ADIS
Modem for Fighter Aircraft

ADIS Radio Modem

The modem is based on a data-radio transmission modem developed by Albrecht for aviation applications at speeds exceeding MACH 2.

The assignment was to realise an air-to-air or air-to-ground data transmission. Owing to space and weight requirements, no special data radio device was to be installed, rather the existing voice-radio device was to also to be used for data radio. Extensive simulations of the entire transmission path including typically occurring interferences had to be carried out in order to be able to select or develop a suitable system, As a result, a mathematical model of the high frequency transmission channel running on CRAY computer became available as a by-product. This model served to optimise the transmission system and for testing the suitability of systems upon changing peripheral conditions of a technical or deployment nature.

The device under consideration successfully passed extensive tests and was installed in aeroplanes oper-ating at MACH 2.

DESCRIPTION

Functional Description

The basic requirements of the modem consist of accepting digital data and converting this data to a format satisfactorily supported by the transmission channel under consideration. In the case under discussion, this is a voice-radio channel having a bandwidth of 300 to 3400 Hz coupled with interference typical

of the ratio frequency under consideration. In addition, the special characteristics of the radios being used have to be taken into account.

Especially problematic is taking into account the situation of the relative movement of transmitter and receiver. This where the basic design for wired connections by appropriate CCITT recommendations for the proposed V.xx system reaches its limits.

Features

-Several modulation types, optimised for different radios, HF modulation types and data rates:

- CPFSK	for VHF/UHF radio with AM or FM
- Multi-tone FSK	for short-wave radio with SSB modulation
- OFDM	or STANAG waveforms
-Data rates	1200 to 9600 bits/sec for VHF/UHF operation, 300 to 2400 bits/sec for short-wave operation, with FEC Forward Error Correction.
-Audio bandwidth:	300 to 3400 Hz

-Optimisation for mobile transmitter and receiver; relative speed over 600 m/sec

-Permissible group propagation time distortion of the entire audio transmission channel: +/- 1 ms

-Adaptive equaliser for automatic adjustment to changing channel parameters

-Forward Error Correction, optimised for bit error types occurring on the radio path; Soft Decision Decoder

-Algorithm for recognition of voice traffic on the radio channel

-Priority control between voice and data radio

-Complete communications protocol

-No parameter variation with temperature and time due to digital implementation (DSP signal processor)

-Extensive self-test characteristics, BITE

-Fail-save behaviour upon modem outage (voice radio not impaired).

-The component quality of the standard execution corresponds to MIL-STD 883V/Rev.C.

Operating Modes

-Acknowledgement Mode

-Broadcast Mode

-Interrogation Mode

-Automatic Mode

-Channel Monitoring