DEVELOPMENT OF AN LED DISPLAY SYSTEM FOR CROSS-TRACK DISTANCE AND VELOCITY FOR LORAN-C FLIGHT

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Abstract

Figure 1 illustrates in block diagram the methodology for estimating cross-track velocity by combining rate-gyro and Loran-C data. At present preliminary analysis has established values for K_1, K_2, the parameters of the digital control loops.

A computer program has been written to implement a digital simulation of the system as illustrated in figure 2. Given a model for the noise in the rate-gyro and Loran-C receiver, and their dynamic response, the simulation provides a working model to establish good control loop parameters.

The layout of the LED display for flight testing of Loran-C approach flying, which was constructed during a visit to Langley Research Center, is shown in figure 3. Four bar-graph LED displays are paired to provide cross-track distance and velocity from a Loran-C defined runway centerline. Two seven-segment LED displays are used to provide alphanumeric readout of range to touchdown and desired height. A metal case was built, a circuit board designed, and manufactured with the assistance of NASA Langley personnel.

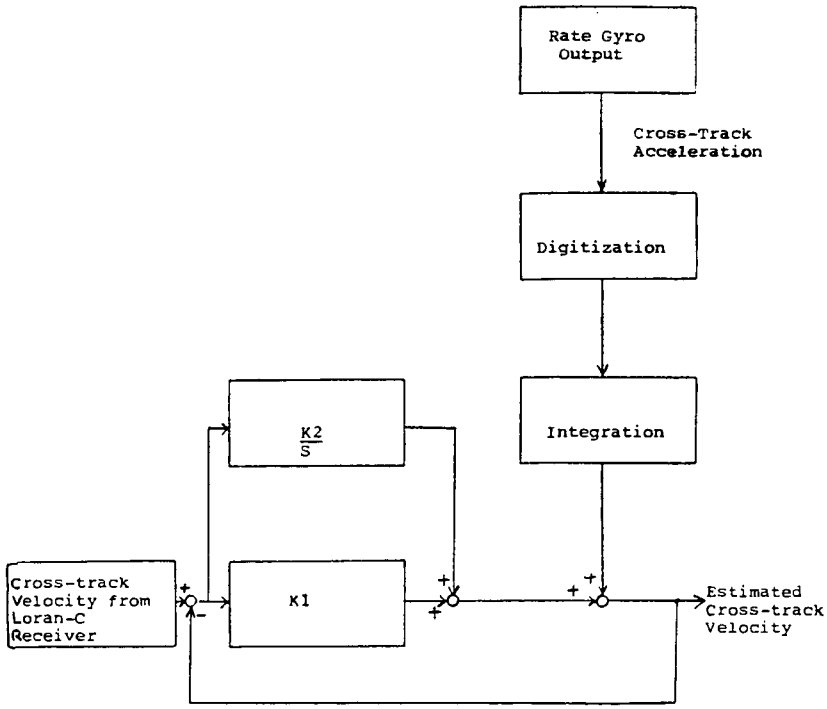

Figure 1. Block diagram - optimal estimation of cross-track velocity.

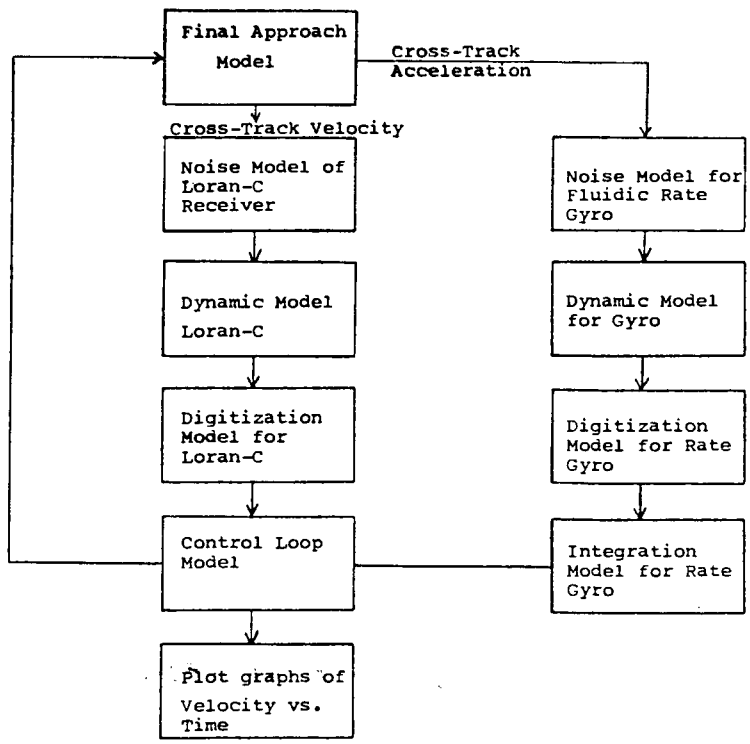

Figure 2. Digital simulation of the optimal cross-track velocity system.

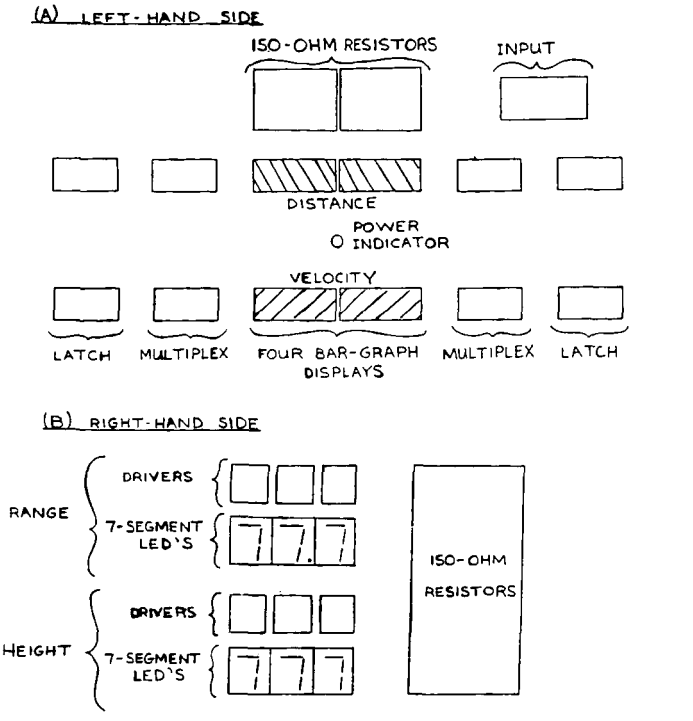

Figure 3. Layout of LED display for Loran-C flight.