



BY JAMES E. TERPSTRA

Flying off the edge of an enroute chart is not quite as hazardous as flying off the edge of a flat earth, but if the chart border data is not utilized, it could be as disconcerting. Running out of chart seems to happen at the most inopportune time, but the changes can be made easily if the border information is used.

When approaching the edge of a chart, there is a way to tell which adjoining chart to use — the shaded blue line about two inches from the top of the chart (see illustration below) indicates that US(LO)18 is the next chart to the north and west.

If the chart and map makers had been allowed input, the earth would *not* have been a sphere — it would have been a cube. Trying to project a curved surface onto a flat piece of paper is like fitting a round peg into a square hole. To solve this problem, Jeppesen has selected the Lambert Conformal Conic Projection for most enroute charts, as indicated in the upper right or left corner of each chart. The reason for mentioning projection? You can draw a straight line between two points on a chart to represent a

## The Chart Clinic – Third in a Series

great circle route — the shortest distance between two points on our curved earth.

Once you have selected the correct chart, how do you locate your position fix or destination airport? Latitude and longitude lines and their values are shown throughout the chart. In the chart illustration, just to the northwest of the Lincoln VOR, is the intersection of 41° north latitude and 97° west longitude. The coordinate values are shown adjacent to the latitude and longitude lines. This makes it relatively easy to find locations on the chart, such as the Wahoo, Nebraska Airport at N41°14.4' W96°35.7'.

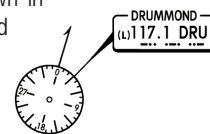
More examples of border information showing “off-the-chart” facilities are also on the chart illustration. On the top and right edges outside the neatline, the next VORs used on the airways are Columbus and Omaha. When an intersection is the next enroute fix beyond the chart edge, the intersection name and the distance to that intersection are indicated just inside the neatline. This can be seen just above the Lincoln VOR on V-6-8 at the right of the chart. The Grett Intersection is 23 miles beyond Yutan Intersection on V-6-8.

The Panny Intersection just southeast of the Lincoln VORTAC is formed by the 137° radial from Lincoln and the 219° radial from the Omaha (OVR) VORTAC that is just outside the chart border. When this situation occurs, the three-letter ident from the navaid off the chart will be included plus its frequency and the radial forming the intersection.

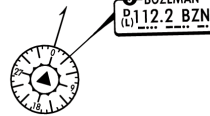
### Navigation Aids

VOR, VORTAC, NDB, ILS and LF — these terms are bantered around frequently by pilots. I have even heard it said that pilots learn their language very well so they cannot be understood by the “lesser” of their peers.

Every VOR facility has a compass rose surrounding the location of the VOR. A single line extends from the 360° radial to indicate magnetic north. The small tick at the end of the line is used to measure angles with the PV-5 plotter. A box immediately adjacent to the VOR compass rose gives the name, frequency, three-letter identifier and Morse code identifier for the VOR and its class. This information is shown in the example for the Drummond VOR. The shadow area on the right and bottom of the box denotes that the Drummond VOR is part of the enroute structure.



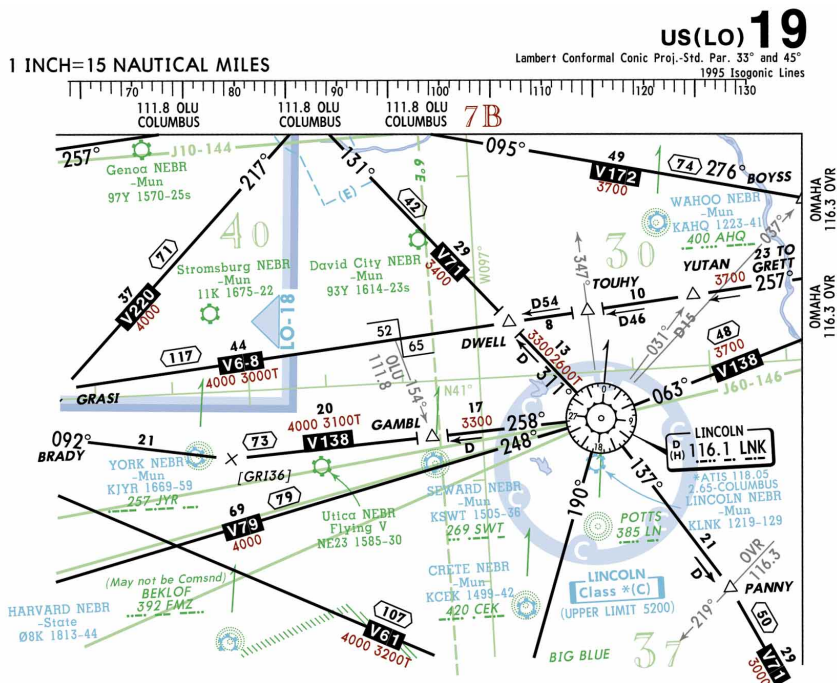
There are two ways of determining if a VOR has DME capability. A VORTAC station that provides DME information is indicated by both a scalloped circle inside the compass rose and a small letter “D” to the left of the VORTAC frequency. For example, the Bozeman VORTAC in the illustration shows both symbols.



### Reporting Points

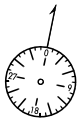
The Bozeman VOR is a compulsory reporting point, as indicated by the solid triangle in the center of the compass rose. In the past, and on international charts, an open triangle in the center of a VOR shows that it is a *noncompulsory* reporting point. By looking at the actual enroute charts for the United States, you will see that all the noncompulsory triangles are missing from the center of the VOR symbols. Why? All nav aids, when used for overflights on either airways or direct flights, are potentially reporting points. The nav aids are mostly noncompulsory reporting points so there is no need to add the triangle symbol in the middle of each VOR symbol.

Over the years, the FAA has reduced the number of compulsory reporting points because of the large increase in radar capability and coverage. There are only a handful of compulsory reporting points remaining in areas where radar coverage is minimal. As an example of the decrease in compulsory reporting points, there is only one compulsory intersection on US(LO)7 that covers the less populated areas of Montana and northern Wyoming and Idaho.



Note the number "9" on the navaid facility box for Bozeman. This indicates additional information somewhere on the same enroute chart panel. On the chart, a note on the top half of the panel states there is a crossing altitude for V-86 and V-365 that is formed by the Bozeman VOR. In Canada, there are no crossing altitudes that are separately stated because the MEA of the next airway segment always indicates the crossing altitude at a VOR or intersection.

Terminal VORs and VORTACs are normally used only in the terminal area for approaches and usually have a range not more than 25 NM. In the illustration, the letter "T" just to the left of the VOR frequency of 109.4 MHz shows that the Buffalo VOR is a terminal VOR. The terminal VOR name, frequency and three-letter identifier are not enclosed in a box that indicates it is not part of an airway. Most terminal VORs are for IFR use, but the letters "VFR only" enclosed in parentheses indicate that Buffalo can only be used for VFR navigation.



(VFR Only)  
BUFFALO  
109.4 BUA

## Other Navaids

Pure TACANS do not have compass roses since the azimuth cannot be used by most civilian pilots. When the TACAN channel is compatible with the civilian VHF frequencies, the VHF frequency will be placed below the TACAN name in parentheses. For example, the Malstrom TACAN can be used for DME information by tuning to 115.8 MHz. The code "TAC-105" is used solely by military navigation receivers to tune TACAN channel numbers.

MALMSTROM  
TAC-105 GFA  
(115.8)

A series of dots forming three concentric circles show the location of non-directional radio beacons (NDBs). The NDBs are normally presented in a green color on enroute charts and each has a magnetic north tick mark above the facility the same as VORs. The Hauser NDB transmits on 386 kHz and has an identifier of HAU.

HAUSER  
386 HAU

The Morse code identifier for each NDB is included.



Localizers are currently included only when they are used to form an enroute intersection. In the illustration, the Butte, Montana localizer transmits on 110.9 MHz and has an ident of IBEY. It is used to form the Ketch Intersection. Since the Butte localizer is a LOC-DME facility, the formation of Ketch is also made by the 30 DME from the localizer DME. Beginning in June, the Jeppesen

CEDAR CITY WX-\*2.0  
2.2-2.4-2.65-  
GREAT FALLS  
BUTTE MONT  
Mooney  
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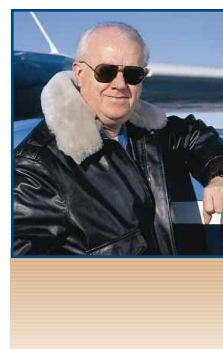
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enroute charts will also depict all the localizers to indicate their availability. The localizers that perform an enroute function will be included with their frequencies, and the ones depicted to show localizer availability will be shown without their frequencies.

In the next article, we will talk about all the communication information found on the face of the chart as well as the front panel.



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