

Utilizing Loran C TD's on RD33

Furuno's RD33 uses data from your GPS to determine position, speed and course. The unit does not receive actual Loran data signals. Because Loran C has been decommissioned in the U.S.A., the practical use of this application is so that you can continue to use your saved Loran C positions using modern GPS technology.

To display position in Loran TD's, the RD33 uses a logarithmic calculation to convert GPS position data (Latitude/Longitude) into Loran TD's. This calculation is only as accurate as the data that is entered by the user as described in this instruction set. The purpose of these steps is to enable you to determine an average offset value reflecting the difference between the actual Loran C position and the logarithmically calculated Loran C position as it is generated by your RD33. Because you may have a number of Loran C positions from different sources that you want to utilize, you will need to consider the following:

- If all of your Loran C positions are from a single Loran C receiver, the offset calculation will work quite well and you will be able to use your existing waypoints with reasonable accuracy and repeatability.
- If you have Loran C positions from your own Loran C receiver as well as from friends, magazines, the Internet or from any other source, then you will need to first determine which of these sources provides you with the most "important" positions. Then, you should only use positions generated from that source to make your offset calculations described in the steps below.
- One easy way to choose which source to use is to use the source that provides the most positions. By doing this, the majority of your positions will be reasonably accurate and repeatable when the offset calculation is complete. Data from other sources, however, may require some updating to be accurate with the new offsets.

Before going through the steps detailed on the following pages, it is vital that any Loran C offset values be cleared from your RD33. If these values are not cleared before starting this procedure, the accuracy of your new offset values, and ultimately the conversion to Loran TD's, will be degraded.

IMPORTANT! *The following steps **must** be performed prior to entering any Loran data into the system!*

1. Power up unit as normal.
2. Allow unit to acquire satellites and display a stable position fix.
3. Select **MENU – POS/TD SETUP**.
4. If you know your GRI chain numbers, enter them here. If you do not know your GRI numbers, select the GRI Chain for your geographic area according to the GRI listings at the end of this document and enter those numbers in the LORAN C section.
5. Once you've entered your GRI numbers, press the right arrow key to select your station pairs. If you know your station pairs, simply select them here. If you do not know your station pairs, select the appropriate pairs for your geographic area according to the GRI listings at the end of this document.
6. Clear any offsets by resetting their values to 0.
7. Return to the Chart Plotter display on your RD33.

For steps 8-10, you will need to position the vessel at locations where you have known LORAN C position data. These locations should be at least ½ mile apart and must be located within the same geographical location you selected for your GRI and station pairs in steps 4 and 5. For best results, you should perform steps 7-9 for as many locations as possible (recommended 5-7 locations).

8. Position vessel at a known location to compare your LORAN C source data with LORAN C data as shown on your RD33 display. The numbers will be slightly different.
9. Compare **first** number of LORAN coordinate displayed on RD33 to **first** LORAN reference number and **subtract** the **known TD number** from the **RD33 TD number**. Write down the difference between the numbers and be certain to note if it is + or – from the known number (ie: difference = +.4, -1.2, etc.).
10. Compare **second** number of LORAN coordinate displayed on RD33 to **second** LORAN reference number and **subtract** the **known TD number** from the **RD33 TD number**. Write down the difference between the numbers and be certain to note if it is + or – from the known number (ie: difference = +.4, -1.2, etc.).
11. Repeat steps 8-10 for several locations to improve offset accuracy. A minimum of 5-7 locations is recommended.
12. Once the differences have been documented for several locations, calculate an average of the top numbers and then an average of the bottom numbers. See the example on page 3 on how to calculate an average of these numbers.
13. Once you've calculated the average difference of the first and second numbers, select **MENU – POS/TD SETUP**.
14. Enter the difference of the **first** numbers, observing the +/- designation.

15. Enter the difference of the **second** numbers, observing the +/- designation.
16. Return to the Chart Plotter display. At this point, your source LORAN C numbers should closely match those that appear on your RD33 display.

Example of calculating an average offset:

	Known TD's for Position	Possible RD33 TD's reading	Offset (Difference):
1st Location	25583.7	25584.9	1.2
	47401.5	47400.7	-0.8
2nd Location	25588.1	25589.4	1.3
	47401.7	47400.8	-0.9
3rd Location	25586.6	25587	0.4
	47401.6	47400.6	-1
4th Location	25588.1	25589.2	1.1
	47401.7	47401.1	-0.6
5th Location	25589.6	25590	0.4
	47401.7	47401	-0.7

Add differences of first number: $1.2 + 1.3 + 0.4 + 1.1 + 0.4 = 4.4$

Divide by # of locations used: $4.4/5 = .88$

Note: Round this number up or down to the nearest single decimal point

In the POS/TD SETUP menu, enter +.9

Add differences of second number: $-0.8 - 0.9 - 1 - 0.6 + -0.7 = -4$

Divide by # of locations used: $-4 / 5 = -0.8$

Note: Round this number up or down to the nearest single decimal point

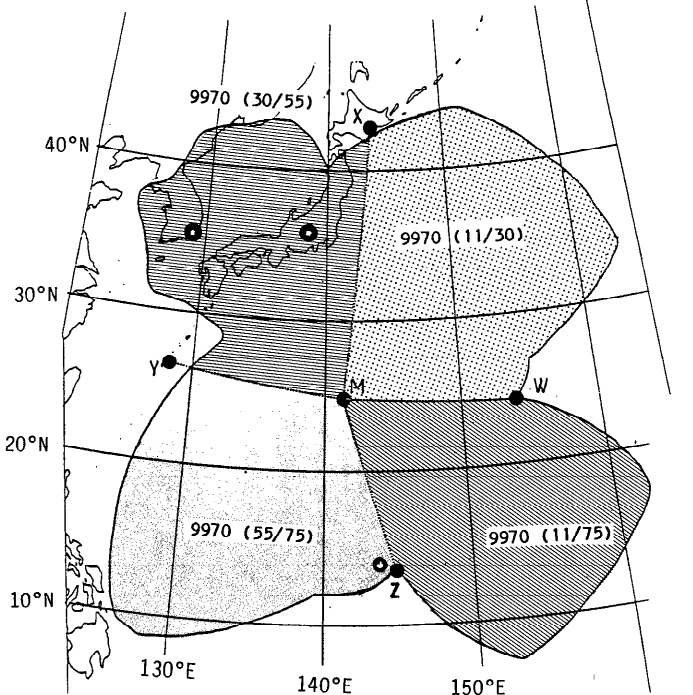
In the POS/TD SETUP menu, enter -0.8

APA-2

LORAN-C

NORTHWEST PACIFIC CHAIN
GRI 9970

	MIN. TIME DELAY	MAX. TIME DELAY
W: 11,000 usec		19,567.88 usec
X: 30,000 usec		43,370.24 usec
Y: 55,000 usec		63,926.36 usec
Z: 75,000 usec		86,493.58 usec



LEGEND:

- TRANSMITTING
- ⊙ MONITOR
- ⊕ MONITOR (AUTOMATED)

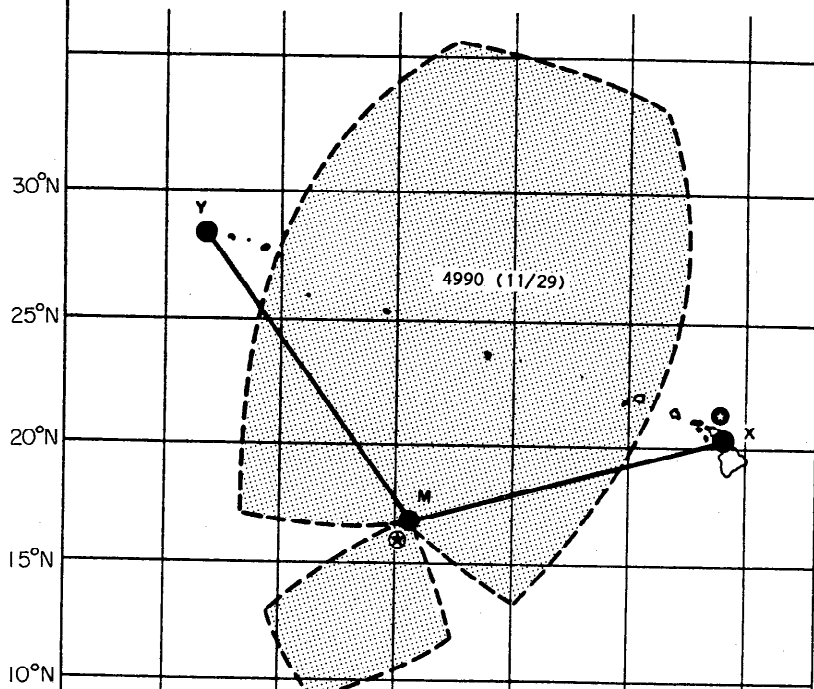
Approximate Limits of Coverage — 1:3 SNR and
1/2 NM Fix Accuracy (95% 2dRMS)

- M IWO JIMA
- W MARCUS IS.
- X HOKKAIDO
- Y GESASHI
- Z GUAM IS.

LORAN-C

CENTRAL PACIFIC CHAIN
GRI 4990

	MIN. TIME DELAY	MAX. TIME DELAY
X: 11,000 usec		20,944.46 usec
Y: 29,000 usec		39,506.34 usec



LEGEND:

- TRANSMITTING
- ⊙ MONITOR
- ⊕ MONITOR (AUTOMATED)

Approximate Limits of Coverage — 1:3 SNR and
1/2 NM Fix Accuracy (95% 2dRMS)

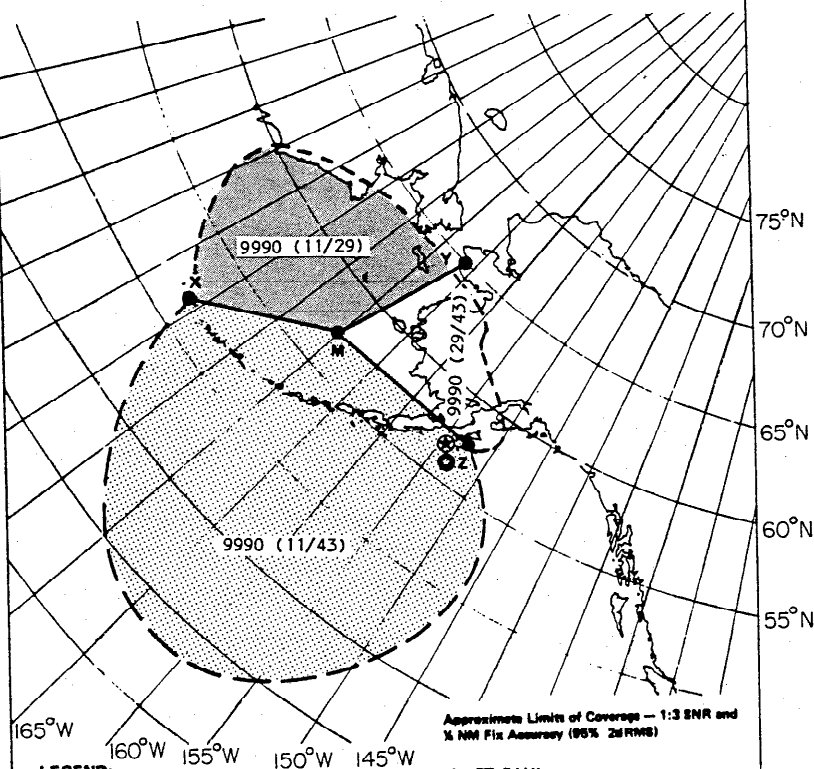
- M JOHNSON IS.
- X UPOLU PT.
- Y KURE IS.

APA-3

LORAN-C

NORTH PACIFIC CHAIN
GRI 9990

	MIN. TIME DELAY	MAX. TIME DELAY
X: 11,000 usec		18,750.5 usec
Y: 29,000 usec		35,137.9 usec
Z: 43,000 usec		50,180.9 usec



LEGEND:

- TRANSMITTING
- ⊙ MONITOR
- ⊕ MONITOR (AUTOMATED)

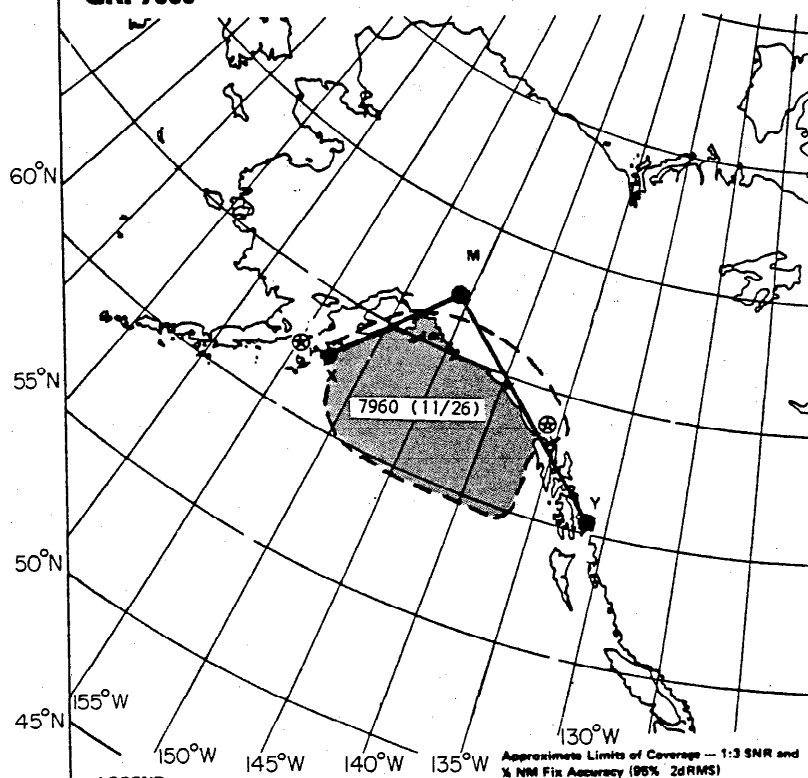
Approximate Limits of Coverage — 1:3 SNR and
1/2 NM Fix Accuracy (95% 2dRMS)

- M ST. PAUL
- X ATTU
- Y PORT CLARENCE
- Z NARROW CAPE

LORAN-C

GULF OF ALASKA CHAIN
GRI 7960

	MIN. TIME DELAY	MAX. TIME DELAY
X: 11,000 usec		16,508.9 usec
Y: 26,000 usec		33,302.28 usec

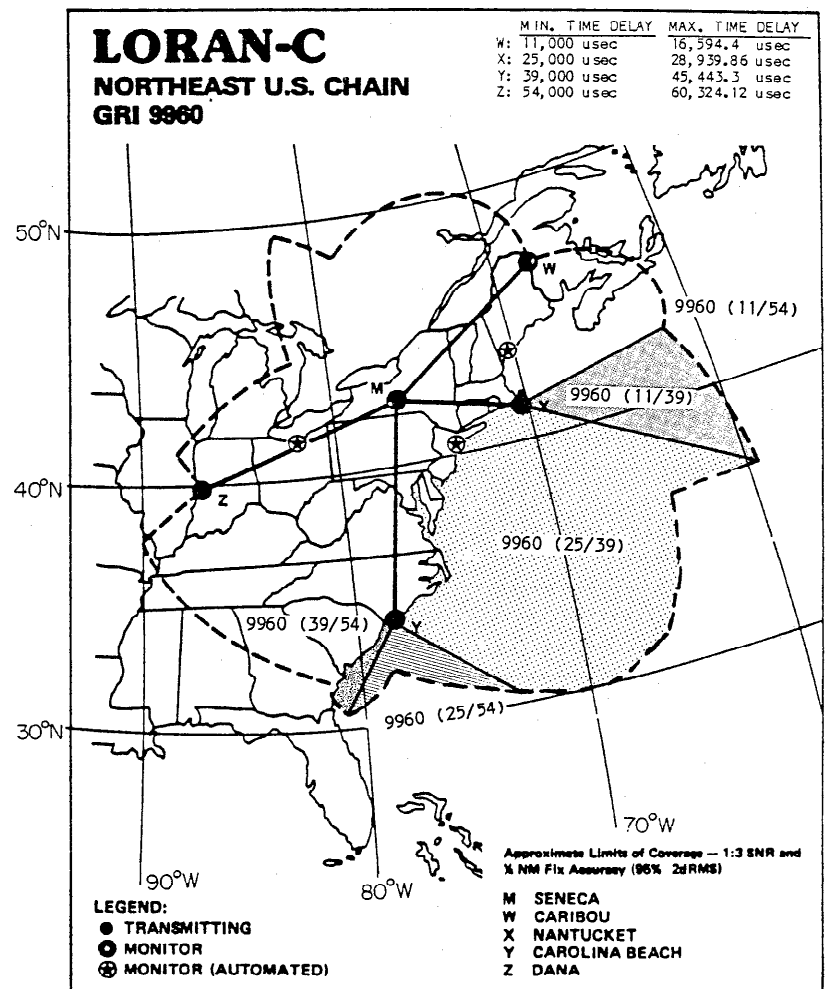
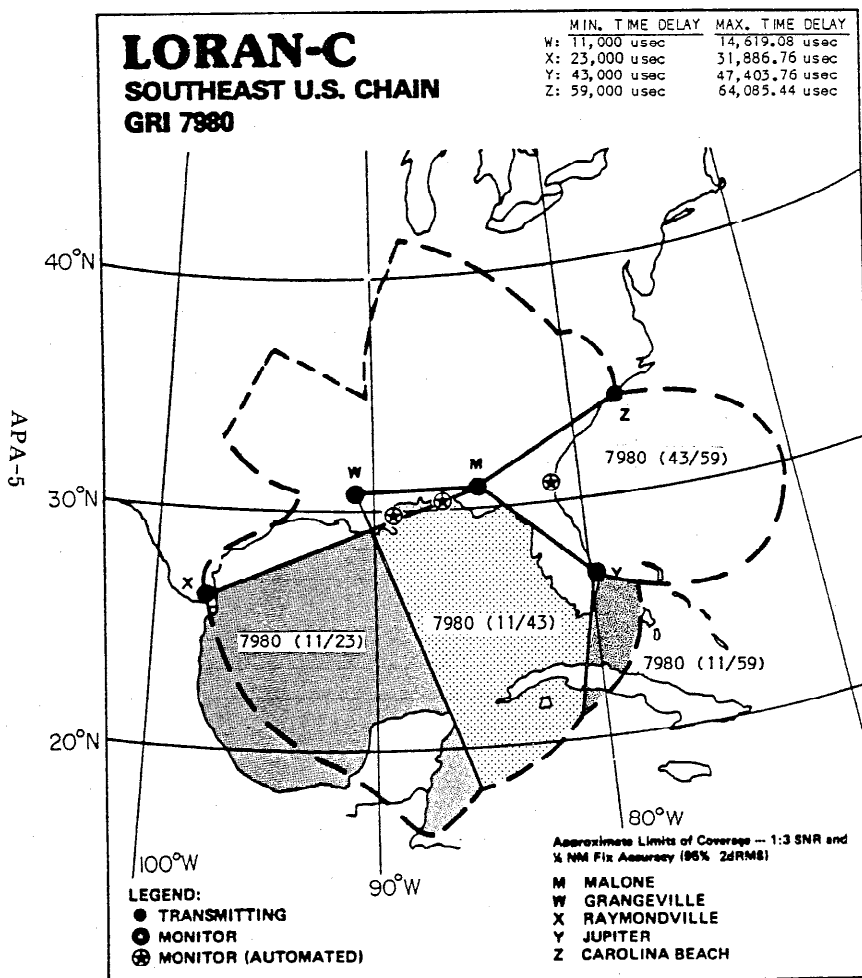
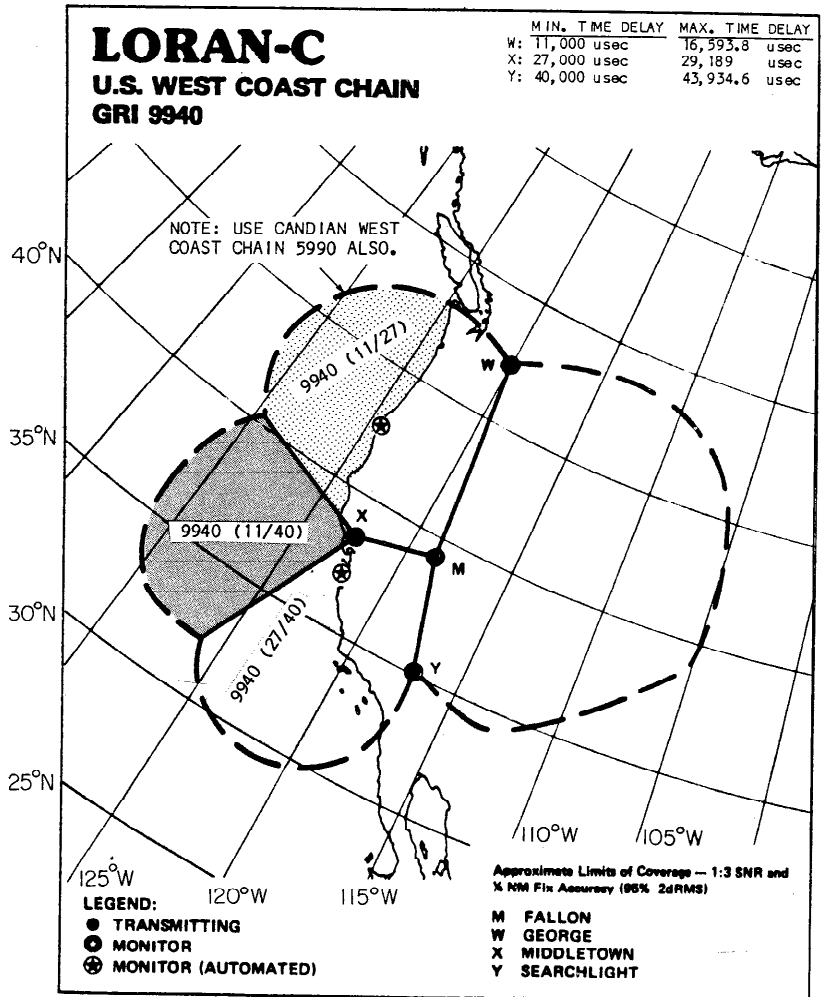
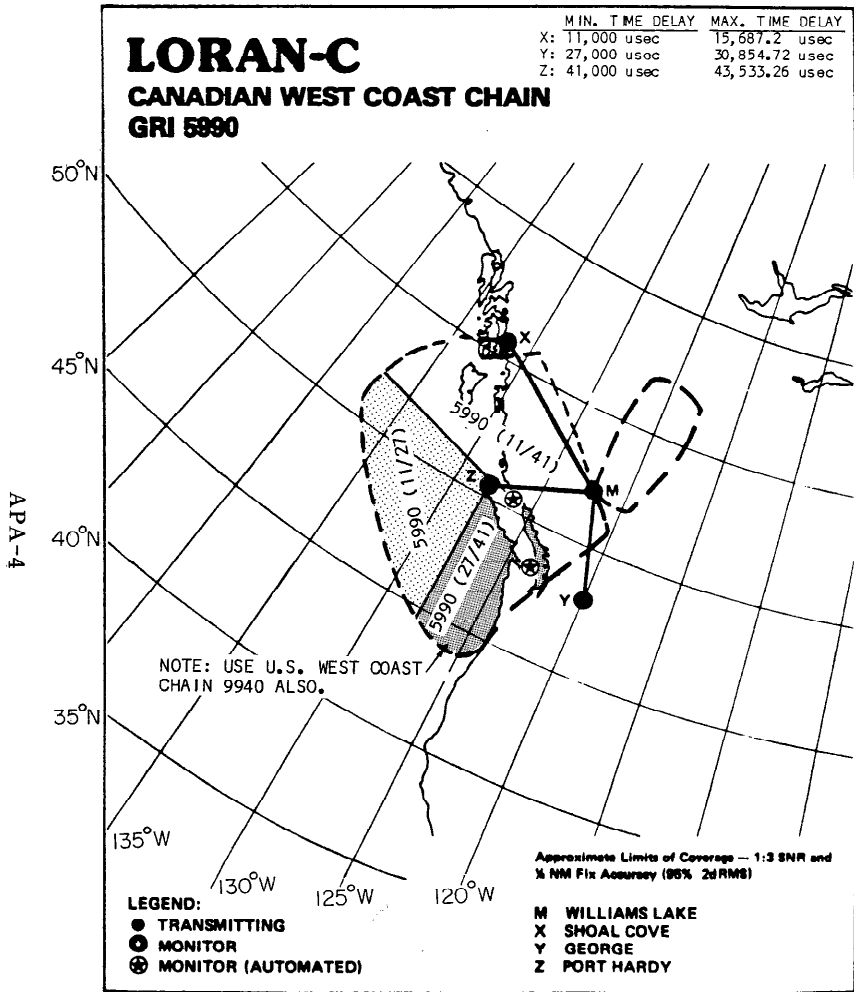


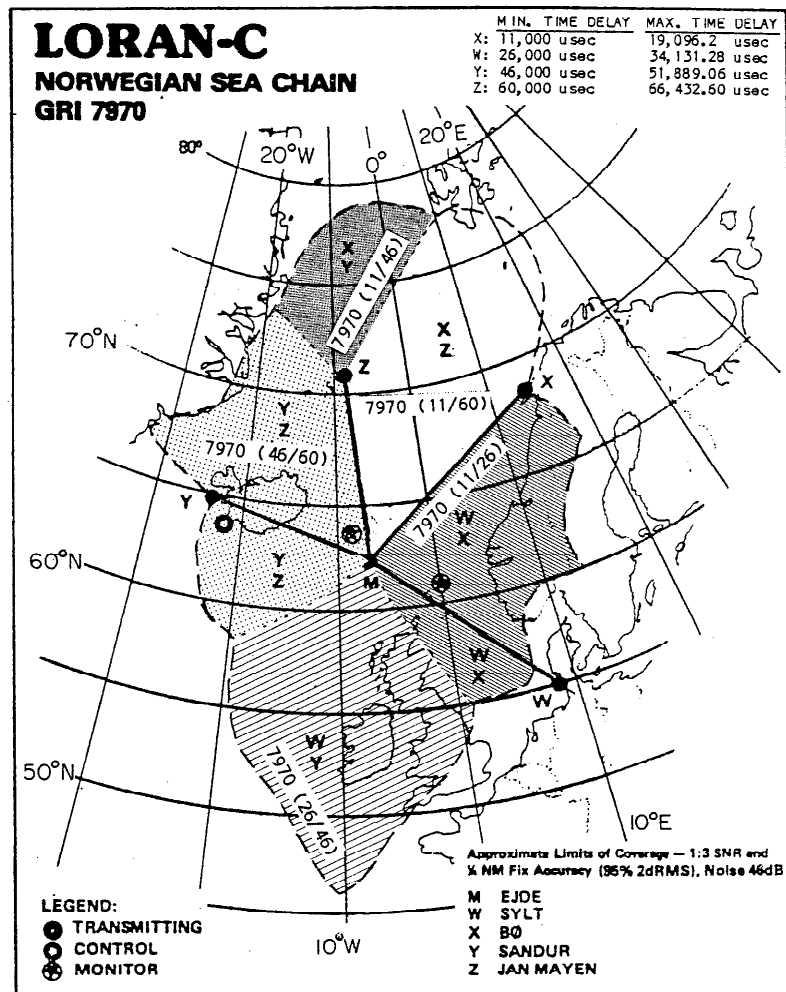
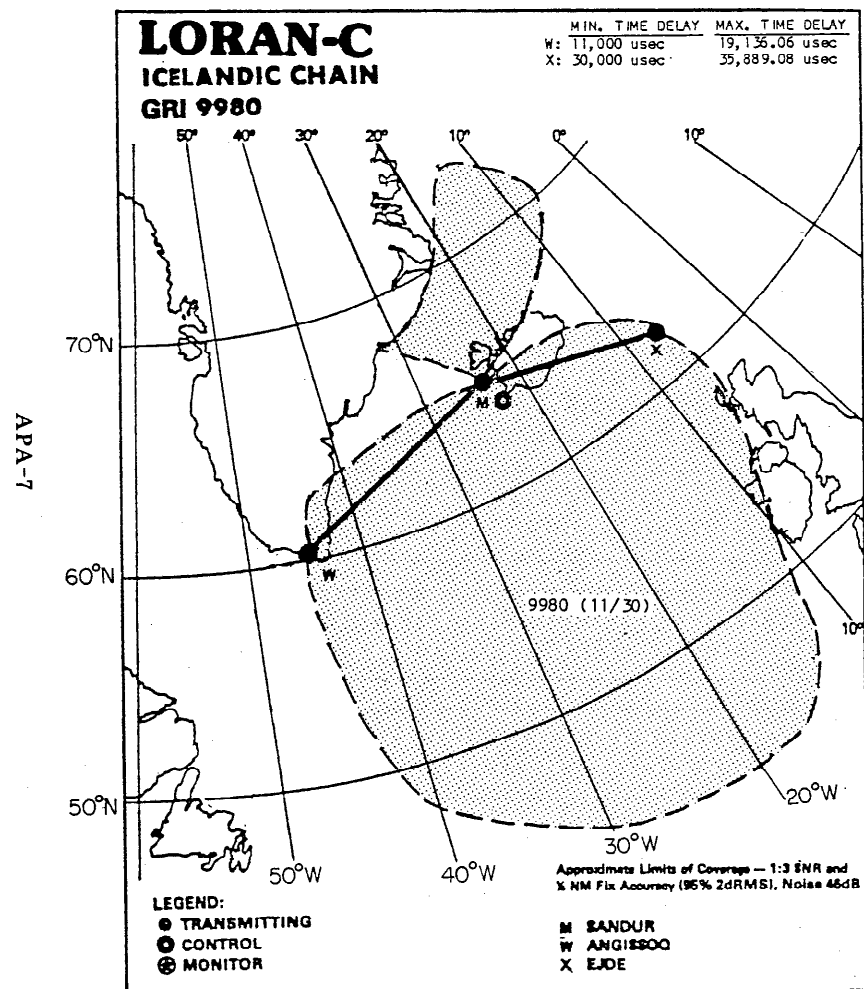
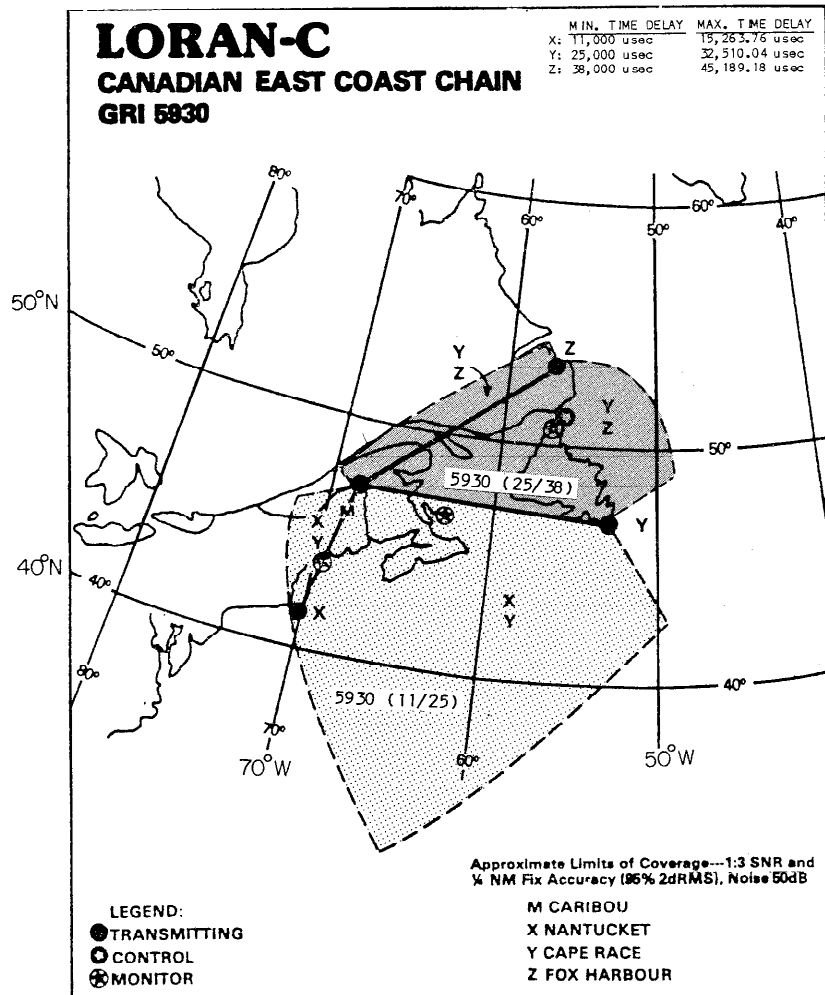
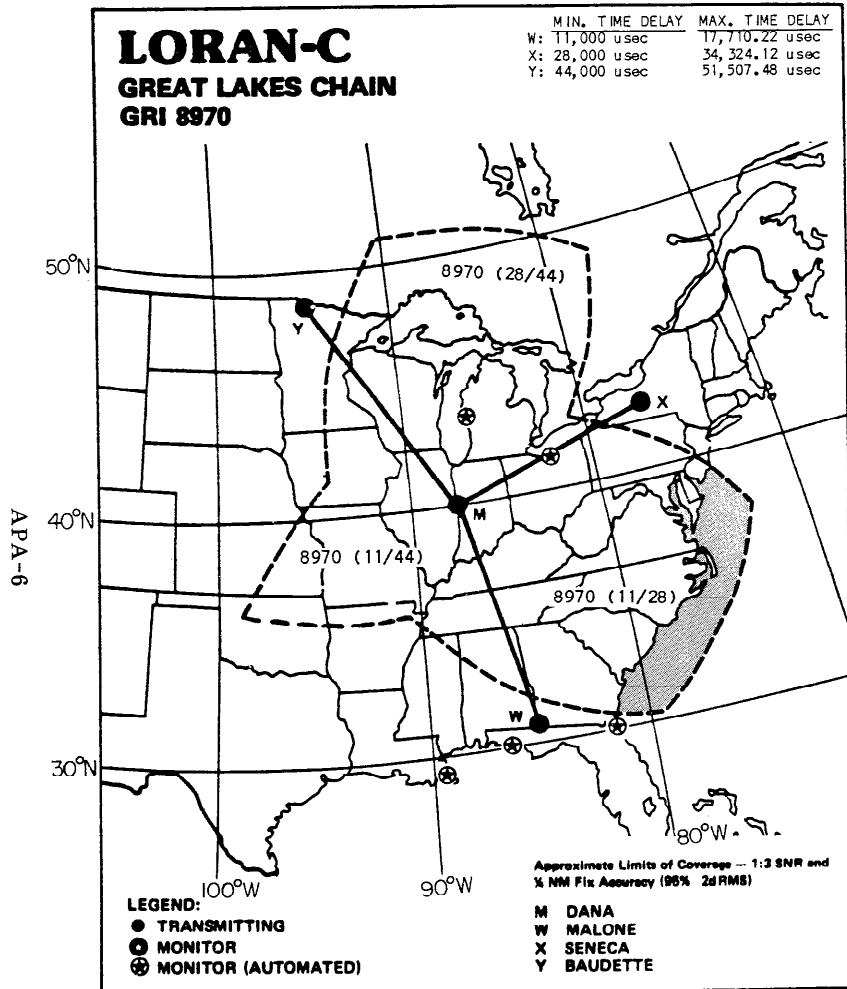
LEGEND:

- TRANSMITTING
- ⊙ MONITOR
- ⊕ MONITOR (AUTOMATED)

Approximate Limits of Coverage — 1:3 SNR and
1/2 NM Fix Accuracy (95% 2dRMS)

- M TOK
- X NARROW CAPE
- Y SHOAL COVE

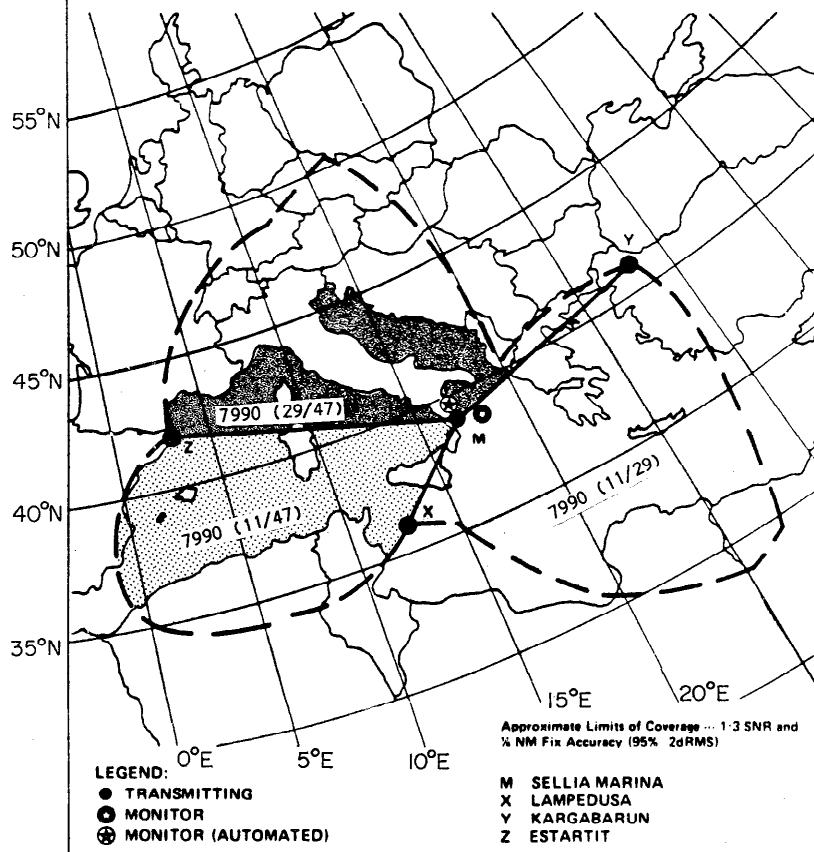




LORAN-C

MEDITERRANEAN CHAIN GRI 7990

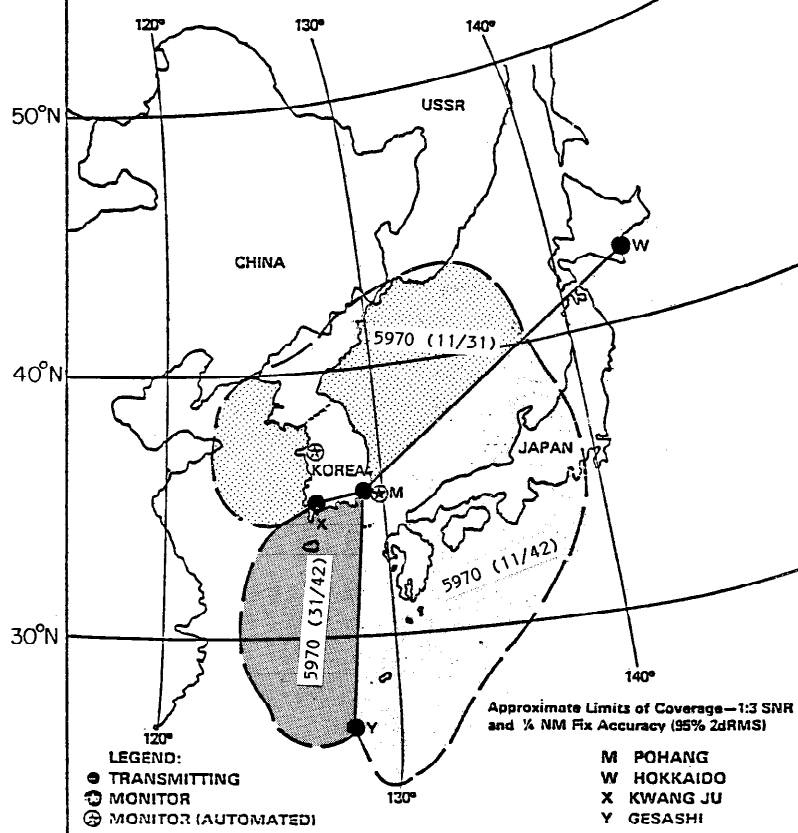
	MIN. TIME DELAY	MAX. TIME DELAY
X:	11,000 usec	14,511.96 usec
Y:	29,000 usec	35,546.58 usec
Z:	47,000 usec	54,999.42 usec



LORAN-C

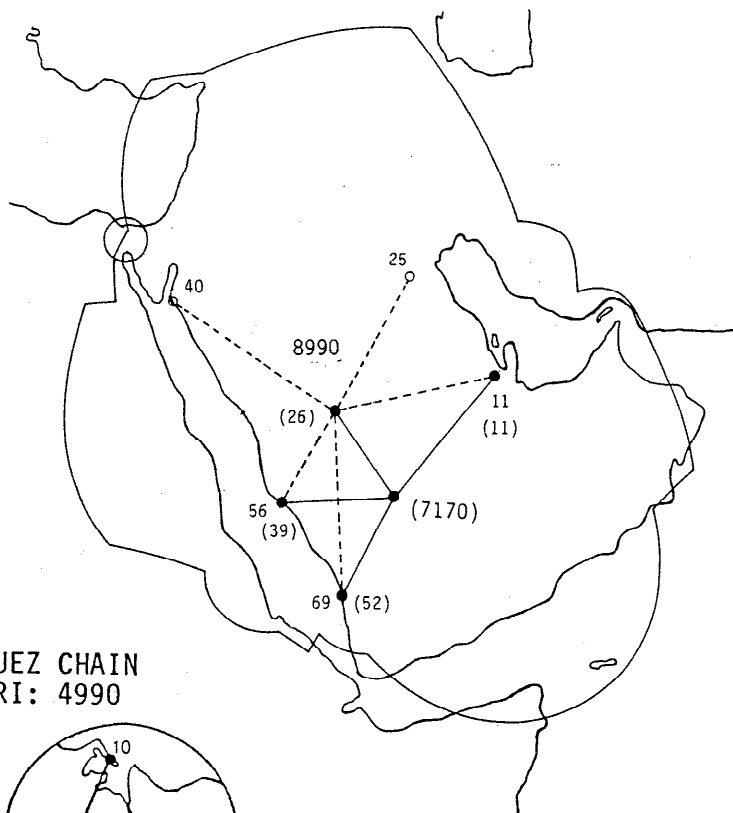
COMMANDO LION CHAIN GRI 5970

	MIN. TIME DELAY	MAX. TIME DELAY
W:	11,000 usec	20,567.36 usec
X:	31,000 usec	32,894.04 usec
Y:	42,000 usec	49,131.12 usec



SAUDI ARABIA LORAN-C SYSTEM

NORTH CHAIN(dotted lines) SOUTH CHAIN(solid lines)
GRI 8990 GRI 7170



SUEZ CHAIN
GRI: 4990

* Set GRI of SUEZ chain to "4991"
on the LC-80/90.

LORAN-C

LABRADOR SEA CHAIN GRI 7930

	MIN. TIME DELAY	MAX. TIME DELAY
W:	11,000 usec	15,334.62 usec
X:	26,000 usec	33,130.76 usec

