

# ATMOSPHERIC NOISE CANCELLATION FOR LF AND VLF COMMUNICATIONS

## Technology in Development:

- NAVAIR Phase I SBIR awarded Feb. 2007
- NAVAIR Phase II SBIR selection takes place Fall 2007



## General Description:

GIRD Systems, in collaboration with Pole/Zero Corporation, a subsidiary of Dover Corporation, is developing a novel Interference Mitigation System (IMS) for mitigation of atmospheric impulsive type interference for LF and VLF communications channels. Operating as a stand-alone processor, the IMS can be quickly integrated into virtually any LF/VLF platform.

By exploiting *a priori* knowledge of the nominal Signal-Of-Interest (SOI) as well as interference characteristics, GIRD's signal processing algorithms can better separate the interference and SOI.

The all-digital IMS directly samples the LF/VLF RF signal, and performs digital downconversion to baseband. Following digital signal processing, the sanitized signal is regenerated at the original RF frequency. Therefore the IMS system is completely stand-alone and can be easily plugged-into any existing LF/VLF receiver.

## Example Scenario:

Figure 1 illustrates one potential interference scenario. Strong impulsive interference corrupts a BPSK transmission over an LF channel. With interference mitigation, the impulsive noise is largely reduced (Fig. 2).

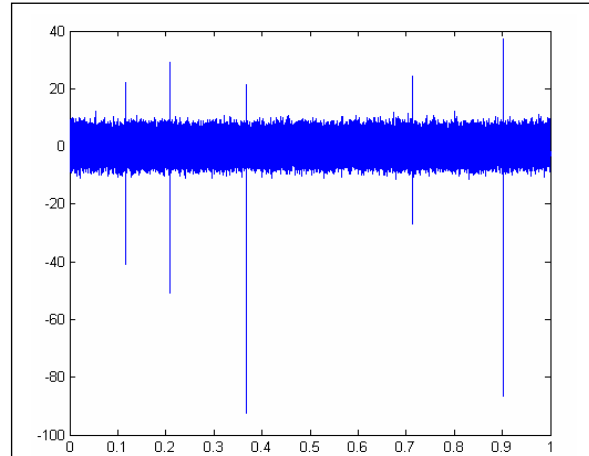


Figure 1 - Impulsive interference often corrupts LF/VLF signals due to lightning of the atmosphere. Shown here are a BPSK signal corrupted by strong impulsive noise.

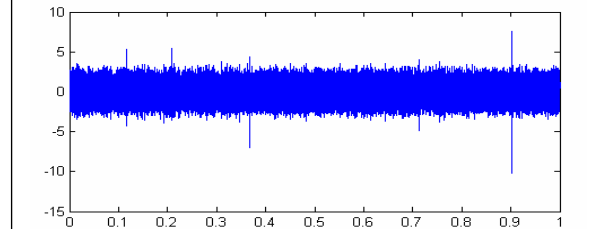


Figure 2 - After GIRD Systems' proprietary mitigation processing, the impulses are largely reduced.

## All-Digital Hardware:

Figure 3 illustrates the all-digital approach of the IMS hardware structure for LF/VLF communications applications.

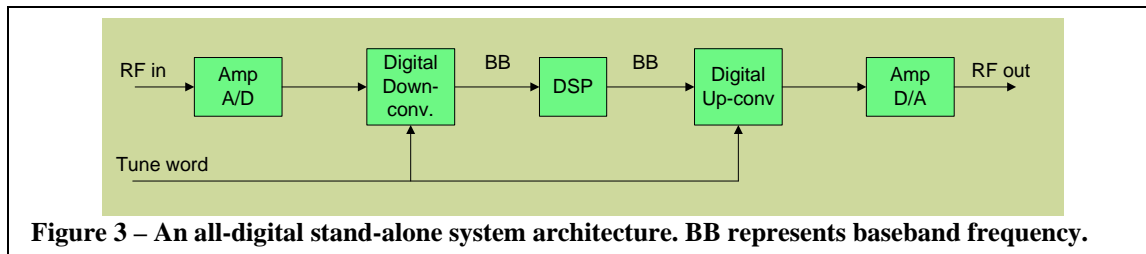


Figure 3 - An all-digital stand-alone system architecture. BB represents baseband frequency.