

AEROSPACE RECOMMENDED PRACTICE

SAE ARP5289

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Supeseding ARP5289

(R) Electronic Aeronautical Symbols

RATIONALE

This document is an update of SAE Aerospace Recommended Practice ARP5289, issued on 09-01-1997, containing recommended aeronautical symbols that typically appear on aeronautical charts, but which may also be depicted on flight deck electronic display devices. The purpose of this document is to provide general recommendations and also a specific recommended set of symbols, lines, and linear patterns to be used on electronic display devices to promote consistency across display applications, aircraft types, and operations.

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1. SCOPE

This Aerospace Recommended Practice (ARP) provides design philosophies, guidelines, requirements, and a set of recommended symbols, lines, and linear patterns for aeronautical information presented on electronic flight deck display devices.

Specifically, this document addresses symbols, lines, and linear patterns historically seen on aeronautical charts. It provides recommended symbols for navigation aids, airspace boundaries, missed approach holding patterns, etc. The document does not address all aeronautical symbols, lines, or linear patterns, nor does it provide specific recommendations about color, text and fonts, line weight, or symbol size. Additionally, it does not provide recommendations for non-aeronautical symbols such as traffic or weather.

The general guidelines, recommendations and requirements are intended to apply regardless of whether the display application is intended for IFR or VFR operations and regardless of the type of aircraft (14 CFR Part 23, 25, 27, or 29). The recommendations are applicable to all electronic display applications within the flight deck, regardless of where they are located, such as on:

- Electronic Map Displays (EMD)
- Electronic Chart Displays
- Electronic Flight Bags (EFB)
- Stand alone and Multi-Function Displays
- Navigation Displays (ND)

These recommendations also apply to symbols, lines, and linear patterns that are generated in real time from individual elements from an onboard database then overlaid onto a pre-composed image. They are not intended to apply to the electronic display of static pre-composed images in the form of a pre-existing graphic or file image. However, that does not preclude manufacturers of pre-composed images from using these recommendations.

There are permanent benefits to be gained from industry standardization of the symbols specified in this document.

For any aircraft, when new symbols are introduced to an existing function, they shall be compliant with this document. Upgrades to existing fleets or displays that do not introduce new aeronautical elements are encouraged but not required to comply with the symbology requirements in this document.

These recommendations apply to two-dimensional displays. While the recommendations in this document do not specifically address 3-D display symbology, the guidance and recommendations may also be appropriate for 3-D displays.

2. REFERENCES

The latest issue of SAE publications apply unless an earlier version is specifically invoked in a regulatory document (e.g., TSO). In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable regulations and Technical Standard Orders unless a specific exemption or TSO deviation has been obtained.

The following publications were used by the Committee during the development of this ARP and may provide additional information to the reader. The documents listed in Section 2.1 are referenced in this document. The documents listed in Section 2.2 were not referenced in the document but are provided for information purposes only.

2.1 Applicable Documents

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

ARP5621 Electronic Display of Aeronautical Information (Charts)

ARP4102/7 Electronic Displays

ARP4155A Human Interface Design Methodology for Integrated Display Symbolology

AIR1093A Numeral, Letter and Symbol Dimensions for Aircraft Instrument Displays

2.1.2 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

FAA TSO C-113 Airborne Multipurpose Electronic Displays

FAA TSO C-165 Electronic Map Display Equipment for Graphical Depiction of Aircraft Position

FAA AC 120-76A Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices.

FAA Glossary of Terms

FAA Pilot/Controller Glossary

United States Aeronautical Information Manual

2.1.3 ICAO Publications

Available from ICAO, Document Sales Unit, 999 University Street, Montreal, Quebec H3C 5H7 Canada, Tel: +1-514-954-8022, <http://icaodsu.openface.ca/mainpage.ch2>.

ICAO Annex 2 Rules of the Air

ICAO Annex 4 Aeronautical Charts

ICAO Annex 6 Operation of Aircraft

ICAO Annex 10 Aeronautical Telecommunications

ICAO Annex 11 Air Traffic Services

ICAO Annex 14 Aerodromes

ICAO Annex 15 Aeronautical Information Services

ICAO Doc 4444 Procedures for Air Navigation Services Air Traffic Management (PANS-ATM)

ICAO Doc 8400 Procedures for Air Navigation Services ICAO Abbreviations and Codes (PANS-ATC)

ICAO DOC 9613 Performance-based Navigation (PBN) Manual

2.1.4 RTCA Publications

Available from Radio Technical Commission for Aeronautics Inc., 1828 L Street, NW, Suite 805, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

RTCA DO-257A Minimum Operational Performance Standards for the Depiction of Navigation Information on Electronic Maps

2.1.5 Volpe Center Publications

Available from National Technical Information Service, Springfield, VA 22161, www.ntis.gov, or from the Volpe Center, www.volpe.dot.gov.

DOT-VNTSC-FAA-09-03 Chandra, D.C. (2009) Utility and Recognition of Lines and Linear Patterns on Electronic Displays Depicting Aeronautical Charting Information.

DOT-VNTSC-FAA-08-01 Yeh, M. and D. C. Chandra (2008). Survey of Symbolology for Aeronautical Charts and Electronic Displays: Navigation Aids, Airports, Lines, and Linear Patterns.

DOT-VNTSC-FAA-07-07 Chandra, D.C. and M. Yeh, (2007). Pilot Identification of Symbols and an Exploration of Symbol Design Issues for Electronic Displays of Aeronautical Charting Information

DOT-VNTSC-FAA-05-16 Yeh, M. and D. C. Chandra (2005). Designing and Evaluating Symbols for Electronic Displays of Navigation Information: Symbol Stereotypes and Symbol-Feature Rules.

2.2 Applicable References

2.2.1 SAE Publications

ARP1874 Design Objectives for CRT Displays for Part 25 Aircraft

ARP4256 Design Objectives for Liquid Crystal Displays for Part 25 (Transport) Aircraft.

975555 Electric Approach Chart Display Issues

ARP4102 Flight Deck Panels Controls and Displays

ARP5898 Human Interface Criteria for Flight Deck Surface Operations Displays

2.2.2 FAA Publications

FAA AC 25-11A Electronic Flight Deck Displays

FAA AC 61-27C Instrument Flying Handbook

2.2.3 ICAO Publications

ICAO DOC 8697 Aeronautical Chart Manual

2.2.4 RTCA Publications

RTCA DO-289 Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications

RTCA DO-267A Minimum Aviation System Performance Standards (MASPS) for Flight Information Services Broadcast (FIS-B) Data Link

RTCA DO-272 User Requirements for Aerodrome Mapping Information

RTCA DO-276 User Requirements for Terrain and Obstacle Data

2.2.5 NASA Publications

Available from NASA, Documentation, Marshall Space Flight Center, AL 35812, www.nas.nasa.gov.

NASA Technical Paper 3561 Managing Approach Plate Information Study (MAPLIST): An Information Requirements Analysis of Approach Chart Use

2.2.6 Volpe Center Publications

DOT/FAA/RD-95-2 Wright, M. and T. Barlow (1995) Resource Document for the Design of Electronic Instrument Approach Procedure Displays.

2.3 Definitions

2.3.1 Acronyms and Abbreviations

Definitions for the various acronyms and abbreviations used in this document may be found in Appendix A. Definitions for the various terms used in this document may be found in the Glossary of Terms in Appendix B.

2.3.2 Definitions of Shall and Should

The word “shall” is used to express an essential requirement where compliance is mandatory. The word “should” is used to express a recommendation. Deviation from the specified recommendation may require justification.

3. FOREWORD

The goal of this document is to promote safety and consistency by facilitating pilot recognition of symbols across various electronic displays depicting aeronautical information. This is accomplished by recommending symbols that can be used in the next generation of electronic displays, as well as to upgrades of existing displays. This document should be used in conjunction with ARP5621, ARP4102-7 Appendix B, RTCA DO-257A, TSO C-113, and TSO C-165 as appropriate.

Navigation charts have historically been produced as paper products and carried by the flight crew from aircraft to aircraft, providing standardization and consistency from one aircraft type to another. Early versions of electronic charts have essentially been electronic representations of the paper products and because each operator still tends to use a single supplier, a high level of standardization is provided.

It is important to maintain this appropriate level of consistency of charting symbols as the number and diversity of display manufacturers increases along with the variety of display options.

Electronic charts will evolve and become more integrated on individual flight decks. It is also anticipated that charting functionality and navigation display/mapping functionality will become more integrated. Providing an appropriate level of standardization of symbols within and across various manufacturers' flight decks and between various electronic display applications will ultimately reduce aircrew training requirements and enhance safety.

The previous version of this document contained a set of symbols that were not widely adopted by industry. Consequently, there has been a proliferation of alternative symbols (DOT-VNTSC-FAA-08-01). The purpose of this document is to provide recommended symbols to minimize proliferation of dissimilar symbols. In this significantly updated version, a more rigorous process was used that involved human factors testing and pilot and manufacturer input to determine the recommendations provided in Appendix C.

It is important to recognize that transitioning to the symbols recommended in this document may introduce backwards compatibility issues due to the adoption of new symbols. However, the long term benefits gained from an appropriate level of electronic symbol standardization within each flight deck, across different manufacturers' flight decks, and between traditional paper symbols and the recommended electronic symbols must be weighed against the drawbacks associated with backwards compatibility within an individual product line.

These recommendations and requirements were developed with participation from the International Civil Aviation Organization (ICAO), the Federal Aviation Administration (FAA), the Air Line Pilots Association (ALPA), air carriers, and international industry chart and display manufacturers. Additionally, pilots from various organizations both from the United States and other countries contributed data to the research used to develop some of the recommendations and requirements in this document.

4. DESIGN GUIDELINES

The symbols, lines, and linear patterns recommended by this ARP are contained in Appendix C. If Appendix C does not provide a given symbol, line, or linear pattern, the designer should consider the provisions in ICAO Annex 4 - Aeronautical Charts. If neither this document nor the ICAO Annex 4 document provide a given symbol, line, or linear pattern, then additional symbols for consideration are shown in DOT-VNTSC-FAA-08-01.

If/when a manufacturer decides to use a symbol, line, or linear pattern not recommended in this document, the manufacturer should follow the guidance in DOT-VNTSC-FAA-05-16. Additional information is provided in ARP4155A and DOT-VNTSC-FAA-08-01. The new symbols, lines, and/or linear patterns should also be tested and evaluated.

ARP 4102-7 Appendix B (originally published in 1988) contains recommended symbology for Electronic Horizontal Situation Indicators / Navigation Displays, including recommendations for navigation aid symbols. Where there is conflict between ARP 5289A and ARP 4102-7, the symbols of ARP 5289A should take precedence.

4.1 Symbols, Lines, and Linear Patterns

This section provides recommendations and requirements related to the symbols, lines and linear patterns in Appendix C.

4.1.1 General

When using the symbols of Appendix C, the guidelines of Section 4.2 are also applicable.

4.1.1.1 Definitions of Symbols, Lines, and Linear Patterns

When depicting a symbol or linear pattern described in Appendix C, the textual description provides guidance on how to depict the symbol. The graphic depictions in Appendix C are intended to provide the designer an example of the symbol drawn using the textual description. Requirements and recommendations for the depiction of specific symbols in Appendix C are contained in subsequent sections.

4.1.1.2 Additional Detail

Manufacturers may choose to add details to the symbols, lines and linear patterns shown in Appendix C, but the details shall not interfere with the recognizability of the symbol (e.g., an individual manufacturer may choose to add or overlay a compass rose to the VOR symbol).

4.1.1.3 Symbol Orientation

The column labeled "Upright or Rotated" in Appendix C provides specific orientation guidance for each symbol.

All symbols shall be depicted in an upright orientation except for those designed to reflect a particular compass orientation.

Symbols indicating a particular compass orientation shall maintain that compass orientation at all times. An example of this is a depiction of a runway symbol that maintains proper compass orientation as the map rotates.

4.1.2 Navigation Aids and Airspace Fixes

4.1.2.1 Symbol Attributes

The following are attributes that apply to the recommended symbols in Appendix C for Navigation Aids and Airspace Fixes.

4.1.2.1.1 Compulsory Reporting Requirement

Three basic symbol types, specifically navigation aids, intersections (i.e., triangles) and waypoints (i.e., four pointed stars) are used to define significant points. If compulsory reporting status is incorporated in a system, a solid fill shall be added to these basic symbol types to indicate compulsory reporting status and the absence of the solid fill (i.e., open symbol) shall indicate on-request reporting status. Compulsory reporting requirements are illustrated in Appendix C for applicable symbols.

If compulsory-reporting status is indicated, it is only required to be depicted when the point is part of the flight plan.

4.1.2.1.2 Flyover versus Fly-by Requirements

Three basic symbol types, specifically navigation aids, intersections (i.e., triangles) and waypoints (i.e., four pointed stars) are used to define significant points. If flyover status is indicated, a circle shall be added to these basic symbol types to indicate flyover status. The absence of the circle feature indicates fly-by status. Flyover requirements are illustrated in Appendix C for applicable symbols.

If flyover status is indicated, it is only required to be depicted when a significant point is part of the flight plan.

4.1.2.1.3 Inoperative (OTS) Indication

Some applications may provide the capability to graphically depict the operational status or availability of certain displayed elements. For navigation aids and airspace fixes, an X overlaid across the symbol should be used to indicate closed, inoperative, or not-in-service status.

4.1.2.2 Generic Navaid

The Generic Navaid symbol can be used in lieu of the recommended symbols when its substitution does not negatively impact the intended function of the chart or display and is not otherwise required by another regulatory document (e.g., TSO C-165).

The Generic Navaid symbol in Appendix C can be used to represent the following navigation aids as a single group:

- VOR
- VORDME
- TACAN
- VORTAC
- DME (See Note below)
- NDB/Locator (See Note below)

NOTE: The DME and/or the NDB/Locator may be represented separately using the applicable basic recommended symbol in Appendix C.

If the NDB/Locator is included in the group, the Generic Navaid symbol shall be substituted for the radial-dot pattern symbol otherwise shown at the center of the Locator Outer Marker recommended basic symbol.

When representing any navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

When the Generic Navaid symbol is used, there shall be some means to access the information that would be otherwise represented by the recommended basic symbol for navaids. This may be accomplished by using a label.

4.1.2.3 Max Zoom Navaid

Max Zoom Navaid symbol should be used only when the display range does not accommodate the use of the recommended basic symbols or Generic Navaid symbol listed in Appendix C section "VHF Omni-Directional Navaids".

When representing the Max Zoom Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.4 Grouping of Navaids

Navaids can be grouped into families with a single symbol to represent the family.

However:

- a. Symbols used to represent families shall be one of those recommended for navaids in Appendix C.
- b. The basic recommended symbols for the VOR, VORDME, VORTAC, or TACAN shall not be used to represent an NDB navaid.
- c. The basic recommended NDB symbol (LF navaid) shall not be used to represent a VHF navaid.

4.1.2.5 VOR

When a symbol is used exclusively to represent a VOR navaid, the symbol shall be the recommended basic VOR symbol in Appendix C.

When representing the VOR Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.6 DME

When a symbol is used exclusively to represent a DME navaid, the symbol shall be the recommended basic DME symbol in Appendix C.

When representing the DME Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.7 VORDME

When a symbol is used exclusively to represent a VORDME navaid, the symbol shall be the recommended basic VORDME symbol in Appendix C.

When representing the VORDME Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.8 TACAN

When a symbol is used exclusively to represent a TACAN navaid, the symbol shall be the recommended basic TACAN symbol in Appendix C.

When representing the TACAN Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.9 VORTAC

When a symbol is used exclusively to represent a VORTAC navaid, the symbol shall be the recommended basic VORTAC symbol in Appendix C.

When representing the VORTAC Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.10 Compass Rose

The use of the Compass Rose symbol is optional. It may be used in combination with only the following VHF navaid symbols which provide azimuth guidance: VOR, TACAN, VORDME, VORTAC. The Compass Rose symbol shall only be used with a basic VHF Navaid symbol or the Generic Navaid symbol. The addition of a Compass Rose is intended to visually represent compass direction (azimuth) detail when zoomed in. If used, the optional Compass Rose shall not interfere with the recognition of the basic VHF Navaid symbol.

4.1.2.11 Non Directional Beacon (NDB) or Locator

When a symbol is used exclusively to represent a NDB or Locator navaid, the symbol shall be the recommended basic NDB or Locator symbol in Appendix C.

When representing the NDB or Locator Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.12 Marker Beacon (all types)

When a symbol is used exclusively to represent a Marker Beacon navaid, the symbol shall be the recommended basic Marker Beacon symbol in Appendix C.

When representing the Marker Beacon in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.13 Locator Outer Marker (LOM)

When a symbol is used exclusively to represent a Locator Outer Marker navaid, the symbol shall be the recommended basic Locator Outer Marker symbol in Appendix C.

When representing the LOM in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.14 Generic Localizer Navaid and Generic Localizer Label

It is acceptable to represent all localizer type navaids, including MLS, using the Generic Localizer Navaid symbol as defined in Appendix C.

When representing the Generic Localizer Navaid in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

When the Generic Localizer symbol is used, there shall be some means to access the information that would be otherwise represented by the recommended basic Localizer Front Course or Localizer Back Course symbols. This may be accomplished by using a label.

4.1.2.15 Localizer Front Course (includes ILS LOC, LDA, and SDF)

When a Localizer Front Course is depicted, it shall be represented by either the recommended basic Localizer Front Course symbol or the Generic Localizer symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.2.14.

When representing the Glide Slope for an ILS, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.16 Localizer Back Course

When a Localizer Back Course is depicted, it shall be represented by either the recommended basic Localizer Back Course symbol or the Generic Localizer symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.2.14.

4.1.2.17 Microwave Landing System (MLS)

When a MLS is depicted, it shall be represented by either the recommended basic Microwave Landing System (MLS) symbol or the Generic Localizer symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.2.14.

The MLS symbol shall include a label to differentiate from conventional VHF Localizer-type navaid systems. When representing the Glide Slope for an MLS, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.18 Max Zoom Airspace Fix

The Max Zoom Airspace Fix symbol should be used only when the display range does not accommodate the use of the recommended basic symbols listed in Appendix C section "Airspace Fixes".

When representing an Airspace Fix in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.19 Intersection

When an Intersection is depicted, it should be represented by the recommended basic Intersection symbol in Appendix C. Allowable exceptions are described in section 4.1.2.22.

When representing an Intersection in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.20 Waypoint

When a waypoint is depicted, it should be represented by the recommended basic Waypoint symbol in Appendix C.

The waypoint symbol depicted in Appendix C shall not be used to represent anything other than a waypoint. However, it is acceptable to use the waypoint symbol in Appendix C to depict all points along a flight plan route, including navaids, intersections, and waypoints.

When representing a Waypoint in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

4.1.2.21 Unnamed Airspace Fix, Mileage Break, or Turn Point

When an Unnamed Airspace Fix, Mileage Break or Turn Point is depicted, it should be represented by the recommended basic Unnamed Airspace Fix, Mileage Break or Turn Point symbol in Appendix C.

When representing an Unnamed Airspace Fix, Mileage Break, or Turn Point in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C (Conventional Airspace Fix) for the recommended basic symbol to be used.

4.1.2.22 Prioritization of Depicted Symbols for Collocated Navigation Aids, Waypoints and Intersections/Fixes

When navigation aids, waypoints and intersections/fixes have coincident latitude/longitude positions, this paragraph provides a consistent way to determine which symbol should be depicted. If the point is originally sourced/defined as a navigation aid, a ground-based intersection/fix, or an RNAV waypoint, then it should be depicted accordingly.

Refer to Table 1 below for prioritization of symbols for collocated sources.

TABLE 1 – PRIORITIZATION OF SYMBOLS

Collocated Combination	Depiction
Navigation aid and waypoint	Navigation aid
Navigation aid and intersection/fix	Navigation aid
Intersection/fix and waypoint	Intersection/fix

However, when depicting the flight plan route it is acceptable to depict a waypoint symbol in lieu of the underlying symbol.

4.1.3 Airports, Heliports, Runways and Surface Movement Areas

4.1.3.1 General

4.1.3.1.1 Closed Indication

Some applications may provide the capability to graphically depict the operational status or availability of certain displayed elements. For airports, heliports, runways and surface movement areas an X overlaid across the symbol should be used to indicate closed, inoperative, or not-in-service status.

4.1.3.2 Generic Airport Symbol and Generic Airport Label

The Generic Airport symbol in Appendix C may be used to represent airports in lieu of the recommended basic symbols for each described below. The Generic Airport symbol should not be used on the depiction of terminal procedures.

When the Generic Airport symbol is used, there shall be some means to access the information that would be otherwise represented by the recommended basic symbols for airports. This may be accomplished by using a label.

4.1.3.3 Max Zoom Airport/Heliport

Max Zoom Airport/Heliport symbol shall be used only when the display range does not accommodate the use of the recommended basic symbols or Generic Airport symbol listed in Appendix C section "Airports & Heliports."

4.1.3.4 Airport – Civil

When a civil airport is depicted, it shall be represented by either the recommended basic Airport – Civil symbol, the Runway Sketch symbol or the Generic Airport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.2.

NOTE: If an application displays both Civil and Military Airports, the Civil Airport symbol shall not be used to represent a Military Airport.

4.1.3.5 Airport – Military

When a military airport is depicted, it shall be represented by either the recommended basic Airport – Military symbol, the Runway Sketch or the Generic Airport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.2.

NOTE: If an application displays both Civil and Military Airports, the Military Airport symbol shall not be used to represent a Civil Airport.

4.1.3.6 Airport – Joint Civil Military

When a joint civil military airport is depicted, it shall be represented by either the recommended basic Airport – Joint Civil Military symbol, the Runway Sketch or the Generic Airport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.2.

NOTE: The joint civil-military airport can be depicted with either the civil airport symbol or the military airport symbol as appropriate for the intended function of the display.

4.1.3.7 Generic Heliport Symbol and Generic Heliport Label

The Generic Heliport symbol in Appendix C may be used to represent airports in lieu of the recommended basic symbols for each described below. The Generic Heliport symbol should not be used on the depiction of terminal procedures.

When the Generic Heliport symbol is used, there shall be some means to access the information that would be otherwise represented by the recommended basic symbols for airports. This may be accomplished by using a label.

4.1.3.8 Heliport – Civil

When a civil heliport is depicted, it should be represented by the recommended basic Heliport - Civil symbol or the generic heliport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.7.

NOTE: If an application displays both Civil and Military heliports, the Civil Heliport symbol shall not be used to represent a Military Heliport

4.1.3.9 Heliport – Military

When a military heliport is depicted, it should be represented by the recommended basic Heliport - Military symbol or the generic heliport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.7.

NOTE: If an application displays both Civil and Military Heliports, the Military Heliport symbol shall not be used to represent a Civil Heliport.

4.1.3.10 Heliport – Joint Civil Military

When a joint civil military heliport is depicted, it should be represented by the recommended basic Heliport – Joint Civil Military symbol or the generic heliport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.7.

NOTE: The joint civil-military heliport can be depicted with either the civil heliport symbol or the military heliport symbol as appropriate for the intended function of the display.

4.1.3.11 Generic Seaport Symbol and Generic Seaport Label

The Generic Seaport symbol in Appendix C may be used to represent seaports in lieu of the recommended basic seaport. The Generic Seaport symbol should not be used on the depiction of terminal procedures.

When the Generic Seaport symbol is used, there shall be some means to access the information that would be otherwise represented by the recommended basic symbols for seaports. This may be accomplished by using a label.

4.1.3.12 Seaport – Civil

When a civil seaport is depicted, it should be represented by the recommended basic Seaport - Civil symbol or the generic Seaport symbol in Appendix C. If the generic symbol is used, it shall follow the guidelines of section 4.1.3.11.

4.1.3.13 Runway Sketch

It is acceptable to represent any airport using a Runway Sketch as defined in Appendix C, when it is compatible with the map range.

When used the layout shall show runways in correct alignment and configuration. The runway layout shall maintain proper compass orientation as the map rotates.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.3.14 Runway – Paved (Hard Surface)

Paved runways should be indicated per the description in Appendix C.

When representing a runway in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.3.15 Runway – Unpaved (Soft Surface)

Unpaved runways should be depicted per the description in Appendix C.

When representing a runway in a vertical profile view depiction, refer to the Vertical Profile View section of Appendix C for the recommended basic symbol to be used.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.3.16 Displaced Threshold

Displaced thresholds should be depicted per the description in Appendix C.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.3.17 Overrun, Stopway, EMAS, or Blast pad

Overruns, Stopways, EMAS or Blast pads should be depicted per the description in Appendix C.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.3.18 Aircraft Movement Area/ (Ramp, Taxiway)

Aircraft Movement Areas may be depicted per the description in Appendix C.

This symbol is not intended to apply to Airport Moving Map Displays.

4.1.4 Airspace and Boundaries

4.1.4.1 General

When using the recommended Airspace and Boundary depictions of Appendix C, the following guidelines should be applied.

4.1.4.1.1 Overlapping Boundaries

When multiple airspace or boundaries join or overlap along a common boundary the manufacturer should ensure that the individual items are still easily identifiable without creating visual conflict or show only the boundary with the greatest relative importance, as specified in Appendix C.

4.1.4.1.2 Airspace and Boundary Depiction Categories

The recommended depiction of airspace and boundaries is based upon the depiction categories provided in Appendix D. Airspace and boundaries have been assigned a numerical value representing the potential impact on in-flight operations. When a display is intended to distinguish between these categories, the lines and linear patterns referenced in Appendix D, which illustrate the depiction of relative importance, should be used. The categorization is intended to standardize the depiction of airspace and boundaries.

4.1.4.2 Generic Airspace and Boundaries

It is acceptable to represent airspace and boundaries using generic lines in lieu of, or in combination with, the more detailed individual airspace and boundaries that are explained below and illustrated in Appendix C.

When using generic lines to depict airspace and boundaries, the line width and luminance should be based on the depiction category following the guidelines of Appendix C – Generic Depiction of Airspace and Boundaries. For common airspace or boundary types (e.g., Air Defense Identification Zone) the Depiction Category may be found in Appendix D.

If a generic symbol or line is used there should be some way to access the information that would be otherwise represented by a recommended symbol or line. This may be accomplished by using a label.

4.1.4.3 Max Zoom Generic Airspace and Boundary

The Max Zoom Generic Airspace and Boundary line defined in Appendix C should be used in lieu of either the generic or detailed Airspace or Boundary line only when the map range does not accommodate the more detailed line.

4.1.4.4 Special Use Airspace

When airspace types identified in Appendix C – Special Use Airspace (SUA) are depicted, they should be represented by either the recommended basic line/linear pattern or the generic line listed in Appendix C.

The Special Use Airspace lines and linear patterns defined in Appendix C shall not be used to represent anything other than special use airspace.

4.1.4.5 Air Traffic Service (ATS) Airspace

When airspace types identified in Appendix C – Air Traffic Service (ATS) Airspace are depicted, they should be represented by either the recommended basic line/linear pattern or the generic line listed in Appendix C.

4.1.4.6 Miscellaneous Airspace or Boundaries

When airspace types identified in Appendix C – Miscellaneous Airspace or Boundaries are depicted, they should be represented by either the recommended basic line/linear pattern or the generic line listed in Appendix C.

4.1.5 Airways, Routes and Flight Tracks

When Airways, Routes and Flight Tracks identified in Appendix C are depicted, they should be represented by the recommended basic symbol/line.

4.1.6 Vertical Profile View

The symbols for the items contained in the Vertical Profile View section of Appendix C should be used when they are depicted in a vertical profile view or vertical situation display.

4.1.7 Miscellaneous

If obstacles, time zone boundaries and/or international boundaries are depicted, they should be represented using the symbols in the Miscellaneous section of Appendix C.

All other symbols in the Miscellaneous section are provided for reference.

4.2 General Recommendations and Requirements

The following sections contain recommendations and requirements related to symbol, line and linear pattern design and display.

4.2.1 Symbols

4.2.1.1 Identification

Symbols should be easy to identify with minimal training (e.g., due to prior experience, or resemblance to an identifiable object).

4.2.1.2 Single Meaning

Symbols with more than one meaning can be confusing and should be minimized.

4.2.1.3 Distinctiveness

Symbols should be distinctive from other symbols (i.e., not easily confused with other symbols).

4.2.1.4 Size

Symbols should comply with ARP 4102/7 standards for minimum eye angle height at the design eye position of the pilot and other industry guidance.

4.2.1.5 Simplicity

Symbols should be created to be as simple as possible, minimizing use of lines, arcs, and area fills.

4.2.1.6 Relative Importance

Symbols of greater relative importance can be made more prominent using various techniques, such as increased size, highlighting, bolding, color, etc., where appropriate. However, use of these techniques shall not impair the legibility of the display or negatively impact the ability to identify a symbol.

4.2.1.7 Additional Detail

Manufacturers may choose to add details to the symbols shown in Appendix C, but the details shall not cause confusion with other symbols and should not decrease the recognizability of the symbol (e.g., an individual manufacturer may choose to add or overlay a compass rose to the VOR symbol).

4.2.1.8 Dynamic Evaluation

Symbols intended to be presented in a moving or dynamic display format shall be evaluated under dynamic conditions

4.2.1.9 Nested Symbols

The use of nested (combined or co-located) symbols should be minimized. When symbols are nested they shall not create visual conflict or lose the intent of the original individual symbols. Figure 1 illustrates an example of an acceptable nested symbol.

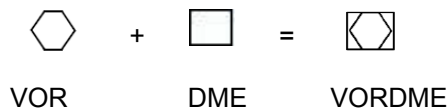


FIGURE 1 - EXAMPLE OF NESTED SYMBOL

4.2.2 Lines and Linear Patterns

Lines and linear patterns are typically used to represent items that are not single points in space, but instead represent multiple points and vertices, such as a flight track or a boundary. The characteristics of a line are its style (e.g., continuous, dashed, or dotted) and weight (e.g., thick, medium, and thin). The defining characteristic of a linear pattern is a series of repeating symbols. Linear patterns may or may not be used in conjunction with a line.

Lines and linear patterns convey information that may or may not be critical to an operator on a particular flight or phase of flight. The need for the information can vary greatly. This document does not cover all lines and linear patterns, but instead covers a selected subset determined to be important to pilots.

Lines and linear patterns are difficult to identify when shown in isolation. They are easier to interpret in context. The shape of an area or region, bounded by the line can be a contextual clue as to what the line represents. Also, the position of the line relative to other objects on the display may provide context.

4.2.2.1 General Guidance

The following guidelines should be considered when designing lines and linear patterns:

4.2.2.1.1 Identification

Lines and linear patterns should be easy to identify with minimal training (e.g., due to prior experience, or resemblance to an identifiable object).

4.2.2.1.2 Simplicity

Lines and linear patterns should be as simple as possible.

4.2.2.1.3 Use of Established Precedents

Lines and linear patterns should be as similar as possible to established precedents.

4.2.2.1.4 Use of Multiple Lines and Linear Patterns

The number of unique lines and linear patterns should be minimized to reduce complexity.

4.2.2.1.5 Consistency and Definition

Lines and linear patterns should be used consistently and defined in a legend and/or a pilot's guide.

4.2.2.1.6 Relative Importance

Lines and linear patterns of greater relative importance can be made more prominent using various techniques, such as through the use of size, highlighting, bolding, color, etc., where appropriate. However, use of these techniques shall not impair the legibility of the display or negatively impact the ability to identify the line or linear pattern. When lines are displayed in combination, the designer must ensure that items of relative importance are displayed appropriately. Examples of relative importance include:

a. Relative Importance in the En Route Environment.

1. A flight plan route is more important than routes or airways not associated with the flight plan.
2. A permanent route is more important than a provisional or conditional route.
3. An airway or route is more important than an intersection formation radial or bearing.

b. Relative Importance in the Terminal Environment

1. The procedure course is more important than the feeder or transition routes.
2. The procedure course is more important than the missed approach procedure course.
3. The missed approach procedure course is more important than the feeder or transition routes.
4. A feeder or transition route is more important than an intersection formation radial or bearing.

4.2.2.1.7 Additional Detail

Additional features or characteristics shall not cause confusion with other symbols or lines, and should not decrease recognition.

4.2.2.1.8 Indication of Sidedness

Where sidedness is applicable, such as an airspace area, boundary line, or closed polygon the line or linear pattern should indicate the interior (inside) versus exterior (outside). This may be accomplished by using a label or graphical detail.

4.2.2.1.9 Evaluation of Linear Patterns

If linear patterns are used, they shall be designed and evaluated to ensure that the pattern is recognizable and distinctive.

4.2.2.2 Lines

4.2.2.2.1 Labels

When generic line styles are used to represent more than one element, context and labeling may aid recognition. However, in situations where a line has a singular meaning or is otherwise obvious, a label is not necessarily required (e.g., final approach course on an approach chart).

4.2.2.2.2 Line Width

Lines should be limited to three relative widths (i.e., thick, medium, and thin). If additional line widths are used they should not adversely impact interpretation.

4.2.2.2.3 Line Style

Lines should be limited to three line styles (i.e., continuous, dashed, and dotted). If additional line styles (e.g., alternating dashes and dots) are used they should not adversely impact interpretation.

NOTE: It has been found that pilots may have difficulty distinguishing multiple lengths of dashes and between dots and short dashes (see DOT-VNTSC-FAA-07-07).

4.2.2.2.4 Combining Line Characteristics

Line width and line style characteristics may be combined (e.g., a thin dashed line may be used as well as a thick dashed line) to achieve additional line type options.

4.2.2.2.5 Use of Line Characteristics to Denote Relative Importance

The following design conventions are recommended to denote relative prominence and importance:

- a. Continuous lines are considered more prominent than dashed or dotted lines
- b. Thicker lines are considered more prominent than thin lines
- c. High contrast lines (i.e., solid) are considered more prominent than low contrast lines (i.e., screened).

4.2.2.3 Area Fills

Area fills may be used for depicting contour intervals, bodies of water, urban areas, uncontrolled airspace, airport surface movement areas, etc. The use of area fills shall not cause symbol confusion and should not reduce the ability of the pilot to identify and recognize other symbols, lines, or information.

4.2.3 Generic Symbols

A generic symbol is a single symbol that is representative of a whole group or class of aeronautical elements. Typically a generic symbol has less detail than the symbols it represents. For example, a generic airport symbol may be used to represent all types of airports including civil, military, heliports, land and seaports.

Generic symbols may be used in lieu of the recommended symbols when their substitution does not negatively impact the intended function of the chart or display and are not otherwise required by another document (e.g., TSO C-165). It may be acceptable to combine the use of generic symbols with the recommended symbols when there is a logical design rational.

Typically generic symbols and lines are used when:

- a. The displayed image is zoomed out showing a large geographical area and visual clutter needs to be reduced.
- b. The display has a low resolution.
- c. The physical screen size prevents the use of the recommended symbols.
- d. Representing a group of like objects with a single symbol or line.

4.2.4 Use of Labels

This section contains general recommendations for labeling of symbols, lines, and linear patterns. It does not contain specific recommendations such as fonts or text sizes. Symbols, lines, and linear patterns shall be labeled where appropriate for the intended function. This is especially important for airports, navigation aids, airspace fixes. This may also be important for airspace boundaries and other features, depending on the intended function.

4.2.4.1 Positioning

The spatial relationships between labels and the objects that they reference should be clear. Labels should be oriented to facilitate readability. When a label is associated with a bounded area (e.g., airspace entity), the default position of the label is on the interior of the area, regardless of whether the full area is shown, or only a part of the area is shown.

4.2.4.2 Decluttering

It may be necessary to automatically remove labels based on display clutter issues. When a label is required for intended function, there shall be some way to access the appropriate information (e.g., this may be accomplished using a different zoom level or by having an information access function).

4.2.4.3 Acronyms and Abbreviations

If acronyms and abbreviations are used, the acronyms and abbreviations recommended in ICAO Doc 8400 should be used. Labels should be readable per the guidance in SAE AIR1093A. Additional information is available in MIL STD 1472D.

4.2.4.4 Labeling Generic Line Styles

When generic line styles are used to represent more than one element, context and labeling may aid recognition. However, in situations where a line has a singular meaning or is otherwise obvious, a label is not necessarily required (e.g., final approach course on an approach chart).

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APPENDIX A – ABBREVIATIONS AND ACRONYMS

ADIZ	Air Defense Identification Zone
AIP	Aeronautical Information Publication
AMA	Area Minimum Altitude
ARP	SAE Aerospace Recommended Practice
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
ATZ	Air Traffic Zone
CFR	Code of Federal Regulations (US FAA)
CNS	Communications, Navigation, and Surveillance
CRT	Cathode Ray Tube
CTA	Control Area
CTR/CTZ	Control Zone
D	Danger Area
DME	Distance Measuring Equipment
DOT	Department of Transportation
ECD	Electronic Chart Display
EFB	Electronic Flight Bag
EMD	Electronic Map Display
FAA	Federal Aviation Administration
FIR	Flight Information Region
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HP	Holding Pattern
HPZ	Helicopter Protected Zone
HTZ	Helicopter Traffic Zone
ICAO	International Civil Aviation Organization

IFR	Instrument Flight Rules
IHO	International Hydrographic Organization
ILS	Instrument Landing System
LCD	Liquid Crystal Display
LF	Low Frequency
LOC	Localizer
LOM	Locator Outer Marker
MAX	Maximum
MATZ	Military Air Traffic Zone
MCTR	Military Control Zone
MLS	Microwave Landing System
MNPS	Minimum Navigation Performance Specifications
MOA	Military Operations Area
MSA	Minimum Sector Altitude / Minimum Safe Altitude
NACO	National Aeronautical Charting Office (US FAA)
NASA	National Aeronautics and Space Administration
NDB	Non-Directional Beacon
OCA	Oceanic Control Area
OTS	Out Of Service
P	Prohibited Area
PBN	Performance Based Navigation
PCA	Positive Control Area
QFE	Atmospheric pressure at airport elevation (or at runway threshold)
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
R	Restricted area
RNAV	Area Navigation
RNP	Required Navigation Performance
RTCA	RTCA, Inc, (formerly Radio Technical Commission for Aeronautics)
RVSM	Reduced Vertical Separation Minimum

SAE	SAE International, (formerly Society of Automotive Engineers)
SRA	Special Rules Area
SRZ	Special Rules Zone
SUA	Special Use Airspace
TAA	Terminal Arrival Area
TACAN	Tactical Air Navigation
TCA	Terminal Control Area (US and Canada)
TFR	Temporary Flight Restrictions area
TIA	Traffic Information Area
TIZ	Traffic Information Zone
TMA	Terminal control Area
TRA	Temporary Reserve Area
TRSA	Terminal Radar Service Area
TSA	Temporary Segregated Area
UCA	Upper Control Area
UIR	Upper flight Information Region
UTA	Upper Terminal Area
VFR	Visual Flight Rules
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range
VORDME	VOR and DME combination
VORTAC	VOR and TACAN combination
WAAS	Wide Area Augmentation System

APPENDIX B – GLOSSARY OF TERMS

ADVISORY AREA: A designated area within a flight information region where air traffic advisory service is available. [ICAO Vocabulary Doc 9713]

AERONAUTICAL INFORMATION PUBLICATION (AIP): A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation. [ICAO Annex 15]

AIRCRAFT: Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface. [ICAO Annex 6]

AIRPORT: A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. [ICAO Annex 14 (Aerodrome)]

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. [US FAA Glossary of terms]

AIR TRAFFIC ZONE (ATZ): An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic. [ICAO Annex 11]

ALERT AREA (A): Airspace which may contain a high volume of pilot training activities or unusual type of aerial activity, neither of which is hazardous to aircraft. [Aeronautical Information Harmonization Working Group (AIHWG)]

AIRPORT OPERATING MINIMA: The limits of usability of an airport for:

- a. take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
- b. landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation; and
- c. landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and
- d. landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions. [ICAO Annex 6 (Aerodrome operating minima)]

AIR DEFENSE IDENTIFICATION ZONE (ADIZ): Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS). [ICAO Annex 4]

AIR TRAFFIC MANAGEMENT (ATM): The aggregation of the airborne functions and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations [ICAO PANS-ATM Doc 4444].

AIR TRAFFIC SERVICE (ATS): A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or airport control service). [ICAO Annex 4]

AIRWAY: A control area or portion thereof established in the form of a corridor. [ICAO Annex 4]

ALTITUDE: The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL). [ICAO Annex 4]

AREA MINIMUM ALTITUDE (AMA): The minimum altitude to be used under instrument meteorological conditions (IMC) that provides a minimum obstacle clearance within a specified area, normally formed by parallels and meridians. [ICAO Annex 4]

AREA NAVIGATION (RNAV): A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

NOTE: Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation. [ICAO Annex 4]

ATS ROUTE: A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services.

NOTE 1: The term ATS route is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

NOTE 2: An ATS route is defined by route specifications which include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude. [ICAO Annex 4]

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north, magnetic north, or some other reference point through 360 degrees. [FAA Pilot/Controller Glossary]

BUFFER ZONE (NON FREE FLYING ZONE): A military term which describes airspace of defined dimensions, established in an area of political unrest, international conflict, or a war zone within which civilian aircraft are not permitted to operate without prior permission of the controlling military authorities [Jeppesen].

CAUTION AREA: An airspace of defined dimensions within which uncontrolled and maneuvering aircraft may be encountered, so it is necessary for the pilots to use caution when entering such airspace for avoidance of danger. Pilots of participating aircraft as well as pilots transiting the area are responsible for collision avoidance and pilots transiting Caution Areas should coordinate with Air Traffic Service (ATS) units prior to entering such areas [Islamic Republic of Iran AIP].

CHART: A special-purpose map, generally designed for navigation or other particular purposes, in which essential map information is combined with various other data critical to the intended use. [US DOD Glossary of Mapping, Charting, and Geodetic Terms]

CLASS A AIRSPACE: IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other. [ICAO Annex 11]

CLASS B AIRSPACE: IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other. [ICAO Annex 11]

CLASS C AIRSPACE: IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights. [ICAO Annex 11]

CLASS D AIRSPACE: IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights. [ICAO Annex 11]

CLASS E AIRSPACE: IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones. [ICAO Annex 11]

CLASS F AIRSPACE: IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested. [ICAO Annex 11 derived]

CLUTTER: A high information density on an electronic chart display that compromises the interpretability/legibility of display elements or the ability for flight crew to quickly identify and focus on high priority information. [SAE ARP5621]

COMPASS ROSE: A circle graduated in degrees, clockwise from 0 degrees at the reference direction to 360 degrees, or in compass points, or in both degrees and compass points. [US DOD Glossary of Mapping, Charting, and Geodetic Terms]

CONTROL ZONE (CTR/CTZ): A controlled airspace extending upwards from the surface of the earth to a specified upper limit. [ICAO Annex 11]

CONTROL AREA (CTA): A controlled airspace extending upwards from a specified limit above the earth. [ICAO Annex 11]

COURSE:

- a. The intended direction of flight in the horizontal plane measured in degrees from north.
- b. The ILS localizer signal pattern usually specified as the front course or the back course.
- c. The intended track along a straight, curved, or segmented MLS path. [FAA Pilot/Controller Glossary]

DANGER AREA (D): An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times. [ICAO Annex 4]

DATA DRIVEN CHART: An electronic aeronautical chart that is dynamically created from a database of individual elements. [SAE ARP5621]

DISPLAY APPLICATION: A flight or airplane information function typically portrayed on an electronic display device located on the flight deck. Typical display applications include Primary Flight Displays, Navigation Displays, Electronic Checklists, and Synoptics.

DISTANCE MEASURING EQUIPMENT (DME): UHF ground equipment used in conjunction with airborne equipment, operating on the interrogation-answer principle. The time required for the round trip of the signal exchange is measured in the airborne DME unit and translated into DME distance. [ICAO Annex 10]

ELECTRONIC CHART: Very broad term to describe the data, the software, and the electronic system capable of displaying chart information. [International Hydrographic Organization Electronic Chart Display and Information System (ECDIS) Glossary]

ELECTRONIC DISPLAY DEVICE: An electronic device on the flight deck used to present information to the flight. A variety of display devices have been used on the flight deck for this purpose including Cathode Ray Tubes (CRTs) and Liquid Crystal Displays (LCDs)

ELECTRONIC FLIGHT BAG (EFB): An electronic display system intended primarily for cockpit, flight deck, or cabin use. EFB devices can display a variety of aviation data or perform basic calculations (e.g., performance data, fuel calculations, etc.). In the past, some of these functions were traditionally accomplished using paper references or were based on data provided to the flight crew by an airline's "flight dispatch" function. The scope of the EFB system functionality may also include various other hosted databases and applications. Physical EFB displays may use various technologies, formats, and forms of communication. These devices are sometimes referred to as auxiliary performance computers (APC) or laptop auxiliary performance computers (LAPC). [EFB AC 120-76A]

ELECTRONIC MAP DISPLAY (EMD): An electronic map display system including own-ship position used to depict navigation information. This includes electronic map displays depicting in-flight, airport surface, and vertical (profile) information. [RTCA DO-257A]

ELEVATION: The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level. [ICAO Annex 4]

ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS): High-energy-absorbing material located in the runway overrun that is designed to crush under the weight of an aircraft as the material exerts deceleration forces on the aircraft landing gear. [Aeronautical Information Harmonization Working Group (AIHWG)]

EQUIPAGE: Aircraft and/or ground equipment configuration and status. [SAE ARP5621]

FINAL APPROACH: That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

- a. at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or
- b. at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an airport from which:
 1. a landing can be made; or
 2. a missed approach procedure is initiated. [ICAO Annex 11]

FINAL APPROACH FIX OR POINT: That fix or point of an instrument approach procedure where the final approach segment commences. [ICAO Annex 4]

FIX: A geographical position determined by visual reference to the surface, by reference to one or more radio NAVAIDs, by celestial plotting or by another navigational device. [FAA AIM]

FLIGHT INFORMATION REGION (FIR): An airspace of defined dimensions within which flight information service and alerting service are provided. [ICAO Annex 11]

FLIGHT PLAN: Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft. [ICAO Annex 11]

GLOBAL POSITIONING SYSTEM (GPS): A navigation system based on the transmission of signals from satellites provided and maintained by the United States. [Aeronautical Information Harmonization Working Group (AIHWG)]

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS): A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the required navigation performance for the intended operation. [ICAO Annex 10]

GLIDE PATH: A descent profile determined for vertical guidance during a final approach. [ICAO Annex 4]

HELICOPTER PROTECTED ZONE (HPZ): A non-controlled airspace of defined dimensions extending upwards from sea level to a specified upper limit. An HPZ is established in order to indicate frequent helicopter activity in the area. [Excerpted from Norway AIP]

HELICOPTER TRAFFIC ZONE (HTZ): A non-controlled airspace of defined dimensions extending upwards from sea level to a defined upper limit. A HTZ is established around an offshore installation with landing pad. An HTZ is established in order to indicate the performance of helicopter approach and departures. [Excerpted from Norway AIP]

HOLDING PATTERN: A predetermined maneuver which keeps an aircraft within a specified airspace while awaiting further clearance. [Derived from ICAO Annex 4]

INTERSECTION: A significant point defined by radials, bearings and/or distances from ground-based navigation aids. [Derived from ICAO Annex 4]

INSTRUMENT FLIGHT RULES (IFR): A set of rules governing the conduct of flight under instrument meteorological conditions. [ICAO Annex 2]

ISOGONIC LINE: A line on a map or chart on which all points have the same magnetic variation for a specified epoch. [Derived from ICAO Annex 4]

LOCATOR: A low or medium powered Non-Directional Beacon (NDB) used as an aid for final approach. [Aeronautical Information Harmonization Working Group (AIHWG)]

LOCALIZER (LOC): The component of an ILS that provides course guidance to the runway. [US FAA Pilot/Controller Glossary]

MAP: A graphic representation, usually on a plane surface and at an established scale, of natural and manmade features on or under the surface of the earth or other planetary body. The features are positioned as accurately as possible, usually relative to a coordinate reference system. [US DOD Glossary of Mapping, Charting, and Geodetic Terms]

MARKER BEACON: A radio beacon used in conjunction with an instrument landing system (ILS), to provide pilots with a means to determine distance to the runway. There are three types of marker beacons on an ILS, outer, middle, and inner. [www.wikipedia.org]

MAX ZOOM: Max Zoom refers to situations where very large ranges are presented on the display. This will vary depending on the application. It does not imply that it is the largest display range available.

MICROWAVE LANDING SYSTEM (MLS): A precision approach and landing guidance system operating in the microwave spectrum, which provides position information and various ground-to-air data. The position information is provided in a wide coverage sector and is determined by an azimuth angle, elevation, and distance. [ICAO Annex 10]

MILITARY AIR TRAFFIC ZONE (MATZ): An airspace of defined dimensions established around a military aerodrome for the protection of aerodrome traffic. [Aeronautical Information Harmonization Working Group (AIHWG)]

MILITARY CONTROL ZONE (MCTR): A control area normally established at the confluence of ATS routes in the vicinity of one or more major military aerodromes. [Aeronautical Information Harmonization Working Group (AIHWG)]

MILITARY OPERATIONS AREA (MOA): A military operations area (MOA) is airspace established outside Class A airspace to separate or segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. [FAA Pilot/Controller Glossary]

MINIMUM SECTOR ALTITUDE/MINIMUM SAFE ALTITUDE (MSA): The lowest altitude which may be used which will provide a minimum clearance of 300 m (1000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 nm) radius centered on a radio aid to navigation. [ICAO Annex 4 derived]

MINIMUM NAVIGATION PERFORMANCE SPECIFICATIONS (MNPS): A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. [ICAO Annex 6 derived]

MISSED APPROACH PROCEDURE: The procedure to be followed if the approach cannot be continued. [ICAO Annex 4]

MOVEMENT AREA: That part of an airport to be used for the take-off, landing and taxiing of aircraft, consisting of the maneuvering area and the apron(s). [ICAO Annex 4]

NATIONAL SECURITY AREA: National Security Areas consist of airspace of defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. [United States Aeronautical Information Manual]

NON-DIRECTIONAL BEACON (NDB): A beacon that radiates a signal which provides directional guidance to and from the transmitting antenna. [FAA].

OBSTACLE: All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- a. are located on an area intended for the surface movement of aircraft; or that
- b. extend above a defined surface intended to protect aircraft in flight; or
- c. stand outside those defined surfaces and that have been assessed as being a hazard to air navigation. [ICAO Annex 4]

OCEANIC CONTROL AREA (OCA): Airspace over the oceans of the world, considered international airspace, where ICAO oceanic separation and procedures are applied. Responsibility for the provisions of air traffic control service in this airspace is delegated to various countries, based generally upon geographic proximity and the availability of the required resources. [Jeppesen]

PERFORMANCE BASED NAVIGATION (PBN): Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace. "Note." Performance requirements are expressed in navigation specifications in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept. [ICAO Annex 4]

POSITIVE CONTROL AREA (PCA): Any aircraft shall, under instrument meteorological conditions, be flown in accordance with instrument flight rules within an air traffic control area or an air traffic control zone, and not fly in any other airspace. [Japan AIP]

PROHIBITED AREA (P): An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited. [ICAO Annex 4]

RADAR VECTORING: Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar. [ICAO Annex 4]

REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AIRSPACE: A term used to describe the reduction of the standard vertical separation required between aircraft flying at levels between FL290 (29 000 ft.) and FL410 (41 000 ft.) from 2000 feet to 1000 feet (or between 8900 meters and 12 500 meters from 600 meters to 300 meters in China).

REPORTING POINT: A specified (named) geographical location in relation to which the position of an aircraft can be reported.

NOTE: There are three categories of reporting points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids. A reporting point can be indicated as "on request" or as "compulsory". [ICAO Annex 4]

REQUIRED NAVIGATION PERFORMANCE (RNP): A statement of the navigation performance necessary for operation within a defined airspace.

NOTE: Navigation performance and requirements are defined for a particular RNP type and/or application. [ICAO Doc 9613].

RESTRICTED AREA (R): An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions. [ICAO Annex 4]

RUNWAY: A defined rectangular area on a land airport prepared for the landing and take-off of aircraft. [ICAO Annex 4]

SEAPORT: An airport intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft on water. [ICAO Annex 14 derived from "water aerodrome"]

SIGNIFICANT POINT: A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

NOTE: There are three categories of significant points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids. [ICAO Annex 4]

SPECIAL RULES AREA / ZONE (SRA/SRZ): Controlled airspace within which special rules and procedures are prescribed and published for the protection of IFR flights from VFR flights. [Excerpted from Austria AIP]

STOPWAY: A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off. [ICAO Annex 4]

TAXIWAY: A defined path on a land airport established for the taxiing of aircraft and intended to provide a link between one part of the airport and another, including:

- a. Aircraft stand taxi lane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
- b. Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
- c. Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aircraft to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times. [ICAO Annex 4]

TEMPORARY FLIGHT RESTRICTIONS AREA (TFR): A TFR is a short-term airspace restriction in a limited geographical area, typically used in the United States. TFRs are generally established to restrict flight over major sporting events, natural disaster areas, air shows, space launches, and during Presidential movements. [United States Aeronautical Information Manual]

TEMPORARY RESERVED / SEGREGATED AREA (TRA/TSA): A temporary reserved / segregated area is a defined volume of airspace normally under the jurisdiction of one aviation authority and temporarily reserved, by common agreement, for the specific use by another aviation authority and through which other traffic may be allowed to transit under an Air Traffic Service (ATS) authority. [United Kingdom AIP]

TERRAIN CONTOURS: Lines on a map or chart connecting points of equal elevation. [ICAO Annex 4 derived]

THRESHOLD: The beginning of that portion of the runway usable for landing. [ICAO Annex 4]

TERMINAL CONTROL AREA (TCA/TMA): A control area normally established at the confluence of ATS routes in the vicinity of one or more major airports. [derived from ICAO Annex 11]

TERMINAL RADAR SERVICE AREA (TRSA): Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft. [United States Aeronautical Information Manual]

TRACK: The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid). [ICAO Annex 4]

TRAINING AREA (T): Airspace of defined dimensions within which a high volume of pilot training or an unusual type of aerial activity may be carried out. [Jeppesen]

TRAFFIC INFORMATION AREA / ZONE (TIA/TIZ): Traffic information areas (TIA) and traffic information zones (TIZ) are established at airports where the traffic is relatively light and therefore only Aerodrome Flight Information Service (AFIS) is provided. AFIS units do not issue clearances. The responsibility for avoiding collisions solely rests with the pilot when flying in to or out from these airports. The AFIS unit will state the runway in use, weather and traffic situation considered.

UPPER CONTROL AREA (UCA/UTA): Controlled airspace established by an appropriate Air Traffic Service (ATS) authority or Air Traffic Control (ATC) unit, of defined dimensions and between upper altitude limits, which exists above terminal airspace area(s) where the terminal ATC unit also has responsibility for control of aircraft operating within the designated upper airspace. An Upper Control Area (UCA) is not associated with an airport. An Upper Terminal Area (UTA) is associated with an airport. [Jeppesen]

UPPER FLIGHT INFORMATION REGION (UIR): An upper airspace of defined dimensions within which flight information service and alerting service are provided. [ICAO Annex 11 derived]

VISUAL CONFLICT: When the overlap or proximity of display elements degrade their individual interpretability/legibility. [SAE ARP5621]

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate a type of flight plan. [FAA Pilot/Controller Glossary]

VHF OMNIDIRECTIONAL RANGE (VOR): Radio aids available: VOR, VOR/DME, TACAN and VORTAC. The VOR provides for lateral sensing, while the VOR/DME includes Distance Measuring Equipment for determining distance from the station. TACAN or Tactical Air Navigation is used only by the military and requires special equipment to use. The VORTAC incorporates both VOR/DME and TACAN capabilities in one facility.

WARNING AREA (W): A warning area is airspace of defined dimensions extending from 3 nautical miles outward from the coast of the United States that contains activity that may be hazardous to nonparticipating aircraft. [United States Aeronautical Information Manual]

WAYPOINT: A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

FLY-BY WAYPOINT: A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or

FLYOVER WAYPOINT: A waypoint at which a turn is initiated in order to join the next segment of a route or procedure. [ICAO Annex 4]

WIDE AREA AUGMENTATION SYSTEM (WAAS): A satellite navigation system consisting of the equipment and software which augments the GPS Standard Positioning Service (SPS). The WAAS provides enhanced integrity, accuracy, availability, and continuity over and above GPS SPS.

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APPENDIX C – MATRIX OF SYMBOLS, LINES, AND LINEAR PATTERNS

The recommended symbols are illustrated graphically in this Appendix. Where applicable, other operational characteristics such as compulsory reporting status, fly-over status, and inoperative or out of service (OTS) status are indicated.

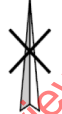
The symbols are grouped into six categories:

- a. Navigation Aids (Nav aids) and Airspace Fixes. These symbols represent an aeronautical navigational element based on a single latitude/longitude data point.
- b. Airports and Runways. These symbols represent airports, landing areas, and associated aircraft movement areas. Airport symbols are based on a single latitude/longitude data point. Aircraft movement areas (e.g., runways, taxiways, and ramps) are shapes and polygons based on multiple latitude/longitude data points.
- c. Airspace and Boundaries. These symbols represent airspace, geographical, and cultural boundaries. They are shapes and polygons based on multiple latitude/longitude points.
- d. Flight Tracks, Airways, and Routes. These symbols represent tracks, courses, airways, and routes between navigation aids and airspace fixes. They are represented as linear elements based upon multiple latitude/longitude data points.
- e. Vertical Profile View. These symbols represent the depiction of elements in a vertical profile (e.g. the vertical profile view of an instrument approach procedure).
- f. Miscellaneous Symbols. This category contains symbols that do not fall in the categories listed above. They represent a variety of features based on single or multiple latitude/longitude data points (e.g., obstacles, rivers, and roads).

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Navigation Aids & Airspace Fixes						
Symbol Name	Recommended Basic Symbol	Flyover Symbol	Compulsory Reporting Point	Inoperative (OTS) Indication	Upright or Rotated	Description
VHF Omni-Directional Navaids						
Generic Navaid		Not Defined	Not Defined		Not Applicable	The Generic Navaid symbol is depicted as a single small dot surrounded by a small circle.
Max Zoom Navaid		Not Applicable	Not Applicable	Not Applicable	Not Applicable	The Max Zoom navaid symbol is depicted as a single small dot.
VOR					Upright	Hexagon
DME		Not Applicable	Not Applicable		Upright	Square
VORDME					Upright	Hexagon inside a rectangle. Combined VOR and DME symbols.
TACAN					Upright	Three "tabs" extending from hexagon shape, with three sides of the hexagon are omitted.
VORTAC					Upright	Combination of VOR and TACAN symbols. Three "tabs" extending from hexagon shape. Entire hexagon shape is shown. The tabs may be filled (solid) or unfilled (open). The tabs must be filled (solid) if compulsory reporting status is to be shown.
Compass Rose		Not Applicable	Not Applicable	Not Applicable	Rotated	The Compass Rose symbol is depicted as a circle with tick marks to indicate cardinal direction. The size of the Compass Rose symbol should be enlarged proportionally to the basic VHF Navaid symbol, if used.
LF Navaids						
Non Directional Beacon (NDB) or Locator					Upright	The NDB or Locator symbol is depicted as a series of small dots shown as concentric circles. Number and complexity of dots may vary based on manufacturer capabilities.
Marker Beacon (all types)		In conventional navigation, it is assumed that marker beacons are fly-over fixes.	Not Applicable	Not Applicable	Rotated	Two arcs joined at each end. The Marker Beacon symbol is rotated perpendicular to the associated Localizer course.
Locator Outer Marker (LOM)		Not Applicable	Not Applicable		Rotated	Combined Locator and Marker Beacon. The Marker Beacon symbol is rotated perpendicular to the associated Localizer course.

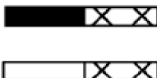
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Navigation Aids & Airspace Fixes						
Symbol Name	Recommended Basic Symbol	Flyover Symbol	Compulsory Reporting Point	Inoperative (OTS) Indication	Upright or Rotated	Description
VHF Localizer Navaids						
Generic Localizer NAVAID		Not Applicable	Not Applicable		Rotated	Both sides of Centerline are the same (eg filled or unfilled, but the centerline must be distinguishable)
Localizer Front Course (includes ILS LOC, LDA and SDF)		Not Applicable	Not Applicable		Rotated	Symbol includes course centerline. LOC Front Course = Left side open (transparent) and Right side is filled (shading, patterned or color, light or dark). Different methods of filling should be used to distinguish the LOC Front Course from the LOC Back Course. Localizer Front Course symbol origin point is at the tip. The symbol is aligned to the appropriate course.
Localizer Back Course		Not Applicable	Not Applicable		Rotated	Symbol includes course centerline. LOC Back Course = Right side open (transparent) and Left side is filled (shading, patterned or color). Different methods of filling should be used to distinguish the LOC Front Course from the LOC Back Course. Localizer Back Course symbol origin point is at the tip. The symbol is aligned to the appropriate course.
Microwave Landing System (MLS)		Not Applicable	Not applicable		Rotated	The symbol is the same as the Localizer Front Course. Symbol origin point is at the tip. The symbol is aligned to the appropriate course. Symbol includes course centerline.
Airspace Fixes						
Max Zoom Airspace Fix		Not Applicable	Not Applicable	Not Applicable	Not Applicable	The Max Zoom airspace symbol is depicted as a single small dot.
Intersection				Not Applicable	Upright	The Intersection is depicted as a triangle.
Waypoint				Not Applicable	Upright	The Waypoint symbol is depicted as a four pointed star shape.
Unnamed Airspace Fix, Mileage Break, or Turn Point		Not Applicable	Not Applicable	Not Applicable	Upright	The symbol is depicted as a small X with two intersecting lines placed at right angles.

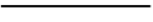
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Airports, Heliports, Runways & Surface Movement Areas				
Symbol Name	Recommended Basic Symbol	Closed	Upright or Rotated	Description
Airports & Heliports				
Generic Airport			Not Applicable	The Generic Airport symbol is depicted as a single open circle.
Max Zoom Airport / Heliport		Not Applicable	Not Applicable	This symbol is depicted as a single small dot.
Airport - Civil			Upright	This symbol is depicted as a single circle with a minimum of 4 small tabs. Civilian Use Airport.
Airport - Military			Upright	This symbol is depicted as two concentric circles.
Airport - Joint Civil Military			Upright	The symbol is a combination of the Civil Airport symbol and the inner circle of the Military Airport.
Generic Heliport			Upright	Same as the Generic Airport symbol including the letter H.
Heliport - Civil			Upright	Civil Airport including the letter H.
Heliport - Military			Upright	Military Airport including the letter H.
Heliport - Joint Civil Military			Upright	Same as the Joint Use Civil Military including the letter H.
Generic Seaport			Upright	Same as the Generic Airport symbol including an anchor symbol.
Seaport - Civil			Upright	Civil Airport including an anchor symbol.

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Airports, Heliports, Runways & Surface Movement Areas				
Symbol Name	Recommended Basic Symbol	Closed	Upright or Rotated	Description
Runways & Surface Movement Areas				
Runway Sketch		Not Applicable	Rotated	Runway layout is either outlined or represented with a solid line. Small graphical depiction used to represent a runway layout.
Runway - Paved (Hard Surface)			Rotated	The symbol is depicted as a rectangle or line placed in correct alignment and configuration. Solid (filled) interior indicates Paved or Hard Surface. Grey Scale (screen percentage) may vary based on the display background color. Grey scale for Runway should be more prominent than Unpaved Runway, Taxiway or Ramp. Closed status is indicated with two or more "X"s which need to be in view at all zoom levels and scales. Actual implementation may vary between static and dynamic displays.
Runway - Unpaved (Soft Surface)			Rotated	The symbol is depicted as a rectangle or line placed in correct alignment and configuration. The rectangle may be left open (unfilled) or shaded, but should be distinguishable from Paved Runway and Taxiway surfaces. Closed status is indicated with two or more "X"s which need to be in view at all zoom levels and scales. Actual implementation may vary between static and dynamic displays.
Displaced Threshold		Not Applicable	Rotated	Rectangle placed perpendicular to the runway centerline at the appropriate distance from runway end. The rectangle is left open or unfilled.
Overrun, Stopway, EMAS or Blast pad			Rotated	The symbol is depicted as a rectangle placed at the runway end at the appropriate distance and dimension. The rectangle may be left open (unfilled) or shaded, but should be distinguishable from Paved Runway and Taxiway surfaces. Closed status is indicated with two or more "X"s which need to be in view at all zoom levels and scales. Actual implementation may vary between static and dynamic displays.
Aircraft Movement Area/ (Ramp, Taxiway)			Rotated	The symbol is depicted as complex shapes and polygons. A screened fill indicates aircraft movement area. Grey Scale (screen percentage) may vary based on the display background color. Grey scale for Taxiway or Ramp should be less prominent than Runway. Closed status is indicated with two or more "X"s which need to be in view at all zoom levels and scales. Actual implementation may vary between static and dynamic displays.

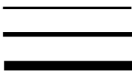
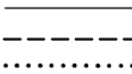
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Airspace & Boundaries				
Line / Linear Pattern Name	Recommended Basic Line / Linear Pattern	Depiction Category	Upright or Rotated	Description
Generic Depiction of Airspace				
Generic Airspace (Depiction Category 1)		1	Rotate	A Thick Continuous line may be used to generically represent all Depiction Category 1 airspace. Line weight (thickness) is used to indicate relative importance where a thicker line represents a higher impact Depiction Category. The relative importance can be visually indicated through other design features (i.e., luminance).
Generic Airspace (Depiction Category 2 & 3)		2 & 3	Rotate	A Medium Continuous line may be used to generically represent all Depiction Category 2 & 3 airspace. Line weight (thickness) is used to indicate relative importance where a thicker line represents a higher impact Depiction Category. The relative importance can be visually indicated through other design features (i.e., luminance).
Generic Airspace (Depiction Category 4 & 5)		4 & 5	Rotate	A Thin Continuous line may be used to generically represent all Depiction Category 4 & 5 airspace. Line weight (thickness) is used to indicate relative importance where a thicker line represents a higher impact Depiction Category. The relative importance can be visually indicated through other design features (i.e., luminance).
Max Zoom Generic Airspace		1 thru 5	Rotate	A Thin Continuous line may be used to generically represent all five Depiction Categories of airspace.
Special Use Airspace (SUA)				
Buffer Zone or Non-Free Flying Zone, National Security Area, Prohibited Area (P), Temporary Flight Restricted Area (TFR)		1	Rotate	A Thick Continuous line represents the outer boundary with angled lines on the interior or active side. Optimum placement of text labels is on the interior or active side.
Danger Area (D), Restricted Area (R)		2	Rotate	A Medium Continuous line represents the outer boundary with angled lines on the interior or active side. Optimum placement of text labels is on the interior or active side.
Alert Area (A), Caution Area (C), Military Operations Area (MOA), Temporary Reserve Area or Temporary Segregated Area (TRA or TSA), Warning Area (W)		3		
Advisory Area (Canada), Special Rules Area or Special Rules Zone (SRA or SRZ), Training Area (T)		5	Rotate	A Thin Continuous line represents the outer boundary with angled lines on the interior or active side. Optimum placement of text labels is on the interior or active side.

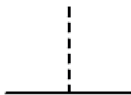
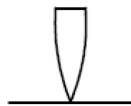
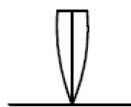
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Airspace & Boundaries				
Line / Linear Pattern Name	Recommended Basic Line / Linear Pattern	Depiction Category	Upright or Rotated	Description
Air Traffic Service (ATS) Airspace				
Air Traffic Zone (ATZ), Class A, B or C Airspace Boundary, Control Zone (CTZ/CTR), Oceanic Control Area (OCA), Positive Control Area (PCA), Terminal Control Area (TCA/TMA), Upper Control Area (UCA/UTA)		2	Rotate	A Medium Continuous line represents the outer boundary with a shaded band on the interior or active side. Optimum placement of text labels is on the interior or active side.
Class D Airspace Boundary		2	Rotate	A Thin Continuous line represents the outer boundary with a shaded band on the interior or active side. Optimum placement of text labels is on the interior or active side. The thin boundary line is used to help distinguish the difference between Class D airspace from Class B and C airspace.
Military Air Traffic Zone (MATZ), Military Control Zone (MCTR)		2	Rotate	A Thin Continuous line represents the outer boundary with a shaded band on the interior or active side. Optimum placement of text labels is on the interior or active side. The thin boundary line is used to help distinguish the difference between MATZ/MCTR airspace from Class B and C airspace.
Class E or F Airspace Boundary, Helicopter Protected Zone or Helicopter Traffic Zone (HPZ or HTZ), Terminal Radar Service Area (TRSA), Traffic Information Area or Traffic Information Zone (TIA or TIZ)		5	Rotate	A Thin Continuous line represents the outer boundary with a shaded band on the interior or active side. Optimum placement of text labels is on the interior or active side.
Miscellaneous Airspace or Boundaries				
Air Defense Identification Zone (ADIZ)		1	Rotate	The linear pattern is depicted as a thin line with 3 sets of parallel dots on the interior or active side. Optimum placement of text labels is on the interior or active side.
Flight Information Region (FIR/UIR) or Air Route Traffic Control Center (ARTCC)		3	Rotate	A thin line with small ticks on both sides of the line.
Class G Airspace (Uncontrolled or Unregulated airspace)		5	Rotate	Represented as complex shapes or closed polygons. Shading or Area Fill indicates the Uncontrolled or Unregulated Airspace. Shading intensity is at the manufacturer's discretion.
CNS/ATM Equipment Requirement Area Boundary (RVSM, MNPS, RNP etc.)		4	Rotate	The linear pattern is depicted as a series of screened shaded dots. Optimum placement of text labels is on the interior or active side.

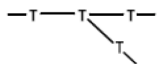
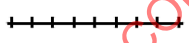
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Airways, Routes & Flight Tracks				
Symbol / Line Name	Recommended Basic Symbol / Line	Inoperative (OTS) Indication	Upright or Rotated	Description
Generic Line Weights (3)		Not Applicable	Rotated	Three line weights depicted are; Thin, Medium, or Thick. Line weight (thickness) is used to indicate relative importance where a thicker line represents a higher significance.
Generic Line Styles (3)		Not Applicable	Rotated	Three line styles depicted are; Continuous, Dashed, Dotted. Line style is used to indicate relative importance where a continuous line represents a higher significance.
Enroute Airway or ATS Route			Rotated	The enroute Airway or ATS Route is depicted as a Medium Continuous line. Closed status is indicated with two or more "X"s per segment which need to be in view at all zoom levels and scales. "X"s may be applied to the appropriate label when shown instead of the linear element. Actual implementation may vary between static and dynamic displays.
Uncontrolled Enroute Airway or ATS Route			Rotated	The Uncontrolled Enroute Airway or ATS route is depicted as a Medium Alternating Long and Short Dashed line. Closed status is indicated with two or more "X"s per segment which need to be in view at all zoom levels and scales. "X"s may be applied to the appropriate label when shown instead of the linear element. Actual implementation may vary between static and dynamic displays.
Procedure Track		Not Applicable	Rotated	Thick Continuous line
Missed Approach Procedure Track		Not Applicable	Rotated	The Missed Approach Procedure Track is depicted as a Medium Dashed Line. DOT-VNTSC-FAA-07-07 indicated that the dashed missed approach line is one of the most accurately recognized line styles across pilots.
Transition Route or Feeder Route			Rotated	This symbol is depicted as a Medium Continuous line. Closed status is indicated with two or more "X"s per segment which need to be in view at all zoom levels and scales. "X"s may be applied to the appropriate label when shown instead of the linear element. Actual implementation may vary between static and dynamic displays.
Intersection Formation (Radial or Bearing)			Rotated	This symbol is depicted as a Thin Continuous line. Closed status is indicated with two or more "X"s per segment which need to be in view at all zoom levels and scales. "X"s may be applied to the appropriate label when shown instead of the linear element. Actual implementation may vary between static and dynamic displays.
Directional Indicator (Arrow)		Not Applicable	Rotated	This symbol is depicted as an arrowhead. Indicates the direction of flight. Used for single direction routes.
Holding Pattern		Not Applicable	Rotated	The symbol is depicted as a racetrack pattern. Directional indicators are optional. Line Weight and Line Style used for Holding Patterns (HP) should conform to the associated phase of flight or relative use; e.g. Procedure / Course Reversal HP = Thick Continuous Line, Missed Approach HP = Medium Dashed Line, ATC or Transition HP = Medium Continuous Line.
Missed Approach Holding Pattern		Not Applicable	Rotated	The symbol is depicted as a racetrack pattern with dashed lines. Directional indicators are optional. DOT-VNTSC-FAA-07-07 indicated that the dashed missed approach line is one of the most accurately recognized line styles across pilots.
Generic IFR Procedure Indicator		Not Applicable	Rotated	The symbol is depicted as a stylized Arrow. Symbol origin point is at the tip. The symbol is aligned to the appropriate course. Used to indicate availability of an instrument approach or departure procedure. May include additional text attributes to indicate specific procedure type (e.g. ILS, RNAV, LPV, VOR, etc.).

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Vertical Profile View			
Symbol Name	Recommended Basic Symbol	Inoperative (OTS) Indication	Description
Navaid or RNAV Waypoint		Not Applicable	The symbol is depicted as a Thin continuous vertical line. Represents all ground-based Nav aids (VHF and LF Nav aids) and RNAV Waypoints. May also be used to represent Marker Beacons (generically).
Conventional Airspace Fix (Intersection or DME Fix)		Not Applicable	The symbol is depicted as a Thin vertical dashed line. Represents all Conventional Airspace Fixes such as Intersection, DME Fix, or Reporting Point (ICAO). Conventional Airspace Fixes are formed by ground-based Nav aids.
Generic Marker Beacon		Not Applicable	The symbol is depicted as a Thin vertical continuous line. Same as ground-based Nav aid or Waypoint symbol. May be used to represent Marker Beacons in generic form.
Marker Beacon		Not Applicable	The symbol is depicted as a combination of vertical lines and partial ellipses/arcs. Represents Marker Beacons of all type.
Navaid or RNAV Waypoint co-located with Marker Beacon		Not Applicable	The symbol is depicted as combination of Nav aid or RNAV Waypoint and Marker Beacon symbols. Combined Nav aid or RNAV Waypoint and Marker Beacon.
Conventional Airspace Fix (Intersection or DME Fix) co-located with Marker Beacon		Not Applicable	Combination of Conventional Airspace Fix and Marker Beacon symbols
Generic Vertical Path		Not Applicable	Thin solid continuous line which represents a vertical path.
Navaid Glide Slope (ILS / MLS)		Not Applicable	The "feather" symbol is constructed with a thin solid continuous line. Represents the electronic signal of the Glide Slope component of ground-based ILS or MLS Nav aid Systems. Not intended for the depiction of vertical guidance provided by GPS, GNSS, WAAS or GLS systems, or for a computed Descent Angle or VNAV path. Symbol is intended for use on static chart displays or during briefing phase of flight. Not required during the execution phase of a flight procedure on dynamic or moving map displays.
Runway		Not Applicable	Thick solid line or rectangle below the profile ground line.
Final Approach Fix (FAF)		Not Applicable	The symbol is depicted as a stylized Maltese Cross. Used in conjunction with the appropriate Nav aid or Airspace Fix symbol.

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Miscellaneous			
Symbol Name	Recommended Basic Symbol	Upright or Rotated	Description
Terrain Contours		Rotated	Depicted as simple curved lines and complex shapes. Lines which connect points of equal elevation..
Spot Elevation		Upright	Depicted as a single small dot. Location of a Natural Terrain point.
Obstacle (single)		Upright	Depicted as an inverted "V" shape with a dot in the center. Single man made obstacle.
Obstacle (group)		Upright	Depicted as an inverted "V" shape with a dot in the center. Group of two or more man made obstacle.
Transmission Line or Power Lines		Rotated	Depicted as a series of "T"s connected by lines. Note: Transmission Line symbol rotates, while the "T" remains upright.
Road		Rotated	Single continuous line(s).
Road (Multi-Lane)		Rotated	Parallel continuous lines.
Railroad		Rotated	Single continuous line with a series of perpendicular tick marks. Parallel lines may be used to indicate a multiple track.
River or Stream		Rotated	Shading or Area Fill indicates the water body. Flowing Body of Water. Represented as complex shapes.
Lake or Pond		Rotated	Shading or Area Fill indicates the water body. Closed Body of Water. Represented as complex shapes.
Shoreline		Rotated	Shading or Area Fill indicates the water body. Large Open Body of Water. Represented as complex shapes.
Urban Area or Population Center		Rotated	Shading or Area Fill indicates the urban or city area. Represented as complex shapes and polygons.
Large Buildings		Rotated	Complex shapes and polygons with a Solid Area Fill.
Time Zone Boundary		Rotated	A boundary composed of a series of Upper Case T text characters.
International Boundary		Rotated	A boundary composed of a Medium Weight line of alternating single long and double short dashes.

APPENDIX D – DEPICTION CATEGORIES

These categories were defined by the Committee for the purpose of creating display symbols that reflect the relative significance of a particular airspace or boundary to a flight crew. The categories are ordered from highest to low potential impact on the flight operation (1 through 5), and described briefly below.

If appropriate, the categories may be used to prioritize the line thicknesses of airspaces and boundaries that are depicted with basic line styles. These categories can also be used to prioritize amongst overlapping boundaries.

1. In-Flight Hazard (including Military Enforcement)

This includes airspace and boundaries that pose a catastrophic consequence to the aircraft and its occupants if entered or crossed without appropriate authorization or coordination.

2. ATC or Regulatory Enforcement

This includes airspace that poses a risk of regulatory enforcement or penalty if entered without appropriate authorization or coordination.

3. Notification or Coordination

This includes airspace where appropriate coordination is recommended but not mandated prior to entry.

4. CNS/ATM Equipment Requirement

This includes airspace where specific Communication, Navigation or Surveillance (CNS) performance, equipage, or approval are required (e.g., MNPS, RVSM, or other airspace with specific PBN requirements).

5. Operational Reference and Miscellaneous Information

This includes all airspace and locations not covered in the first four categories. Airspace types unique to a region or country may exist which are not identified in one of the Depiction Categories below. Additionally, new airspace types may be developed. When an airspace type is not covered in these categories refer to the definitions provided to determine which category is most appropriate.

Table D1 below shows airspace types sorted by depiction categories.

TABLE D1 AIRSPACE TYPES SORTED BY DEPICTION CATEGORIES

Depiction Category	Airspace Name
1	Air Defense Identification Zones (ADIZ)
1	National Security Area (NSA) (United States)
1	Buffer Zone/Non-Free Flying Zone
1	Prohibited Airspace Area (P)
1	Temporary Flight Restriction Area (TFR)
2	Air Traffic Zone (ATZ)
2	Class A Airspace
2	Class B Airspace
2	Class C Airspace
2	Class D Airspace
2	Control Area CTA