

CN477 Fundamentals of Enhanced Loran
September 15, 2008, 1:30 am-5:00 pm, CEU: 3.0, prior to ION GNSS 2008
Marriott Savannah Riverfront, Savannah, GA

Instructor: Dr. Ben Peterson, Peterson Integrated Geopositioning

Prerequisite: Some knowledge of mathematics and electrical engineering will be useful.

Intended Audience: Engineers, scientists, and managers interested in the area of low-frequency navigation techniques, and in particular Loran navigation and/or its Enhancements. The course provides a solid basis in the fundamentals of Loran navigation and timing. The course is more advanced than a simple user's course, but not too detailed for the beginner to Loran.

Notes Provided: Slides presented will be professionally spiral bound, with clear plastic cover, including color to add clarity where needed.

Reference List: A reference list will be provided as part of the note package for completeness and to allow the interested attendee to obtain additional information.

Course Overview: This course emphasizes the fundamentals of Loran with emphasis on the enhancements currently being made to the system, particularly in the United States, and the impacts of those enhancements on receiver design.

Course Content: The main topics to be covered by this course are:

- Current policy on the future of Loran in the US and the rest of the world
- Basic Loran Signal Structure
- Loran propagation: Primary, Secondary, and Additional Secondary Phase Factors, Envelope to Cycle Difference (ECD), Skywaves
- eLoran Receiver Performance Standards being developed currently within RTCM and likely soon within RTCA.
- Loran Receiver Architecture Overview
 - Acquisition/Cycle Integrity/Noise
 - Hyperbolic navigation for position, velocity, and time.
 - Electric field and magnetic field antennas
- Loran Data Channel
 - Modulation, demodulation and coding
 - Message Data Format & Integrity Descriptions
 - Differential Loran
- Loran for frequency and timing applications
 - Traceability to UTC & Independence of GPS
 - Calibration & differential corrections
 - Indoor applications
- GPS Vulnerability and Integration of Loran and GPS
 - Type of integration as function of threat being addressed

Course Outcomes: At the completion of this course, the attendee should have the ability to understand the fundamentals and capabilities of low frequency navigation systems and in particular Enhanced Loran.