearest FSS for information.
"TO" an altitude means "To and including."

FL - Flight Level.
† - Other times by NOTAM.
Use of the term NOTAM in Restricted Areas indicates FAA and DoD NOTAM Systems. Use of this term in all other Special Use areas indicates the DoD NOTAM system.

U.S. P-PROHIBITED, R-RESTRICTED, A-ALERT, W-WARNING, MOA-MILITARY OPERATIONS AREA

NUMBER	ALTITUDE	TIME OF USE	CONTROLLING AGENCY/ CONTACT FACILITY	FREQUENCIES
R-2102 B	TO BUT NOT INCL 10,000	0700-1800 MON-FRI†	ANCHORAGE CNTR TOLEDO ATCT	127.9 284.625 126.1 307.01
R-2202 C	10,000 TO FL 310	INTERMITTENT BY NOTAM	ANCHORAGE CNTR	
R-2205	TO 20,000	0700-1900 MON-FRI†	FAIRBANKS APP CON	126.5
R-2206	TO 8800	CONTINUOUS	NO A/G	
R-2211	TO 18,000	0800-1800 MON-FRI O/T BY NOTAM FROM THE USING AGENCY	FAIRBANKS APP CON	
R-2501 S	UNLIMITED	CONTINUOUS	LOS ANGELES CNTR	133.65 120.25
R-2505	UNLIMITED	CONTINUOUS	LOS ANGELES CNTR	

MOA NAME	ALTITUDE*	TIME OF USE †	CONTROLLING AGENCY/ CONTACT FACILITY	FREQUENCIES
BIRCH	500 AGL TO 5000	0800-1800 MON-FRI	ANCHORAGE CNTR	124.2 270.3
DEVILS LAKE EAST, WEST	100 AGL	0800-1800 MON-FRI	ANCHORAGE CNTR	
REVEILLE NORTH, SOUTH	500 AGL TO 10,000	INTERMITTENT 0700-2200 MON-FRI	FAIRBANKS ATCT	127.9 284.625 126.1 307.01
CHEYENNE HIGH, LOW	10,000	INTERMITTENT 0700-2200 MON-FRI	ANCHORAGE CNTR	132.5 379.15 (W) 133.4 387.15 (E)
YUKON 1	100 AGL	0800-1800 MON-FRI	ANCHORAGE CNTR	
YUKON 2	100 AGL	0800-1800 MON-FRI	ANCHORAGE CNTR	

*Altitudes indicate floor of MOA. All MOAs extend to but do not include FL 180 unless otherwise indicated in tabulation or on chart.
† - Other times by DoD NOTAM.