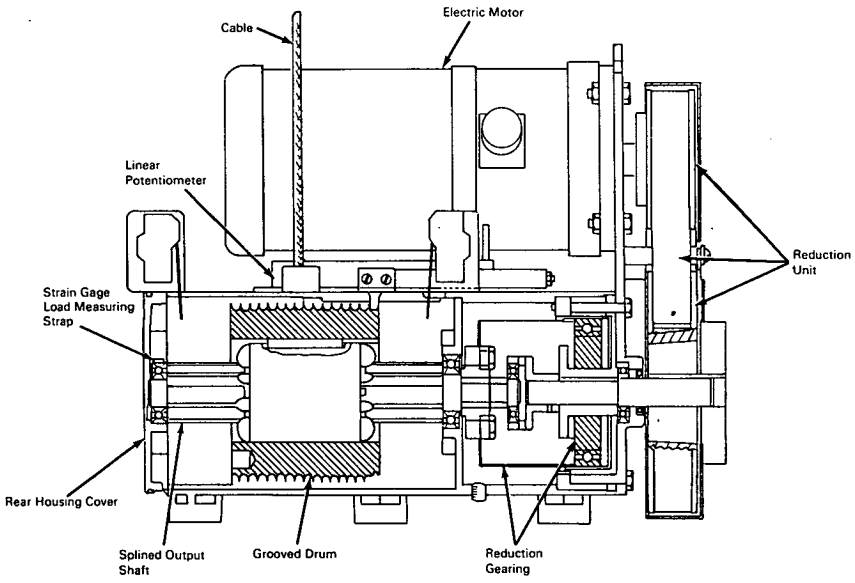
NASA TECH BRIEF

Improved Control System Power Unit for Large Parachutes



An improved control system power unit for driving the control surfaces of very large controllable parachutes has been designed. The improved design features (1) subassemblies simpler and less expensive for determining control surface position and cable loading and (2) protection of the load sensor against the possibility of damage during manipulation.

The system consists of an electric motor driving through a flat timing belt reduction unit to a harmonic drive reduction gear train and, in turn, to a ballbearing splined output shaft. Riding on this shaft is a ballbearing-supported grooved drum which holds the control system cable. As the cable winds or unwinds, the drum traverses back and forth on the splined shaft to keep the position of cable entry into the housing unchanged. The position of the cable on the drum at any instant is thus a function of the drum's position on the shaft. A linear potentiometer is therefore linked to the drum to give an electrical signal proportional to drum position. The various positions of the drum are calibrated to indicate the actual positions of the parachute control surfaces. The cable's position relative to the ballbearings at the ends of the shaft is fixed so that the cable load is shared equally by the bearings. The rear housing cover has integrally machined into it the rear splined-shaft bearing housing. This bearing housing is designed so that the top half, against which the bearing load reacts, is a thin metal strap. This strap restrains the bearing into the bottom half which is a rigid saddle. The strap is dimensioned so that its strain is within the proportional limit for the maximum imposed stress. Strain gages are affixed to the sides of the thin metal strap and to the bottom of the bearing housing for temperature com-

(continued overleaf)

pensation. The strain gage signals are calibrated to provide remote readings of the dynamic or static cable loadings.

Notes:

1. For load measurement of a system that does not keep the cable centered or stationary relative to the bearings, load sensors could be mounted on both bearings in conjunction with an electrical integrating circuit which would indicate the sum of both bearing loads.
2. Inquiries concerning this system may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B67-10677

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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