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Very High Frequency Digital Ranging System

A very high frequency (VHF) digital ranging system has been developed to provide slant range and range tracking between any two airborne vehicles (designated AV-1 and AV-2). This system measures slant range from 500 ft to 200 nautical miles (± 450 ft) and provides a digital range readout during the range tracking procedure.

The VHF digital ranging system could be used for range tracking between commercial aircraft; this application would be useful as an additional safety system to reduce the hazard of collisions at congested airports.

The VHF digital system is a three-tone system consisting of square-wave components at 3.9 kHz, 31.6 kHz, and 247 Hz; the 31.6-kHz signal provides the range measurement accuracy and the 3.9 kHz and 247 kHz signals provide unambiguous range measurements for the 200 nautical mile range.

The sequence of events during the operation of the digital ranging generator (DRG) in conjunction with the AV-1 VHF transceiver can be described as follows: A 3.95-kHz signal is transmitted from AV-1, transponded by AV-2 and locked by the mid-loop tracker in AV-1; a 3.95-kHz tone combined with a 247-Hz tone is then transmitted from AV-1. The 3.95-kHz/247-Hz tone combination is transponded by AV-2, received by AV-1 and locked by the coarse-loop tracker and mid-loop tracker; a 31.6-kHz tone is transmitted after logic test verification of proper tracker operation and 31.6-kHz gating signal is applied

to the AV-1 receiver. AV-2 tracks the 31.6-kHz signal, gates the AV-1 receiver and transmits the tracked 31.6-kHz signal to AV-1.

The condition is finally reached whereby AV-1 is tracking the 31.6-kHz signal which it originated; the signal is now delayed by the two-way distance between vehicles. At this point the following events occur: the DRG range counter and range register are cleared; the range count is transferred to the DRG range counter and down-counted to remove predetermined equipment delay and now represents actual AV-1 to AV-2 range; a "good" track test is performed to determine correct tracker operation; if good tracking exists, the range information in the counter is sent to the digital display readout for pilot monitoring.

Note:

Requests for further information may be directed to:
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Patent status:

Inquiries about obtaining rights for commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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Category 02