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THE FIRST NIGHT-FIRING OF A V-2 ROCKET IN  
THE UNITED STATES

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The possibility of earth-launched meteors was discussed previously.<sup>1</sup> A proposal to realize this possibility was submitted to Major General G. M. Barnes, Office of the Chief of Ordnance. This proposal was accepted and it was decided to launch a V-2 rocket from the White Sands Proving Ground at 10:00 P.M. on the night of December 17, 1946. The rocket chosen was one assigned to the Applied Physics Laboratory of the Johns Hopkins University with Dr. J. A. Van Allen in charge of installing the necessary instrumentation. As the generators for the artificial meteors, six rifle grenades with shaped explosive charges and conical steel inserts were installed in the instrument head of the V-2 rocket. These charges were to be ejected from the V-2, two at a time in opposite directions, and fired immediately after ejection at 70, 80, and 90 seconds, respectively, after the launching of the V-2. Observers from the California Institute of Technology and from Harvard University and technicians from White Sands were stationed at various points within 20 miles of the launching point. These observers operated about 30 cameras including the 8-inch Schmidt F/1 telescope from Palomar Mountain. Observers were also stationed at Tucson (E. F. Carpenter), Albuquerque (L. La Paz), Flagstaff (V. M. Slipher), and at the 18-inch Schmidt telescope on Palomar Mountain. The luminous phenomena to be expected were:

1. The flaming exhaust jet of the V-2, for the first 70 seconds, until the propellant is cut off.
2. The luminous graphite vanes which, being immersed in the jet for steering purposes, get red hot and outline the trajectory of the V-2 after the propellant is cut off.
3. The luminous flash of the exploding shaped charges.
4. The ejected molten steel fragments which, because of their high speed of up to 30,000 feet per second, could be expected

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<sup>1</sup> *Pub. A.S.P.*, 58, 260, 1946.

to be reheated by friction in their dive through the atmosphere and which thus should appear as artificial meteors.

Unfortunately, something seems to have gone wrong with the firing mechanism, for neither the flash from the explosive charges nor the meteors were seen. The experiment will therefore be repeated. The following valuable results were obtained, however :

1. Excellent pictures of the jet trajectory. These include two spectroscopic pictures taken with objective gratings of 1440 lines per inch and strong first order, kindly furnished by Professor R. W. Wood. The  $C_2$  Swan band and CN bands can be clearly seen and measured.
2. The trajectory of the glowing graphite rudders was observed both photographically and visually.

On the night previous to the firing of the V-2, three grenades were exploded, two on the ground and one after having been tossed up in the air for a few hundred feet. These explosions were photographed from a distance of 2.5 miles. Excellent photographs were obtained of the "artificial meteor spray," particularly with the 8-inch Schmidt telescope. Because of the high resistance which the fast steel particles suffer in the dense atmosphere, their trajectories are short. Valuable information was nevertheless obtained about their brightness. A more detailed account will be given after evaluating the data available.

It should be added that the jet of the V-2 was photographed at Tucson at a distance of 285 miles from White Sands. To prospective observers for future firings, the advice is given to use panchromatic films or plates, which will greatly enhance the chances of positive results.

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