

NEXT GENERATION AVIATION EMERGENCY RECORDER LOCATOR: AN IMPROVED UNDERWATER PINGER LOCATOR FOR DOWNED AIRCRAFT

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Introduction

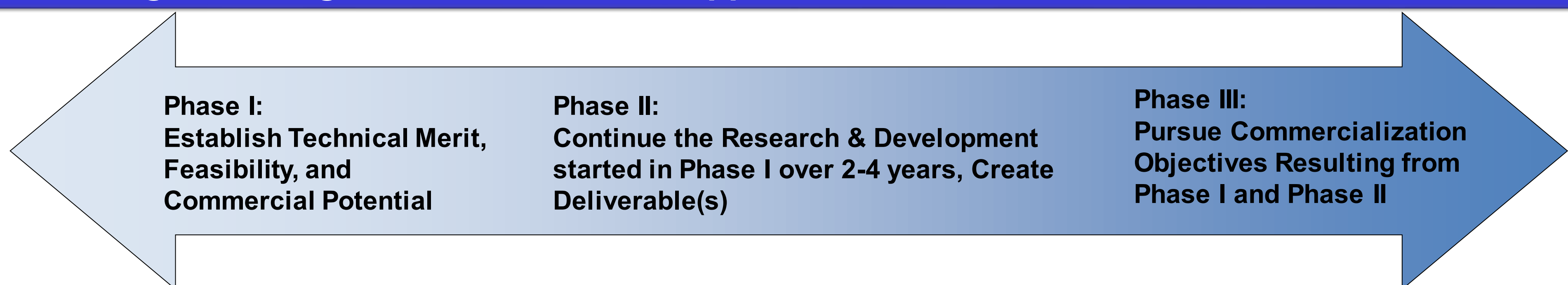
In the early 1970's, there was increasing concern that the root cause for passenger airline crashes was not being addressed because information was lacking as to why airline crashes occur. In response to public demand, regulatory agencies, specifically the FAA and NTSB, mandated that all passenger aircraft be equipped with a Flight Data/Voice Recording (FDVR) devices. Sometimes referred to as a "black box", the recorder takes two forms. In one configuration, the device is designed to continuously record the changes in the aircraft control surfaces, engine parameters, and navigational data. In another configuration, the flight crew conversations are recorded. In both cases, the boxes, which are not black in color, but rather bright orange to improve visibility, are designed to survive a possible crash so that the last moments prior to an aircraft mishap can be re-created, so the cause for the crash ascertained. An audible location device or Pinger is part of both box packages for underwater retrieval.

Commercialization is Key Goal

The end goal of developing an improved underwater Pinger locator is to transition the innovation to commercialization, ultimately resulting in reduced airline recovery failures, reduced insurance costs, and increased public perception of air travel safety. The development of a pilot program of an improved Pinger system may be financed through the SBIR or Small Business Innovation Research Program. This program does not take an equity stake in the technology being developed or in the small business entity itself, instead it's designed to help "kick-start" the development of new ideas. The program goals are as follows;

- Technological Development
- Intellectual Property Protection
- Market Analysis & Implementation
- Initiate Sales

Planning in Moving From Government Supported NTSB SBIR Research to Commercialization

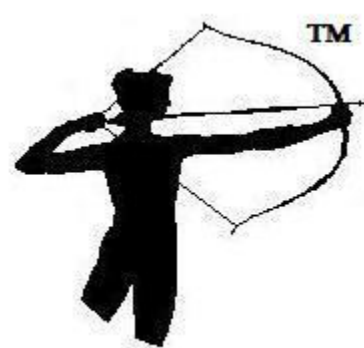


Present State of the Art And Improvements Defined

The principal reasons for the failure to locate a downed aircraft underwater is due to failure of the current flight data/voice recorders' Pinger/Sounder location detection system. Failure can take different forms: insufficient crashworthiness, loss of audible location beacon signal (Dead Battery), and poor audible beacon range. Present Pinger systems are cylindrical in shape, and therefore cannot dissipate kinetic energy uniformly in all directions during a crash, leading to possible enclosure failure. The improved Pinger is spherical in shape and thus is designed to withstand higher crash velocities inherent in current jet aircraft, as well as far greater water submersion depths. The next area of improvement is the adaptation of a low frequency (infrasound <20Hz) high amplitude, underwater, acoustical sounder beacon. The acoustic beacon in use today is of a design dating from the early 1970s, which is limited to 30 days of life or less, with a low amplitude 1 kHz square wave signal. The range of the current Sounder is typically 2 miles or less. If an aircraft crashes in the Atlantic, Pacific, or Indian Ocean the likelihood of detecting and locating the downed aircraft and its black boxes is extremely slim. In contrast, the proposed Pinger system expands the duration of operation to 90 days or more, and the acoustic signal detection distance to many tens, and even potentially, hundreds of miles, over the present state of the art. In addition, the proposed Pinger system incorporates 2 data transmission features: 1) a "low speed" serial data link, GPS coordinate transmission mode in addition to the traditional 1Hz standard pinging, for long distance GPS coordinate transmission via infrasound, and 2) a separate "high speed" serial data link handshake capability with searching surface vessels. This "high speed" serial data feature allows an approaching surface ship, in the region where the Pinger is located, an active acoustical "interrogation" by that surface ship of the Pinger system. The Pinger is designed such that it changes its acoustic output to increase Pinger duty cycle, amplitude, and pitch to help facilitate downed aircraft location at sea.

Improved Flight Data/Voice Recorder Location Will Provide the Following Key Benefits :

- Reduced Search Costs
- Reduced Legal Liability Exposure
- Increased Public Safety
- Improved Public Safety Perception



Improved Location At Sea

The objective of the Phase I is to get to the Phase II. The Phase I typically requires several interim reports. These reports determine early on if the sponsor is motivated to support a Phase II, so early research success is essential to "wow" the sponsor.

Distance and Duration

SBIR programs are fast paced, and commercialization plans must be established in a Phase I to properly plan for a Phase II investigation. This will help tailor the Phase II "end-product" to a prospective market.

Plan Alpha & Beta Testing

Business deals to provide for sales and possible private labeling of a product or service takes time. Commercialization success is enhanced if marketing deals can be established early in the SBIR process, typically at Phase II start.

Conclusion

The Solution:

- Clearly Defined Goals
- IP & Commercialization Discussion at Start
- Routine Group Meeting
- Routine Deliverables
- Early Interface with Investors and Phase III Participants

Commercialization success depends on the business to develop innovative ideas that can be demonstrated for feasibility in a short period of time, where prototypes can be fabricated in approximately 2 years, in parallel with a marketing plan. The marketing plan must include a method for implementing sales, whether by the small business or through some form of retail distribution and/or private labeling.

References

