INTRODUCTION

Robert R. Newton's article in this issue of the *Johns Hopkins APL Technical Digest* deals with our largest and most constant companion, the moon. By making use of solar and lunar eclipse observations that extend back in time more than 2500 years and by reconstructing the dates when those events were recorded, he shows that the subtle gravitational interactions between the earth and the moon have led to definite changes in the earth's spin rate and in the moon's angular velocity. (His recent books on this subject are reviewed by S. J. Goldstein in this issue.)

Since the launch of Sputnik I in 1957, many more satellites have appeared in the sky. They are much too small to have any measurable effects on the earth, but they are of unique value as observation platforms. Among them was Transit 1B, orbited in April 1960, the first of many successful APL-built spacecraft. Its design, development, and deployment were accomplished so quickly and it became such a notable commercial and military success that a few comments about its genesis are worthwhile on this 25th anniversary.

Within a few days after the Sputnik launch on October 4, 1957, APL staff members and many others tuned in on its radio signals. As the satellite approached and receded from the observers, the Doppler shift imposed on the signal was apparent to all. However, quoting from the *History of the Space Department, The Applied Physics Laboratory, 1958-1978*, "every other person who studied the problem of finding the orbit from the Doppler shift solved the theoretical problem wrong and concluded either that the orbit could not be found at all or that at best it could be found with low accuracy. Only Guier and Weiffenbach [*Nature* **118**, 525 (1958)] solved the problem correctly; they found that the Doppler observation from a single pass gave an orbital determination as good as all data from all other types of tracking up to that time."

By a bold stroke of invention, the problem of tracking was inverted to solve a pressing practical problem: why not determine the position on earth of any observer on a ship or plane who tuned in on the modulated signals of the satellite and who was provided with the flight parameters of the satellite? Within a few days, the feasibility of such a scheme was established and communicated to, among others, the president of The Johns Hopkins University in the letter on the facing page.

The elegance of the concept and the obvious practical consequences and technical fallouts of this invention led in two years to a fully functioning satellite prototype and within nine years to a commercial system that outmoded all other methods of navigation.

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WALTER G. BERL

Milton S. Eisenhower died on May 2, 1985, at the age of 85. It is worth recalling an event several years ago when, at a formal ceremony, the Research Center of the Applied Physics Laboratory was renamed the Milton S. Eisenhower Research Center and a plaque was unveiled to him as EMINENT EDUCATOR, DISTINGUISHED PUBLIC SERVANT, STEADFAST AND CHERISHED FRIEND.

He said then: "Of course, it is a pleasure for me to be permanently recognized here. Anyone would be proud. As we pass on, most of the work we did is eventually forgotten, but the building stands for a long time. Occasionally someone will ask 'who was he?' A few may find out." And what a discovery will be in store for them!