

INSTRUCTIONS AND SAMPLE COMPUTATION FOR DMA/NOS PROGRAM GPTOTD

- (a) Convert latitude and longitude coordinates to LORAN TD's
- (b) Convert LORAN TD's to latitude and longitude

1. To run the program from the DOS prompt, enter GPTOTD
2. Following a disclaimer, the program asks you to select a datum.
Option 2, NAD, represents the old NAD 1927 datum.
Option 3, WGS84 (NAD83), represents the current datum used on National Ocean Service (NOS) charts.

For the sample computation, enter 3

3. The program will now prompt you to select one of the following:
 - 1) LORAN-C
 - 2) LORAN-A
 - 3) OMEGA

The LORAN-A option is NOT operational.

For this sample computation, enter 1

4. The program next prompts you to enter STATION.
Enter the LORAN RATE designator (group repetition interval).

For this sample computation, enter 9960X

(This is the designator for the NORTHEAST US CHAIN. See notes below for more details.)

5. The program prompts you again to enter STATION (for the second chain).

For the sample computation, enter 9960Y

6. The program now displays the following main menu:

- 1) SELECT NEW STATIONS
- 2) DIAL READINGS TO GP (LORAN TD TO LAT/LON OPTION)
- 3) GP TO DIAL READINGS (LAT/LON TO LORAN TD OPTION)
- 4) EXIT TO DOS

For the sample computation, enter 3

7. The next 4 prompts ask you to enter latitude degrees, minutes, seconds, and N=NORTH or S=SOUTH.

For the sample computation, enter

41
0
0
N

8. Similarly, for longitude degrees, minutes, seconds, WEST or EAST, enter

71
0
0
W

9. The program computes the results and displays the following:

41 0 .00N 71 0 .00W 25536.54 43765.74

(Latitude Longitude 9960X Value 9960Y Value)

10. The main menu is displayed again:

- 1) SELECT NEW STATIONS
- 2) DIAL READINGS TO GP
- 3) GP TO DIAL READINGS
- 4) EXIT TO DOS

For the sample computation, enter 2

to compute the inverse. Use as input the LORAN coordinates computed above for 41 N , 71 W.

11. The next prompt is:

ENTER APPROXIMATE POSITION AND DIAL READINGS
DDMMA DDDMMA XXXXX.XX XXXXX.XX

Note: DD = Latitude degrees
DDD = Longitude degrees
MM = minutes
A = 0
XXXXX..XX = LORAN coordinate

Since there are 2 possible solutions for each set of dial readings, approximate position values are needed to obtain the correct answer. In most cases, it is only necessary to specify the positions to the nearest degree.

For the sample computation, enter the following

41000 under DDMMA
071000 under DDDMMA
25536.54 under the first XXXXX.XX (9960X)
43765.74 under the second XXXXX.XX (9960Y)

The program outputs the following results:

25536.54 43765.74 40 59 59.99N 70 59 59.99W

The main menu is displayed again. Make another computation or enter 4 to exit.

CAUTION

When converting LORAN-C coordinates to corresponding latitude and longitude coordinates, it is very important to correct for overland signal propagation delays (ASF or Additional Secondary Phase Factor). The program computation routine assumes an all sea water path.

Correcting for ASF gives a positional accuracy of +/- 200 meters. Converted positions should agree with positions scaled directly from NOS charts using the charted lines of position and are accurate to within 0.1 nautical miles.

ASF corrections for each 5-minute interval of latitude and longitude are available in the LORAN-C CORRECTION TABLES published by the Defense Mapping Agency Hydrographic/Topographic Center. However, since these tables are out-of-print, they may be difficult to obtain.

Many LORAN receivers will automatically produce a corresponding latitude and longitude position. However, the result may contain a positional error of up to 1.5 miles if ASF data are not taken into account.

At any one location, the relative accuracy of a LORAN fix is determined by the geometry of the intersecting lines of position. Specifically, accuracy depends on

1. gradient (spacing between adjacent lines of position)
2. crossing angle (angle of intersection between LORAN lines for any 2 rates).

The smaller the gradient, the more reliable the fix.

The closer the crossing angle is to 90 degrees, the better the fix.

All LORAN coordinate points converted by NOS to corresponding geographic positions and all charted LORAN lines of position shown on NOS nautical charts are corrected for ASF and meet the standards established by the United States Coast Guard for LORAN-C positional accuracy (+/- 200 meters) over 95% of the coverage area.

ADDITIONAL NOTES

LORAN-C COVERAGE GUIDE

Anomalies do exist in certain areas regarding the selection of a pair of stations. Local knowledge may suggest that a pair, other than those indicated below, are the stronger pair.

THE GREAT LAKES

The 9960 chain gives the best coverage in Lake Ontario and in Lake Erie. 9960W and 9960Z are the preferred pair in Lake Ontario. 9960Y and 9960Z are the preferred pair in Lake Erie.

8970X and 8970Y are the only reliable pair for Lake Superior and Lake Michigan.

Lake Huron falls in the coverage area of both the Great Lakes Chain (8970) and the Northeast Chain (9960). 8970X and 8970Y are the preferred pair but the 9960W and 9960Y pairs also provide strong coverage in the southern part of the lake.

THE NORTHEAST COAST

The preferred coastal LORAN-C pair from the Canadian Border to Nantucket Island are 9960W and 9960X, close to shore. 9960W and 9960Y give reliable coverage further off-shore.

THE MID-ATLANTIC COAST

From Nantucket to Cape Hatteras, NC, the preferred pairs are 9960X and 9960Y.

THE SOUTHEAST COAST

From Cape Hatteras to Fort Lauderdale, Fla. the preferred pairs are 7980Y and 7980Z.

There is some overlapping coverage between the Northeast chain (9960) and the Southeast Chain (7980). South of Cape Fear, N.C. to Brunswick, Georgia, 9960X and 9960Y can be used offshore. Closer inshore from Cape Fear to St. Catherine's Island, GA., 9960Y and 9960Z are the preferred pair for 9960.

SOUTH FLORIDA AND THE GULF COAST

From Fort Lauderdale around to Cape Sable the preferred pairs are 7980W and 7980Z. 7980W and 7980Y provide the most reliable

coverage along the entire west coast of Florida from Cape Sable to Panama City.

From Panama City to Mobile, Alabama, the preferred pairs are 7980X and 7980Y.

In the western Gulf of Mexico from Mobile to Grangeville, Louisiana, the preferred pairs are 7980W and 7980X. From Grangeville to Brownsville Texas, the preferred pair are 9610Y and 9610Z.

THE WEST COAST

5990Y and 5990Z are the preferred pair from the Canadian Border along the Washington State Coast down to about 44 degrees latitude (along the Northern Coast of Oregon). 5990X and 5990Z give a strong fix further off the Washington and Oregon Coast.

Off the southern portion of the Oregon Coast and the extreme northern portion of the California coastline, 9940W and 9940X provide the best intersections.

9940W and 9940Y are the preferred pair along the northern California Coast to just below San Francisco. 9940X and 9940Y are the best pair off the coast of southern California.

CONTACT AT NOAA/NOS

Call Jeff Stuart (301) 713-2729 for ASF information or questions regarding the program GPTOTD.

COMMERCIAL SOFTWARE

Andren Software Company has a WINDOWS compatible program that will also convert LORAN positions to latitude/longitude positions. This program can be run in batch mode. If adjusted for ASF, the converted positions are accurate and equivalent to the results obtained using GPTOTD. A Macintosh version is also available.

The package includes options for drawing maps. Andren also publishes books of LORAN positions of wrecks and other significant objects.

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