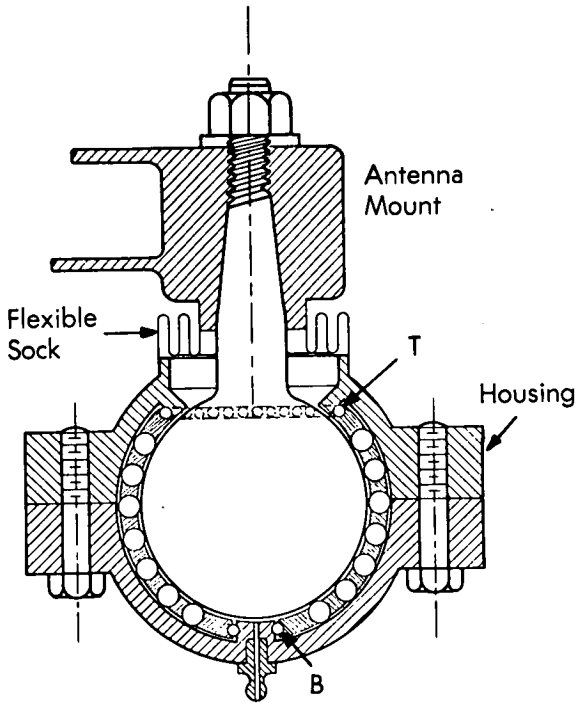
NASA TECH BRIEF

NASA Pasadena Office

Low-Friction Ball-and-Socket

The problem:

To replace the gimbals-mounting used with spacecraft antennas which require only a limited change in pointing direction during a mission. Although gimbals mounting arrangements are satisfactory and



provide a wide range of pointing directions, they have a number of disadvantages.

The solution:

A ball-and-socket mount which includes a ball-bearing retainer assembly to reduce friction.

How it's done:

A schematic section of the improved ball-and-socket arrangement is shown in the diagram. It is made up principally of a separable housing which is secured to a fixed part or member of the spacecraft and a ball-ended movable member to which is fastened the spacecraft antenna. A ball-bearing retainer maintains a number of ball bearings in fixed positions while they are in contact with the ball-ended movable member; thus, the ball-ended member moves relatively frictionlessly in the socket. Moreover, because all surfaces which are in tangential contact with the ball bearings have been finished to the usual tolerances for spherical bearings, the ball-ended member exhibits a minimum of play in all directions. Freedom of play in all directions is not possible with ball-and-socket arrangements which use plastic materials as retainers; such materials are particularly affected by temperature changes and by cold flow.

The retainer is a globular member which, for convenience of manufacture and assembly may be made of two or more segments. Ball races at the top and bottom of the retainer (T and B in the diagram) restrict its motion only to rotation about one axis. More importantly, however, the ball bearing apertures in the retainer are spirally offset; this arrangement and the independent rotation of the retainer allows the roll path of the balls to be at some optimum angle to the direction of pivoting of the ball-ended support. If the apertures were parallel and vertical to the rotational axis of the retainer, only the balls parallel to the pivoting plane would roll and all others would tend to skid.

(continued overleaf)

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP72-10081

Patent status:

No patent action is contemplated by NASA.

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