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REVIEW OF THE HIGH ALTITUDE RESEARCH PROGRAM (HARP)

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Abstract: Project High Altitude Research Program (HARP) is directed toward the use of guns for scientific probing of the upper atmosphere. The attractive features of guns for this purpose are the basic economy of such a system and the high inherent accuracy of guns for placement at altitude as well as accuracy in ground impact. The basic liability for such an approach lies in the very high accelerations experienced by gun-launched payloads. The guns used in Project HARP vary in size from 5-inch and 7-inch extended guns on mobile mounts to transportable fixed 16-inch guns. Altitude performance varies from 20 pound, 5- inch projectiles reaching 240,000 feet to 185-pound, 16-inch projectiles reaching 470,000 feet. Single and multiple stage rockets launched from the 16- inch gun have very promising predicted performance and are under development. Scientific results to date are primarily wind profiles measured by radar **chaff**, aluminized balloons and parachutes, and tri-methyl-aluminum trails, although a number of successful 250 MHz and 1750 MHz telemetry flights were made. Sun sensors, magnetometers, and temperature sensors were flown and an electron density sensor was fired in early June.

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