NASA TECH BRIEF

Development of Lunar Drill to Take Core Samples to 100-Foot Depths

A Lunar Drill Program was initiated to develop a lunar drill capable of taking lunar surface cores to depths of at least 100 feet and to examine methods and techniques of extending this concept beyond 100 feet.

The lunar drill concept is predicated on the design and development of an adaptation of an operational system, the wireline drill, which has been in widespread use for many years. The wireline drill system, like conventional drills, consists of a drill rig, a prime mover, drill rods, a core barrel, and a bit, and employs conventional rotary drilling. The unique element, which sets the wireline drill system apart from other drilling systems and techniques, is the method of core recovery. As the core is cut, it is collected in a retractable core barrel which can be lifted to the surface without withdrawing and dismantling the drill rods and leaves the bit in place. After a length of core is withdrawn, the same or an alternate retractable core barrel can be lowered into place inside the drill rod and drilling continued. This technique permits a large reduction in the operation time of the drill compared to other drilling systems.

This system has been adapted to operate in the lunar environment by providing a sealed dc motor for vacuum operation, and solid metallic base lubricants for bearings and gears.

A preliminary analysis shows that a 100-foot hole will take approximately 40 hours to install, drill, and collect samples in dry rock using the wireline techniques.

While the engineering model drill system did not achieve all of the objectives of the program, significant advances were made toward the goal of developing a reliable tool for lunar drilling. The limited laboratory testing indicated that further development is required in the following areas: diamond bit design, chip removal, gear box, drill string coupling, drill motor, and automation techniques.

Complete details of this program are contained in: *Development of a Subsurface Drill System for Post-Apollo Missions,* Westinghouse Defense and Space Center, Final Report, March 1967. Copies are available from:

Technology Utilization Officer
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Patent status:

No patent action is contemplated by NASA.

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