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Digital Decoder for Phase-Delay Coded Data

A digital decoding technique can be used to convert "phase-delay" coded or modulated digital data to nonreturn to zero (NRZ) data. The technique includes logic implementation and pertinent timing diagrams. Demodulation to NRZ facilitates digital logic operations on incoming data.

Phase-delay modulation, originally developed in conjunction with high-density (saturation) digital tape recording, combines the advantages of both NRZ and phase modulation. Unlike phase modulation, which has two transitions per bit at the maximum character rate, phase-delay modulation requires at most one transition per bit and thus permits a higher packing density. Consequently, though phase-delay modulation requires approximately the same bandwidth as NRZ modulation, it has the advantage of inherent self-timing not present in NRZ modulation.

A potential time-phase ambiguity exists in receiving and decoding phase-delay data when the timing information is extracted from the transitions in the incoming data bits. A clock phase shift of π radians (180°) can occur when the receiver synchronizes to the "wrong" (half-a-bit out of phase) transitions. Proper phasing of the receiver clock and data must be ensured at all times for reliable decoding operation.

Although operation of the decoder in converting phase-delay data to NRZ, as well as tracking the correct phase, has been confirmed in the laboratory, its quantitative performance under severe noise conditions has not yet been evaluated. Under such conditions, it may be necessary to include coding or error detection techniques to augment the phase-tracking circuitry.

Note:

Requests for further information may be directed to:

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No patent action is contemplated by NASA.

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Category 01