Am Fm Airborne Transmitter Power Amplifier

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The Marine Corps GazetteAircraft Radio SystemsJeppesen Sanderson
This interim report describes the work performed from 27 March to 30 September 1978 on Phase I of Contract F33615-78-C-1517, Multifunction-Multiband Airborne Radio System (MFBARS) Study. The objective of Phase I of the study is to define a wide range of alternative Communication, Navigation and Identification (CNI) architectures, to develop an approach for economic comparison of architectures, to establish criteria for selecting among the alternatives based on a set of requirements furnished by the government and to recommend a specific approach or approaches to be detailed further in the second phase of the study. The first step in performing the study consisted of reviewing and analyzing the results of previous studies related to CNI integration. This analysis in combination with information and direction from AFAL resulted in an assessment degree of time-sharing and pulse interleaving possible for the MFBARS resources such as antennas, transmitter power amplifier, IF amplifiers and signal processor channels. It also resulted in the establishment of a set of guidelines and ground rules that were used in the performance of the rest of the study tasks. Next several different overall architectures were developed. One of these architectures was a totally non-integrated configuration consisting of a set of separate equipment units, one for each CNI function (HF, VHF AM, VHF FM, UHF, JTIDS, IFF, TACAN, GPS, etc.). The units were assumed to be a next generation development beyond the current developed version of the equivalent unit.
The objective of this study is to develop a statistical model to calculate the effectiveness of an airborne jammer on analog communication and broadcast receivers, such as AM and FM Broadcast Radio and Television receivers. During the development the required power margin in dB, or equivalently, the required linear ratio, between the jammer power and the carrier power at the target receiver input was first determined. Subsequently, using probabilities that the jammer power will exceed the target signal's carrier power, the required power margin was calculated. This power margin was determined by statistical techniques to predict the propagation characteristics of communication and broadcast signals, such as Log-Normal Shadowing, and Small-Scale Fading. From the model, it was determined that it is difficult to achieve high probabilities of exceeding the required jamming margins with a single jammer. Hence, the use of spatial diversity jamming is recommended, that is, using two or more jammers spaced sufficiently far apart from each other, such that their jamming signals at the targeted area are de-correlated due to the differences in their respective angles of arrival.