February 1968

Brief 68-10058

NASA TECH BRIEF

Simplified, High-Speed Binary Data Decoder

A simpler and faster decoder of encoded binary data received over a noisy channel is provided in a versatile apparatus that can accommodate more than one particular set of codes. The apparatus, which functions as a maximum likelihood, parallel, hybrid digital/analog/digital decoder, is applicable to satellite, lunar, and planetary data transmission.

The noisy signal is integrated by analog procedures deriving a confidence level per symbol. The received integrated analog symbol confidence levels are converted into digital form. The received and converted symbol values taken in groups constitute words. A received word is compared to all possible dictionary words, and a word correlation is established for each comparison. The word correlation value, which includes the originally derived confidence levels per symbol, is established in parallel by means of an analog summing network. Storing of the analog correlation values during the sorting operation (sorting for maximum correlation) is accomplished in the digital domain by first reconverting the analog correlation value to digital form.

This decoder has a number of advantages over conventional systems. Its high operating speed and small number of functional components are made possible by using parallel digital or parallel analog operation, whichever is optimum for the particular function involved. The decoder is not restricted to any special code and performs exhaustive searches through the entire code dictionary. In computing the correlation value, the decoder considers symbol confidence levels and integrates these over the word length, as opposed to algebraic bit-by-bit decoders. In sorting for maximum word correlation value, the error weight, computed in the analog domain, is reconverted to digital form so that it may be conveniently stored and sorted.

Note:

A complete description of this decoder may be obtained from:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B68-10058

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

Source: Tage O. Anderson
Jet Propulsion Laboratory
(NPO-10118)

Category 01