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NASA TECH BRIEF

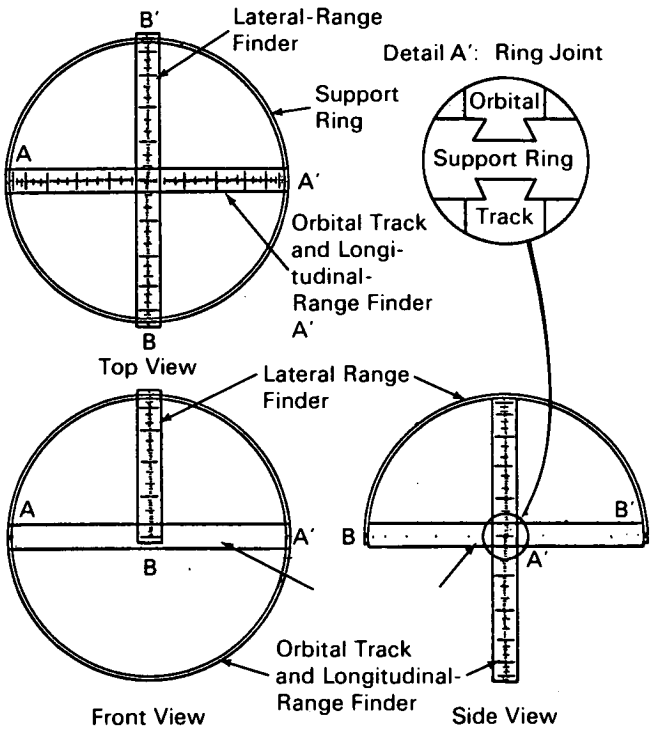
Orbit, Reentry, and Landing Attachment for Globes

A novel, simple, and inexpensive navigational device, invented to aid the recovery of spacecraft from any orbit, can be used to illustrate the motions of satellites relative to Earth, and the entry-ranging requirements of such vehicles. The device may be of interest to educators and to manufacturers of globes, maps, and graphic teaching aids.

The attachment can be made wholly of 1/16-in. clear plastic. Its basic element is the support ring (Figs. 1 and 2), a narrow strip made to fit snugly around the globe. Normal to the ring, another strip—the orbital track and longitudinal range finder—is passed around the globe and fixed to the ring at two diametrically opposed points, A and A′, and the ends are joined by a press clip. At opposed points, B and B′, midway between A and A′, are pinned (single-pin joints) the ends of a semicircular strip that fits snugly around one-half of the globe. This is the lateral range finder which, like the orbital track, is graduated in degrees.

The attachment is placed on the globe such that the

(continued overleaf)



Support Ring Figure 1. Views of the Device

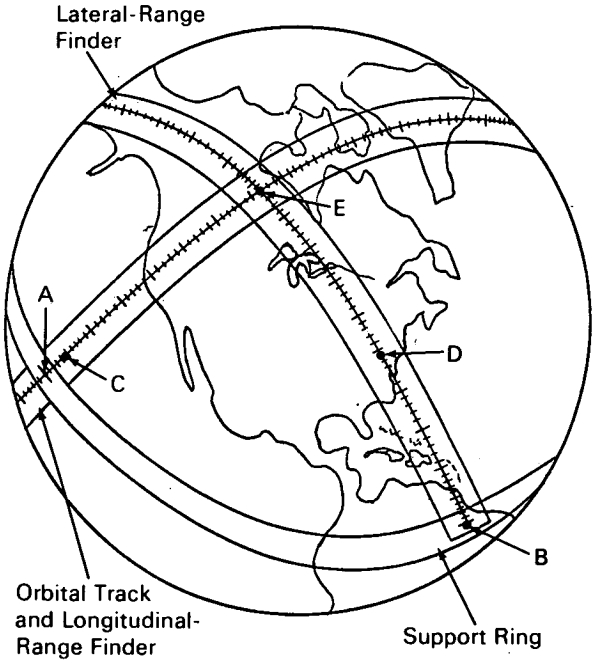


Figure 2. Operation of the Device

orbital track is at the desired inclination to the equator, with points A and A′ aligned with the orbital nodes for any particular point of initiation of the analysis. The orbital track thus lies over the point of entry, point C in Figure 2. The lateral range finder is then rotated on its pins until it lies over point-D, the desired landing point. Here it intersects the orbital track at point-E. Thus the longitudinal range can be read between C and E; the lateral range, between E and D. Subsequent orbital passes can be studied after appropriate shifts of the nodal line A—A′ around the equator.

The general purpose of this invention is to provide a rapid means of defining, with reasonable accuracy, the lateral range requirements for spacecraft returning from any orbit to any desired site. Lateral range requirements, accurate within about 30 nautical miles, can be defined in less than 10 percent of the time required for calculation. Unattractive sites can be eliminated visually without calculation.

Prior methods required solving the orbital equations of motion either manually or by a computer program. The time-consuming procedure required calculations for all possible landing sites before lateral range requirements for the best group of sites could be defined.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Langley Research Center
Hampton, Virginia 23365
Reference: B70-10656

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

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