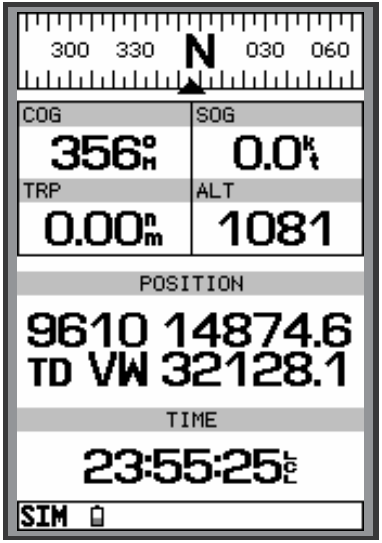
GARMIN

Loran TD



position format handbook

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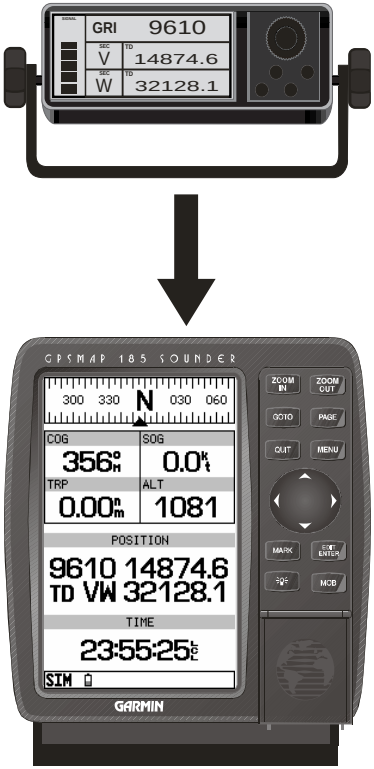
Loran TD Position Format

As a convenience to our customers that have used Loran C as their primary source of navigation, we are now including a *Loran TD* position format in our marine GPS products.

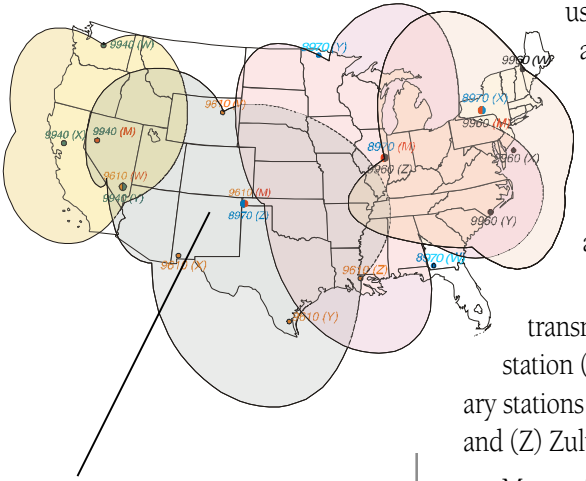
The new *Loran TD* Position Format will allow our customers to enter Time Difference (TD) coordinates into their GARMIN GPS. When a Loran C, TD coordinate is entered in a GARMIN GPS, the coordinate will go through a conversion that makes it GPS friendly. The converted coordinate can be used for immediate navigation and/or stored for future use.

For those unfamiliar with Loran C, but want to use TD coordinates in your GARMIN GPS, it will help to have a basic understanding of Loran C and it's components. This booklet is designed to provide you with enough basic knowledge of Loran C to allow you to setup and use the GARMIN *Loran TD* Position Format.



Loran C is a radio navigation system, operated and maintained in the United States by the Untied States Coast Guard. The name Loran is an acronym for '**LO**ng **RA**nge **N**avigation'.

The Loran C system covers the entire United States and the U.S. Coastal Confluence Zone. From a mariner's perspective, the Loran C system is used primarily for ocean and coastal navigation. It can be used as a supplemental system for harbor and harbor approach navigation, and for inland navigation by recreational vehicles. Loran C will be phased out as a primary source of navigation, but should remain active until after the turn of the century. It will be replaced by GPS. The Global Positioning System provides greater accuracy and world wide coverage.



9610 Master Station and 8970 (Z) Zulu Station share a common transmitter.

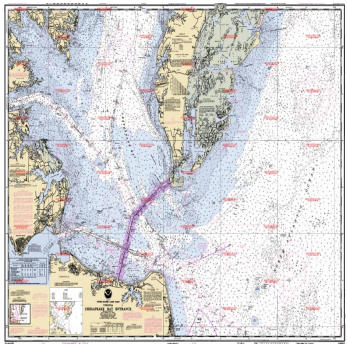
The Loran C system consists of groups of land based transmitter stations called chains. A chain contains a Master station (M) and at least two, but more commonly 4 or 5 Secondary stations designated (V) Victor, (W) Whiskey, (X) Xray, (Y) Yankee, and (Z) Zulu. These stations are separated by several hundred miles.

Many of the Loran C transmitter stations serve multiple roles. A transmitter can serve as a Master Station for one chain and a secondary station for multiple chains. An example would be chain 9610's Master Station and chain 8970's Zulu Station. These operate from the same transmitter located in Boise City, OK.

Each Master Station transmits a pulsed radio frequency (RF) signal at a set time interval. This time interval is referred to as the Group Repetition Interval or GRI. The GRI is used to identify the different Loran C transmitter chains. It is not important to understand how this number is determined, just that it represents the Master Station and chain.

After a Master Station transmits it's pulsed RF signal, each Secondary station after recieving the master station signal, transmits a pulsed RF signal at a set time delay. As the signals are processed by the Loran C receiver, the master signal is separated and used to measure the difference in time with each secondary signal. The time interval is very short, measured in millionths of a second or micro seconds. This time difference is how the Loran C determines a location.

To determine a location, a Loran C must receive signals from a Master and two Secondary Stations of the same chain. From those three signals, a set of two TD's are constructed and using the TD's a location can be plotted.



Loran C Chart

Loran TD Position Format

Loran C users can now use their TD's in GARMIN GPS systems. The new *Loran TD* position format provides users with the ability to create waypoints using TD's. When a waypoint is created using the *Loran TD* position format, a background conversion is performed on the TD's. This conversion allows the GPS to navigate to the TD's location. Don't worry, this conversion process will maintain the integrity of the TD location and has proven to be accurate to within 30 meters most of the time. The new waypoint can be used for immediate navigation and/or stored for future use.

Let's take a look at how to select and setup the *Loran TD* Position Format. The Position Format field is located in the Navigation Setup menu. Refer to your GPS Owner's Manual for directions on locating the Navigation Setup Menu.

Selecting the Loran TD Position Format:

1. Highlight the Position Format field and press **ENTER**.
2. Using the Arrows or Rocker Keypad highlight *Loran TD* and press **ENTER**.

After the *Loran TD* format is selected, a new field will appear to the right of the Position Format. This field, called *Setup TD* provides access to the *Loran Setup* page. The *Loran Setup* page contains fields where the GRI-Chain Number and Secondary Stations are set. To activate the *Loran Setup* page, highlight the *Setup TD* field and press **ENTER**.

The GRI-Chain Number and Secondary Station Identifiers that are set in the *Loran Setup* page will be used as a reference for the TD's when creating waypoints using the *Loran TD* Position Format.

Note: If you do not have the correct GRI-Chain or Secondary stations set the waypoint will not be accurate.

The first setting is the Loran Chain Number. Accessing the field activates a dropdown menu containing the 28 available GRI-Chain numbers.

Setting the GRI-Chain Number:

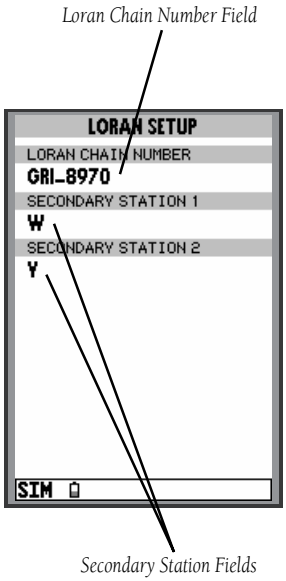
1. Highlight the Loran Chain Number field and press **ENTER**.
2. Using the Arrows or Rocker Keypad, highlight the desired chain number and press **ENTER**.

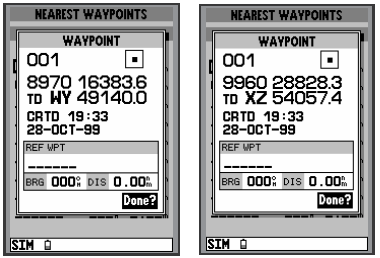
The next settings are Secondary Stations 1 and 2. Accessing these fields activates a dropdown menu containing the 5 Secondary Station Identifiers.

To set a Secondary Station:

1. Highlight either Secondary Station 1 or 2 field and press **ENTER.**
2. Using the Arrows or Rocker Keypad select the desired identifier and press **ENTER.**

If a Secondary Station is selected, but the identifier is not valid for the active GRI-chain, the corresponding TD field on the Position Page will be filled with zeros. To remedy this, select a valid Secondary Station Identifier.





These two screens show the same waypoint. You can see that when the Loran Chain Number or Secondary Stations are changed, all waypoints stored in the GPS's memory will reference the new settings. Remember that when you created the waypoint the GPS converted the TD's to a GPS friendly Position Format and stored that converted location in memory. The converted location is used for navigation. This allows the GPS to reference any Loran Chain or Secondary Station and still navigate to the original location.

Creating Waypoints

When creating a waypoint using the Loran TD Position Format there are some things to be aware of and look for.

1. Verify that the correct Loran Chain Number and Secondary Stations are displayed. If not they will need to be changed using the *Setup TD* page.
2. If 000000 is displayed in a TD field, that Secondary Station Identifier is not a valid selection for the chain. To remedy, select a valid Secondary Station Identifier.

When the new waypoint is saved, the TD's are converted to a GPS friendly Position Format and stored in the units memory.

When the Loran Chain Number and/or the Secondary Stations are changed, all waypoints stored in memory will reflect that change. The side-bar will help to explain how that affects the waypoints.

Navigating

While the *Loran TD* Position Format is selected the unit will display the Loran Chain Number and Secondary Stations selected in the *Setup TD* page and the TD's for the current location.

It is important to remember that the unit is not using the Loran C signal for navigation, but can display TD's as a current location. The GPS uses the same process that it used to create a waypoint, in reverse. The GPS takes that GPS friendly position format and converts it to a TD for display.

Remember, it is a good practice to update any waypoint created using TD's while you are actually at the waypoint location. Consult your GPS Owner's Manual for directions on updating a waypoint.

For more information, visit the U.S. Coast Guard web site at: www.navcen.uscg.mil

Notes

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