

1. VERTICAL AND HORIZONTAL COORDINATES

A. DETERMINATION OF AIRLINE MILEAGES

1. Long distance message telecommunications rates (between cities, towns or localities) are based on the airline distance between rate centers. In general, each point is designated as a rate center except that certain small towns or localities are assigned adjacent rate centers with which they are closely associated for communications purposes or by community of interest.
2. For the purpose of determining airline mileages, vertical and horizontal coordinates are used.
 - a. Vertical and horizontal grid lines have been established across Wisconsin. The spacing between adjacent vertical grid lines and between horizontal grid lines represents a distance of one coordinate unit. This unit is the square root of 0.1, expressed in statute miles. A vertical (V) and a horizontal (H) coordinate is computed for each rate center from its latitude and longitude location by use of appropriate map-projection equations. A pair of V & H coordinates locates a rate center, for determining airline mileages, at a particular intersection of an established vertical grid line with an established horizontal grid line. The distance between any two rate centers is the airline mileage computed as explained in "Rate Distance" following.
 - b. The vertical and horizontal coordinates for each Wisconsin rate center, are listed in the List of Rate Centers and Central Offices, issued by AT&T Communications in Tariff F.C.C. No. 10 which, including any amendments thereto or successive issues thereof, is hereby adopted and made a part of this Tariff.
 - c. When service is available at a point not listed in the above List of Rate Centers and Central Offices:
 - (1) If the point is served through an exchange, the rate center is the rate center for the central office through which exchange telephone service at the point is furnished; or
 - (2) If the point is served by a toll station, the pair of V & H coordinates established for the toll station is the rate center.

1. VERTICAL AND HORIZONTAL COORDINATES (Cont'd)

A. DETERMINATION OF AIRLINE MILEAGES (Cont'd)

3. Rate Distances - Milwaukee Exchange

- a. A toll rate center, specifically described below, is established for each of the zones contained in the Milwaukee Exchange.

<u>Zone</u>	<u>Toll Rate Center</u>	<u>V</u>	<u>H</u>
North Zone	West Bradley at North River Road	5763	3598
West Zone	Watertown Plank Rd. at Elm Grove Rd.	5798	3608
Hales Corners Zone	W. Forest Home Ave. at S. 108th St.	5817	3592
South Milwaukee Zone	10th Ave. at Madison, S. Milwaukee	5805	3564
Milwaukee Zone	N. 26th St. at W. Kilbourn	5788	3589

- b. If the airline distance between a Milwaukee zone and a rate center outside the Milwaukee Exchange is 40 miles or less, the rate distance to that zone is determined by using the appropriate V-H coordinates shown above.

- c. If the airline distance between a Milwaukee zone and a rate center outside the Milwaukee Exchange is more than 40 miles, the rate distance to that zone is determined by using the V-H coordinates for the Milwaukee zone.

4. Rate Distance

To determine the rate distance between any two rate centers, proceed as follows:

- a. Obtain the "V" and "H" coordinates for each rate center.
- b. Obtain the difference between the "V" coordinates of the two rate centers. Obtain the difference between the "H" coordinates.

NOTE: The difference is always obtained by subtracting the smaller coordinate from the larger coordinate.

- c. Divide each of the differences obtained in b. by three, rounding each quotient to the nearer integer.

1. VERTICAL AND HORIZONTAL COORDINATES (Cont'd)

A. DETERMINATION OF AIRLINE MILEAGES (Cont'd)

4. Rate Distance (Cont'd)

d. Square these two integers and add the two squares. If the sum of the squares is greater than 1777, divide the integers obtained in c. by three and repeat step d. Repeat this process until the sum of the squares obtained in d. is less than 1778.

e. The number of successive divisions by three in steps c. and d. determines the value of "N". Multiply the final sum of the two squares obtained in step d. by the multiplier specified in the following table for this value of "N" preceding:

<u>N</u>	<u>Multiplier</u>	<u>Minimum Rate Mileage</u>
1	0.9	-
2	8.1	41
3	72.9	121
4	656.1	361

f. Obtain square root of product in e., and, with any resulting fraction, round up to next higher integer. This is the message rate mileage except that when the mileage so obtained is less than the minimum rate mileage shown in e. preceding, the minimum rate mileage corresponding to the "N" value is applicable.

1. VERTICAL AND HORIZONTAL COORDINATES (Cont'd)

A. DETERMINATION OF AIRLINE MILEAGES (Cont'd)

4. Rate Distance (Cont'd)

g. Example

The message rate distance is required between Fond du Lac and Green Bay.

	<u>V</u>	<u>H</u>
(1) Fond du Lac	5685	3734
Green Bay	5512	3747
(2) Difference	173	13
(3) Dividing each difference by three and rounding to nearer integer = 58 and 4		
(4) Squaring integers and adding.	$58 \times 58 = 3,364$	
Sum of squared integers	$4 \times 4 = \underline{16}$	3,380
Sum of squared integers if greater than 1,777, so divide integers in step 3 above by three and repeat step 4.		
(5) Dividing integers in step 3 above by three and rounding = 19 and 1,		
(6) Squaring integers and adding	$19 \times 19 = 361$	
Sum of squared integers.	$1 \times 1 = \underline{1}$	362
This sum of squared integers is less than 1,778 and was obtained after two successive divisions by three; therefore, "N" = 2 (From table shown in step E preceding).		
(7) Multiply final sum of squared integers by factor 8.1 (corresponding to "N" = 2),		362 $\underline{\times 8.1}$ 2,932.2
(8) Square root of 2,932.2 = 54 and a fraction, which is rounded up to 55 miles (fractional miles being considered full miles). The 54 miles is larger than the minimum of 41 rate miles applicable when "N" = 2 so the message rate mileage is 55 miles.		