INTRODUCTION

This Chart User's Guide is intended to serve as a learning aid, reference document and an introduction to the wealth of information provided on aeronautical charts and publications of the Federal Aviation Administration's (FAA) National Aeronautical Charting Office (NACO). This guide can also serve as a basic reference of chart information for experienced pilots.

The Federal Avaition Administration (FAA) publishes charts for each stage of VFR (Visual Flight Rules) and IFR (Instrument Flight Rules) flight including training, planning, departure, enroute (low and high altitude), approach, and taxiing. A description of the charts, other aeronautical products, chart coverage, ordering instructions, and a list of FAA chart agents are included in the FAA Aeronautical Chart Catalog, available free upon request from:

FAA/NACO Distribution Division AVN-530
6303 Ivy Lane, Suite 400
Greenbelt, MD 20770

Phone: 800-638-8972
Website: http://naco.faa.gov
E-mail: 9-AMC-Chartsales@faa.gov

Terms and abbreviations used in this publication are defined in the FAA Aeronautical Information Manual (AIM) Pilot/Controller Glossary. Unless otherwise indicated, miles are nautical miles (NM), altitudes are in feet above Mean Sea Level (MSL), and times are Coordinated Universal Time (UTC). To be assured of having the most current information, pilots should also refer to other sources such as Notices to Airman (NOTAMs), Airport/Facility Directory (AFD) and the Special Notices page of the NACO website. Chart symbols in this guide are current to June, 2002.

USING CURRENT CHARTS

Use of obsolete charts or publications for navigation may be dangerous. Aeronautical information changes rapidly, and it is vitally important that pilots check the effective dates on each aeronautical chart and publication to be used. Obsolete charts and publications should be discarded and replaced by current editions.

To make certain a chart or publication is current, refer to the next scheduled edition date printed on the cover. Pilots should also consult Aeronautical Chart Bulletins in the **Airport/Facility Directory** or NACO Website (http://naco.faa.gov) and **NOTAMs** for changes essential to the safety of flight that may occur during the effective dates of a chart or publication.

The Notices to Airman Publication also includes current Flight Data Center NOTAMs, which are regulatory in nature and primarily reflect changes to Standard Instrument Approach Procedures (SIAPs), flight restrictions, and aeronautical chart revisions. This publication is prepared every 14 days by the FAA, and is available by subscription from the Government Printing Office.

REPORTING CHART DISCREPANCIES

Every effort is made to ensure that each piece of information shown on NACO charts and publications is accurate. Source materials are verified to the maximum extent possible.

You, the pilot, are a valuable source of information. You are encouraged to notify the National Aeronautical Charting Office of any discrepancies you observe while using our charts and related publications. Postage-paid chart correction cards are available at FAA Flight Service Stations for this purpose (or you may write directly to us, at the address below). Should delineation of data be required, mark and clearly explain the discrepancy on a current chart (a replacement copy will be returned to you promptly). Mail the corrected chart to the address below. Suggestions concerning this guide should also be sent to this address:

National Aeronautical Charting Office, FAA
AVN-510 SSMC4 Sta. 2355
1305 East-West Highway
Silver Spring, MD 20910-3281

Telephone Toll-Free 1-800-626-3677
E-mail: 9-AMC-Aerochart@faa.gov

EXPLANATION OF VFR TERMS AND SYMBOLS

The discussions and examples in this section are based on the Sectional aeronautical charts. These charts include the most current data and are at a scale (1:500,000) most beneficial to pilots flying under Visual Flight Rules. A pilot should have little difficulty in reading these charts which are, in many respects, similar to automobile road maps. Each chart is named for a major city within its area of coverage.

The chart legend lists various aeronautical symbols as well as information concerning terrain and contour elevations. You may identify aeronautical, topographical, and obstruction symbols (such as radio and television towers) by referring to the legend. Many landmarks which can be easily recognized from the air, such as stadiums, pumping stations, refineries, etc., are identified by brief descriptions adjacent to small black squares marking their exact locations ▪ cabln . Oil wells are shown by small circles ○ oil . Water, oil and gas tanks are shown by small black circles • water and labeled accordingly, if known. The depictions of many items larger than scale are exaggerated on the charts for improved legibility.

NACO charts are prepared in accordance with specifications of the Interagency Air Cartographic Committee (IACC), and are approved by representatives of the Federal Aviation Administration and the Department of Defense.

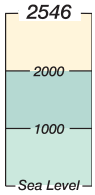
TERRAIN AND OBSTRUCTIONS

The elevation and configuration of the Earth's surface are certainly of prime importance to pilots. Cartographers devote a great deal of attention to showing relief and obstruction data in a clear and concise manner. Five different techniques are used to show this information: Contour lines, shaded relief, color tints, obstruction symbols, and Maximum Elevation Figures. (MEF)

1. Contour lines are lines connecting points on the Earth of equal elevation. On Sectional aeronautical charts, basic contours are spaced at 500 foot intervals. Intermediate contours may also be shown at 250 foot intervals in moderately level or gently rolling areas. Occasionally, auxiliary contours at 50, 100, 125, or 150 foot intervals may be used to portray smaller relief features in areas of relatively low relief. The pattern of these lines and their spacing gives the pilot a visual concept of the terrain. Widely spaced contours represent gentle slopes, while closely spaced contours represent steep slopes.

2. Shaded relief is a depiction of how the terrain might appear from the air. The cartographer shades the areas that would appear in shadow if illuminated by a light from the northwest. Studies have indicated that our visual perception has been conditioned to this view.

3. Color tints are used to depict bands of elevation. These colors range from light green for the lowest elevations to brown for the higher elevations.



4. Obstruction symbols are used to depict man-made vertical features that may affect the National Airspace System. NACO maintains a file of over 90,000 obstacles in the United States, Canada, the Caribbean and Mexico. Each obstacle is evaluated by cartographers before it is added to the visual charts. When the position or elevation of an obstacle is unverified, it is marked UC (under construction or reported but not verified).

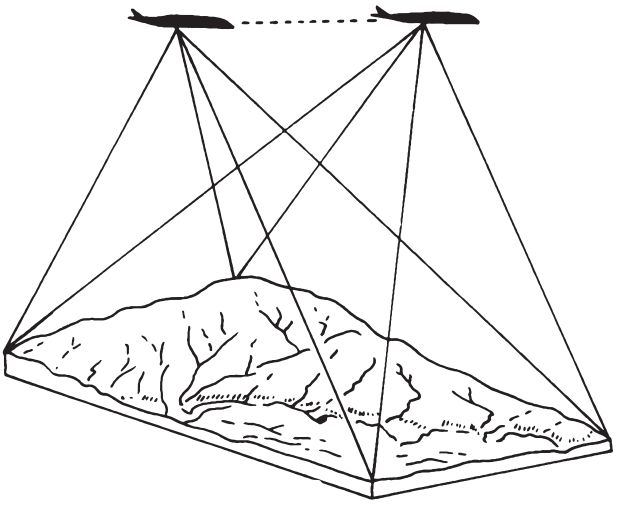
The data in the Digital Obstacle File (DOF) is collected and disseminated as part of NACO's responsibility for managing the National Airspace System.

Source data on terrain and obstructions is sometimes not complete or accurate enough for use in aeronautical publications; for example, a reported obstruction may be plotted on a map with insufficient detail for determining the obstruction's position and elevation. Such cases are identified by NACO and investigated by the FAA Flight Edit program.

The FAA Flight Edit crew conduct data verification missions in an aircraft equipped with an aerial mapping camera. The pilots visually verify cultural and topographic features and review all obstacle data.

This review includes checking for obstructions that may have been constructed, altered, or dismantled without proper notification. Unverified obstacles are pho-

tographed and the position and elevation are determined photogrammetrically.



Generally, only man-made structures extending more than 200 feet above ground level are charted. Objects 200 feet or less are charted only if they are considered hazardous obstructions; for example, an obstruction is much higher than the surrounding terrain or very near an airport. Examples of features considered obstacles to low level flight are antennas, tanks, factories, lookout towers, and smoke-stacks.

Obstacles less than 1000 feet above ground level are shown by the symbol . Obstacles 1000' and higher above ground level are shown by the symbol . Man-made features which can be seen clearly from the air and can be used as checkpoints may be represented with pictorial symbols shown in black with the required elevation data in blue.

The height of the structure above ground level and the elevation of the top of the obstacle above sea level are shown when known or when they can be reliably determined by the cartographer. The height above ground level is shown in parentheses below the elevation above mean sea level of the top of the obstacle (650) . In extremely congested areas the above ground level values may be omitted to avoid confusion.

Obstacles are portrayed wherever possible. But since legibility would be impaired if all obstacles within city complexes or within high density groups of obstacles were portrayed, only the highest obstacle in an area is shown using 4977 (1432) , the group obstacle symbol.

Obstacles under construction are indicated by the letters UC immediately adjacent to the symbol. If available, the above ground level height of the obstruction is shown in parentheses; for example, (1501) . Obstacles with high intensity strobe lighting systems are shown as:

5. The Maximum Elevation Figure (MEF) represents the highest elevation, including terrain and other vertical obstacles (towers, trees, etc.), bounded by graticules. Graticules on Sectional aeronautical charts are the ticked lines dividing each 30 minutes of latitude and each 30 minutes of longitude. MEF figures are depicted to the nearest 100 foot value. The last two digits of the number are not shown. In this example the MEF represents

ATTENTION

THIS CHART CONTAINS MAXIMUM ELEVATION FIGURES (MEF).
The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. The MEF is based on information available concerning the highest known feature in each quadrangle, including terrain and obstructions (trees, towers,antennas,etc.).

Example: 12,500 feet ..... 12^{5}

12,500 feet. MEFs are shown over land masses as well as over open water areas containing man-made obstacles such as oil rigs.

In the determination of MEFs, extreme care is exercised to calculate the values based on the existing elevation data shown on source material. Cartographers use the following procedure to calculate MEFs:

When a man-made obstacle is more than 200 feet above the highest terrain within the area bounded by graticules:

1. Determine the elevation of the top of the obstacle above mean sea level (MSL).
2. Add the possible vertical error of the source material to the above figure (100 feet or 1/2 contour interval when interval on source exceeds 200 feet. U.S. Geological Survey Quadrangle Maps with contour intervals as small as 10 feet are normally used).
3. Round the resultant figure up to the next higher hundred foot level.

Example: Elevation of obstacle top (MSL) =		**2424**
Possible vertical error	**+**	**100**
	equals	**2524**
Raise to the following 100 foot level		**2600**
Maximum Elevation Figure (MSL)		**26**

When a natural terrain feature or natural vertical obstacle (e.g. a tree) is the highest feature within the area bounded by graticules:

1. Determine the elevation of the feature.
2. Add the possible vertical error of the source to the above figure (100 feet or 1/2 the contour interval when interval on source exceeds 200 feet).
3. Add a 200 foot allowance for natural or man-made obstacles which are not portrayed because they are below the minimum height at which the chart specifications require their portrayal.

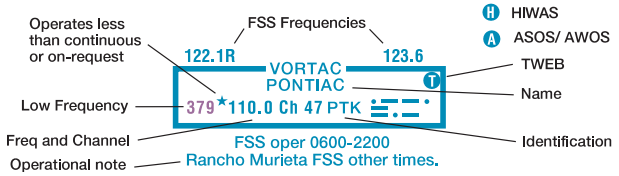
4. Round the figure up to the next higher hundred foot level.

Example: Elevation of obstacle top (MSL) =		**3450**
Possible vertical error	**+**	**100**
Obstacle Allowance		**200**
	equals	**3750**
Raise to the following 100 foot level		**3800**
Maximum Elevation Figure (MSL)		**38**

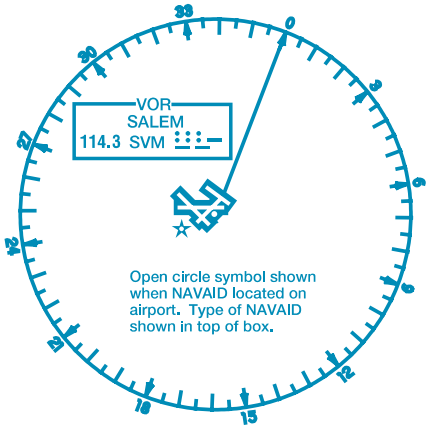
Pilots should be aware that while the MEF is based on the best information available to the cartographer, the figures are not verified by field surveys. Also, you must consult the Aeronautical Chart Bulletin in the Airport/Facility Directory or NACO website to ensure that your chart has the latest MEF data available.

RADIO AIDS TO NAVIGATION

On visual charts, information about radio aids to navigation is boxed, as illustrated. Duplication of data is avoided. When two or more radio aids in a general area have the same name with different frequencies, TACAN channel numbers, or identification letters, and no misinterpretation can result, the name of the radio aid may be indicated only once within the identification box. VHF/UHF radio aids to navigation names and identification boxes (shown in blue) take precedence. Only those items that are different (e.g., frequency, Morse Code) are repeated in the box in the appropriate color. The choice of separate or combined boxes is made in each case on the basis of economy of space and clear identification of the radio aids.



Radio aids to navigation located on an airport depicted by the pattern symbol may not always be shown by the appropriate symbol. A small open circle indicates the NAVAID location when co-located with an airport symbol. The type of radio aid to navigation may be indicated by letter identification; e.g., VOR, VORTAC, etc., positioned on and breaking the top line of the identification box.



AIRPORTS

Airports in the following categories are charted as indicated (additional symbols are shown later in this Section).

Public use airports:

Hard-surfaced runways greater than 8069'

Hard-surfaced runways 1500' to 8069'

Other than hard-surfaced runways

Seaplane bases

Military airports:

Other than hard-surfaced runways

Hard-surfaced runways are depicted the same as public-use airports.

Military airports are identified by abbreviations such as AFB, NAS, AAF, NAAS, NAF, MCAS, DND, etc.

Services available:

Tick marks around the basic airport symbol indicate that fuel is available and the airport is tended during normal working hours. (Normal working hours are Monday through Friday 10:00 A.M. to 4:00 P.M. local time.)

Other airports with or without services:

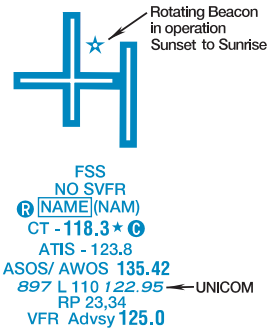
Airports are plotted in their true geographic position unless the symbol conflicts with a radio aid to navigation (navaid) at the same location. In such cases, the airport symbol will be displaced, but the relationship between the airport and the navaid will be retained.

Airports are identified by their designated name. Military airport names all include abbreviations (such as AFB, NAS, AAF, NAAS, NAF, MCAS, DND, etc.) indicating the type of facility. Generic parts of long airport names (such as "airport," "field," or "municipal") and the first names of persons are commonly omitted unless they are needed to distinguish one airport from another with a similar name.

The following figure illustrates the coded data that is provided along with the airport name. The elevation of an airport is the highest point on the usable portion of the landing areas. Runway length is the length of the longest active runway including displaced thresholds and excluding overruns. Runway length is shown to the nearest 100 feet, using 70 as the division point; a runway

8070' long is charted as 81, and a runway 8069' long is charted as 80.

Airports with control towers, and their related information, are shown in blue. All other airports, and their related information, are shown in magenta (reddish purple).



FSS - Flight Service Station on field

NO SVFR - Airports where fixed wing special visual flight rules operations are prohibited (shown above airport name) F.A.R. 91

□ - Indicates F.A.R. 93 Special Air Traffic Rules and Airport Traffic Patterns

R - Airport Surveillance Radar (Not shown on WAC)

(NAM) - Location Identifier (Not shown on WAC)

CT - 118.3 - Control Tower (CT) - primary frequency

★ - Star indicates operation part-time. See tower frequencies tabulation for hours of operation

C - Indicates Common Traffic Advisory Frequencies (CTAF) (Not shown on WAC)

ATIS 123.8 - Automatic Terminal Information Service

ASOS/ AWOS 135.42 - Automated Surface Weather Observing Systems (Shown when full-time ATIS is not available) Some ASOS/AWOS facilities may not be located at airport. (Not shown on WAC)

897 - Elevation in feet

L - Lighting in operation Sunset to Sunrise

*L - Lighting limitations exist; refer to Airport/Facility Directory.

110 - Length of longest runway in hundreds of feet; usable length may be less.

UNICOM - Aeronautical advisory station ("U" only on WAC)

RP 23,34 - Runways with Right Traffic Patterns (public use) (Not shown on WAC)

RP* - (See Airport/Facility Directory)

VFR Advsy 125.0 - VFR Advisory Service shown where ATIS is not available and frequency is other than primary CT frequency.

The symbol ☆ indicates the existence of a rotating or flashing airport beacon operating continuously sunset to sunrise.

The symbol "L" indicates that runway lights are on during hours of darkness. The "*L" indicates that the pilot must consult another source (e.g., the Airport/Facility Directory) to determine runway lighting limitations, such as: available on request (by radio call, letter, phone, etc), part-time lighting or pilot/airport controlled lighting. The lighted runway may not be the longest runway available, and may not be lighted full length. A detailed description of airport and air navigation lighting aids available at each airport can be found in the Airport/Facility Directory. The Aeronautical Information Manual thoroughly explains the types and uses of airport lighting aids.

CONTROLLED AIRSPACE

Controlled airspace consists of those areas where some or all aircraft may be subject to air traffic control, such as Class B, Class C, Class D and Class E airspace.

Class E Airspace with floor 700 ft. above surface.

Class E Airspace with floor 1200 ft or greater above surface that abuts Class G Airspace.

The lateral and vertical limits of all controlled airspace up to but not including 18,000 feet are shown by narrow bands of vignette on Sectional aeronautical charts and Terminal Area Charts. Controlled airspace floors of 700 feet above the ground are defined by a magenta vignette; floors other than 700 feet that abut uncontrolled airspace are defined by a blue vignette; differing floors greater than 700 feet above the ground are annotated by a symbol

2400 AGL
4500 MSL

and a number indicating the floor. If the ceiling is less than 18,000 feet MSL, the value (prefixed by the word "ceiling") is shown along the limits of the controlled airspace. These limits are shown with the same symbol indicated above.

Class B Airspace is shown in abbreviated form on World Aeronautical Charts (WAC). The Sectional aeronautical charts and Terminal Area Charts (TAC) show Class B airspace in greater detail. The MSL ceiling and floor altitudes of each sector are shown in solid blue figures with the last two digits eliminated: 90/20 Radials and arcs used to define Class B airspace are prominently shown on Terminal Area Charts. Detailed rules and requirements associated with the particular Class B airspace are shown. The name by which the Class B airspace is identified is shown as: LAS VEGAS CLASS B

Class C Airspace is shown in abbreviated form on World Aeronautical Charts. The Sectional aeronautical charts and Terminal Area Charts show Class C airspace in greater detail.

The MSL ceiling and floor altitudes of each sector are shown in solid magenta figures with the last two digits eliminated: 70/15 . The following figures identify a sector that extends from the surface to the base of the Class B airspace: T/SFC . The name by which the Class C airspace is identified is shown as: BURBANK CLASS C . Separate notes, enclosed in magenta boxes, give the approach control frequencies to be used by arriving VFR aircraft to establish two-way radio communication before entering the Class C airspace (generally within 20 NM):

CTC BURBANK APP WITHIN 20 NM ON 124.6 395.9

Class D Airspace is symbolized by a blue dashed line. Class D airspace operating less than continuous is indicated by the following note: See NOTAMs/Directory for Class D eff hrs . Ceilings of Class D airspace are shown as follows: 30 . A minus in front of the figure is used to indicate "from surface to but not including .... ."

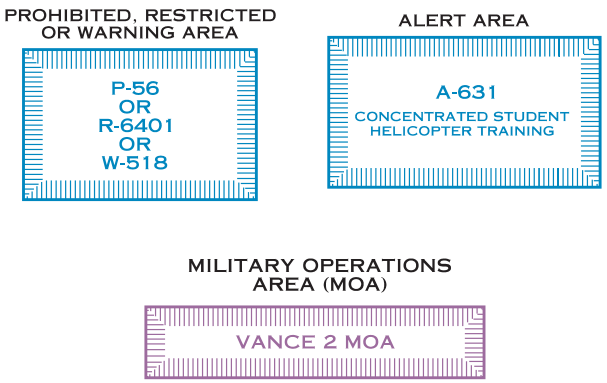
Surface Class E Airspace is symbolized by a magenta dashed line. Class E airspace operating less

than continuous is indicated by the following note:

See NOTAMs/Directory for Class E (sfc) eff hrs .

SPECIAL USE AIRSPACE

Special use airspace confines certain flight activities and restricts entry, or cautions other aircraft operating within specific boundaries. Except for Controlled Firing Areas, special use airspace areas are depicted on visual aeronautical charts. Controlled Firing Areas are not charted because their activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. Nonparticipating aircraft are not required to change their flight paths. Special use airspace areas are shown in their entirety (within the limits of the chart), even when they overlap, adjoin, or when an area is designated within another area. The areas are identified by type and identifying name or number, positioned either within or immediately adjacent to the area.



OTHER AIRSPACE AREAS

Mode C Required Airspace (from the surface to 10,000' MSL) within 30 NM radius of the primary airport(s) for which a Class B airspace is designated, is depicted by a solid magenta line.

Mode C is also depicted within 10 NM of any airport listed in Appendix D of FAR 91.215. Mode C is required but not depicted for operations within and above all Class C airspace up to 10,000' MSL. Enroute Mode C requirements (at and above 10,000' MSL except in airspace at and below 2,500 ft AGL) are not depicted. See FAR 91.215 and the Aeronautical Information Manual (AIM).

FAR 93 Airports and heliports where Federal Aviation Regulation (FAR 93) special air traffic rules and airport traffic patterns apply are shown by "boxing" the airport name.

FAR 91 Airports where fixed wing special visual flight rules operations are prohibited (FAR 91) are shown with the type "NO SVFR" above the airport name.

National Security Areas are indicated on VFR charts with a broken magenta line. Unauthorized aircraft are requested to remain clear of these areas.

Terminal Radar Service Areas (TRSAs) are shown in their entirety, symbolized by a screened black outline of the entire area including the various sectors within the area.

The outer limit of the entire TRSA is a continuous screened black line. The various sectors within the TRSA are symbolized by slightly narrower screened black lines.

Each sector altitude is identified in solid black color by the MSL ceiling and floor values of the respective sector, eliminating the last two digits. A leader line is used when the altitude values must be positioned outside the respective sectors because of space limitations. The TRSA name is shown near the north position of the TRSA as follows: PALM SPRINGS TRSA . Associated frequencies are listed in a table on the chart border.

Military Training Routes (MTRs) are shown on Sectional and Terminal Area Charts and are identified by the route designator: ← IR21 . Route designators are shown in solid black on the route centerline, positioned along the route for continuity. The designator IR or VR is not repeated when two or more routes are established over the same airspace, e.g., IR201-205-227. Routes numbered 001 to 099 are shown as IR1 or VR99, eliminating the initial zeros. Direction of flight along the route is indicated by small arrowheads adjacent to and in conjunction with each route designator.

The following note appears on all Sectional aeronautical charts and VFR Terminal Area Charts covering the conterminous United States.

MILITARY TRAINING ROUTES (MTRs)

All IR and VR MTRs are shown, and may extend from the surface upwards. Only the route centerline, direction of flight along the route and the route designator are depicted - route widths and altitudes are not shown.

Since these routes are subject to change every 56 days, and the charts are reissued every 6 months, you are cautioned and advised to contact the nearest FSS for route dimensions and current status for those routes affecting your flight.

Routes with a change in the alignment of the charted route centerline will be indicated in the Aeronautical Chart Bulletin of the Airport/Facility Directory.

Military Pilots refer to Area Planning AP/1B Military Training Route North and South America for current routes.

There are IFR (IR) and VFR (VR) routes as follows:

Route identification:

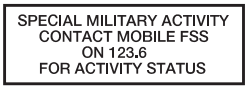
a. Routes at or below 1,500 feet AGL (with no segment above 1,500 feet) are identified by four-digit numbers; e.g., VR1007, etc. These routes are generally developed for flight under Visual Flight Rules.

b. Routes above 1,500 feet AGL (some segments of these routes may be below 1,500 feet) are identified by three-digit or less numbers; e.g., IR21, VR302, etc. These routes are developed for flight under Instrument Flight Rules.

Route widths vary for each MTR and can extend several miles on either side of the charted MTR centerline. Detailed route width information is available in the Flight Information Publication (FLIP) AP/1B (a Depart-

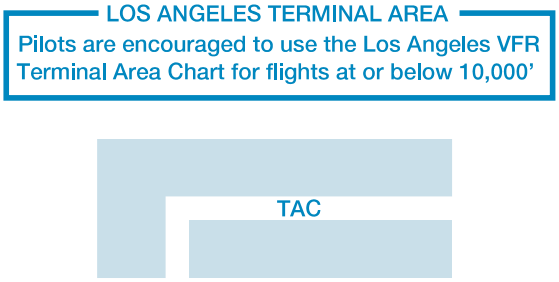
ment of Defense publication), or in the Digital Aeronautical Chart Supplement (DACS).

Special Military Activity areas are indicated on the Sectional charts by a boxed note in black type. The note contains radio frequency information for obtaining area activity status.



TERMINAL AREA CHART (TAC) COVERAGE

Terminal area chart coverage is shown on appropriate Sectional charts by a 1/4" masked line as indicated below. Within this area, pilots should use TACs which provide greater detail and clarity of information. A note to this effect appears near the masked boundary line.



INSET COVERAGE

Inset coverage is shown on appropriate Sectional charts by a 1/8" masked line as indicated below. A note to this effect appears near the masked boundary line.