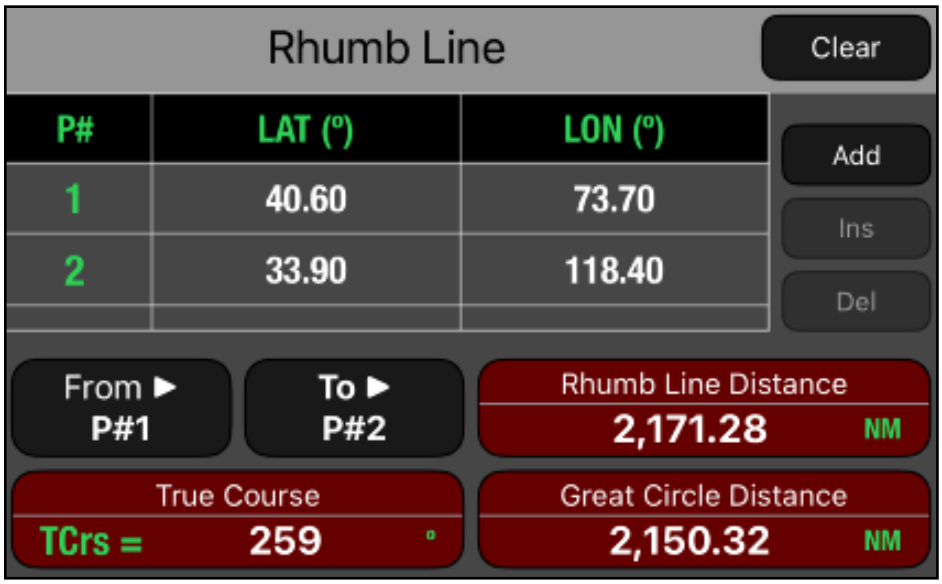
Rhumb Line Worksheet



Clear	Remove all points leaving the initial one and clears all values to 0.
P#	Geographical points index column.
LAT	Latitude coordinate of each point (touch to change units).
LON	Longitude coordinate of each point (touch to change units).
Add	Appends a new point (latitude, longitude).
Ins	Insert a new point (latitude, longitude) before the selected point.
Del	Deletes the selected point (latitude, longitude).
From▶	Select the initial point (latitude, longitude) of the trip segment.
To▶	Select the end point (latitude, longitude) of the trip segment.
Dist	Recalls to the display the distance over the Rhumb Line from the "**From**" selected point to the "**To**" selected point.
GCD	Recalls to the display the shortest distance (Great Circle distance) from the "**From**" selected point to the "**To**" selected point.
TCrs	Recalls to the display the true course required for flight over the Rhumb Line.
NOTE: Tap the **LAT** or **LON** heading to select the coordinates units: Decimal degrees (°), Degree-Minute-Second (DMS) or radians (RAD).	

The Rhumb Line function allows you to compute the true course (**TCrs**), the distance (**Dist**) of the Rhumb Line and the distance (**GCD**) in the great circle between multiple points (LAT, LON).

NOTE: Always verify the physical units
To change the units of a variable, tap over the unit symbol and select the right one from the pop-up menu. To change the whole units in the worksheet select “Set Metric Units” or “Set US Units” from the **[UNITS▶]** button in the Navigation Bar.

All the following examples use US units. So please select “Set US Units” from the **[UNITS▶]** menu in the Navigation Bar.

Example 1:

What is the true course and distance between JFK (40.6°, 73.7°) and LAX (33.9°, 118.4°)?.

Solution:

Keystrokes	Description
[Clear]	Clears all variables to start a new calculation.
type 40.6 touch P#1 LAT cell	Set latitude to 40.6º for point #1.
type 73.7 touch P#1 LON cell	Set longitude to 73.7º for point #1.
[Add]	Append point #2 to the list
type 33.9 touch P#2 LAT cell	Set latitude to 33.9º for point #2.
type 118.4 touch P#2 LON cell	Set longitude to 118.4º for point #2.
[To▶] Point 2	The initial point is already set to “Point 1” so, select the end point from the **To▶** menu to “Point 2” and the result is calculated automatically: **TCrs = 259 º** (True Course). **Dist = 2,171.28 NM** (Rhumb Line Distance). **GCD = 2,150.32 NM** (Great Circle Distance).

Appendix : Equations Used

The equations that this worksheet calculates are:

Leg Between Point 1 (Lat_1 , Lon_1) and Point 2 (Lat_2 , Lon_2):

$\Delta LonW = MOD(Lon_2 - Lon_1 , 2\pi)$
$\Delta LonE = MOD(Lon_1 - Lon_2 , 2\pi)$
$\Delta Lon = MIN(\Delta LonW , \Delta LonE)$
$\Delta Lat = LN(TAN(Lat_2 / 2 + \pi/4) / TAN(Lat_1 / 2 + \pi/4))$
$q = (Lat_1 != Lat_2) ? (Lat_2 - Lat_1)/ \Delta Lat : COS(Lat_1)$

TCrs $= 2\pi - MOD(ATAN2(\Delta Lat , \Delta Lon) , 2\pi)$
Dist $= \sqrt{[q^2 \cdot \Delta Lon^2 + (Lat_2 - Lat_1)^2]} \cdot R_E$
GCD $= ACOS[SIN(Lat1) \cdot SIN(Lat2) + COS(Lat1) \cdot COS(Lat2) \cdot COS(Lon2 - Lon1)] \cdot R_E$

Where:
R_E = 6,371 (Km) -> Standard Radius of the Earth