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TECHNICAL REPORT
BWL 24

ENGINEERING DESIGN AND DEVELOPMENT OF THE E120R1 BOMBLET (U)

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(U) A contract for the development of the dispenser was let by the Air Force to the Boeing Airplane Company. 

(C) Several conferences were held among representatives of Boeing, the Air Force, and Fort Detrick to discuss the requirements and design features of both components to assure a compatible system. The design proposed by Boeing was for a rectangular dispenser to be fastened in the bomb bay of the aircraft. The dispenser would be cellular, three cells wide by eight cells long. Each cell would contain three 15-inch cubical cartons. Insulation and heaters would provide temperature control, and each cell would be equipped with a door and latch mechanism. An intervalometer control would permit release of the cells separately, in groups, or in salvo.

(U) The carton was to be designed to maintain the bomblet fuze safe after it was assembled into the carton. The pin-arming fuze becomes armed when an arming spring ejects an arming pin. This frees the parts to move, and the fuze fires on impact. For normal handling and transportation a safety wire holds the arming pin in place. To permit the fuze to arm after release from the carton, however, the safety wire must be removed when the bomblet is assembled into the carton. Consequently, it was necessary that the carton be designed to retain the arming pin in place until the time of release.

(U) Through discussion it was agreed that the bomblet fuze would be designed for safe, easy assembly into the carton and that the carton would be designed to hold the bomblets, and the arming pin, in a fixed position until release.

3. (U) Military Characteristics

(U) Military characteristics are defined as those qualities of an item, device, or assemblage required to fulfill a specific military requirement. Those for long-term projects should be limited to statements of requirements and capabilities desired. Those for short-term developments may be more specific if considered essential to obtain desired capabilities.

(U) In the case of the E120 the basic requirement and the general design features of an item (E94) to fill those requirements were at hand. Consequently, the military characteristics for the E120 were prepared to define the specific requirements of the item to be developed.

(U) The military characteristics were prepared through the joint efforts of the Air Force and Fort Detrick, and served as guidelines throughout the development. They are presented in their entirety in Appendix A.

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(U) Design work on the E94 had shown that the four-inch diameter of the outer sphere imposed severe design limitations on the inner generator sphere, since the thickness of the cushioning material limited the diameter of the generator to three inches. To maintain symmetry and proper weight and moment distributions it was necessary to design the generator components of the nozzle, propellant, and fuze along the polar axis as a centerline. Within the limits of the three-inch sphere any necessary increase in the length of one component required a decrease in length of one of the other components.

(U) A study was made of the packaging efficiency of spheres of various sizes within the E19 dispenser. The results showed that a 4.5-inch-diameter outer sphere would provide near maximum agent capacity per dispenser load. Therefore, a sphere 4.5 inches in diameter was selected for development. This permitted the diameter of the generator sphere to be increased to 3.25 inches, which greatly facilitated design.

(U) In the design of any air-arming fuze, a predictable force which can be used to arm the fuze in flight is required. In the case of the spheres, where external propellers could not be used, fuze arming would depend upon a predictably stable rotation about a given axis.

(U) At the time negotiations were initiated on the E120, investigations into the spherical self-dispersing shapes were relatively new. The information available showed the spheres to be capable of wide dispersion and relatively good distribution, but data on the flight characteristics of the individual spheres were almost non-existent. The spheres were too small to permit theodolite or photographic tracking of individual trajectories. As a consequence it was not known whether the spheres would rotate stably about any given axis. This made it necessary to consider fuze types which would not depend upon rotation of the sphere. In addition, the time schedule for the complete development of the weapon system was quite restrictive considering the amount of work to be done. It was deemed impractical to undertake an investigation of the flight characteristics of the individual spheres, and the development of an air-arming fuze. Such an undertaking would be time-consuming, and effort could be better directed toward other aspects of the program. It was therefore decided that a simple pin-arming fuze would be used that would be completely independent of the flight characteristics of the sphere.

2. (C) Weapon System

(C) The E120 was to be a component of an over-all weapon system. That system was primarily composed of the aircraft, a dispenser, a dispenser carton, the bomblets, and the agent (Figures 4, 5, and 6). The concept was to provide for the delivery of the bomblets to the target in a dispenser-type delivery-release system. The dispenser, fastened in the bomb bay of the aircraft, would provide both for maintaining temperature control for the agent, and for releasing the bomblets either in small numbers or in salvo over the target.

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