

CHAPTER 4 - DEFINITIONS

The following definitions are provided to aid the reader in understanding this document:

- A. Antenna Current: the signal at a Loran-C transmitting station taken from the transmitting antenna ground return. This waveform is used at the transmitting station to monitor and measure the Loran-C pulse.
- B. Blanking (Priority, Alternate): the suppression of pulses on one rate due to the periodic phenomenon that occurs when a dual-rated transmitting station has to transmit two pulse groups of different rates at the same (or nearly the same) time. During the period of overlap, the one rate's pulses are suppressed. Priority blanking occurs when the same rate is always blanked while alternate blanking occurs when the two rates are blanked in an alternating manner. (For more information, see Chapter 2.E.)
- C. Coding Delay (CD): the interval of time after reception of the master's transmission that a secondary station waits prior to transmitting its own signal. The coding delay is added to the baseline transmission delay in order to develop the Emission Delay (ED). The Coding Delays, the electrical lengths between the stations, and the lengths of the signal groups are used to develop the minimum allowed Group Repetition Interval (GRI) for a chain. The Coding Delay assigned to each secondary station allows stations of a chain to transmit sequentially in time and to prevent overlap of the different signal groups anywhere in the system.
- D. Controlling Standard Envelope-to-Cycle Difference (CSECD): Envelope-to-Cycle Difference that is maintained at the monitor site as determined by chain calibration.
- E. E-field Transformation: With an antenna current pulse as described in equations (2.1) and (2.2), the leading edge of the E-field Loran-C pulse as sensed outside the near far-field of the transmitting antenna is described by:

$$e(t) = 0; \text{ for } t < \tau \quad (4.1)$$

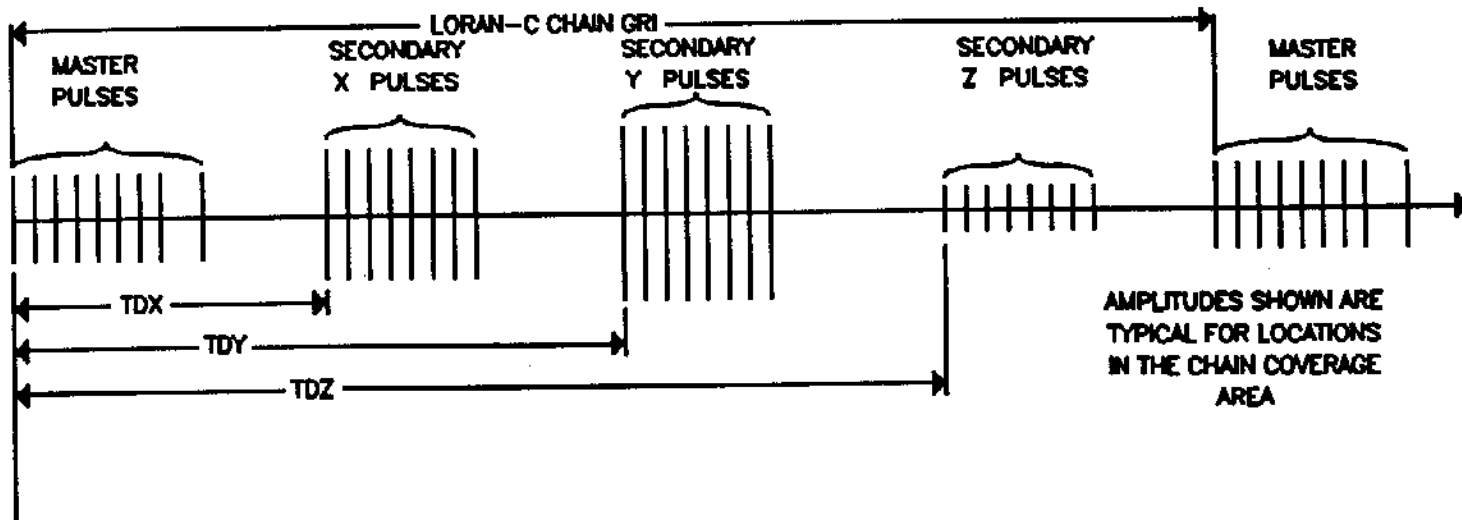
$$e(t) = A'(t - \tau)^2 \exp \left[ \frac{-2(t - \tau)}{65} \right] \cos(0.2\pi t + PC) + \text{higher order terms}$$

$$\text{for } \tau \leq t \leq 65 + \tau \quad (4.2)$$

where

A' is a different normalization constant,  $t$ ,  $\tau$ , and PC are as described in equation (2.2), and the higher order terms are small and have no significant impact on the description of the leading edge of  $e(t)$  when  $t \geq 20$ .

- F. Emission Delay: the interval of time (in microseconds) between the beginning of the first pulse from the master station and the beginning of the first pulse from the secondary station in the same chain (both stations using a common time reference). The emission delay equals the sum of the baseline travel time plus the secondary coding delay.
- G. Envelope-to-Cycle Difference (ECD): ECD is the time relationship between the phase of the RF carrier and the time origin of the envelope wave form. In practice, the ECD of an actual Loran-C pulse is determined from the transmitting station antenna current waveform using the procedure in Chapter 2.A.1.a.
- H. Far Field: The area typically greater than 5 to 10 wavelengths from the transmitting antenna. The far field consists of the propagating components of the electric and magnetic fields. In the far field, the term  $1/R$  dominates in the field equations derived from Maxwell's Equations.
- I. Group Repetition Interval (GRI): The time interval between successive pulse groups measured from the third cycle (or zero cross-over) of the first pulse of any one station in the group to the third cycle of the first pulse of the same station in the following pulse group. All stations in a chain have the same GRI, and the GRI expressed in tens of microseconds is the identifier for that chain and is called the chain "rate". GRI's may range from 40,000 microseconds to 99,990 microseconds, in increments of 10 microseconds.



- J. Loran-C Peak Radiated Signal Level: The level of a Loran-C signal is the RMS level of a CW signal having the same peak-

to-peak amplitude as the Loran-C pulse envelope at the peak of the pulse.

- K. Near Field: The area typically within a radius of 2 wavelengths from the transmitting antenna. In this area, static and quasi-static electric and magnetic fields exist. These fields do not propagate. In the field equations derived from Maxwell's Equations, the terms  $1/R^2$  and  $1/R^3$  dominate.
- L. Near Far-Field: the boundary area between the near and far fields typically from 2 to 10 wavelengths from the transmitting antenna. In this area, the propagating components of the electric and magnetic fields exist as in the far field but the effects of topography are not existent.
- M. Nominal Envelope-to-Cycle Difference (NECD): The calculated ECD held at the transmitting station which, given the identical propagation conditions which existed during the chain calibration, would result in the assigned CSECDs being observed at the monitor sites. The Nominal ECD is determined from the transmitting station's antenna current waveform using the procedure in Chapter 2.A.1.a.
- N. Phase Code Interval: That interval over which the phase code repeats itself. Loran-C phase codes repeat every two GRIs.
- O. Pulse Leading Edge: The portion of the pulse between the beginning and the peak.
- P. Pulse Trailing Edge: The portion of the pulse following the peak.
- Q. Signal to Noise Ratio (SNR): The ratio of the RMS amplitude of the Loran pulse at the standard sampling point to the RMS value of the noise present at that time.
- R. Standard Sampling Point: the point on the Loran-C pulse envelope 25 microseconds after the beginning of the pulse to which far-field field strength calculations or measurements are referenced. For the standard Loran-C pulse with 0.0 ECD, the amplitude at the standard sampling point is .506 times the peak amplitude.
- S. Standard Zero Crossing: the positive zero crossing at 30 microseconds of a positively phase coded pulse on the antenna-current waveform. This zero crossing is phase-locked to the Loran-C station's cesium time reference. The standard zero crossing is used as a timing reference for measurement of Loran-C signal specifications.
- T. Time Difference (TD): the interval in time between the receipt of a master station's signal and secondary station's signal from the same rate. Controlling Standard Time

Difference (CSTD) is the reference standard against which the control station compares the observations of the System Area Monitor.

- U. Two-Pulse Communications (TPC): a synchronous communication system which uses two Loran-C pulses to transmit information between Loran stations. For a more complete description, see page 2-11.