Modification of Hipotronics Discontinuity Enamel Wire Test for Wire Screening

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The Quality Assurance DSN and Mechanical Hardware Section and the Fabrication Section have redesigned the wire spindle section of the wire screening test equipment to prevent breakage of small gage magnet wire during testing operations.

I. Introduction

In the last year, use of magnet wire at JPL has increased dramatically. With emphasis being directed toward smaller and lighter packaging of electronics, the use of lighter gage wire has risen sharply.

Prior to its use, the wire is screened by Quality Assurance for defects. In attempting to perform screening tests with our existing test equipment on the smaller gage magnet wire, problems were encountered with repeated breakage of wire. After investigation and analysis, a deficiency was discovered in the design of the spindle that induced improper load and wire tension during testing operations.

II. Description of Equipment

The equipment used by Quality Assurance to perform the screening test is a Hipotronics Discontinuity Enamel Wire Tester Model DT-1 (Fig. 1). This unit is designed to spark-test the insulation coating ot magnet wire and to record the number of defects.

The procedure is to set a spool of magnet wire on the left side spindle, remove a small amount of insulation from the end of the wire, feed the wire through the guide rollers and through the mercury bath, and then attach the end of the wire to the ground terminal of the takeup drum. The voltage range is selected and the machine is started, pulling the wire through the mercury bath. Any defect in the enamel coating completes the circuit through the mercury to ground and activates the defect counter. A footage counter is preset to run 30.5 meters for each test.

III. Problem

The problem experienced was frequent breakage of wire in the smaller gages (38 and under). This was caused by the manufacturer's design of the feed spindle (Fig. 2). The spindle was designed with radial bearings only, with no means for supporting the weight of the spool. (A spool of wire weighs from 0.45 to 4.54 kg.) To adjust tension, a screw on the bottom required tightening or loosening.

This action exerted a compression load on bearings not designed for this purpose. Erratic operation was the result, causing constant breakage of wire.

IV. Solution

A redesign of the spindle was accomplished by the Quality Assurance DSN and Mechanical Hardware Section, and the Fabrication Section. The new design (Fig. 3) incorporates a compression bearing below the spindle to carry the load. In the main body there are two radial bearings. This combination provides smooth, free-running action regardless of weight. Tension is accomplished by use of a spring-loaded nylon button that presses against the main shaft; it is adjusted by a set screw. The result has been an extremely smooth operation with no breakage or loss of wire during test.

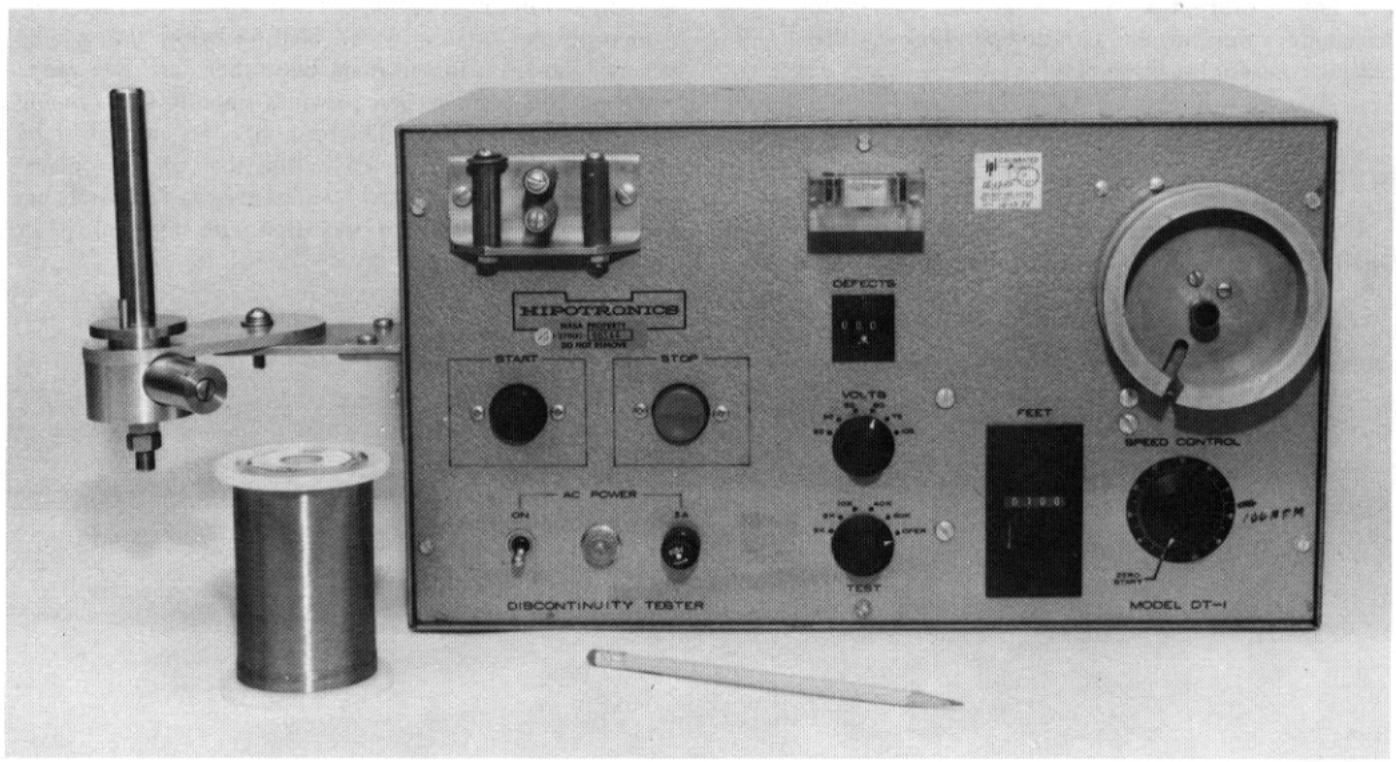

Fig. 1. Hipotronics Discontinuity Enamel Wire Tester Model DT-1

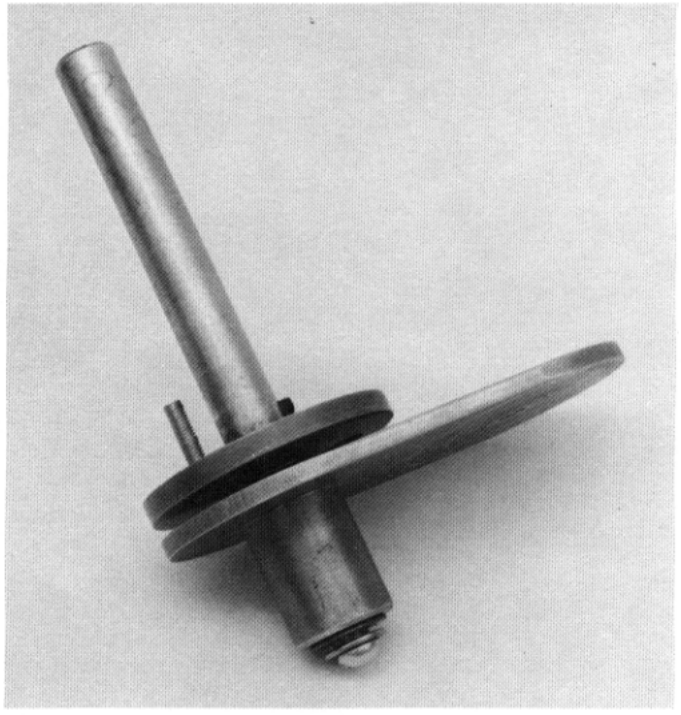

Fig. 2. Feed spindle, manufacturer's design

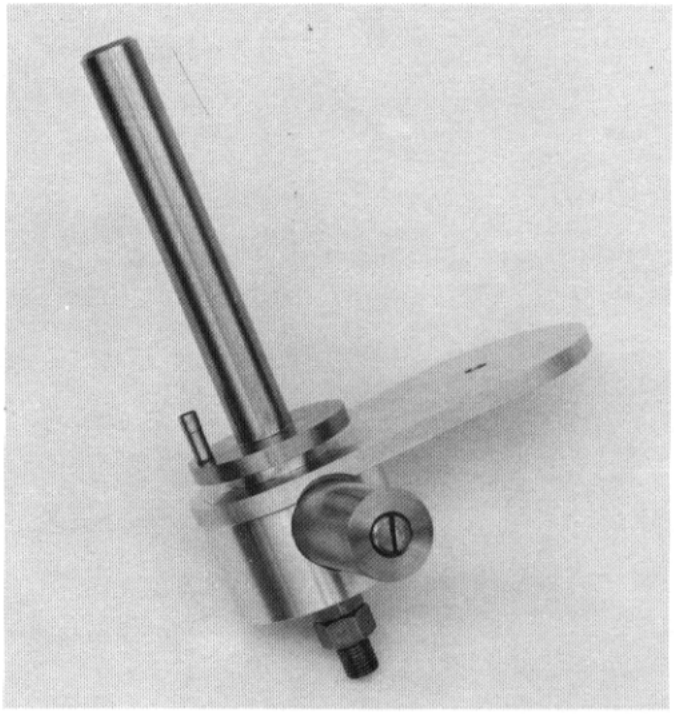

Fig. 3. Feed spindle, new design