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.